



Precision
Engineered
Solutions



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NEXT DAY DELIVERY ON STOCK ITEMS
348
PRODUCTS
INSIDE





1920



1924

1926

1918

1920s



JOHN BONEHAM

John Boneham was born on the 21st April 1885. In 1899 he gained an apprenticeship as a toolmaker with Barringer, Wallis & Manners Ltd.

In 1906 he took up a position in India with North West Box Manufacturing Company of Calcutta.

1909 John took up a position to install a manufacturing facility making pencil tins. After not being paid for his work, an argument progressed into John being severely beaten. Having escaped the hospital during guard exchange, John fled to Rangoon where he was hired by Mower Ltd. managing Agent gold on the Irrawaddy river.

After losing everything due to the Rangoon bank collapse, John returned to the UK eventually working for Peter Brotherhood manufacturing munitions during WW1.

1918 On 23rd August, 1918, Boneham and Turner Ltd was founded by John Boneham and Mr Turner. Most great enterprises have humble beginnings; Boneham and Turners commenced with the making of Jigs, Fixtures and Press Tools in a farm previously renowned for cock-fighting, then named "Cockpit Close" but altered to what we know as Duke Street.



ABOVE: The Duke Street works.

LEFT: The company's Certificate of Incorporation dated 23rd August 1918.

WHAT BEGAN as a location where locals used to gamble on their prized cockerels, became too much of a gamble for Mr Turner during the nationwide slump of the early 20's. Not only did John buy Mr Turner out, but he also hedged on two large investments from the US: The first a Landis Crankshaft Grinder, and the second a Heald Planetary Grinder.

Throughout the 1920's and 30's the company not only produced many thousands of reconditioned engines, but also manufactured most of the components of the E.R.A racing engines.

1920 The first patent granted to Boneham and Turner Ltd was in 1920 for improvements in the manufacture of dimpled golf balls.

1924-26 It was during 1924 that Boneham and Turner manufactured vertical hones to create, what would become to be known as, the cross-hatched finish. This developed the oil retaining properties required in the cylinder bores of motor engines. By 1926 five vertical hones had been manufactured.

It was during this time that Boneham also manufactured the American ACCO range of paper fasteners. A product that was manufactured by the company up until the 1960's.



TOP: The Duke Street works from 1918 through the 1920's featured belt driven machines.

ABOVE LEFT: The first patent granted to Boneham and Turner Ltd was in 1920 for improvements in the manufacture of dimpled golf balls. Three variants which shaped the golf ball we know now.

ABOVE RIGHT: Reconditioned engines from the 1920's.

1930

1935

1936

1938

1930s



ABOVE: Boneham and Turner, Nottingham Road works, 1936.

1930 William Boneham, second son of John Boneham joined the company in 1930. William added scientific and mechanical flair to the organisation.

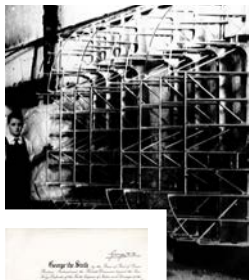
1935 The company grew at a fast rate during the 1930's under the stewardship of John and William. It was after 1935 when the country began to re-arm that Boneham and Turner won significant contracts.

1936 It was during 1936 that Boneham and Turner Ltd looked to the US to help influence the standardisation of drill bushes in the UK. The company launched the first standard drill bush range in the UK.

The Nottingham Road factory, which was Boneham and Turners headquarters for 72 years, began construction in 1936. The factory was developed over the years with additions such as a second storey.

1938 Peter Boneham joined the company in 1938 from Sheffield University as a trainee toolmaker.

Reg Parnell and Raymond Mays were the pre-eminent British racing drivers of the 1920's and 30's competing in the equivalent of Formula One today. Regular visits from both drivers during the early 30's were common place. Peter Boneham received driving lessons off Raymond Mays at the age of 17.



ABOVE LEFT: Tail plane uprights for the Lancaster Bomber at Croft Mill.



ABOVE RIGHT: Hoisting the Union Jack at the Nottingham Road works on V.E. Day 1945.

LEFT: Letter for John Boneham's OBE.



1941

1942

1943

1945

1940s



WWII The early war years saw the shift from motorsport and automotive, with its inevitable decline during this time, to orders received to support the war effort. There was a substantial order book, with Rolls Royce, Bristol Aircraft and De Havilland being projects of note.

War demand necessitated the extension of the Nottingham Road site to 53,000 sq. ft and the acquisition of the Croft Mill site on Bottle Lane. Machines at this time were Dean, Smith and Grace, Lang, and Holbrook lathes. Archdale, Cincinnati, Milwaukee, and Parkson milling machines. Bryant, Jung, Heald, Keighley, Jones and Shipman, Churchill and Precimax grinding machines. The company in the early 1940's employed over 400 people spread across three sites.

During the war Boneham and Turner Aircraft manufactured engine parts for the Rolls Royce Merlin engines destined for the Supermarine Spitfire. The company was also producing fuselage component parts such as the Plexiglass cockpits for the Spitfire, Lancaster and Wellington planes. The Croft Mill works also manufactured the uprights for the tail planes of the Lancaster Bomber.

1941 The company took delivery of a Mattison Surface Grinder. The substantial shipping crate for this immense, American machine was packed with tins of food from the US, a generous offering after rationing had begun in the UK from January 1940. This was the beginning of Boneham's 'special relationship' with the US, which continues to be a significant part of the business today.



ABOVE: Mattison Surface Grinder arriving in 1941, along with a copy of the original receipt.

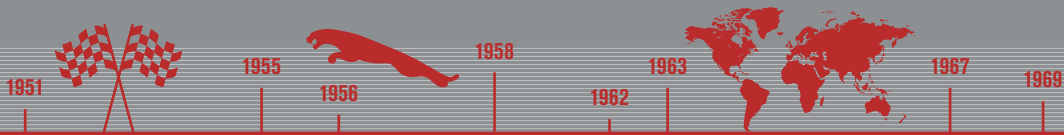
1942 Boneham and Turner's standardised drill bush range formed the backbone of the British Standard for drill bushes in 1942 by the Standards Committee.

1943 It was in 1943 at the Kings Birthday Honours, George VI appointed John Boneham to the Order of the British Empire (OBE).

During this time the company manufactured many of its own specialist machines. Two of the bench lathes remain in use today. One of the operators Mrs. Mary Lee, was recognised with a British Empire Medal for her work on these machines through the war, working 12 hours a day.

1945 May 8th 1945. Victory in Europe Day. The US and Union Jack flags were hoisted and flown above the Nottingham Road works.

As wartime contracts came to an end, the company's standard parts catalogue grew. Peacetime demand was high and production was booming on all fronts. The company was manufacturing electrical laminations, toggle clamps, spindles, fine boring machines, die sets, drill bushes and fixturing parts. There was also the revival of work with E.R.A and Raymond Mays.



1950s

1951 Manufacturing for E.R.M again led to the Mays Project which became the B.R.M 16 cylinder racing car. Raymond Mays founded British Racing Motors in 1945, with the first championship race in 1951 at the British Grand Prix. The hemispherical combustion chambers were manufactured on the S.I.P Jig borer

Nottingham Road in the early 1950's had a full order book. With deliveries on fine boring machines out to 12-14 months. Spindles were out to around 16 to 20 weeks. A Societe Genevoise S.I.P Jig Borer was purchased around this time, which was the biggest investment to date, the equivalent of £330,000 today.

In 1951 the factory at Field Mill was built. Under the management of Peter Boneham, the site had a great team of toolmakers. It was a highly productive factory with sales of £16m in todays money from 40 people. Presses from C.V.A and Bliss were part of the capacity, as well as, Newall jig borers and Studer grinders.

The principle of the hemispherical combustion chamber was also used in a design by Jaguar and used on the XK 120 and Mark 7 saloon. Boneham and Turner designed and built a special purpose boring machine for this operation. The machine ran through the manufacturing lifetime of those models.

1955 Founder John Boneham O.B.E died December 1955 aged 70. A clear end of an era and one that would remove a balance in the organisation resulting in uncertainty for the next decade.

1956 John W Boneham joined the company in 1956. The 1950's was a fantastic trading period for the company. Although held back by death duties and sale of 24% of the company to I.C.F.C to pay them. John recalls the fantastic array of machinery and skills available to the company. All were highly receptive to training the next generation.

The involvement with B.R.M and Jaguar carried on. The principle first designed by William Boneham of scratch-line elimination, was used by Jaguar and Dunlop in the development of disk brakes, first used in the braking systems for the Type C and D Jaguars. Boneham fine boring machines were extremely popular at this time with a constant order book of over 18 machines.

1958 Dowel pins and shims were also major products at this time. High volume items that created better cash flow for the company, when deliveries and costs associated with the fine boring machines were high. By 1958 the order book for spindles was 600 strong and 80 spindles a month being dispatched.

Ferranti had approached Boneham and Turner Ltd to achieve accuracy of less than -0.0001" total run-out for a memory drum for the Atlas computer. This was achieved and the company went on to manufacture drums for the Pegasus, the hard drive of the era.



LEFT: B&T Precision News cover showing B.R.M. Racing Car cylinder head.

The Boneham and Turner boring machine used to build the Jaguar XK 120 hemispherical combustion chamber.

1960s

1962 William Boneham passed away 28th December 1962 aged 48. J.W Boneham became a Director.

1963 January 1963, longest serving colleague, Mick Northing started with Boneham and Turner. Still leading the shim section of the business after 56 years.

1967 The company undertook their first exhibition in the US. Standing at Chicago Machine Tool Exhibition with spindle and drill bushings the main display. The spindles sold out and Engis Equipment became the US agent for spindles.

The company was thriving in the mid 1960's. With Field Mill and Nottingham Road processing 700 transactions a day on standard parts.

1969 Boneham and Turner Ltd had 16 agents across the globe including, Japan, Africa, Australia, USA, Canada and throughout Europe.



Firm that serves the world is 50 years old



LEFT: Boneham and Turner's longest serving colleague Mick Northing.

Mansfield Chad article celebrating Boneham and Turner's 50th Anniversary in 1968.



LEFT: Boneham and Turner at the 1967 Chicago Machine Tool Exhibition.

BELOW: Field Mill and an aerial view of Nottingham Road in 1937.



1970

1972



1974

1975



1976

1970s



ABOVE: The company received its largest ever order from Asquith in 1975, an order worth over £500,000 (£4.9m today) for fine boring machines.



ABOVE: Margaret Thatcher and her husband Dennis visiting Boneham and Turner in 1975, along with a thank you letter she sent after her visit.



1970 Boneham and Turner was growing rapidly. Both sites were extended heavily. Many new machine purchases were made, with new NC controls. All facets of the company were pushing forward. The company was taking on 9 apprenticeships a year in the late 1960's and 1970. The 1970's however became an incredibly turbulent decade. Industrial action in industry and the Post Office would significantly damage sales. Despite the competitive and challenging environment, Boneham and Turner continued into product development and always kept quality at the forefront, whilst others reduced costs by diminishing quality.

1972 The company completed the acquisition of Brico Metal Products Inc. Brico Metal Products was a joint venture between BAC and Hitchiner Corp. The venture didn't work out for both parties. In October 1972 it became Boneham Metal Products Inc. This would be an extremely important acquisition for the future of the company.

1974 Boneham Metal Products ran successful testing with General Motors in Detroit. The longevity of the Nitalloy bushings meant GM saved 60% on the Trenton Engine project. This would go on to be one of the company's largest customers for many years until transfer lines were removed.

1975 Nicholas Boneham joined Boneham and Turner moving out to Castleisland in 1975 to open up a factory to support the manufacture of 4 million dowel pins a year. The company received its largest ever order from Asquith, an order worth over £500,000 (£4.9m today) for fine boring machines. On 2nd May 1975, Margaret Thatcher and her husband Dennis made an official visit to Boneham and Turner. She was particularly interested in family run manufacturing companies. They showed a great deal of interest in the production and staff.

1976 Boneham and Turner Technical Director Ken Doy was awarded the MBE in the Queens honours at Buckingham Palace on the 14th May 1976. In the summer of 1976 Boneham and Turner took over British Aero Components Ltd (BAC). This would add the nitalloy range of bushings as well as a significant amount of business in the UK. The acquisition included the Koenig Expander Plug agency. The Koenig Expander Plug would go on to be one of the companies most important product lines.



LEFT: Boneham and Turner Technical Director Ken Doy was awarded the MBE in 1976.

ABOVE: Boneham and Turner took over British Aero Components Ltd (BAC) in 1976.



ABOVE AND LEFT: Castleisland under construction in 1975, and the staff at BMP in 1976.

1980

1983

1980s

A SIGN OF THE TIMES: The mid 1970's had seen the UK almost bankrupt. The country had borrowed \$3.6bn from the IMF. Businesses had not invested enough, union control, poor quality and over manned factories lead to global uncompetitiveness. British manufactured machine tools were 8% of World sales in 1971 and fell to 3% by the early 1980's. Manufacturing methods and the numerical control saw Japan boom and the UK fall.

1980 Spindle sales began to plummet from 1980. CNC controlled milling machines replaced fine boring. The first wave of very serious redundancies came in March 1981 as spindle sales halved. Regrettably 35 people were lost, 27 from production and 8 from senior management. This would be the beginning of the contraction of the company.

Nicholas Boneham became a Director of the company during 1981.

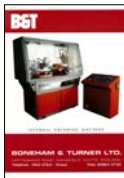
A SIGN OF THE TIMES: In 1980 British Steel was entered into the Guinness Book of Records as the most unprofitable company ever, a £1.8billion loss. In the early 1980's 2 million people lost their jobs in manufacturing at a rate of 20,000 per week.

During the 1980's Boneham and Turner balanced turbines for the large RB 211 Trent jet engine. A special facility was built at Nottingham Road for the operation.

1983 The Castleisland factory was closed in the early 1980's and the majority of machinery squeezed into Nottingham Road. Continued market contractions also saw the sale of the Field Mill as production was consolidated further at Nottingham Road.

Despite the decline, Boneham and Turner continued to build Fine Boring machines on a tool room basis. 3 large DE 585 machines were manufactured for Istanbul Piston Company in Turkey. It was also during the mid 1980's that the company built internal grinders. These were used throughout the factory and also 6 or 7 sold to customers.

Charles Boneham joined the company in 1988.



ABOVE LEFT TO RIGHT:
Boneham and Turner DE 585 fine boring machine.
Balancing turbines for the large RB 211 Trent jet engine.
Boneham and Turner internal grinder.



ABOVE: Nottingham Road works in 1980.

1993

1995

SFC KOENIG

1990s



ABOVE: Boneham and Turner's shop floor during the 1990's.

DRILL BUSHINGS took a back seat in the US after the changes in motor manufacturing practices. It was decided that spindles would take the majority of the focus.

1993 Boneham and Turner became strongly involved with a research project run by the Advanced Manufacturing and Technology Research Institute. The project was to produce a machine tool spindle that embodied many new advanced features. Increased power, high and low speed agility, and automatic tool change.

With margin erosion during the 1990's and further loss of labour the company developed relationships globally to manufacture periphery products and establish mutual business. This shift in mentality saw the addition of new products.

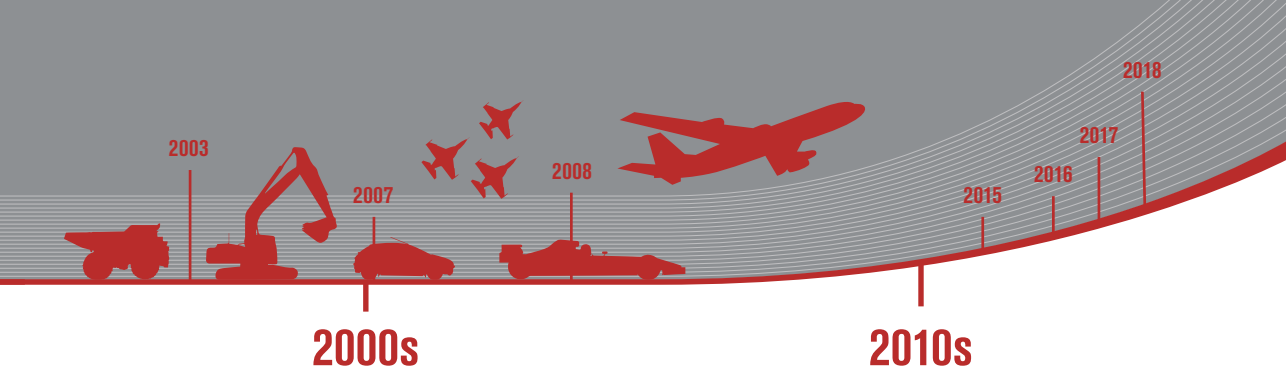
1995 The company invested in an S40 Studer CNC grinder at a cost of around £120,000.

Concentration began to lean towards factored goods with more emphasis placed on the Koenig Expander plug.



LEFT: The S40 Studer CNC grinder being delivered in 1995.





2003 The spindle business was sold to Jena Tec (Avingtrans) in 2003, with a significant amount of machinery and personnel moving to the Sherwood Park site in Annesley.

Charles Boneham became a Director of the company in 2003.

Peter Boneham joined the company in 2006.

2007 The company finally managed to sell the Nottingham Road site. The 68,000 Sq.ft site had become too much to maintain, was inefficient and too big for manufacturing tooling components. Aldi supermarket purchased the site.

2008 Boneham and Turner relocated to Oddicroft Lane. With focus solely on the manufacture of tooling components and shims. The company went through an intensive process of disposing of many machines and equipment, whilst investing in some new Mori Seiki CNC machines and automated Kardex storage systems.

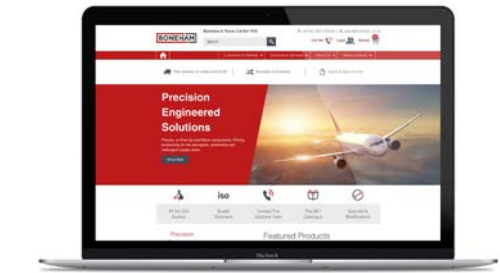
2009 Late in 2008/09 the recession hit the company. Product lines focussed on the automotive market fell overnight with a 40% drop in sales. The company reacted with 3 day working weeks and pay cuts. The support of all the team meant the company maintained all its workforce. New lines were added in the later 2010's to extend the company's catalogue to over 200 pages.



TOP LEFT: Nottingham Road works being demolished in 2007.



ABOVE CLOCKWISE: Boneham and Turner relocated to Oddicroft Lane in 2008.



ABOVE: Boneham and Turner's new and improved e-commerce platform.

THE COMPANY began to recover during the early part of the 2010's, sales began to increase and the company began investing in marketing and customer focused activities such as an improved e-commerce platform.

Peter Boneham became a Director of the company in 2015.

2015 In January 2015, Boneham and Turner agreed to become the UK agent for US manufactured DADCO gas springs.

2016-18 Have been strong years for the company with 40% growth over the period and over 20,000 orders shipped since 2017.

2017-18 Has seen the largest amount of investment in manufacturing for a number of years, with over £700,000 worth of new machinery including two new Citizen sliding head lathes, a XYZ VMC, a Doosan Lynx, 3 Delapena honing machines and grinding machines.

2018 A Mezzanine level was constructed to increase the stores capacity by 40%.

2018 will also see the completion of a full drill bushing manufacturing line in the US with the aim of offering a one week turnaround premium service. The production line also includes internal heat treatment and blacking.



LEFT: First of the machines; part of the production line investment at Boneham Metal Products.



Celebrating
100 YEARS
1918 – 2018

Precision Engineered Solutions

The Boneham Group's philosophy is to build a solution around **customer specific requirement**. We tailor the resources we have available to customer and market circumstance. We strive to ensure all customer obligations are met, combining the important elements that allow our customers to competitively manufacture or supply products, build production lines, or create innovation of the future, on a global scale.

ENGINEERING & PRODUCTION KNOWLEDGE

Manufacture has been at the very heart of Boneham & Turner since 1918. The organisation has developed and nurtured skills, resulting in technical knowhow. We support all aspects of the supply chain in providing the right solution and advice.

INTERNAL STOCK MANAGEMENT

Inventory and manufacturing processes have been developed to ensure maximum availability. We are committed to working with our customers to ensure on-time and in-full delivery, ensuring stock of standard and special items are always available. Customer relationships and insight are paramount to Boneham.

VOLUME TAILORED PRICING

Manufacturing and sourcing procedures are under a constant improvement process, allowing tailored pricing for volume and key customer levels. Our flexible solutions adapt to customer requirement.

UK MANUFACTURE & SUPPORT

The Boneham Group Manufacturing Centre in the UK specialises in turning, milling, grinding and pressing. Adopting lean principles, our engineers aim for efficiency and speed to deliver standard and special solutions to customer requirement.

QUALITY GUARANTEED

Boneham & Turner operates with strict quality procedures and principles. All products follow a consistent and recorded process. Products can be released in accordance with our AS9100D accreditation.



A global leader in the manufacture and supply of drill bushes, the Boneham brand offers the broadest inventory in the UK of drill bushes, dowel pins, location bushes, pins and miniature flow control components. Utilising the company's manufacturing facility and global supply chain partnerships, the company has assembled a catalogue of parts essential for the manufacture and assembly of; jigs and fixtures, work holding, hydraulic systems, machine building and tool manufacture.

SFC**KOENIG** EXPANDER®

SP SHIMPRESS
Precision Shim Solutions

DADCO

BONEHAM
Boneham Metal Products Inc.
New Jersey

BONEHAM
Boneham & Turner Ltd.
Nottinghamshire

Quality & Excellence

The Boneham brands reputation for quality and excellence has been the central factor behind the company’s success since 1918. Emphasis on precision and quality has allowed the company to be at the forefront across a wide variety of markets including; aerospace, automotive, auto-sport, power generation, MOD and machine building.

Overseas, Boneham’s reputation has become well known and the company’s products are being used in most, if not all Continents of the World. A sister company in the US, Boneham Metal Products Inc. has manufacturer’s reps and distributors throughout all states, operating out of a central hub in New Jersey. The company’s commitment to providing quality solutions, supported by a service that is second to none, is a philosophy that has long been associated with the Boneham family, who still own and manage the organisation.



Contacting and Ordering

Boneham Sales Technicians are on hand to advise on the best solutions available from a large portfolio of precision components.

Stocked items are generally sent out same day on a next day tracked courier service.

For enquiries or to order:

Call sales: 01623 445 450
Fax sales: 01623 445 451

Our lines operate from 8.30am until 5.30pm Monday to Friday.

Email sales:

sales@boneham.co.uk

For online information:

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(Buy Online/Download Catalogue)
www.koenigexpander.co.uk
(Download Catalogue)
www.shimpress.co.uk
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Methods of payment

To make payment easier for you, Boneham & Turner offer the following payment methods:

Boneham & Turner offer a 30-day credit account service. Please request a credit application form by email, or call our Technical Sales Team.

All major Credit/Debit Cards accepted
BACS/Cash/Cheque on collection.



Precision Engineered Solutions

The image shows a laptop displaying the Boneham & Turner Ltd website. The website features a red and white color scheme. The main heading on the page is "Precision Engineered Solutions". Below this, there is a navigation menu with options like "Customers & Materials", "Solutions & Services", "About Us", and "News & Events". There are also icons for "Free delivery on orders over £100", "Business to business", and "Quick & easy to order". The main content area features a large image of an airplane in flight. Below the main content, there are several icons and text boxes: "#1 For Drill Business", "Quality Statement", "Contact The Solutions Team", "The B&T Catalogue", and "Specialist & Modifications".

Callout boxes pointing to various features on the website include:

- Stock Check
- Order on Account
- Order Online
- Track Orders
- News
- Volume Discounts
- Technical Information and CAD Library
- Catalogue Pages
- Up-to-date Pricing
- Customer Discounts

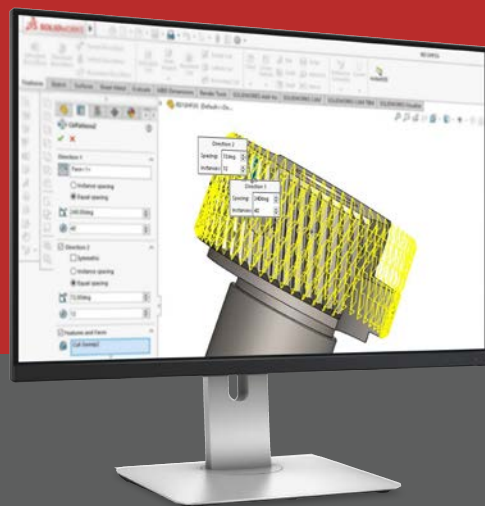
www.boneham.co.uk

A host of information, or your solution delivered, 24/7 on any device





All our products are available in CAD formats



To design Boneham products into a project,
please contact the Technical Sales Team and
request the CAD file you require.



SIX REASONS TO CHOOSE **BONEHAM**[®]

1 **BSI ISO QUALITY ASSURANCE**

Boneham and Turner are an AS9100 Rev D approved company. We can manufacture and release in accordance with Aerospace AS9100 compliance or in accordance with ISO 9001 2015.



2 **BONEHAM PRODUCT SOURCING: PRECISION PARTS SOURCED**

Although Boneham's are proud to remain a British manufacturer, the company has a global reach, with supplier relationships spanning the World. B&T have the ability to provide quality precision engineered components at the right price, reliably.



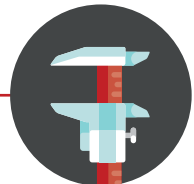
3 **NEXT-DAY NATIONWIDE DELIVERY**

All stocked items are shipped out on a next day delivery. Boneham & Turner prides itself on responding to customer requirements, stocking standard and special items to schedules and call offs. **93% of the Boneham range is serviced from stock.**



4 **BONEHAM STANDARD PRECISION**

The Boneham team is made up of time served engineers, carrying a wealth of engineering knowledge and experience. The company is built on these engineering foundations bringing 'Precision as Standard'.



5 **E-COMMERCE WEB PORTAL**

www.boneham.co.uk "Precision Engineered Solutions" – Most of Boneham's range of components are available to buy online, with an easy ordering process and no minimum order, or credit card surcharges and the ability to order 24/7.



6 **UK MANUFACTURING BONEHAM PRECISION**

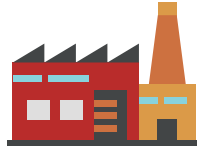
Boneham's manufacturing facility, which has been the backbone of the company since 1918, allows for the manufacture of special and standard items, including modifications. Our manufacturing capability allows for quicker turnarounds and traceability. The UK manufacturing capacity is detailed on page 95 or www.boneham.co.uk.



Getting Boneham Quality To You

Boneham UK Manufacturing

AS9100D, JISQ 9100:2016
and ISO 9001:2015
accredited manufacture



Boneham Metal Products



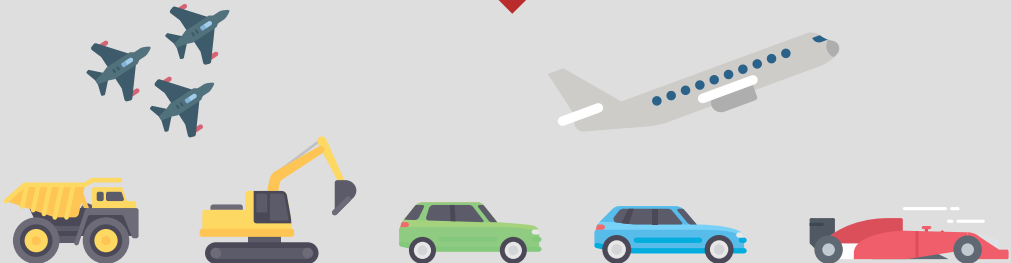
Sales




















US in-house
modifications



Fast Track
Premium Specials



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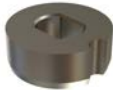
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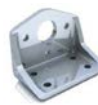
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Threaded Ball Spring Plungers



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BONEHAM[®]

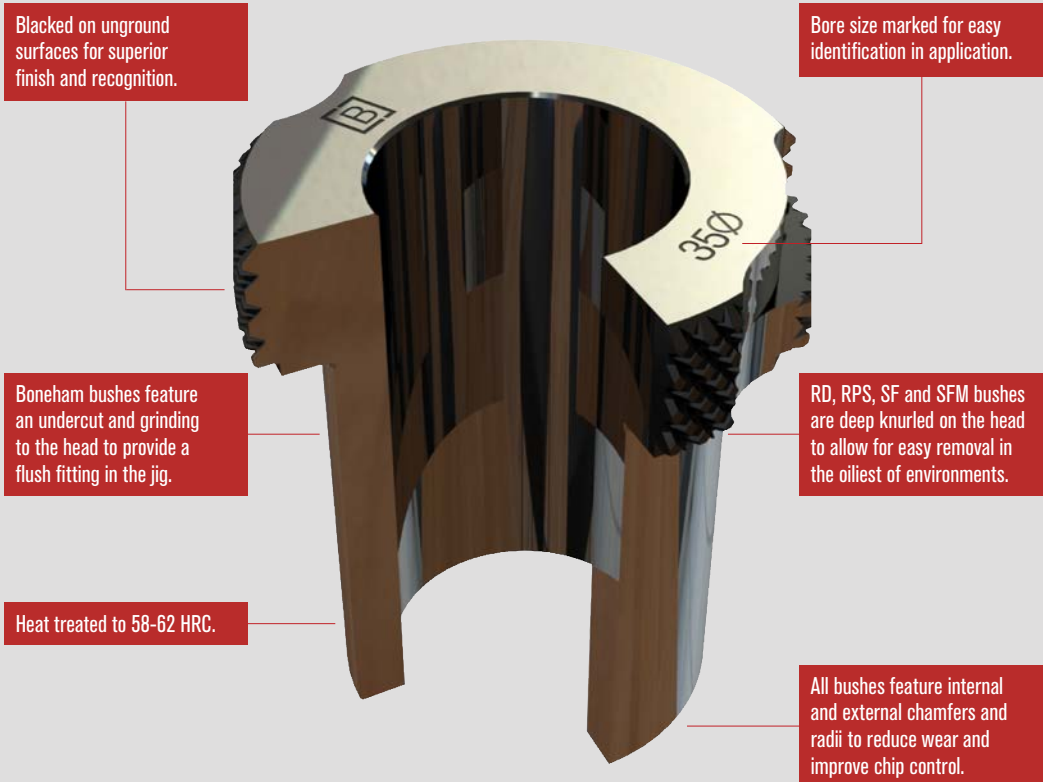
Produced and supplied by Boneham & Turner for over 100 years. With so many variations of sizes, it takes years of experience and knowledge to service customers from stock. Special versions of the Boneham range can be quoted and manufactured to suit customer requirement.



BONEHAM® BUSHES

The Difference

Boneham Drill Bushes are manufactured to the highest quality with dedication to superior concentricity and tolerances. Boneham bushes provide the accuracy required for precise drilling and alignment.



Manufactured from quality EN31 bearing steel which has a high degree of hardness and abrasion resistance. Special material options can be manufactured including Boneham's famous Nitralloy, Carbide, 300 and 400 series stainless and tool steels.

Standard Jig Bushes

Metric Range
ISO and DIN standards

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PP. HEADLESS TYPE. PRESS FIT BS 1098 PT.2 1977/ISO 4247/DIN 179A

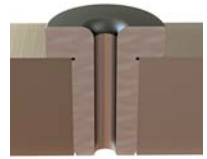
- / This type of bush is normally used for all jigs where an economical bush is required.
- / They also afford the minimum spacing between bushes.
- / Boneham bushes adhere to strict tolerance and concentricity guidelines.



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PH. HEADED TYPE. PRESS FIT. BS1098 PT.2 1977/ISO 4247/DIN 172A

- / This range is the same as type PP but headed. The head is convenient for pressing the bush home.
- / The head is also useful when it is desired to feed down to a dead stop.
- / Boneham bushes adhere to strict tolerance and concentricity guidelines.



Page 41

RD. FIXED AND SLIP RENEWABLE

- / These two features are incorporated on one bush, which is used in conjunction with liner bushes, and is held in place by a lock screw, tenon or stop pin.
- / The bush is a slide fit in its corresponding liner.
- / The removable fixed feature of the bush is normally used on high production work, when the bush can be easily and quickly replaced with a minimum loss of production.
- / The removable slip feature of the bush is used when more than one operation is carried out, when the bush is instantly removable after each operation.
- / Boneham bushes adhere to strict tolerance and concentricity guidelines.



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LP. HEADLESS LINER TYPE

- / This range is for use in conjunction with Renewable Fixed and Slip type bushes.
- / Boneham bushes adhere to strict tolerance and concentricity guidelines.



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LH. HEADED LINER TYPE

- / This range is the same as the plain liner but headed.
- / The shallow head can be left standing proud or countersunk flush.
- / Boneham bushes adhere to strict tolerance and concentricity guidelines.



Standard Jig Bushes

Imperial Range
BS standards

30

BONEHAM

HEADLESS TYPE. PRESS FIT. BS 1098 PT.1 1967

- / This type of bush is normally used for all jigs where an economical bush is required.
- / They also afford the minimum spacing between bushes.
- / Boneham bushes adhere to strict tolerance and concentricity guidelines.

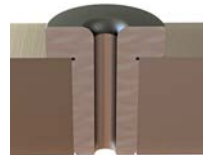
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HEADED TYPE. PRESS FIT. BS 1098 PT.1 1967

- / This range is the same as the plain type but headed. The head is convenient for pressing the bush home.
- / The head is also useful when it is desired to feed down to a dead stop.
- / Boneham bushes adhere to strict tolerance and concentricity guidelines.

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FIXED AND SLIP RENEWABLE. BS 1098 PT.1 1967

- / These two features are incorporated on one bush, which is used in conjunction with liner bushes, and is held in place by a lock screw.
- / The bush is a slide fit in its corresponding liner.
- / The removable fixed feature of the bush is normally used on high production work, when the bush can be easily and quickly replaced with a minimum loss of production. The removable slip feature of the bush is used when more than one operation is carried out, when the bush is instantly removable after each operation.
- / Boneham bushes adhere to strict tolerance and concentricity guidelines.

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HEADLESS LINER TYPE. BS 1098 PT.1 1967

- / This range is for use in conjunction with Renewable Fixed and Slip type bushes.
- / The reference system used matches up with the corresponding slip bush.
- / For example a PL3 Liner bush suits an RPS3 Slip bush and so on.
- / Boneham bushes adhere to strict tolerance and concentricity guidelines.

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HEADED LINER TYPE. BS 1098 PT.1 1967

- / This range is the same as the plain liner but headed.
- / The shallow head can be left standing proud or counterbored flush.
- / Boneham bushes adhere to strict tolerance and concentricity guidelines.

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Standard Jig Bushes

Boneham Standard Parts

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GS RECESSED SERRATED DRILL JIG BUSHES – IMPERIAL AND METRIC

- / GS Bushes feature outside diameter serrations for pressing, moulding or casting into plastic based materials.
- / Feature radial groove locks the bush in place to allow downward load pressure.
- / Perfect as a location bush in composite, glass fibre, carbon fibre and synthetic resin.



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ANCHOR DRILL BUSHES AB1 | AB2 | AB3 IMPERIAL AND METRIC

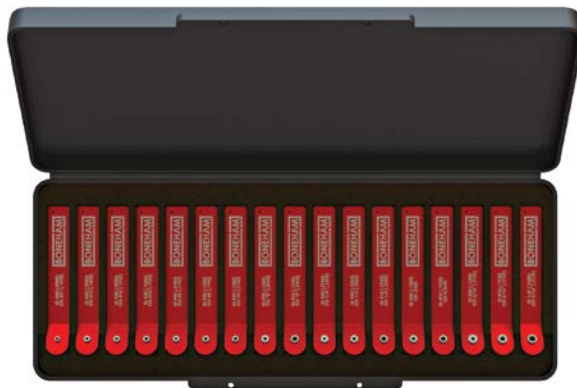
- / Two-piece assembly for riveting or welding to the template.
- / The strap anchors the bush whilst the spigot on the hardened body locates accurately into the plate.
- / Standard and corner versions for maximum pattern capability.



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HANDLE BUSHES HB AND HBM IMPERIAL AND METRIC

- / For use with RD, RPS, SF and SFM drill bushes.
- / Aluminum lightweight handle in Boneham red.
- / Reusable and includes the lock screw.



Popular Boneham Drill Bushings in Application

From the American Standard Range ANSI / ASME

IMAGE	ANSI TYPE	DESCRIPTION
	P PTW PM NP	Headless press fit drill bushings are normally used in jigs where an economically priced drill bushing is required. These drill bushings are also often used where less space is available on the jig plate. Headless press fit drill bushings are pressed into the plate to achieve a flush surface in conjunction with a simple drilling and reaming operation. Headless drill bushings have less resistance than the headed type when subjected to large axial loads.
	H HTW HM NH	Headed press fit drill bushings are dimensionally identical to the headless range, but for the head. Headed press fit drill bushings contain a shoulder at the top of the bush to allow greater axial force on the jig, and aids where it is desired, to feed down to a dead stop. The head of the bushing can be pressed into the plate easier and can be left either exposed above the plate surface or counter bored to sit flush.
	SP SPM	Serrata Press Fit Drill Bushings are a part serrated drill bushing similar to the 'P Type' bushing but for a half-serrated OD. These bushings are designed to press into soft materials such as wood, plastics and soft metals. The top half of the bushing OD is serrated to prevent rotational movement and increased axial resistance in the jig or fixture. The second half of the Serrata press fit bushing is finish ground for accurate and easy location and positioning.
	DG DGM	Diamond Groove Drill Bushings are fully diamond knurled. They are designed to be cast-in to the fixture or mold. Composite resin runs through the grooves to lock the bushing in place. The combination of the groove(s) and the diamond knurling form a strong resistance to axial and rotational movement. Serrated or diamond knurled bushings do not feature a ground outside diameter, whilst this makes them more economical, the bushing must be accurately located using the bore. Alignment pins can be used where appropriate in a fixture.
	L LTW SF SFM LS	Slip-Fixed Renewable Drill Bushings incorporate two features on one bush. Used in conjunction with liner bushings, Slip-Fixed Renewable Drill Bushings can be held in place by a lock screw, tenon or stop pin. The bushing is a slide fit in its corresponding liner, which allows for accurate alignment and easy replacement.
	HL SF SFM LS	The removable fixed feature of the bushing is normally used in high production work. The bushing can be easily and quickly replaced with a minimum loss of production. The removable slip feature of the bushing is used when more than one operation is carried out. Many drill sizes can be used with one bushing liner. The bushing is instantly removable after each operation. Both methods are designed to speed up operations and improve productivity. The knurled head allows for easy handling of the bushing to enable it to be rotated out of the removable slip feature.
	A2100 A2200 A2300	Air-feed bushings are a threaded locking collar and drill bushing shank. They are designed for use with air-feed drills, rackfeeds, tappers and spotfaces. The collar screws into the air-feed drill's nosepiece, precisely aligns the shank, and locks the drill in place when rotated into the liner. Boneham Air-feed bushings are manufactured to order.

Standard Jig Bushes



STANDARD INCREMENT BORE SIZES FOR BONEHAMS METRIC JIG BUSH RANGE

- From 1.0mm to 3mm in steps of 0.05mm
- From 3mm to 14mm in steps of 0.1mm and including all 0.25mm and 0.75mm sizes
- From 14mm to 33mm in steps of 0.25mm
- From 33mm to 51mm in steps of 0.5mm
- From 51mm to 100mm in steps of 1.0mm

Note

- / ALL other sizes are regarded as specials. Bushes with a bore size above 48mm may not always be stocked sizes.
- / Specials manufactured to customer requirements.
- / USA Bushings ANSI standards including thin wall range available (Pages 99-117).

Nominal Sizes		I.S.O. Limits for Reference in connection with Drill Bushes Unit = 0.001mm										Limits for Bores* of Reamer Bushes	
Over	Up to	H6 Hole		F7 Hole		n6 Shaft		m6 Shaft		h13 shaft		High+	Low+
		High+	Low	High+	Low+	High+	Low+	High+	Low+	High	Low-		
-	3	6	0	16	6	10	4	8	2	0	140	18	11
3	6	8	0	22	10	16	8	12	4	0	180	23	15
6	10	9	0	28	13	19	10	15	6	0	220	27	18
10	18	11	0	34	16	23	12	18	7	0	270	31	21
18	30	13	0	41	20	28	15	21	8	0	330	38	25
30	50	16	0	50	25	33	17	25	9	0	390	46	30
50	80	19	0	60	30	39	20	30	11	0	460	-	-
80	120	22	0	71	36	45	23	35	13	0	540	-	-

FITTING INSTRUCTIONS FOR IMPERIAL BUSHES

Recommended limits, shown below to which receiving holes should be bored or reamed so that bushes are a suitable press fit.

BS1916 H6 LIMITS

Dimensions in inches

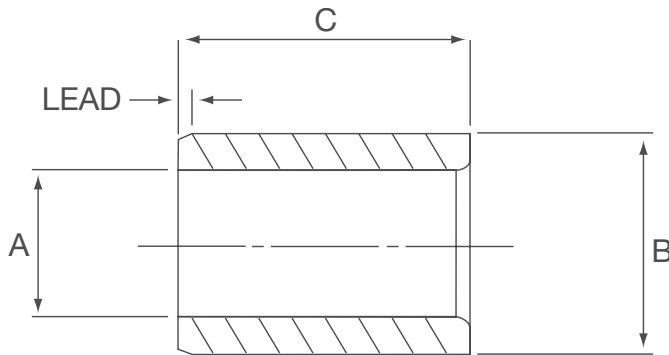
BORE LIMITS	.120 to .240	.240 to .710	.710 to 1.190	1.190 to 1.970	1.970 to 3.150
	-.0000	-.0000	-.0000	-.0000	-.0000
	+.0003	+.0004	+.0005	+.0006	+.0007

/ Concentricity is .0008" on drilled or ground bores up to .055".

- / USA Bushings ANSI standards including thin wall range available.
- / Serrated Bushes available.

Plain Jig Bushes – Metric

BS 1098 PT. 2 1977/ISO 4247/DIN 179A



KEY FEATURES

- / Hardened from 58 to 62 RC
- / F7 ID drill limits
- / OD ground to suit H6 limits
- / Radius for easy drill entry
- / Lead for easy drill bush location

ORDERING INSTRUCTIONS

- / Nitrided bushes for longer life can be supplied.
- / State: Qty, Type, Bore Size and Length
- / Example: 5, PP15E 10mm

NOTES

- See page 33 for table showing ISO Limits for Jig Bushes and standard bore sizes. *(Also Reamer Limits.)
- / Bushes with a bore size above 48mm may not be stock items.
- / Price and delivery on application.
- / Some overlap sizes available from stock.

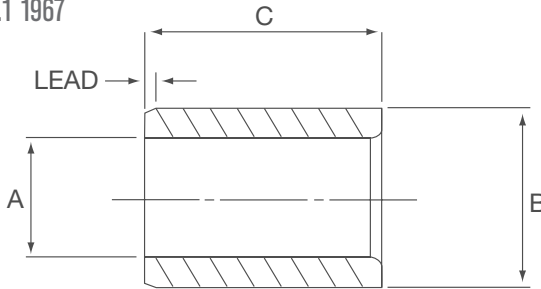


A Dia. F7 Limits (Drills) *Limits (Reamers)		B Dia. n6 Limits	Length C and Bush Reference					
From	Up to		Short		Long		Extra Long	
			C	Ref.	C	Ref.	C	Ref.
-	1	3	6	PP3A	9	PP3C	-	-
1.05	1.8	4	6	PP4A	9	PP4C	-	-
1.85	2.6	5	6	PP5A	9	PP5C	-	-
2.65	3.3	6	8	PP6B	12	PP6E	16	PP6F
3.4	4	7	8	PP7B	12	PP7E	16	PP7F
4.1	5	8	8	PP8B	12	PP8E	16	PP8F
5.1	6	10	10	PP10D	16	PP10F	20	PP10H
6.1	8	12	10	PP12D	16	PP12F	20	PP12H
8.1	10	15	12	PP15E	20	PP15H	25	PP15J
10.1	12	18	12	PP18E	20	PP18H	25	PP18J
12.1	15	22	16	PP22F	28	PP22K	36	PP22N
15.25	18	26	16	PP26F	28	PP26K	36	PP26N
18.25	22	30	20	PP30H	36	PP30N	45	PP30R
22.25	26	35	20	PP35H	36	PP35N	45	PP35R
26.25	30	42	25	PP42J	45	PP42R	56	PP42S
30.25	35	48	25	PP48J	45	PP48R	56	PP48S
35.50	42	55	30	PP55L	56	PP55S	67	PP55T
42.50	48	62	30	PP62L	56	PP62S	67	PP62T
48.50	55	70	30	PP70L	56	PP70S	67	PP70T
56	63	78	35	PP78M	67	PP78T	78	PP78W
64	70	85	35	PP85M	67	PP85T	78	PP85W
71	78	95	40	PP95P	78	PP95W	105	PP95Y
79	85	105	40	PP105P	78	PP105W	105	PP105Y
86	95	115	45	PP115R	89	PP115X	112	PP115Z
96	105	125	45	PP125R	89	PP125X	112	PP125Z

All dimensions in millimetres

Plain Drill Bushes – Imperial

BS 1098 PT.1 1967



ORDERING INSTRUCTIONS

- / Imperial bushes including metric bores.
- / Nitrided bushes for longer life can be supplied.
- / State: Qty, Type, Bore Size and Length
- / Example: 5, P6 3/8" x 3/4" lg

Note: All bores of the 32nd and 64th sizes over 1/2" diameter are now considered special. Standard bore sizes see chart page.

Oversize bushes: +.010"/+.015" on 'B' diameter can be supplied for finish grinding. State O/S if required after ref. Price on application. **Ream limits:** If required state R after ref. Price on application. Special bushes price on application.

FITTING INSTRUCTIONS

Bore or Ream hole to dimension 'B' use H6 Limit when the Bush will be a suitable press fit.

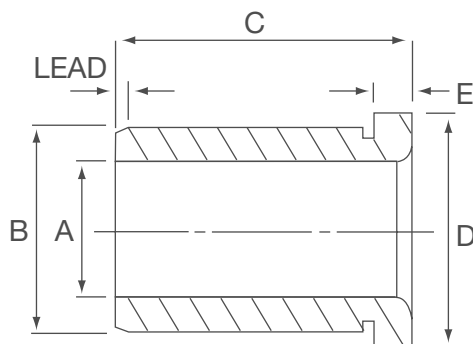


A Dia. Range		B	Length C and Reference													
mm	Imp.	O.D.	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"	1 1/4"	1 3/8"	1 1/2"	1 3/4"	2"	2 1/4"	2 1/2"
1.2 to 2.35	3/64 to 3/32	.2035 .2038	PB1	PB1	PB1	PB1										
2.4 to 3.5	7/64 to 9/64	.2505 .2508	P2	P2	P2	P2										
3.6 to 4.75	5/32 to 3/16	.3131 .3135		P3	P3	P3	P3	P3								
4.8 to 6.3	13/64 to 1/4	.4068 .4072		P4	P4	P4	P4	P4								
6.4 to 7.9	17/64 to 5/16	.5006 .5010		P5	P5	P5	P5	P5								
8.0 to 10.3	21/64 to 13/32	.6257 .6262				P6	P6	P6	P6	P6						
10.4 to 12.6	27/64 to 1/2	.7507 .7512				P7	P7	P7	P7	P7						
12.75 to 15.75	9/16 to 5/8	.8757 .8762						P8	P8	P8	P8	P8				
16 to 19	11/16 to 3/4	1.0009 1.0015				P9		P9	P9	P9	P9	P9				
19.25 to 22	13/16 to 7/8	1.1884 1.1890						P9	P9	P9	P9	P9	P9			
22.25 to 25.25	15/16 to 1	1.3759 1.3765						P10	P10	P10	P10	P10	P10			
25.5 to 30	1 1/16 to 1 3/16	1.5635 1.5642						P10	P10	P10	P10	P10	P10	P10		
30.25 to 34.5	1 1/4 to 1 3/8	1.7510 1.7517						P11	P11	P11	P11	P11	P11	P11		
35 to 39.5	1 7/16 to 1 9/16	2.0010 2.0017						P11	P11	P11	P11	P11	P11	P11		PB11
40 to 44	1 5/8 to 1 3/4	2.2512 2.2520						P12	P12	P12	P12	P12	P12	P12		P12

References shaded price on application

Headed Drill Jig Bushes – Metric

BS 1098 PT.2 1977/ISO 4247/DIN 172A



HUGE STOCKS

VOLUME DISCOUNT

KEY FEATURES

- / Hardened from 58 to 62 RC
- / F7 ID drill limits
- / OD ground to suit H6 limits
- / Radius for easy drill entry
- / Lead for easy drill bush location

ORDERING INSTRUCTIONS

- / Nitrided bushes for longer life can be supplied.
- / State: Qty, Type, Bore Size and Length
- / Example: 5, PH18E 10.1mm

NOTES

- See page 33 for table showing ISO Limits for Jig Bushes and standard bore sizes. *(Also Reamer Limits.)
- / Bushes with a bore size above 48mm may not be stock items.
- / Price and delivery on application
- / Some overlap sizes available from stock.



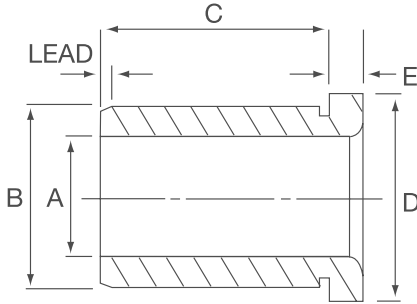
A Dia. F7 Limits (Drills) *Limits (Reamers)		B Dia. n6 Limits	Length C and Bush Reference						D Dia. h13 Limits	E Length
From	Up to		Short		Long		Extra Long			
			C	Ref.	C	Ref.	C	Ref.		
-	1	3	6	PH3A	9	PH3C	-	-	6	2
1.05	1.8	4	6	PH4A	9	PH4C	-	-	7	2
1.85	2.6	5	6	PH5A	9	PH5C	-	-	8	2
2.65	3.3	6	8	PH6B	12	PH6E	16	PH6F	9	2.5
3.4	4	7	8	PH7B	12	PH7E	16	PH7F	10	2.5
4.1	5	8	8	PH8B	12	PH8E	16	PH8F	11	2.5
5.1	6	10	10	PH10D	16	PH10F	20	PH10H	13	3
6.1	8	12	10	PH12D	16	PH12F	20	PH12H	15	3
8.1	10	15	12	PH15E	20	PH15H	25	PH15J	18	3
10.1	12	18	12	PH18E	20	PH18H	25	PH18J	22	4
12.1	15	22	16	PH22F	28	PH22K	36	PH22N	26	4
15.25	18	26	16	PH26F	28	PH26K	36	PH26N	30	4
18.25	22	30	20	PH30H	36	PH30N	45	PH30R	34	5
22.25	26	35	20	PH35H	36	PH35N	45	PH35R	39	5
26.25	30	42	25	PH42J	45	PH42R	56	PH42S	46	5
30.25	35	48	25	PH48J	45	PH48R	56	PH48S	52	5
35.50	42	55	30	PH55L	56	PH55S	67	PH55T	59	5
42.50	48	62	30	PH62L	56	PH62S	67	PH62T	66	6
48.50	55	70	30	PH70L	56	PH70S	67	PH70T	74	6
56	63	78	35	PH78M	67	PH78T	78	PH78W	82	6
64	70	85	35	PH85M	67	PH85T	78	PH85W	90	6
71	78	95	40	PH95P	78	PH95W	105	PH95Y	100	6
79	85	105	40	PH105P	78	PH105W	105	PH105Y	110	6
86	95	115	45	PH115R	89	PH115X	112	PH115Z	120	6
96	105	125	45	PH125R	89	PH125X	112	PH125Z	130	6

All dimensions in millimetres

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Headed Drill Jig Bushes – Imperial

BS 1098 PT.1 1967



ORDERING INSTRUCTIONS

- / Imperial bushes including metric bores.
- / Nitrided bushes for longer life can be supplied.
- / State: Qty, Type, Bore Size and Length
- / Example: 5, S6 3/8" x 3/4" lg

Note: All bores of the 32nd and 64th sizes over 1/2" diameter are now considered special. Standard bore sizes see chart page.

Oversize bushes: +.010"/+.015" on 'B' diameter can be supplied for finish grinding. State O/S if required after ref. Price on application. **Ream limits:** If required state R after ref. Price on application. Special bushes price on application.

FITTING INSTRUCTIONS

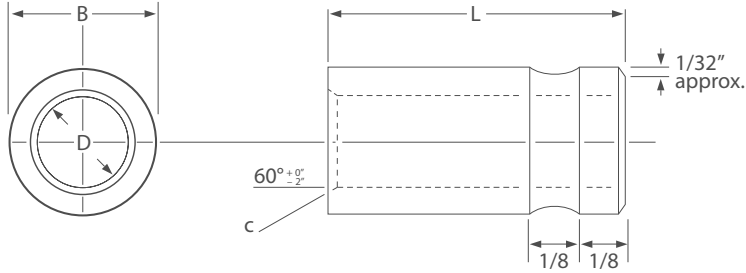
Bore or Ream hole to dimension 'B' use H6 Limit when the Bush will be a suitable press fit.



A Dia. Range		B	Length C and Reference															Head	
mm	Imp.	Q.D.	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"	1 1/4"	1 3/8"	1 1/2"	1 3/4"	2"	2 1/4"	2 1/2"	D	E	
1.2 to 2.35	3/64 to 3/32	.2035 .2038	SB1	SB1	SB1	SB1											5/16	3/32	
2.4 to 3.5	7/64 to 9/64	.2505 .2508	S2	S2	S2	S2											5/16	1/8	
3.6 to 4.75	5/32 to 3/16	.3131 .3135		S3	S3	S3	S3	S3									3/8	1/8	
4.8 to 6.3	13/64 to 1/4	.4068 .4072		SB4	SB4	SB4	SB4	SB4									9/16	3/16	
6.4 to 7.9	17/64 to 5/16	.5006 .5010		S5	S5	S5	S5	S5	S5								5/8	3/16	
8.0 to 10.3	21/64 to 13/32	.6257 .6262				S6	S6	S6	S6	S6							3/4	3/16	
10.4 to 12.6	27/64 to 1/2	.7507 .7512				S7	S7	S7	S7	S7							15/16	1/4	
12.75 to 15.75	9/16 to 5/8	.8757 .8762						S8	S8	S8	S8	S8					1 1/8	1/4	
16 to 19	11/16 to 3/4	1.0009 1.0015				S9		S9	S9	S9	S9	S9	S9				1 1/4	5/16	
19.25 to 22	13/16 to 7/8	1.1884 1.1890						SB9	SB9	SB9	SB9	SB9	SB9	SB9			1 7/16	5/16	
22.25 to 25.25	15/16 to 1	1.3759 1.3765						S10	S10	S10	S10	S10	S10	S10			1 5/8	5/16	
25.5 to 30	1 1/16 to 1 3/16	1.5635 1.5642							SB10	SB10	SB10	SB10	SB10	SB10	SB10		1 13/16	3/8	
30.25 to 34.5	1 1/4 to 1 3/8	1.7510 1.7517							S11	S11	S11	S11	S11	S11	S11		2	3/8	
35 to 39.5	1 7/16 to 1 9/16	2.0010 2.0017							SB11	SB11	SB11	SB11	SB11	SB11		SB11	2 1/4	3/8	
40 to 44	1 5/8 to 1 3/4	2.2512 2.2520							S12	S12	S12	S12	S12	S12	S12	S12	2 1/2	3/8	

References shaded price on application

Polygrip Recessed Serrated Bushes



**HUGE
STOCKS**

**VOLUME
DISCOUNT**

MATERIAL

/ Carbon tool steel, hardened throughout.

NOTES

Serrated bushes are common place in glass fibre, composite or synthetic jigs. The serrations and grooved recess lock the bush in place and prevent axial movement. Unlike regular drill bushes, serrated bushes are not to tight tolerance unless requested. The grooved recess feature of our GS bushes allows for resin based materials to run into the channel and set the bush in place.

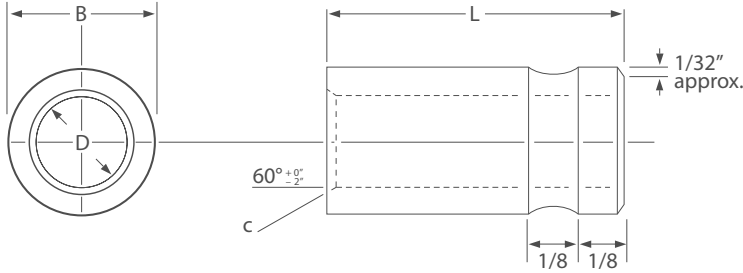


Bush Reference	"Bore Diameter D"		Limits of Tolerance	Outside Diameter of Body B	Depth of Chamfer C	Length L
	From	To				
GS1	1/16	1/8	+0.0005	1/4	1/64	3/8
GS2	1.6mm	3.45mm	+0.0015	1/4	1/64	1/2
GS3				1/4	1/64	3/4
GS4				3/8	1/32	3/8
GS5	3/32	3/16	+0.0005	3/8	1/32	1/2
GS6	3.45mm	4.9mm	+0.0015	3/8	1/32	3/4
GS7	3/16	1/4	+0.001	7/16	1/32	3/8
GS8	4.95mm	6.5mm	+0.002	7/16	1/32	1/2
GS9				7/16	1/32	3/4
GS10				1/2	3/64	3/8
GS11	1/4	5/16	+0.001	1/2	3/64	1/2
GS12	6.4mm	7.9mm	+0.002	1/2	3/64	3/4
GS13				5/8	3/64	3/8
GS14	5/16	13/32	+0.001	5/8	3/64	1/2
GS15	8.0mm	10.5mm	+0.002	5/8	3/64	3/4

Unless otherwise stated, dimensions and tolerances shown in Inches.
Maximum eccentricity 0.003.

Soft Polygrip Serrated Bush

Polygrip Serrated GS Bush Soft Condition



KEY FEATURES

- / Soft Natural Condition
- / Reworkable in the Mould

APPLICATION

Boneham Soft Serrated Bushes are designed to be reworked in a mould or fixture should alignment be slightly off-centre. They are for alignment purposes and not drilling applications. Tolerances and concentricity may differ to the standard hardened bush.

ORDERING INSTRUCTIONS

When ordering: Choose the ID required based on the pin size in use and select the part number form the corresponding length. Part numbers are formed using the 'Bush Reference' code followed by the bore size. For example: SFGS14-8.00MM

NOTES

Specials Manufactured by BONEHAM



INCH

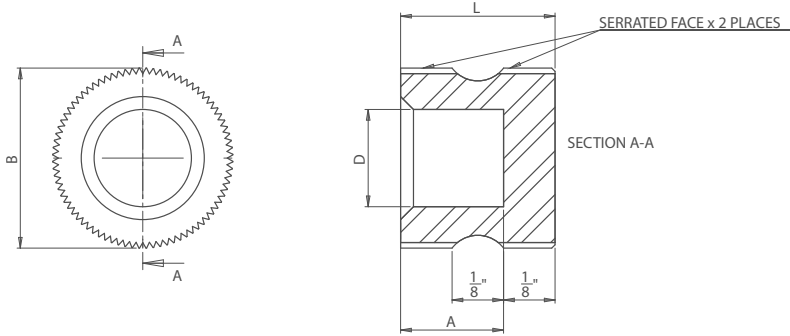
Part Code	Bore Dia (D)	Limits	OD (B)	Depth of Chamfer (C)	Length (L)
SFGS7-1/4"	1/4"	+0.001 / +0.002	7/16"	1/32"	3/8"
SFGS8-1/4"	1/4"	+0.001 / +0.002	7/16"	1/32"	1/2"
SFGS9-1/4"	1/4"	+0.001 / +0.002	7/16"	1/32"	3/4"
SFGS13-5/16"	5/16"	+0.001 / +0.002	5/8"	5/8"	3/8"
SFGS14-5/16"	5/16"	+0.001 / +0.002	5/8"	5/8"	1/2"
SFGS15-5/16"	5/16"	+0.001 / +0.002	5/8"	5/8"	3/4"

METRIC

Part Code	Bore Dia (D)	Limits	OD (B)	Depth of Chamfer (C)	Length (L)
SFGS7-6.00MM	6mm	+0.001 / +0.002	7/16"	1/32"	3/8"
SFGS8-6.00MM	6mm	+0.001 / +0.002	7/16"	1/32"	1/2"
SFGS9-6.00MM	6mm	+0.001 / +0.002	7/16"	1/32"	3/4"
SFGS13-8.00MM	8mm	+0.001 / +0.002	5/8"	5/8"	3/8"
SFGS14-8.00MM	8mm	+0.001 / +0.002	5/8"	5/8"	1/2"
SFGS15-8.00MM	8mm	+0.001 / +0.002	5/8"	5/8"	3/4"

Blind Polygrip Serrated Bush

Polygrip Serrated GS Bush Blind Hole



KEY FEATURES

- / Carbon Tool Steel
- / Hardened
- / Blind Bore

APPLICATION

Boneham Blind Serrated Bushes are hardened like the standard GS bushes, but with a blind bore. The hardened nature of the bush provides protection for the mould integrity. These bushes retain the same features as the standard Polygrip Bushes. The serrations prevent rotational movement and the recess allows resin to lock the bush in place.

ORDERING INSTRUCTIONS

When ordering: Choose the ID required based on the pin size in use and select the part number from the corresponding length. Part numbers are formed using the 'Bush Reference' code followed by the bore size. For example: BLSG14-8.00MM

NOTES

Specials Manufactured by BONEHAM



INCH

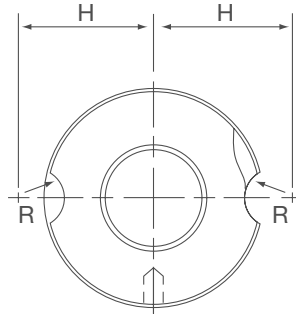
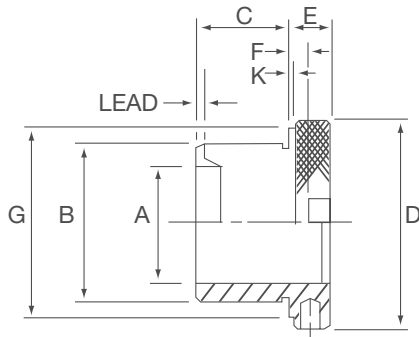
Part Code	Bore Dia (D)	Limits	OD (B)	Depth of Chamfer (C)	Length (L)
BLGS7-1/4"	1/4"	+0.001 / +0.002	7/16"	1/32"	3/8"
BLGS8-1/4"	1/4"	+0.001 / +0.002	7/16"	1/32"	1/2"
BLGS9-1/4"	1/4"	+0.001 / +0.002	7/16"	1/32"	3/4"
BLGS13-5/16"	5/16"	+0.001 / +0.002	5/8"	5/8"	3/8"
BLGS14-5/16"	5/16"	+0.001 / +0.002	5/8"	5/8"	1/2"
BLGS15-5/16"	5/16"	+0.001 / +0.002	5/8"	5/8"	3/4"

METRIC

Part Code	Bore Dia (D)	Limits	OD (B)	Depth of Chamfer (C)	Length (L)
BLGS7-6.00MM	6mm	+0.001 / +0.002	7/16"	1/32"	3/8"
BLGS8-6.00MM	6mm	+0.001 / +0.002	7/16"	1/32"	1/2"
BLGS9-6.00MM	6mm	+0.001 / +0.002	7/16"	1/32"	3/4"
BLGS13-8.00MM	8mm	+0.001 / +0.002	5/8"	5/8"	3/8"
BLGS14-8.00MM	8mm	+0.001 / +0.002	5/8"	5/8"	1/2"
BLGS15-8.00MM	8mm	+0.001 / +0.002	5/8"	5/8"	3/4"

Renewable Bushes

BS 1098 PT.2 1977/ISO 4247



Key features

- / Hardened from 58 to 62 RC
- / F7 ID drill limits
- / OD ground to suit H6 limits
- / Radius for easy drill entry
- / Lead for easy drill bush location

ORDERING INSTRUCTIONS

- / Nitrided bushes for longer life can be supplied.
- / State: Qty, Type, Bore Size and Length.
- / Example - 5, RD12E 6mm.

NOTES

- See page 33 for table showing ISO Limits for Jig Bushes and standard bore sizes. *(Also Reamer Limits.)
- / Bushes with a bore size above 48mm may not be stock items.
- / Price and delivery on application.

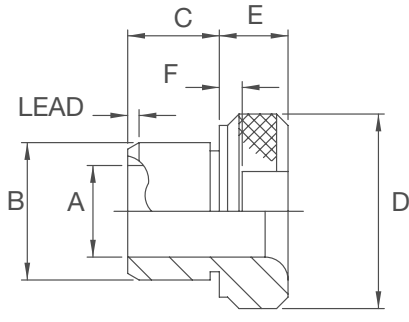


A Dia. F7 Limits (Drills)		B Dia. m6 Limits	Length C and Bush Reference						D Dia.	G Dia. +0 - 0.25	E Length	F Thickness	K Length	H	R Rad
*Limits (Reamers) From	Up to		Short		Long		Extra Long								
			C	Ref.	C	Ref.	C	Ref.							
1.0	4	8	10	RD8D	16	RD8F	-	-	15	12	8	3	1	11.5	7
3.7	6	10	12	RD10E	20	RD10H	25	RD10J	18	15	8	3	1	13	7
5.7	8	12	12	RD12E	20	RD12H	25	RD12J	22	18	10	4	1	16	8.5
7.7	10	15	16	RD15F	28	RD15K	36	RD15N	26	22	10	4	1	18	8.5
9.6	12	18	16	RD18F	28	RD18K	36	RD18N	30	26	10	4	1	20	8.5
11.5	15	22	20	RD22H	36	RD22N	45	RD22R	34	30	12	5.5	1	23.5	10.5
14.5	18	26	20	RD26H	36	RD26N	45	RD26R	39	35	12	5.5	1	26	10.5
17.5	22	30	25	RD30J	45	RD30R	56	RD30S	46	42	12	5.5	1	29.5	10.5
21.5	26	35	25	RD35J	45	RD35R	56	RD35S	52	46	12	5.5	1.5	32.5	10.5
25.5	30	42	30	RD42L	56	RD42S	67	RD42T	59	53	12	5.5	1.5	36	10.5
29	35	48	30	RD48L	56	RD48S	67	RD48T	66	60	16	7	2	41	12.5
34	42	55	30	RD55L	56	RD55S	67	RD55T	74	68	16	7	2	45	12.5
41	48	62	35	RD62M	67	RD62T	78	RD62W	82	76	16	7	2	49	12.5
47	55	70	35	RD70M	67	RD70T	78	RD70W	90	84	16	7	2	53	12.5
53	63	78	40	RD78P	78	RD78W	105	RD78Y	100	94	16	7	2	58	12.5
61	70	85	40	RD85P	78	RD85W	105	RD85Y	110	104	16	7	2	63	12.5
68	78	95	45	RD95R	89	RD95X	112	RD95Z	120	114	16	7	2	68	12.5
76	85	105	45	RD105R	89	RD105X	112	RD105Z	130	124	16	7	2	73	12.5

All dimensions in millimetres

Renewable Bushes

BS 1098 PT.1 1967



ORDERING INSTRUCTIONS

- / Imperial bushes including metric bores.
- / Nitrided bushes for longer life can be supplied.
- / State: Qty, Type, Bore Size and Length
- / Example: 10, RPS3 12mm x 1" lg

Note: All bores of the 32nd and 64th sizes over 1/2" diameter are now considered special. Standard bore sizes see chart page 51.

/ The above Bushes are used in conjunction with Plain and Headed Liners and Lock Screws, as shown on pages 48 and 49.

Ream limits: If required state R after ref. Price on application.
/ Special bushes price on application.



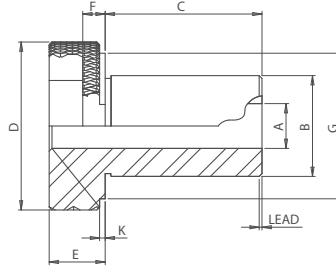
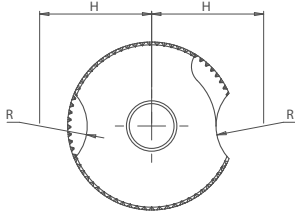
A Dia. Range		B	Length C and Reference												
mm	Imp.	O.D.	5/16"	3/8"	1/2"	3/4"	1"	1 1/4"	1 3/8"	1 1/2"	1 3/4"	2"	2 1/4"	2 1/2"	
1.2 to 4.75	3/64 to 3/16	.3123 .3125	RPS1	RPS1	RPS1	RPS1									
3.9 to 8.7	5/32 to 11/32	.4997 .5000	RPS2	RPS2	RPS2	RPS2	RPS2	RPS2							
7.6 to 12.6	19/64 to 1/2	.7496 .7500			RPS3	RPS3	RPS3	RPS3		RPS3					
12.4 to 19.0	31/64 to 3/4	.9996 1.0000				RPS4	RPS4	RPS4	RPS4	RPS4	RPS4	RPS4			
17.5 to 26.75	11/16 to 1 1/16	1.3746 1.3750				RPS5	RPS5	RPS5	RPS5	RPS5	RPS5	RPS5	RPS5		
25.25 to 34.5	1 to 1 3/8	1.7496 1.7500					RPS6	RPS6	RPS6	RPS6	RPS6	RPS6	RPS6	RPS6	
33.0 to 45.0	1 5/16 to 1 3/4	2.2495 2.2500					RPS7	RPS7	RPS7	RPS7	RPS7	RPS7	RPS7	RPS7	

References shaded price on application

Ref.	Head Dimensions in inches					
	D	E	F	R	H	
RPS1	9/16	3/8	1/8	11/32	1/2	
RPS2	13/16	3/8	1/8	11/32	5/8	
RPS3	1 1/16	3/8	1/8	11/32	3/4	
RPS4	1 1/16	7/16	1/8	11/32	59/64	
RPS5	1 25/32	7/16	1/8	11/32	1 1/64	
RPS6	2 3/32	1/2	3/16	13/32	1 25/64	
RPS7	2 25/32	1/2	3/16	13/32	1 11/64	

Pilot Bushes

Drill Bushes for initial drilling operations



KEY FEATURES

- / Standard OD Sizes
- / Special Pilot Hole Bores
- / Can be used with Handles, Egg Cups and with Liners

APPLICATION

Boneham Pilot Bushes are designed for guiding drills for pilot holes in drilling and reaming operations. They are traditionally used with liner bushes in a fixture, but they can also be used with handle bushes and egg cup stands. Standard OD's.

ORDERING INSTRUCTIONS

When ordering: Identify the OD of the bush required. The OD will either suit the liner or the hand held fixture used in the application.
For example: 12mm ID Liner
Choose SFM122035

NOTES

Specials Manufactured by BONEHAM



INCH

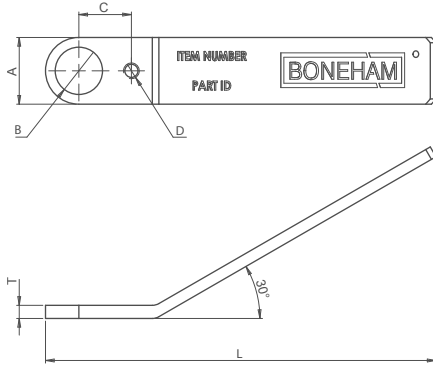
Part Code	ID (A) F7	OD (B) h5	Length	D	E	H	F
RPS21834	1/8"	1/2" .4997 / .5000	3/4"	51/64"	1/4"	5/8"	1/8"
RPS3516134	5/16"	3/4" .7496 / .7500	1+3/4"	1-3/64"	1/4"	3/4"	1/8"

METRIC

Part Code	ID (A) F7	OD (B) m6	Length	D	E	H	F
RDP12E35	3.5mm	12mm	20	22	8	16	4
RDP12E45	4.5mm	12mm	20	22	8	16	4
RDP15F65	6.5mm	15mm	28	26	8	18	4
RDP18F80	8mm	18mm	28	30	8	20	4

Handle Bush

Spoon Handle Drill Bush



KEY FEATURES

- / Red Anodised Aluminium
- / Etched Part Code
- / Etched ID Range
- / Special Lock Screw Included

APPLICATION

Boneham Handle Bushes are designed to provide an accurate drilling tool without the need for a rigid fixture. Handle bushes are lightweight, ergonomic and able to provide precise drilling in hard to reach applications.

For applications in fixtures where multi drilling or reaming operations are required, liner bush can be placed in a complex fixture and each handle can be equipped with a pilot and multiple sizes of RD, RPS, SF and SFM bushes using standard renewable bushes and lock-screw

assembly. Handle bushes are a must have solution for controlled environments. Kits of bushes can be associated with one handle to reduce error and prevent loss.

Boneham Handle Bushes use renewable RD and RPS bushes to reduce tooling costs across a wide range of tooling, including conventional jigs, handles and egg cup style fixtures.

ORDERING INSTRUCTIONS

When ordering identify the OD size required based on the standard drill range.

Ordering example:

- / Handle Only: To Suit 10mm OD bush would be HBM-10
- / With Drill Bush: To Suit 10mm OD bush with 6mm bore would be HBM-10 - RD10H 6mm



INCH

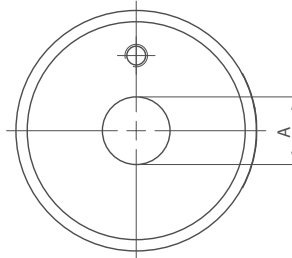
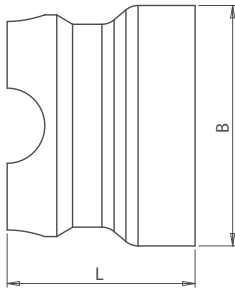
Part No.	B	A	L	T	BS/Din Bushes	ANSI Bush	Lock screw
HB-12-SL	3/16	5/8"	4.75"	0.1968"	-	SF-12	HBLS0
HB-12	3/16	1"	4.75"	0.1968"	-	SF-12	HBLS0
HB-20-SL	5/16	5/8"	4.75"	0.1968"	RPS1	SF-20	HBLS1
HB-20	5/16	1"	4.75"	0.1968"	RPS1	SF-20	HBLS1
HB-32	1/2	1"	4.75"	0.1968"	RPS2	SF-32	HBLS1
HB-48	3/4	1"	4.75"	0.1968"	RPS3	SF-48	HBLS1

METRIC

Part No.	B	A	L	T	BS/Din Bushes	ANSI Bush	Lock screw
HBM-8-SL	8mm	16mm	4.75"	5mm	RD8	SFM-8	HBMS5
HBM-8	8mm	25mm	4.75"	5mm	RD8	SFM-8	HBMS5
HBM-10-SL	10mm	16mm	4.75"	5mm	RD10	SFM-10	HBMS5
HBM-10	10mm	25mm	4.75"	5mm	RD10	SFM-10	HBMS5
HBM-12	12mm	25mm	4.75"	5mm	RD12	SFM-12	HBMS6
HBM-15	15mm	25mm	4.75"	5mm	RD15	SFM-15	HBMS6
HBM-18	18mm	25mm	4.75"	5mm	RD18	SFM-18	HBMS6

Egg Cup Bush

Right Angle Drill Bush Fixture



KEY FEATURES

- / Ideal for drilling sheet metal
- / Red Anodised Aluminium
- / For Standard Renewable Bushes
- / Etched Part Code
- / Etched Size Range

APPLICATION

Boneham "Egg Cup" style drill bush fixtures are designed to provide an accurate and portable drilling fixture. This drilling solution is ideal for sheet metal applications including piloting, drilling and reaming for rivets. Interchangeable with traditional Boneham drill bushes and lock screws. No need for a separate range of drill bushes or liners.

ORDERING INSTRUCTIONS

When ordering identify the OD size required based on the standard drill range.

For example:

- / 1/4" drilled hole: RPS2 1/4" x 3/4" bush required and an Egg Cup part of ECB-500

NOTES

- / Nylon version available
- / Specials Manufactured by BONEHAM



INCH

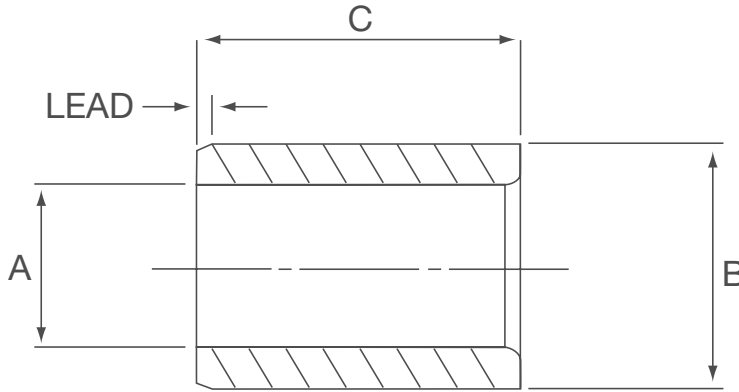
Part Code	Fixture ID (A)	To Suit Bush ID Range	Diameter (B)	Height (L)
ECB-500	0.500"	5/32" - 11/32"	64mm	50mm

METRIC

Part Code	Fixture ID (A)	To Suit Bush ID Range	Diameter (B)	Height (L)
ECB-8	8mm	1mm - 4mm	64mm	50mm
ECB-10	10mm	3.7mm - 6mm	64mm	50mm
ECB-12	12mm	5.7mm - 8mm	64mm	50mm
ECB-15	15mm	7.7mm - 10mm	64mm	50mm
ECB-18	18mm	9.6mm - 12mm	64mm	50mm

Liner Drill Bushes – Plain

BS 1098 PT.2 1977/ISO 4247/DIN 179A



HUGE STOCKS

VOLUME DISCOUNT

ORDERING INSTRUCTIONS

/ State: Qty and Ref.
/ 5, LP48J.

FITTING INSTRUCTIONS

Bore or Ream to dimension 'B' H6 limits when bush will be suitable press fit.

NOTES

See page 33 for table showing ISO limits for liner bushes.
/ Bushes with a bore size above 62mm may not be stock items.
These bushes are manufactured against customer's order only.



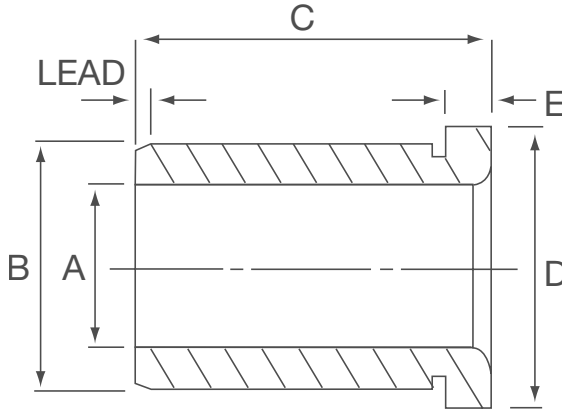
A Dia. F7 Limits	B Dia. n6 Limits	Length C and Bush Reference					
		Short		Long		Extra Long	
		C	Ref.	C	Ref.	C	Ref.
8	12	10	LP12D	16	LP12F	-	-
10	15	12	LP15E	20	LP15H	25	LP15J
12	18	12	LP18E	20	LP18H	25	LP18J
15	22	16	LP22F	28	LP22K	36	LP22N
18	26	16	LP26F	28	LP26K	36	LP26N
22	30	20	LP30H	36	LP30N	45	LP30R
26	35	20	LP35H	36	LP35N	45	LP35R
30	42	25	LP42J	45	LP42R	56	LP42S
35	48	25	LP48J	45	LP48R	56	LP48S
42	55	30	LP55L	56	LP55S	67	LP55T
48	62	30	LP62L	56	LP62S	67	LP62T
55	70	30	LP70L	56	LP70S	67	LP70T
62	78	35	LP78M	67	LP78T	78	LP78W
70	85	35	LP85M	67	LP85T	78	LP85W
78	95	40	LP95P	78	LP95W	105	LP95Y
85	105	40	LP105P	78	LP105W	105	LP105Y
95	115	45	LP115R	89	LP115X	112	LP115Z
105	125	45	LP125R	89	LP125X	112	LP125Z

All dimensions in millimetres

www.boneham.co.uk / Tel: +44 (0) 1623 445 450 / Fax: +44 (0) 1623 445 451 / sales@boneham.co.uk

Liner Bushes – Headed

BS 1098 PT.2 1977/ISO 4247/DIN 172A



ORDERING INSTRUCTIONS

/ State: Qty and Ref.
/ Example – 5, LH42J

FITTING INSTRUCTIONS

Bore or Ream to dimension 'B' H6 limits when bush will be suitable press fit.

NOTES

See page 33 for table showing ISO limits for liner bushes.
/ Bushes with a bore size above 62mm may not be stock items.
These bushes are manufactured against customer's order only.

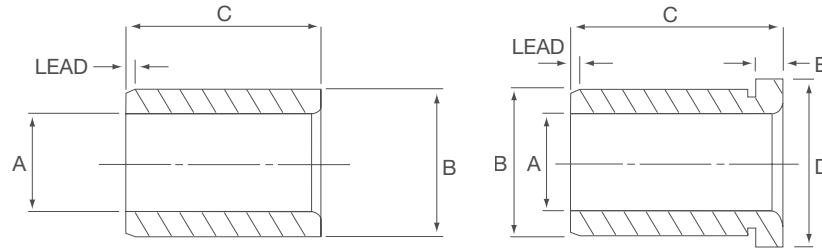


A Dia. F7 Limits	B Dia. n6 Limits	Length C and Bush Reference						D Dia. h13 Limits	E Length
		Short		Long		Extra Long			
		C	Ref.	C	Ref.	C	Ref.		
8	12	10	LH12D	16	LH12F	-	-	15	3
10	15	12	LH15E	20	LH15H	25	LH15J	18	3
12	18	12	LH18E	20	LH18H	25	LH18J	22	4
15	22	16	LH22F	28	LH22K	36	LH22N	26	4
18	26	16	LH26F	28	LH26K	36	LH26N	30	4
22	30	20	LH30H	36	LH30N	45	LH30R	34	5
26	35	20	LH35H	36	LH35N	45	LH35R	39	5
30	42	25	LH42J	45	LH42R	56	LH42S	46	5
35	48	25	LH48J	45	LH48R	56	LH48S	52	5
42	55	30	LH55L	56	LH55S	67	LH55T	59	5
48	62	30	LH62L	56	LH62S	67	LH62T	66	6
55	70	30	LH70L	56	LH70S	67	LH70T	74	6
62	78	35	LH78M	67	LH78T	78	LH78W	82	6
70	85	35	LH85M	67	LH85T	78	LH85W	90	6
78	95	40	LH95P	78	LH95W	105	LH95Y	100	6
85	105	40	LH105P	78	LH105W	105	LH105Y	110	6
95	115	45	LH115R	89	LH115X	112	LH115Z	120	6
105	125	45	LH125R	89	LH125X	112	LH125Z	130	6

All dimensions in millimetres

Liner Drill Bushes

BS 1098 PT.1 1967



ORDERING INSTRUCTIONS

/ State: Ref. and Length

Oversize bushes: $+0.010/+0.015$ on 'B' diameter can be supplied for finish grinding. State O/S if required after ref.



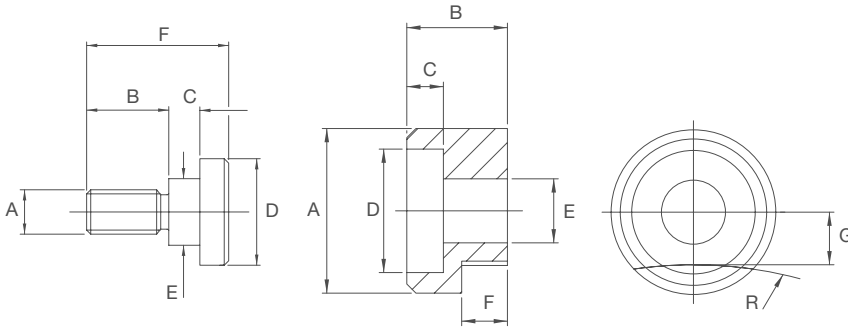
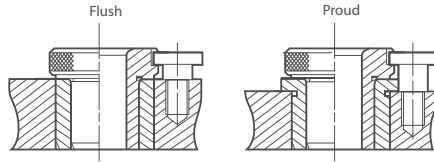
A Dia.		B Dim.	Length C and Reference											
Size	Limit		5/16"	3/8"	1/2"	3/4"	1"	1 1/4"	1 3/8"	1 1/2"	1 3/4"	2"	2 1/4"	2 1/2"
5/16	+0.002 +0.004	.5006 .5010	PL1	PL1	PL1	PL1	PL1							
1/2	+0.002 +0.006	.7507 .7512	PL2	PL2	PL2	PL2	PL2	PL2						
3/4	+0.003 +0.006	1.0009 1.0015			PL3	PL3	PL3	PL3		PL3				
1	+0.003 +0.006	1.3759 1.3765				PL4	PL4	PL4	PL4	PL4	PL4	PL4		
1 3/8	+0.004 +0.008	1.7510 1.7517				PL5	PL5	PL5	PL5	PL5	PL5	PL5	PL5	
1 3/4	+0.004 +0.008	2.2512 2.2520					PL6	PL6	PL6	PL6	PL6	PL6	PL6	PL6
2 1/4	+0.004 +0.009	2.7512 2.7520					PL7	PL7	PL7	PL7	PL7	PL7		PL7

A Dia.		B Dim.	Length C and Reference												Head	
Size	Limit		5/16"	3/8"	1/2"	3/4"	1"	1 1/4"	1 3/8"	1 1/2"	1 3/4"	2"	2 1/4"	2 1/2"	D	E
5/16	+0.002 +0.004	.5006 .5010	SL1	SL1	SL1	SL1	SL1								5/8	1/8
1/2	+0.002 +0.006	.7507 .7512	SL2	SL2	SL2	SL2	SL2								7/8	1/8
3/4	+0.003 +0.006	1.0009 1.0015			SL3	SL3	SL3	SL3		SL3					1 1/8	1/8
1	+0.003 +0.006	1.3759 1.3765				SL4	SL4	SL4	SL4	SL4	SL4	SL4			1 1/2	1/8
1 3/8	+0.004 +0.008	1.7510 1.7517				SL5	SL5	SL5	SL5	SL5	SL5	SL5	SL5		1 7/8	1/8
1 3/4	+0.004 +0.008	2.2512 2.2520					SL6	SL6	SL6	SL6	SL6	SL6	SL6	SL6	2 3/8	1/8
2 1/4	+0.004 +0.009	2.7512 2.7520					SL7	SL7	SL7	SL7	SL7	SL7		SL7	2 7/8	1/8

References shaded price on application

Lock Screw

BS 1098 PT.2 1977/ISO 4247



WHEN BUSH HEAD IS FLUSH

For use with Bushes	F	C	B	D	E	A	Screw Ref.
RD8 - RD10	15	3	9	13	7.5	M5	MS5
RD12 - RD18	18	4	10	16	9.5	M6	MS6
RD22 - RD42	22	5.5	11.5	20	12.0	M8	MS8
RD4S - RD105	32	7	18.5	24	15.0	M10	MS10

WHEN BUSH HEAD IS PROUD

For use with Bushes	F	C	B	D	E	A	Screw Ref.
RD8 - RD10	18	6	9	13	7.5	M5	LMS5
RD12 - RD18	22	8	10	16	9.5	M6	LMS6
RD22 - RD42	27	10.5	11.5	20	12.0	M8	LMS8
RD48 - RD105	38	13	18.5	24	15.0	M10	LMS10

All dimensions in millimetres

TENONS

WHEN BUSH HEAD IS FLUSH

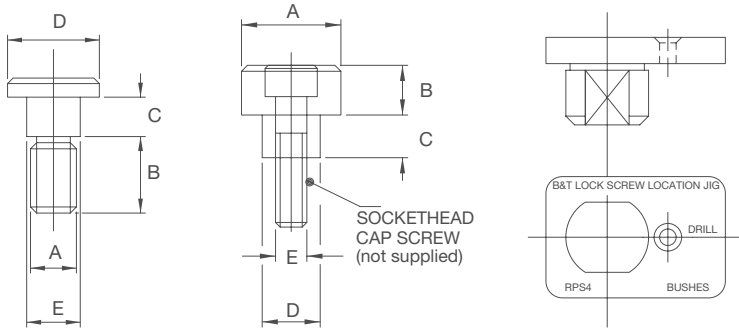
For use with Bushes	B	F	C	A	D	E	R	G	Size of Fixing Screw	Tenon Ref.
RD8 - RD10	8	3	4	13	10	5.1	9.5	3.7	M5	DMS5
RD12 - RD18	10	4	5	16	12	6.1	15	4.7	M6	DMS6
RD22 - RD42	12	5.5	5	20	15	8.1	30	6.2	M8	DMS8
RD48 - RD105	16	7	7	24	18	10.1	80	7.5	M10	DMS10

WHEN BUSH HEAD IS PROUD

For use with Bushes	B	F	C	A	D	E	R	G	Size of Fixing Screw	Tenon Ref.
RD8 - RD10	11	6	4	13	10	5.1	9.5	3.7	M5	DLMS5
RD12 - RD18	14	8	5	16	12	6.1	15	4.7	M6	DLMS6
RD22 - RD42	17	10.5	5	20	15	8.1	30	6.2	M8	DLMS8
RD48 - RD105	22	13	7	24	18	10.1	80	7.5	M10	DLMS10

All dimensions in millimetres

Lock Screws



ORDERING INSTRUCTIONS

/ State: Qty, Ref. and Thread.

NOTES

These detachable lock screws consist of a separate hardened bush held in place by a socket head screw, because of this they are easier to fit and replace than

the solid conventional type lock screw listed above. Further, the hardened bush can be held against the slip bush and used as a simple jig for locating the screw.

These jigs locate the lock screw position accurately and quickly. The spigot fits a bore the same inside diameter as the corresponding liner.



B&T Ref.	A	B	C	D	E		To suit Bushes Nos.
LSA	5/16" BSF UNC Whit	3/8"	.135"	5/8"	3/8"	For use when Flush Fitting Liner is used.	RPS1 to RPS5
LSC	3/8" BSF UNC Whit	5/8"	.197"	3/4"	7/16"	For use when Flush Fitting Liner is used.	RPS6 and RPS7
LSD	5/16" BSF UNC Whit	3/8"	.260"	5/8"	3/8"	For use when Headed type Liner is used with Head Proud.	RPS1 to RPS5
LSF	3/8" BSF UNC Whit	5/8"	.322"	3/4"	7/16"	For use when Headed type Liner is used with Head Proud.	RPS 6 and RPS7

DETACHABLE LOCK SCREWS

B&T Ref	A	B	C	D	E		To suit Bushes Nos.
DLSA	5/8"	5/16"	.135"	3/8"	2 BA	For use when Flush Fitting Liner is used.	RPS1 to RPS5
DLSC	3/4"	3/8"	.197"	7/16"	1/4" Whit	For use when Flush Fitting Liner is used.	RPS6 and RPS7
DLSD	5/8"	5/16"	.260"	3/8"	2 BA	For use when Headed type Liner is used with Head Proud.	RPS1 to RPS5
DLSF	3/4"	3/8"	.322"	7/16"	1/4" Whit	For use when Headed type Liner is used with Head Proud.	RPS 6 and RPS7

LOCK SCREW LOCATING JIG

Jig Ref.	LJ1	LJ2	LJ3	LJ4	LJ5	LJ6	LJ7
Suitable for Bushes	RPS1	RPS2	RPS3	RPS4	RPS5	RPS6	RPS7

Imperial and Metric Bore Sizes

Decimal Equivalents for Imperial Range BS 1098 PT1 1967
and Metric Sizes for Metric Range ISO 4247

Dec. Equiv.	Eng.	m/m	Dec. Equiv.	Eng.	m/m	Dec. Equiv.	Eng.	m/m	Dec. Equiv.	Eng.	m/m	Dec. Equiv.	Eng.	m/m	Dec. Equiv.	Eng.	m/m	Dec. Equiv.	Eng.	m/m
.0469	3/64		.1299		3.3	.2559		6.5	.3819		9.7	.5079		12.9	.8268		21.00	1.2205		31.00
.0472		1.2	.1339		3.4	.2598		6.6	.3839		9.75	.5118		13.00	.8366		21.25	1.2303		31.25
.0492		1.25	.1378		3.5	.2638		6.7	.3858		9.8	.5157		13.1	.8465		21.50	1.2402		31.50
.0512		1.3	.1406	9/64		.2656	17/64		.3898		9.9	.5197		13.2	.8563		21.75	1.250	11/4	
.0532		1.35	.1417		3.6	.2657		6.75	.3906	25/64		.5217		13.25	.8661		22.00	1.2598		32.00
.0551		1.4	.1457		3.7	.2677		6.8	.3937		10.00	.5236		13.3	.8750	7/8		1.2697		32.25
.0571		1.45	.1476		3.75	.2717		6.9	.3976		10.1	.5276		13.4	.8760		22.25	1.2795		32.50
.0591		1.5	.1496		3.8	.2756		7.00	.4016		10.2	.5315		13.5	.8858		22.50	1.2894		32.75
.0610		1.55	.1535		3.9	.2795		7.1	.4035		10.25	.5354		13.6	.8957		22.75	1.2992		33.00
.0625	1/16		.1562	5/32		.2812	9/32		.4055		10.3	.5394		13.7	.9055		23.00	1.3125	15/16	
.0630		1.6	.1575		4.0	.2835		7.2	.4062	13/32		.5413		13.75	.9154		23.25	1.3189		33.50
.0650		1.65	.1614		4.1	.2854		7.25	.4094		10.4	.5433		13.8	.9252		23.50	1.3386		34.00
.0669		1.7	.1654		4.2	.2874		7.3	.4134		10.5	.5472		13.9	.9350		23.75	1.3583		34.50
.0689		1.75	.1673		4.25	.2913		7.4	.4173		10.6	.5512		14.00	.9375	15/16		1.3750	13/8	
.0709		1.8	.1693		4.3	.2953		7.5	.4213		10.7	.5610		14.25	.9449		24.00	1.3780		35.00
.0728		1.85	.1719	11/64		.2969	19/64		.4219	27/64		.5625	9/16		.9547		24.25	1.3976		35.50
.0748		1.9	.1732		4.4	.2992		7.6	.4232		10.75	.5709		14.5	.9646		24.50	1.4173		36.00
.0768		1.95	.1772		4.5	.3032		7.7	.4252		10.8	.5807		14.75	.9744		24.75	1.4370		36.50
.0781	5/64		.1811		4.6	.3051		7.75	.4291		10.9	.5906		15.00	.9843		25.00	1.4375	17/16	
.0787		2.00	.1850		4.7	.3071		7.8	.4331		11.00	.6004		15.25	.9941		25.25	1.4567		37.00
.0807		2.05	.1870		4.75	.3110		7.9	.4370		11.1	.6102		15.5	1.000	1		1.4764		37.50
.0827		2.1	.1875	3/16		.3125	5/16		.4375	7/16		.6201		15.75	1.0039		25.50	1.4961		38.00
.0846		2.15	.1890		4.8	.3150		8.00	.4409		11.2	.6250	5/8		1.0138		25.75	1.5000	11/2	
.0866		2.2	.1929		4.9	.3189		8.1	.4429		11.25	.6299		16.00	1.0236		26.00	1.5157		38.50
.0886		2.25	.1968		5.00	.3228		8.2	.4449		11.3	.6398		16.25	1.0335		26.25	1.5354		39.00
.0906		2.3	.2008		5.1	.3248		8.25	.4488		11.4	.6496		16.5	1.0433		26.50	1.5551		39.50
.0925		2.35	.2031	13/64		.3268	21/64	8.3	.4528		11.5	.6594		16.75	1.0531		26.75	1.5625	19/16	
.0938	3/32		.2047		5.2	.3281			.4531	29/64		.6693		17.00	1.0625	11/16		1.5748		40.00
.0945		2.4	.2067		5.25	.3307		8.4	.4567		11.6	.6791		17.25	1.0630		27.00	1.5945		40.50
.0965		2.45	.2087		5.3	.3346		8.5	.4606		11.7	.6875	11/16		1.0728		27.25	1.6142		41.00
.0984		2.5	.2126		5.4	.3386		8.6	.4626		11.75	.6890		17.5	1.0827		27.50	1.6250	15/8	
.1004		2.55	.2165		5.5	.3425		8.7	.4646		11.8	.6988		17.75	1.0925		27.75	1.6339		41.50
.1024		2.6	.2188	7/32		.3438	11/32		.4685		11.9	.7087		18.00	1.1024		28.00	1.6535		42.00
.1043		2.65	.2205		5.6	.3445		8.75	.4688	15/32		.7185		18.25	1.1122		28.25	1.6732		42.50
.1063		2.7	.2244		5.7	.3465		8.8	.4724		12.00	.7283		18.5	1.1220		28.50	1.6875	111/16	
.1083		2.75	.2264		5.75	.3504		8.9	.4764		12.1	.7382		18.75	1.1250	11/8		1.6929		43.00
.1094	7/64		.2283		5.8	.3543		9.00	.4803		12.2	.7480		19.00	1.1319		28.75	1.7126		43.50
.1102		2.8	.2323		5.9	.3583		9.1	.4823		12.25	.7500	3/4		1.1417		29.00	1.7323		44.00
.1122		2.85	.2344	15/64		.3594	23/64		.4843		12.3	.7579		19.25	1.1516		29.25	1.750	13/4	
.1142		2.9	.2362		6.00	.3622		9.2	.4844	31/64		.7677		19.5	1.1614		29.50	1.7520		44.50
.1161		2.95	.2402		6.1	.3642		9.25	.4882		12.4	.7776		19.75	1.1713		29.75	1.7717		45.00
.1181		3.00	.2441		6.2	.3661		9.3	.4921		12.5	.7874		20.00	1.1811		30.00	1.7913		45.50
.1220		3.1	.2461		6.25	.3701		9.4	.4961		12.6	.7972		20.25	1.1875	13/16		1.8110		46.00
.1250	1/8		.2480		6.3	.3740		9.5	.5000	1/2		.8071		20.5	1.1909		30.25	1.8307		46.50
.1260		3.2	.2500	1/4		.3750	3/8		.5020		12.75	.8125		13/16	1.2008		30.50	1.8504		47.00
.1280		3.25	.2520		6.4	.3780		9.6	.5039		12.8	.8169		20.75	1.2106		30.75	1.8701		47.50
																		1.8898		48.00

Anchor Bushes

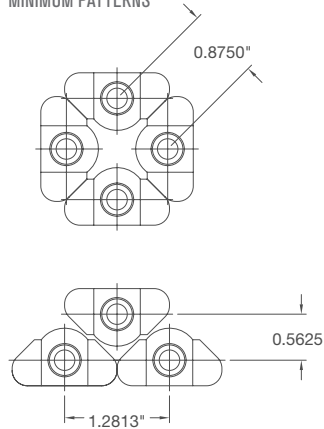


The B&T Anchor Bush is a two-piece assembly consisting of a hardened steel bush with a bore to suit the appropriate drill size and a low carbon steel anchor which is either welded or riveted to the drill template. This strap only holds the bush firmly in place and has no influence on location which is obtained from a spigot on the bush machined concentric with the bore. Thus Anchor Bushes can be spaced accurately, when desired, by Jig Boring the template. On many applications, however, marking out and either punching or drilling the locating holes is sufficiently accurate. B&T Anchor Bushes are made in Standard and Corner types and by using a combination of the two various hole patterns can be made up as shown on the following pages.

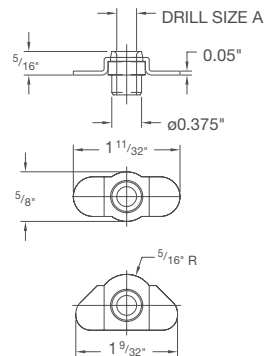
AB1

A Bore	C O.D.	B Length
3/64" to 9/32"	.375"	.050"
1.2mm to 7.1mm	+ .000"	.125"
	- .004"	.187"
		.250"
		.375"

MINIMUM PATTERNS



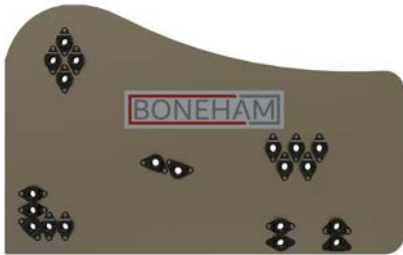
Standard Type Ref. AB1



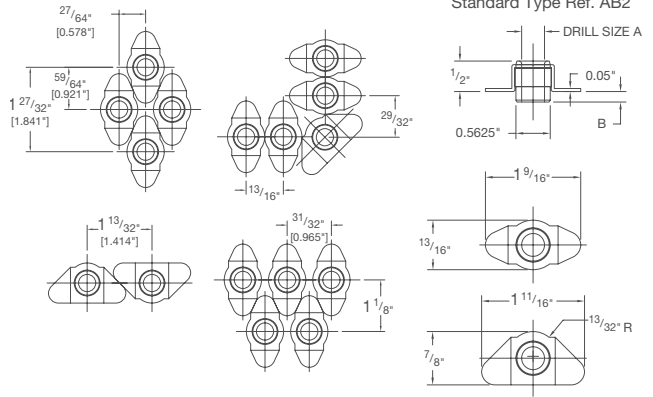
Anchor Bushes

AB2

A Bore	C O.D.	B Length
9/32" to 29/64"	.5625" +.000"	.125" .187"
7.2mm to 11.5mm	-.004"	.250" .375"



MINIMUM PATTERNS

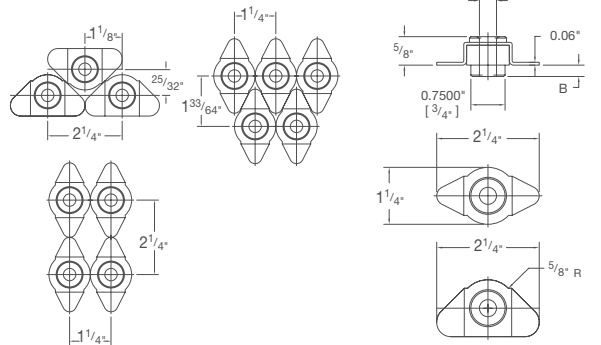


AB3

A Bore	C O.D.	B Length
29/64" to 5/8"	.750" +.000"	.050" .187"
11.6mm to 15.75mm	-.004"	.250" .375"

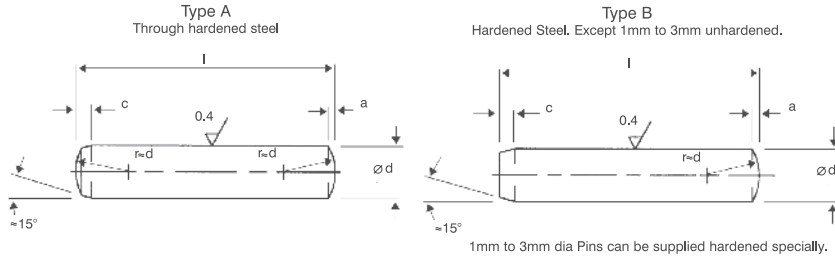


MINIMUM PATTERNS



Dowel Pins Plain – Metric

BS 8734 (1992) / ISO 8734 Limits, Types A & B including additional lengths



Our stock is based on Type B Pins

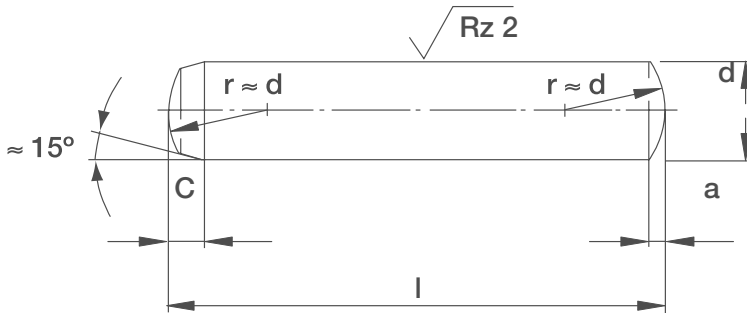
d = m6 limit mm			+0.02 +0.09	+0.02 +0.09	+0.02 +0.09	+0.02 +0.09	+0.02 +0.09	+0.04 +0.12	+0.04 +0.12	+0.04 +0.12	+0.06 +0.15	+0.06 +0.15	+0.07 +0.18	+0.07 +0.18	+0.08 +0.21	+0.08 +0.21
min	max	d	1	1.5	2	2.5	3	4	5	6	8	10	12	16	20	25
2.75	3.25	3														
3.75	4.25	4														
4.75	5.25	5														
5.75	6.25	6														
7.75	8.25	8														
9.75	10.25	10														
11.5	12.5	12														
13.5	14.5	14														
15.5	16.5	16														
17.5	18.5	18														
19.5	20.5	20														
21.5	22.5	22														
23.5	24.5	24														
24.5	25.5	25														
25.5	26.5	26														
27.5	28.5	28														
29.5	30.5	30														
31.5	32.5	32														
34.5	35.5	35														
39.5	40.5	40														
44.5	45.5	45														
49.5	50.5	50														
54.25	55.75	55														
59.25	60.75	60														
64.25	65.75	65														
69.25	70.75	70														
74.25	75.75	75														
79.25	80.75	80														
84.25	85.75	85														
89.25	90.75	90														
94.25	95.75	95														
99.25	100.75	100														
109.25	110.75	110														
119.25	120.75	120														



Dowel Pins can be supplied with air release flat at extra cost

Dowel Pin

DIN 6325



HUGE STOCKS

VOLUME DISCOUNT

- / Fully hardened and tempered, fine ground finished to m6, turned tip and edge.
- / Hardness: 60 ± 2 HRC

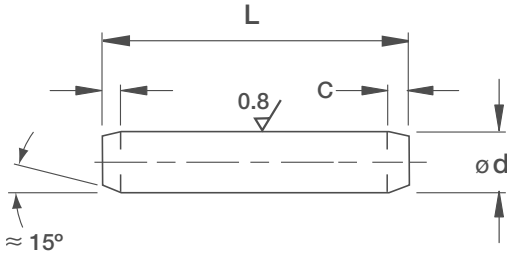
ORDERING INSTRUCTIONS
/ State: Diameter and Length



d	m6	1	1.5	2	2.5	3	4	5	6	8	10	12	16	20	
a	≈	0.12	0.20	0.25	0.3	0.4	0.5	0.63	0.8	1	1.2	1.6	2	2.5	
c		0.5	0.6	0.8	1	1.2	1.4	1.7	2.1	2.6	3	3.8	4.6	6	
r1	min	-	0.2	0.2	0.3	0.3	0.4	0.4	0.4	0.5	0.6	0.6	0.8	0.8	
	max	-	0.6	0.6	0.7	0.8	0.9	1	1.1	1.3	1.4	1.6	1.8	2	
Nominal Value		l													
Value	min	max													
4	3.75	4.25													
5	4.75	5.25													
6	5.75	6.25													
8	7.75	8.25													
10	9.75	10.25													
12	11.50	12.50													
14	13.50	14.50													
16	15.50	16.50													
18	17.50	18.50													
20	19.50	20.50													
24	23.50	24.50													
28	27.50	28.50													
32	31.50	32.50													
35	34.50	35.50													
40	39.50	40.50													
45	44.50	45.50													
50	49.50	50.50													
55	54.25	55.75													
60	59.25	60.75													
70	69.25	70.75													
80	79.25	80.75													
90	89.25	90.75													
100	99.25	100.75													
120	119.25	120.75													

Dowel Pins Stainless Steel – Metric & Imperial

ISO 2338A Stainless Steel A2



MATERIAL: Stainless Steel A2 Soft Condition. $d = m6$ Limit.

TO ORDER: State DP55 $d \times L$

L	d	1mm	1.5mm	2mm	2.5mm	3mm	4mm	5mm	6mm	8mm	10mm	12mm	16mm
	c	0.2	0.3	0.35	0.4	0.5	0.63	0.8	1.2	1.6	2	2.5	3
5													
8													
10													
12													
16													
20													
24													
30													
35													
36													
40													
45													
50													
60													
80													
100													
120													

Other sizes available.

IMPERIAL SIZES

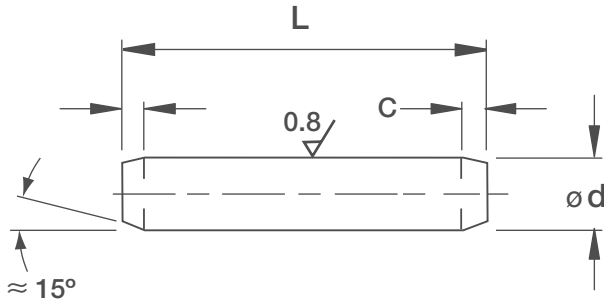
MATERIAL: Stainless Steel A2 Soft Condition. $d = m6$ Limit.

TO ORDER: State DP66 $d \times L$

L	d	1/16	3/32	1/8	3/16	1/4	5/16
	c	0.020	0.020	0.020	0.030	0.030	0.040
1/4							
3/8							
1/2							
5/8							
3/4							
1							
1 1/4							
1 1/2							
1 3/4							
2							

Dowel Pins Stainless Steel – Metric

ISO 2338A Stainless Steel 316



HUGE STOCKS

VOLUME DISCOUNT

STAINLESS STEEL

MATERIAL: Stainless Steel 316 Soft Condition. d = m6 Limit.
TO ORDER: State DP88 d x L

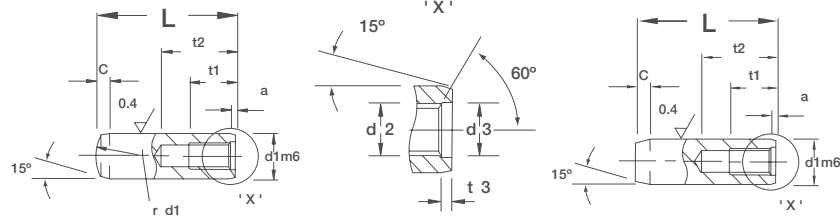


L \ d	d	1mm	1.5mm	2mm	2.5mm	3mm	4mm	5mm	6mm	8mm	10mm	12mm	16mm
	c	0.2	0.3	0.35	0.4	0.5	0.63	0.8	1.2	1.6	2	2.5	3
5													
8													
10													
12													
16													
20													
24													
30													
35													
36													
40													
45													
50													
60													
80													
100													
120													

Other sizes available.

Dowel Pins Tapped – Metric

BS 8735 / ISO 8735 Limits, Types A and B



Our stock is based on Type B Pins

d ¹	6	8	10	12	16	20	25	30	40	50
d ² = m6 Limits	+0.004 +0.012	+0.006 +0.015	+0.006 +0.015	+0.007 +0.018	+0.007 +0.018	+0.008 +0.021	+0.008 +0.021			
a	0.8	1	1.2	1.6	2	2.5	3	4	5	6.3
c	2.1	2.6	3	3.8	4.6	6	6	7	8	10
d ²	M3*	M4*	M6	M6	M8	M10	M16	M20	M20	M24
d ³	4.3	5.3	6.4	6.4	8.4	10.5	17	21	21	25
t ¹	6	8	10	12	16	18	24	30	30	36
t ² min.	10	12	16	20	25	28	35	40	40	50
t ³	1	1.2	1.2	1.2	1.5	1.5	2	2	2.5	2.5
L										
nom.	min.	max.								
16	15.5	16.5								
18	17.5	18.5								
20	19.5	20.5								
22	21.5	22.5								
24	23.5	24.5								
25	24.5	25.5								
28	27.5	28.5								
30	29.5	30.5								
32	31.5	32.5								
35	34.5	35.5								
40	39.5	40.5								
45	44.5	45.5								
50	49.5	50.5								
55	54.25	55.75								
60	59.25	60.75								
65	64.25	65.75								
70	69.25	70.75								
75	74.25	75.75								
80	79.25	80.75								
85	84.25	85.75								
90	89.25	90.75								
95	94.25	95.75								
100	99.25	100.75								
120	119.25	120.75								
140	139.25	140.75								
160	159.25	160.75								
180	179.25	180.75								
200	199.25	200.75								



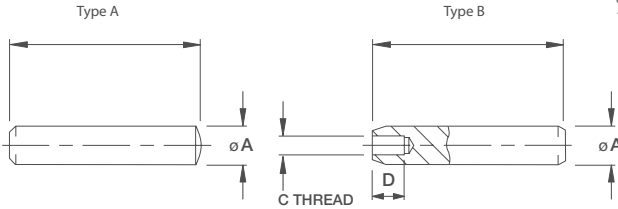
/ d2* to prevent cracking B&T supply 6mm and 8mm pins with smaller tapped hole size than the BS/ISO standard.
/ Tapped Dowel Pin Extractors available – state thread size. Dowel Pins can be supplied with air release flat at extra cost.

Dowel Pins Plain and Tapped – Imperial

Plain BS 1804 Limits

A range of A.N.S.I Dowel Pins can be supplied

1/16" and 3/32" unhardened
1/8 - 1" Steel hardened



- / 1/16" and 3/32" dia Pins can be supplied hardened specially.
- / Diam's 1/16" - 3/32" - 1/8" will be chamfered each end.

T = Tapped range

Diameter 'A'	1/16"	3/32"	1/8"	5/32"	3/16"	7/32"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
'C' thread							4 B.A.	3 B.A.	2 B.A.	1/4" B.S.F.	1/4" B.S.F.	1/4" B.S.F.	
'D'							1/4"	1/4"	5/16"	3/8"	3/8"	3/8"	
1/4"													
5/16"													
3/8"													
7/16"													
1/2"							T	T	T				
9/16"													
5/8"							T	T	T				
3/4"							T	T	T	T			
7/8"							T	T	T	T			
1"							T	T	T	T	T		
1 1/8"							T	T	T	T	T		
1 1/4"							T	T	T	T	T		
1 3/8"							T	T	T	T	T		
1 1/2"							T	T	T	T	T	T	
1 5/8"							T	T	T	T	T	T	
1 3/4"							T	T	T	T	T	T	
1 7/8"							T	T	T	T	T	T	
2"							T	T	T	T	T	T	
2 1/8"							T	T	T	T	T	T	
2 1/4"							T	T	T	T	T	T	
2 3/8"							T	T	T	T	T	T	
2 1/2"							T	T	T	T	T	T	
2 5/8"								T	T	T	T	T	
2 3/4"							T	T	T	T	T	T	
2 7/8"								T	T	T	T	T	
3"							T	T	T	T	T	T	
3 1/8"								T	T	T			
3 1/4"								T	T	T	T	T	
3 1/2"								T	T	T	T	T	
3 3/4"									T	T	T	T	
4"									T	T	T	T	
4 1/4"											T	T	
4 1/2"											T	T	
5"											T	T	
5 1/4"												T	
5 1/2"												T	
6"												T	

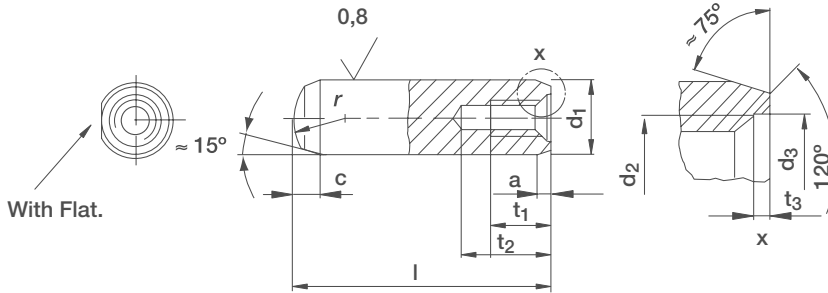
HUGE STOCKS

VOLUME DISCOUNT

/ Intermediate lengths can be supplied to order.
/ Tapped Dowel Pin Extractors available - state thread size. Dowel Pins can be supplied with air release flat at extra cost.

Dowel Pin with Internal Thread

DIN 7979



HUGE STOCKS

VOLUME DISCOUNT

- / Hardened, tempered and fine ground finished to ISO tolerance m6 with air-vent flat.
- / Hardness: 600 - 700 HV1

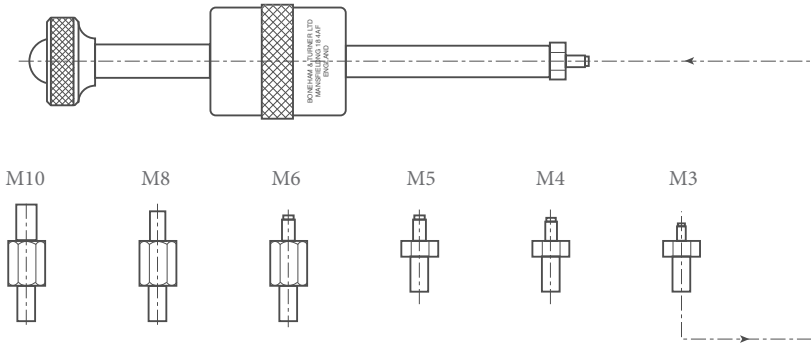
ORDERING INSTRUCTIONS

- / State: Diameter and Length



d1 m6	6	8	10	12	16	20
r	6	8	10	12	16	20
d2	M 4	M 5	M 6	M 6	M 8	M 10
d3	4.3	5.3	6.4	6.4	8.4	10.5
t1	6	8	10	10	12	16
t2 min.	10	12	16	16	20	25
t3	1	1.2	1.2	1.2	1.5	1.5
a	0.8	1.0	1.2	1.6	2.0	2.5
c	2.1	2.6	3.0	3.8	4.6	6.0
Length l						
16						
18						
20						
24						
28						
32						
35						
40						
45						
50						
55						
60						
70						
80						
90						
100						
120						

Tapped Dowel Pin Extractor



KEY FEATURES

- / Metric M3 to M10
- / INCH UNC, UNF, BSW and BSF
- / Slide hammer style
- / Knurled for extra grip
- / Special head sizes manufactured

APPLICATION

The Boneham Extractor Tool is designed for use with extractable dowel pins in metric and inch. The tool uses a slide hammer method making it extremely easy to use. Knurled parts allow for easy grip.

ORDERING INSTRUCTIONS

- / When ordering the tool state: DPE
- / When ordering metric heads state: DPE and then metric size. Example: DPE3MM
- / When ordering INCH heads state: DPE, size and standard. Example: DPE3/8BSF

NOTES

- / A BONEHAM original product. For Extractable dowel pins see pages 58-59.
- / BA, UNC and BSF heads available.
- / For metric and imperial full kits, please see the following page.



CODE SUFFIX	UNF / UNC	METRIC
DPE	4-40	M2.5
DPE	8-32	M3
DPE	10-32	M4
DPE	1/4-20	M5
DPE	5/16-18	M6
DPE		M8
DPE		M10
DPE		M12
DPE		M16

Dowel Extractor Kit

DPE and DP Heads



KEY FEATURES

- / Dowel Pin Extractor Tool
- / Choice of Metric or Inch extractor heads
- / Waterproof and Dustproof case
- / Case certified according to IP67

APPLICATION

The Boneham Dowel Pin Extractor tool is used to extract tapped dowel pins from their location hole. This kit is supplied in a hard, durable and ergonomic case. It's ideal for production environments and tool control. The case uses pick and pluck foam so operators can customise to suit. The case is supplied as pictured.

ORDERING INSTRUCTIONS

The Dowel Pin Extractor Kit has a part number of DPE001 for Metric and DPE002 for Inch. Please see table below for the kit contents.

NOTES

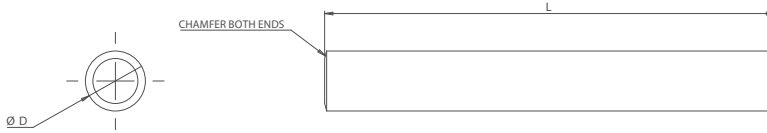
Specials Manufactured by BONEHAM



Part Code	Tool	Unit	Heads included						
DPE001	DPE	Metric	M3	M4	M5	M6	M8	M10	M16
DPE002	DPE	Inch	4-40	8-32	10-32	1/4-20	5/16-18		

Nylon Dowel Pins

Nylon 66 Dowel Pins



KEY FEATURES

- / White Nylon 6.6
- / Tough and Rigid
- / Excellent Abrasion and Chemical Resistance
- / Low Friction Coefficient

APPLICATION

Nylon dowels are ideal for the composite mould process. They have a wide temperature range (-40°C - +70°C) with good chemical and abrasive qualities. Boneham Nylon dowels work in vacuum environments and unlike traditional metal dowels, can easily be destroyed to prevent damage to the mould or workpiece.

ORDERING INSTRUCTIONS

When ordering identify the diameter and length required and choose the appropriate part number.

NOTES

- / Can be used with Boneham GS bushings or -BP mould bushings
- / Specials, including tighter tolerances Manufactured by BONEHAM.

DIAMETER TOLERANCES

- 2 - 5.5mm +/- 0.01
- 6 - 10mm 0.00 - + 0.02



METRIC

Part Code	D	L (0.00 - + 0.1)
N6DP0NU2C	3	20
N6DP0PU24B	2.4	30
N6DP0PU25B	2.5	30
N6DP0PU2C	3	30
N6DP0PW2C	3	35
N6DP0QU2C	3	40
N6DP0QW2C	3	45
N6DP0RU2C	3	50
N6DP0RW2C	3	55
N6DP0SU2C	3	60
N6DP0PU22C	3.2	30
N6DP0PU23C	3.3	30
N6DP0PU26C	3.6	30
N6DP0PU27C	3.7	30
N6DP0PU2D	4	30
N6DP5QU2D	4	35
N6DP0QU2D	4	40
N6DP5RU2D	4	45
N6DP0RU2D	4	50
N6DP5SU2D	4	55
N6DP0SU2D	4	60
N6DP0PU22D	4.2	30
N6DP0PU25D	4.5	30

Part Code	D	L (0.00 - + 0.1)
N6DP0PU2E	5	30
N6DP5QU2E	5	35
N6DP0QU2E	5	40
N6DP0RU2E	5	50
N6DP0PU25E	5.5	30
N6DP0QE2E	5.5	40
N6DP0PU2F	6	30
N6DP5QU2F	6	35
N6DP0QU2F	6	40
N6DP5RU2F	6	45
N6DP0RU2F	6	50
N6DP5SU2F	6	55
N6DP0SU2F	6	60
N6DP0QA2F	6.1	40
N6DP0PU28F	6.8	30
N6DP5QU28F	6.8	35
N6DP0QU28F	6.8	40
N6DP0PU2G	7	30
N6DP0QU2G	7	40
N6DP0PU2H	8	30
N6DP5QU2H	8	35
N6DP0QU2H	8	40
N6DP5RU2H	8	45

Part Code	D	L (0.00 - + 0.1)
N6DP0RU2H	8	50
N6DP5SU2H	8	55
N6DP0SU2H	8	60
N6DP0QU25H	8.5	40
N6DP0PU2I	9	30
N6DPB0NU2J	10	20
N6DP0PU2J	10	30
N6DP0QU2J	10	40
N6DP0RU2J	10	50
N6DP0SU2J	10	60
N6DP0PU2L	12	30
N6DP0QU2L	12	40

IMPERIAL

Part Code	D	L
N6DP0PU235F	1/4"	30
N6DP5QU235F	1/4"	35
N6DP0QU235F	1/4"	40
N6DP1CG5B	1/2"	30
N6DP1GG5B	1/2"	40
N6DP1CH5A	1/8"	30

Accurate Mould Alignment and Clamping Solutions from



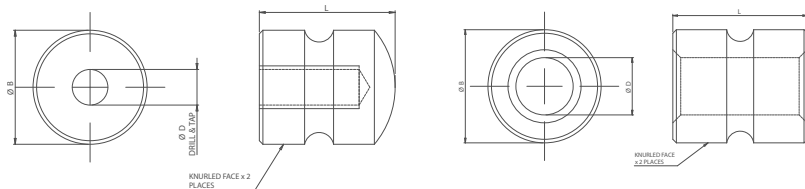
The Boneham Mould Clamping and Alignment solution combines components to produce a system that can be installed along a split mould, accommodating any pattern and spacing. With varying methods of either clamping or aligning the mould, these simple components are purpose designed to reduce scrapping of the pattern base, component or mould.



GS Serrated Bushes for pins Page 38	Knurled Mould Bush for standard bolts Page 65	Short Knurled Bush for standard bolts Page 66	Short Knurled Bush to H7 for dowels Page 66	Nylon 6 Dowel Pins Page 63
Extractable dowel pins Page 58-60	Knurled Mould Nut for bolts Page 65	Ground Shoulder bolts Page 334	Blind GS Bushes for pins Page 40	Slotted Mould Bushes for Pins Page 67

Knurled Mould Clamps

A Boneham registered design for Split Moulds



KEY FEATURES

- / Mild Steel
- / Chemically Blacked
- / Deep Knurl
- / Resin Recess
- / Compact Design

APPLICATION

Knurled Mould Clamps are designed by Boneham to be used in the composite mold process. The split composite mould process can require accurate alignment and good torque resistance. The GSCL mold clamp range is relatively compact and reduces mould scrappage whilst providing dedicated components which reduce subcontract and multicomponent requirements. The bushing and nut are purchased separately so a more precise bushing, such as a GS or PP type bushing can be used if required.

ORDERING INSTRUCTIONS

When ordering check the size of bolt and thread required and choose corresponding part number. Example:
 / M8 Bolt: Bushing: GSCL-8MM-B and Nut: GSCL-8MM-N

If a shoulder bolt is being used. Example:
 / 8MM Shoulder Bolt with 6mm thread: Bushing GS14-8.00MM and Nut: GSCL-6MM-N

Bushing Types
 -B: Suitable for standard bolts

NOTES

- / Can be used as a nut and bushing assembly or with Boneham pins and drill bushes



Knurled Bushing – For use with standard bolt

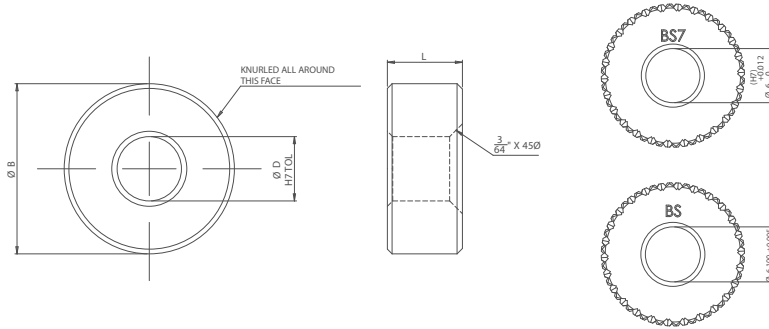
Part Code	Bore D	Outside Diameter B	Length L	Grooves
GSCL-6MM-B	6.1mm	5/8"	3/4"	1
GSCL-8MM-B	8.1mm	5/8"	3/4"	1
GSCL-10MM-B	10.1mm	5/8"	3/4"	1
GSCL-12MM-B	12.1mm	3/4"	3/4"	1

Knurled Nut – For use with standard bolt

Part Code	D	Outside Diameter B	Length L	Grooves
GSCL-6MM-N	M6	5/8"	3/4"	1
GSCL-8MM-N	M8	5/8"	3/4"	1
GSCL-10MM-N	M10	5/8"	3/4"	1
GSCL-12MM-N	M12	3/4"	3/4"	1

Short Knurled Mould Bush

A Boneham registered design for Split Moulds



KEY FEATURES

- / Mild Steel
- / Chemically Blacked
- / Deep Knurl
- / Compact Design
- / 7mm Long

APPLICATION

The Short Knurled Mould Bush is a shortened version of the Knurled Mould Clamp Bush. The short version does not feature a resin groove, but allows for alignment when depth of locating material is at a minimum and a standard length bush is not suitable. The short mould clamp is available in two versions. BS: Short version of -B for a fastening bolt
BS7: Machined for a locating dowel pin.

ORDERING INSTRUCTIONS

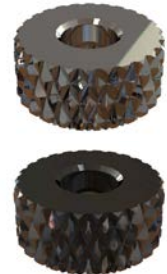
When ordering check the size of bolt and thread required and choose corresponding part number. Example:
/ M8 Bolt: Bush: GSCL-8MM-BS and Nut: GSCL-8MM-N
If a dowel pin is being used. Example:
/ DP35B 8MM Pin order: Bush GSCL-8MM-B7
and Nut: GSCL-6MM-N

Bush Types:

- / BS: Suitable for standard bolts
- / BS7: Suitable for Boneham Dowel Pins

NOTES

- / Can be used as a nut and bush assembly or with Boneham pins and drill bushes
- / Inch versions available



Knurled Bush – For use with standard bolt

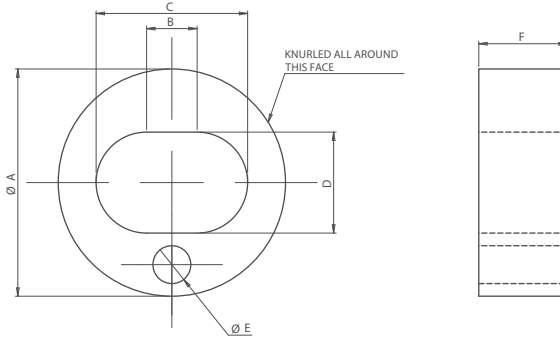
Part Code	Bore D	Outside Diameter B	Length L	Grooves
GSCL-6MM-BS	6.1mm	5/8"	7mm	0
GSCL-8MM-BS	6.1mm	5/8"	7mm	0

Knurled Bush – For use with standard Dowels

Part Code	Bore D H7	Outside Diameter B	Length L	Grooves
GSCL-6MM-BS7	6mm	5/8"	7mm	0
GSCL-8MM-BS7	8mm	5/8"	7mm	0

Knurled Slotted Mould Bush

For Composite Moulds



KEY FEATURES

- / Mild Steel
- / Chemically Blacked
- / Deep Knurl
- / Compact Design
- / 7mm Long

APPLICATION

Knurled Slotted Mould Bushes are designed for the mould tool-up process. During a curing process thermal expansion may occur causing the movement of the mating bushes in the base mould. Boneham have designed the Slotted Mould Bush to allow for variable expansion by accepting natural longitudinal adjustment, preventing misalignment. They are designed to accept standard dowel pins. The elongated bushing features a drilled hole to assist in clocking up the bush during setting.

ORDERING INSTRUCTIONS

When ordering check the size of pin in use and choose corresponding part number. Example:

- / 8mm pin order: CLS8MM

NOTES

- / Can be used with Boneham pins and drill bushes



Slotted Bushing – For use with Standard Dowels

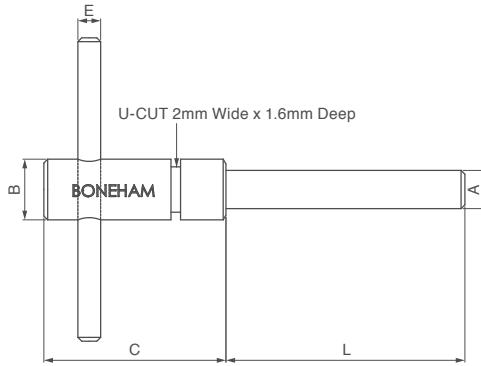
Part Code	Slot W x L	Outside Diameter A	Length F	Clock Pin
CLS6MM	6mm x 10mm	18mm	7mm	3mm
CLS8MM	8mm x 12mm	18mm	7mm	3mm
CLS10MM	10mm x 14mm	24mm	10mm	3mm

Quick removing “T-Bar” Location Pins

Metric and Imperial

68

BONEHAM



APPLICATION

T-Bar Location Pins, or Jig Pins, are a removable precision ground location pin which is designed to accurately align holes in sectional jigs. The ground finish pin can be used in conjunction with Boneham's standard liner bushes pressed into the jig. Quick removal is assisted thanks to the featured shoulder of the pin which allows a raised handle and a slide pin which can be tapped into an 'L-shaped' pin if necessary. In both metric and imperial and with various lengths, the T-Bar pins can be used in various applications of alignment and location.

MATERIAL

Body: Mild Steel
Pin: Case Hardened and Ground
 Available in Stainless Steel

TIP

Use with BONEHAM bushes for accurate alignment in jigs.



IMPERIAL SIZES

Part Reference	Pin Diameter A		Pin	Body		T-Bar	
	Nominal	Tolerance		Length	Diameter	Length	Length
			L	B	C	D	E
RLP-1AS	3/16	-0.00015" -0.00045"	2"	3/8	1+1/4	1+3/4	3/16
RLP-2AS	1/4	-0.0002" -0.0006"	2"	1/2	1+1/2	2+1/2	3/16
RLP-2BS	5/16	-0.0002" -0.0006"	2"	1/2	1+1/2	2+1/2	3/16
RLP-3AS RLP-3AM	3/8	-0.0002" -0.0006"	2" 3"	5/8	1+1/2	2+3/4	1/4
RLP-4AS RLP-4AL	1/2	-0.0002" -0.0006"	2" 4"	3/4	1+3/4	2+3/4	1/4

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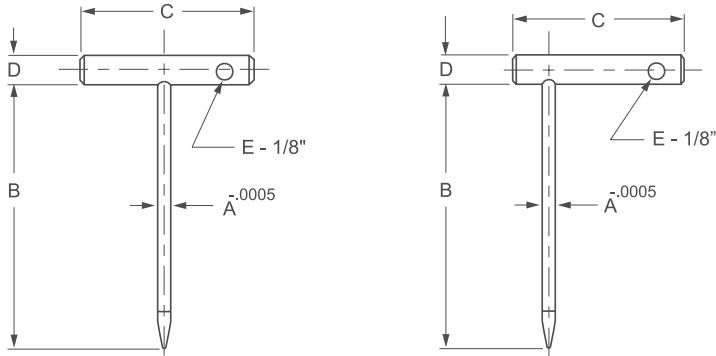
METRIC SIZES

Part Reference	Pin Diameter A		Pin	Body		T-Bar	
	Nominal	Tolerance	Length	Diameter	Length	Length	Diameter
			L	B	C	D	E
MRLP-1AS MRLP-1AM	5	-0.004mm -0.012mm	25	3/8	1+1/4	1+3/4	3/16
50							
MRLP-2AS MRLP-2AM	6	-0.004mm -0.012mm	25	1/2	1+1/2	2+1/2	3/16
50							
MRLP-2BS MRLP-2BM	7	-0.005mm -0.014mm	25	1/2	1+1/2	2+1/2	3/16
50							
MRLP-2CS MRLP-2CM	8	-0.005mm -0.014mm	25	1/2	1+1/2	2+1/2	3/16
50							
MRLP-3AM MRLP-3AL	9	-0.005mm -0.014mm	50	5/8	1+1/2	2+3/4	1/4
75							
MRLP-3BM MRLP-3BL	10	-0.005mm -0.014mm	50	5/8	1+1/2	2+3/4	1/4
75							
MRLP-4AM MRLP-4AL	12	-0.005mm -0.014mm	50	3/4	1+3/4	2+3/4	1/4
75							



L-Pins and T-Pins

Case Hardened Steel – Black Oxide Finish



KEY FEATURES

- / Precision ground pin
- / Case hardened steel
- / Black oxide finish
- / Drilled handle for cable assembly

APPLICATION

L Shaped Alignment Pins LP:

L-Pins are used to align location devices in Jig and Fixtures. They are precise and quick to remove. The 'L' shape is ideal when working space is restrictive. A cross drilled 1/8 hole is supplied in the handle to connect the pin to the fixture using an optional cable of lanyard.

T Shaped Alignment Pins TP:

T-Pins are used to align location devices in Jig and Fixtures. They are precise and quick to remove. The T shaped pins allow for greater grip

control and easy removal. A cross drilled 1/8 hole is supplied in the handle to connect the pin to the fixture using an optional cable of lanyard."

ORDERING INSTRUCTIONS

When ordering identify the nominal diameter required and then choose the length from the chart below. Example: 0.1910 x 6

NOTES

If you cannot find what you are looking for, Boneham can manufacture special sizes and materials to specification.



INCH Alignment Pins

T-PIN Part No.	L-PIN Part No.	Dimensions				
		A (+.0000 -0.0005)	B (+-.06)	C	D	E (+-.06)
TP125025	LP125025	0.1250	2-1/2	1-1/2	1/4	1/4
TP156235	LP156235	0.1562	3-1/2	2-1/2	5/16	1/4
TP18753	LP18753	0.1875	3	2-1/2	5/16	1/4
TP18754	LP18754	0.1875	4	2-1/2	5/16	1/4
TP18756	LP18756	0.1875	6	2-1/2	5/16	1/4
TP19103	LP19103	0.1910	3	2-1/2	5/16	1/4
TP19104	LP19104	0.1910	4	2-1/2	5/16	1/4
TP19106	LP19106	0.1910	6	2-1/2	5/16	1/4
TP19603	LP19603	0.1960	3	2-1/2	5/16	1/4
TP25002	LP25002	0.2500	2	2-1/2	3/8	3/8
TP25003	LP25003	0.2500	3	2-1/2	3/8	3/8
TP25004	LP25004	0.2500	4	2-1/2	3/8	3/8

ALL DIMENSIONS IN INCHES

Continued on next page

INCH Alignment Pins

T-PIN Part No.	L-PIN Part No.	Dimensions				
		A (+.0000 -.0005)	B (+-.06)	C	D	E (+-.06)
TP25006	LP25006	0.2500	6	2-1/2	3/8	3/8
TP25703	LP25703	0.2570	3	2-1/2	3/8	3/8
TP25704	LP25704	0.2570	4	2-1/2	3/8	3/8
TP31252	LP31252	0.3125	2	2-1/2	7/16	1/2
TP312535	LP312535	0.3125	3-1/2	3	7/16	1/2
TP31254	LP31254	0.3125	4	3	7/16	1/2
TP31256	LP31256	0.3125	6	3	7/16	1/2
TP37503	LP37503	0.3750	3	2-1/2	1/2	1/2
TP37504	LP37504	0.3750	4	3-1/2	1/2	1/2
TP37505	LP37505	0.3750	5	3-1/2	1/2	1/2
TP37506	LP37506	0.3750	6	3-1/2	1/2	1/2
TP37507	LP37507	0.3750	7	3-1/2	1/2	1/2
TP43754	LP43754	0.4375	4	3-1/2	9/16	5/8
TP43755	LP43755	0.4375	5	3-1/2	9/16	5/8
TP43756	LP43756	0.4375	6	3-1/2	9/16	5/8
TP50004	LP50004	0.5000	4	3-1/2	9/16	5/8
TP50005	LP50005	0.5000	5	3-1/2	9/16	5/8
TP50006	LP50006	0.5000	6	3-1/2	9/16	5/8
TP50007	LP50007	0.5000	7	3-1/2	5/8	5/8
TP50009	LP50009	0.5000	9	3-1/2	5/8	5/8
TP56254	LP56254	0.5625	4	3-1/2	5/8	5/8
TP56256	LP56256	0.5625	6	3-1/2	5/8	5/8
TP62506	LP62506	0.6250	6	3-1/2	7/8	3/4
TP62508	LP62508	0.6250	8	3-1/2	7/8	3/4
TP75006	LP75006	0.7500	6	3-1/2	7/8	3/4

ALL DIMENSIONS IN INCHES

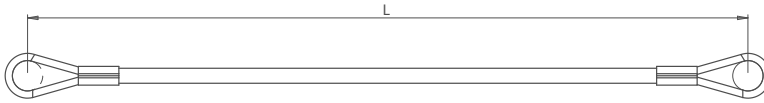
METRIC Alignment Pins

T-PIN Part No.	L-PIN Part No.	Dimensions				
		A (+.0000 -.0005)	B (+-.06)	C	D	E (+-.06)
TP488	LP488	4	88	64	8	8
TP576	LP576	5	76	64	8	8
TP5152	LP5152	5	152	64	8	8
TP676	LP676	6	76	64	10	10
TP6152	LP6152	6	152	64	10	10
TP888	LP888	8	88	76	11	11
TP8152	LP8152	8	152	76	11	11
TP1076	LP1076	10	76	64	13	13
TP10152	LP10152	10	152	88	13	13
TP12102	LP12102	12	102	88	16	16
TP12152	LP12152	12	152	88	16	16
TP16152	LP16152	16	152	88	22	22
TP16204	LP16204	16	204	88	22	22
TP20152	LP20152	20	152	88	22	22
TP20204	LP20204	20	204	88	22	22

ALL DIMENSIONS IN MILLIMETERS

Cable

Cables for Fixtures



KEY FEATURES

- / Red nylon jacket
- / 4" to 24" long
- / Loop to loop configuration
- / 304 stainless steel cable
- / Aluminium crimps

APPLICATION

Boneham cables are ideal for linking removable location or alignment components to a fixture. Cables prevent damage or loss of the component by fixing one end of the cable to the fixture and the other to the component.

ORDERING INSTRUCTIONS

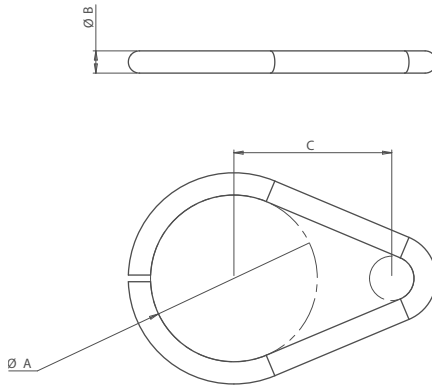
When ordering: Choose length of wire required and order corresponding part number. Clips are ordered separately.



Part No.	L	Loop Fixing Size
LC4R	4"	1/4"
LC6R	6"	1/4"
LC8R	8"	1/4"
LC10R	10"	1/4"
LC12R	12"	1/4"
LC16R	16"	1/4"
LC20R	20"	1/4"
LC24R	24"	1/4"

Cable Clips

Clips for Cables



KEY FEATURES

- / Use with Boneham Cables
- / To suit T-Bar and Alignment Pins
- / 304 Stainless Steel
- / Simple economic cable solution

APPLICATION

Retaining Clips for Boneham cables are a simple and economic method of securing components to cables (lanyards) which then prevent loss or damage to important location and alignment pins on fixtures.

ORDERING INSTRUCTIONS

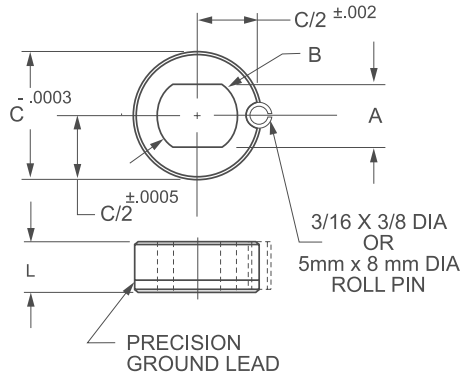
When ordering: Identify the clip size required and choose corresponding part number. Lanyards ordered seperately.



Part No.	A (ID)	B	C
LCC8.5SS	0.335	0.039	0.279
LCC11.5SS	0.453	0.047	0.343
LCC14.5SS	0.571	0.063	0.405
LCC17.5SS	0.689	0.063	0.468
LCC20.5SS	0.807	0.078	0.532

Slotted Locator Bushes

SL Type Press-Fit Locator Bush



KEY FEATURES

- / INCH (SL) and Metric (SLM)
- / Heat treated to HRC 58-62
- / Precision ground
- / Black oxide finish

APPLICATION

Boneham's 'SL Type' Slotted Locator Bushes are designed for use with 'L' or 'T' Pins. Using a configuration with a high tolerance bush, Slotted Location Bushes allow for relief in one direction during alignment, whilst maintaining tight tolerances in the other direction.

ORDERING INSTRUCTIONS

When ordering identify the slot width required and select the appropriate part number. Example: SL-488-A

NOTES

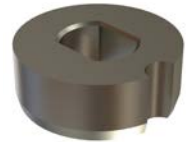
To Install:

- / Drill and ream a 3/16 for the Inch roll pin or 5mm for the metric assembly
- / Then bore a press fit hole with an interference fit of 0.0003 to 0.0005
- / Press the roll pin and locator bush in together until flush. The relationship between the roll pin and bush provides accurate orientation.

Roll Pin Included:

Inch: 3/16 x 3/8
Metric: 5mm x 8mm

- / Stainless can be manufactured upon request. Please talk to the technical sales team.

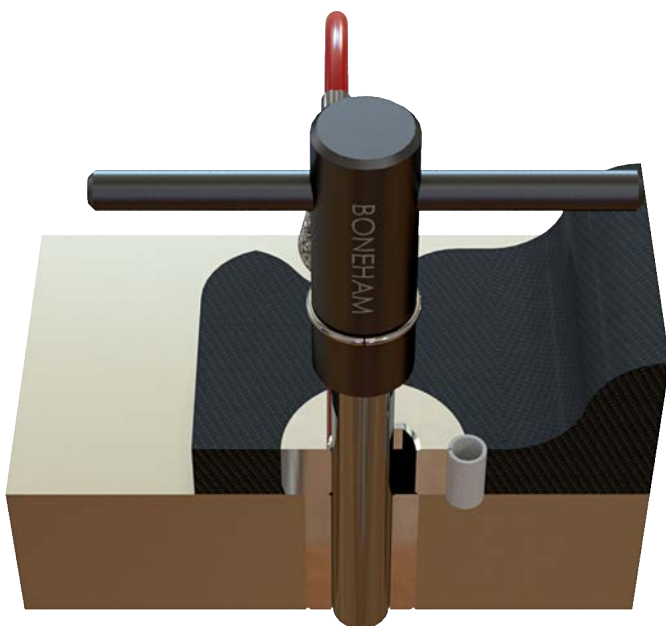


INCH

Part No.	A	B	C	L	Pin Dia.
SL-488-A	.1876 / .1882	0.312	0.7504	0.40	3/16
SL-488-B	.2501 / .2507	0.375	0.7504	0.40	1/4
SL-648-A	.2501 / .2507	0.375	1.0004	0.40	1/4
SL-648-B	.3126 / .3132	0.437	1.0004	0.40	5/16
SL-648-C	.3751 / .3757	0.500	1.0004	0.40	3/8
SL-648-D	.5001 / .5007	0.625	1.0004	0.40	1/2
SL-6416	.5001 / .5007	0.625	1.0004	0.90	1/2
SL-8016	.6251 / .6257	0.750	1.2504	0.90	5/8
SL-9616-A	.7501 / .7510	0.812	1.5004	1.00	3/4
SL-9616-B	.8751 / .8760	1.000	1.5004	1.00	7/8
SL-9616-C	1.0001 / 1.0010	1.062	1.5004	1.00	1

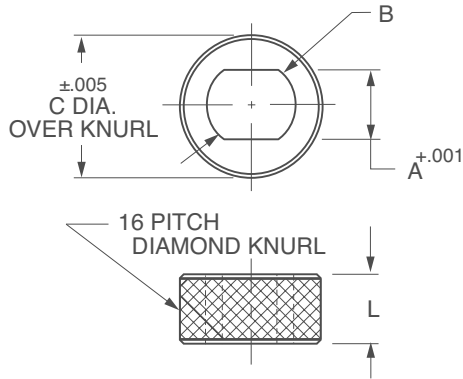
METRIC

Part No.	A	B	C	L	Pin Dia.
SLM6	6.00 / 6.03mm .2363 / .2373	9mm 0.354	20mm 0.787	9mm 0.354	6mm
SLM8	8.00 / 8.03mm .3151 / .3161	11mm 0.423	24mm 0.945	9mm 0.354	8mm
SLM10	10.00 / 10.30mm .3938 / .3948	13mm 0.512	24mm 0.945	9mm 0.354	10mm
SLM12	12.00 / 12.03mm .4725 / .4735	15mm 0.591	24mm 0.945	14mm 0.551	12mm
SLM16	16.00 / 16.03mm .6300 / .6310	18mm 0.709	30mm 1.181	12mm 0.472	16mm
SLM20	20.00 / 20.03mm .7875 / .7885	22mm 0.866	36mm 1.417	19mm 0.748	20mm
SLM25	25.00 / 25.03mm .9844 / .9854	27mm 1.063	40mm 1.575	19mm 0.748	25mm



Slotted Locator Bushes

KSL Type Knurled Locator Bushes



KEY FEATURES

- / Inch sizes
- / Heat treated to HRC 58-62
- / Knurled OD
- / Ground

APPLICATION

Boneham Metal Products KSL type bushes are designed with a knurled OD for setting or casting into composites or soft materials. Like the 'SL type' these locator bushes are used with locator pins such as the 'L' or 'T' pins. The slotted bush allows for relief in one direction during alignment, whilst maintaining tight tolerances in the other direction.

ORDERING INSTRUCTIONS

When ordering identify the slot width required and select corresponding part number. Example: KSL-408

NOTES

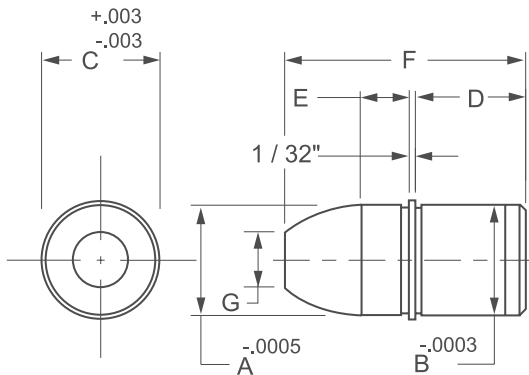
The KSL bushes OD diamond knurl allows for the locator bush to be embedded into materials such as composites.



Part No.	A	B	C	L	PIN DIA
KSL-368	0.1876	0.312	0.565	0.500	3/16
KSL-408	0.2501	0.375	0.640	0.500	1/4
KSL-488	0.3126	0.437	0.765	0.500	5/16
KSL-568	0.3751	0.500	0.890	0.500	3/8
KSL-648	0.5001	0.625	1.015	0.500	1/2
KSL-9616	0.5001	0.625	1.015	1.000	1/2

Location Pins

Bullet Nose Dowels



KEY FEATURES

- / Precision ground location system
- / Case hardened
- / Black oxide finish
- / Concentric to 0.0005" TIR
- / INCH and Metric sizes

APPLICATION

Bullet Nose Dowels BND are used in conjunction with a Bullet Nose Liner BNL to create a precision location system, aligning two work pieces with complete accuracy. The pins head and body diameters are concentric to within .0005" TIR.

ORDERING INSTRUCTIONS

When ordering identify the diameter required and identify the part number from the chart below. Example: BND2499

NOTES

If you cannot find what you are looking for, Boneham can manufacture special sizes and materials to specification.



INCH

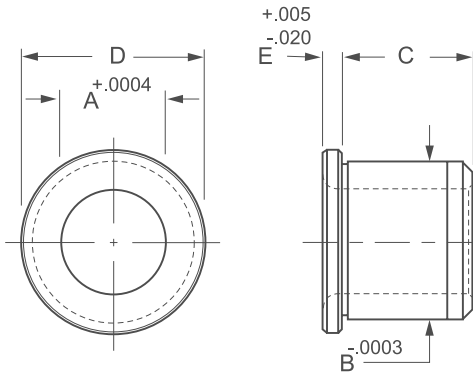
Part No.	Dimensions								Mating Liner Part No.
	A		B	C	D	E	F	G	
	+ .0000	- .0005	+ .0000	+/- .003					
	NOMINAL	ACTUAL	- .0003						
BND2499	1/4	.2499	.2516	.280	.500	.125	.907	1/8	BNL2501
BND3124	5/16	.3124	.3141	.344	.500	.157	.939	5/32	BNL3126
BND3749	3/8	.3749	.3766	.407	.500	.187	1.032	3/16	BNL3751
BND4999	1/2	.4999	.5017	.532	.500	.187	1.094	1/4	BNL5001

METRIC

Part No.	Dimensions								Mating Liner Part No.
	A		B	C	D	E	F	G	
	+ .0000	- .0005	+ .0000	+/- .003					
BNDM600	6mm	6mm	7mm	12mm	3mm	22mm	1/8	BNLM600	
BNDM800	8mm	8mm	9mm	12mm	4mm	23mm	5/32	BNLM800	
BNDM1000	10mm	10mm	11mm	12mm	5mm	25mm	3/16	BNLM1000	
BNDM1200	12mm	12mm	15mm	12mm	5mm	27mm	1/4	BNLM1200	

Location Pins

Liner for Bullet Nose Dowels



KEY FEATURES

- / Precision ground location system
- / Case hardened
- / Black oxide finish
- / ID / OD Concentric to 0.0003" TIR
- / INCH and Metric sizes

APPLICATION

Liners for Bullet Nose Dowels are the receiving bush element of the location system. The bushes ID and OD are concentric to within .0003 TIR.

ORDERING INSTRUCTIONS

When ordering identify the ID required and identify the part number from the chart below. Example: BNL3751

NOTES

If you cannot find what you are looking for, Boneham can manufacture special sizes and materials to specification.



INCH

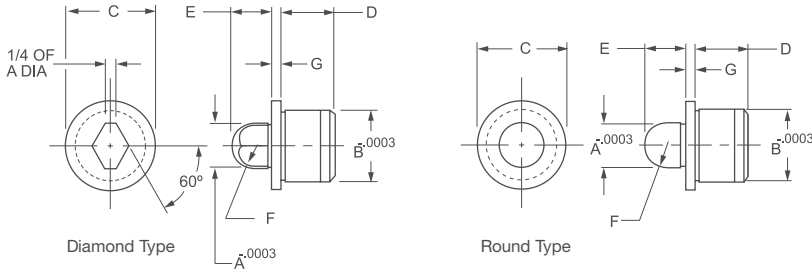
Part No.	Dimensions					
	A .0000 / +.0004		B +.0000 -.0003	C +/- .003	D	E
	NOMINAL	ACTUAL				
BNL2501	1/4	0.2501	0.5017	3/8	0.625	.100
BNL3126	5/16	0.3126	0.5017	3/8	0.625	.100
BNL3751	3/8	0.3751	0.6267	1/2	0.750	.100
BNL5001	1/2	0.5001	0.7518	5/8	0.875	.100

METRIC

Part No.	Dimensions				
	A .0000 / +.0004	B -.0003	C	D	E +.005 / -.020
BNLM600	6mm	10mm	7mm	13mm	3mm
BNLM800	8mm	12mm	7mm	15mm	3mm
BNLM1000	10mm	15mm	9mm	18mm	3mm
BNLM1200	12mm	18mm	12mm	22mm	3mm

Location Pins

Bullet Nose Pins



KEY FEATURES

- / Precision ground location system
- / Case hardened
- / Black oxide finish
- / Concentric to .0005" TIR
- / INCH and Metric sizes

APPLICATION

Bullet Nose Pins come in two different forms, round BNR or diamond (relieved) BNP. Bullet Nose Pins are used with a mating bush BNPL to create an accurate alignment and locating system. Using a relieved diamond pin maintains accuracy in alignment but prevents binding of the work pieces. For simple

installation the OD of the pin and the bush are exactly the same to allow for one pass boring of the holes in both plates. The pins head and body are concentric to .0005 TIR.



ORDERING INSTRUCTIONS

When ordering identify the diameter of the pin required and select the part number from the chart below.
Example: BNR4998

NOTES

If you cannot find what you are looking for, Boneham can manufacture special sizes and materials to specification.



INCH

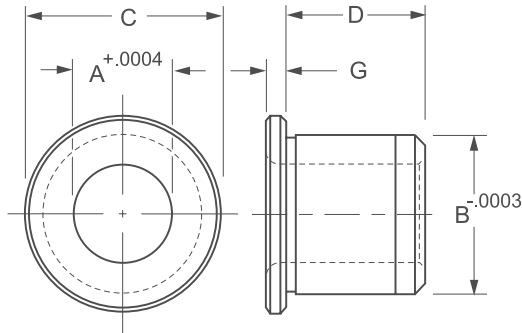
Part No.		Dimensions									Mating Liner Part No.
Round Pin	Diamond Pin	A -.0003		B -.0003		C	D	E	F	G	
		NOMINAL	ACTUAL	NOMINAL	ACTUAL						
BNR2499	BNP2499	1/4	0.2499	13/32	0.4078	9/16	3/8	7/32	1/8	1/16	BNPL2501
BNR3124	BNP3124	5/16	0.3124	1/2	0.5017	5/8	3/8	9/32	5/32	1/16	BNPL3126
BNR3748	BNP3748	3/8	0.3748	5/8	0.6267	3/4	1/2	11/32	3/16	1/16	BNPL3751
BNR4998	BNP4998	1/2	0.4998	3/4	0.7518	7/8	1/2	13/32	1/4	1/16	BNPL5001
BNR7498	BNP7498	3/4	0.7498	1	1.0018	1+1/8	3/4	9/16	3/8	1/8	BNPL7502
BNR9998	BNP9998	1	0.9998	1+3/8	1.3771	1+1/2	3/4	3/4	1/2	1/8	BNPL1000

METRIC

Part No.		Dimensions									Mating Liner Part No.
Round Pin	Diamond Pin	A	B	C	D	E	F	G			
		-0.0003	-0.0003								
BNRM600	BNDPM600	6mm	10mm	13mm	9mm	6mm	3mm	2mm	BNPLM600		
BNRM800	BNDPM800	8mm	12mm	15mm	9mm	7mm	4mm	2mm	BNPLM800		
BNRM1000	BNDPM1000	10mm	15mm	18mm	11mm	9mm	5mm	2mm	BNPLM1000		
BNRM1200	BNDPM1200	12mm	18mm	22mm	11mm	10mm	6mm	2mm	BNPLM1200		

Location Pins

Liner for Bullet Nose Pins



KEY FEATURES

- / Precision ground location system
- / Case hardened
- / Black oxide finish
- / ID / OD Concentric to .0003" TIR
- / INCH and Metric sizes

APPLICATION

Liners for bullet nose pins are the receiving bush element of the location system. The bush OD is the same size as the pins diameter and is concentric to the ID within .0003 TIR.

ORDERING INSTRUCTIONS

When ordering identify the ID required and identify the part number from the chart below.
Example: BNPL5001

NOTES

If you cannot find what you are looking for, Boneham can manufacture special sizes and materials to specification.



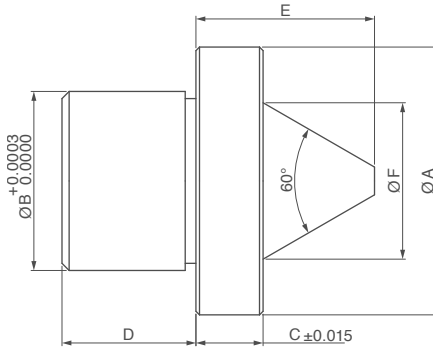
INCH

Part No.	Dimensions					
	A +.0004		B -.0003	C	D	G
	NOMINAL	ACTUAL				
BNPL2501	1/4	0.2501	0.4078	9/16	7/16	1/16
BNPL3126	5/16	0.3126	0.5017	5/8	7/16	1/16
BNPL3751	3/8	0.3751	0.6267	3/4	7/16	1/16
BNPL5001	1/2	0.5001	0.7518	7/8	1/2	1/16
BNPL7502	3/4	0.7502	1.0018	1-1/8	1/2	1/8
BNPL10000	1	1.0002	1.3771	1-1/2	11/16	1/8

METRIC

Part No.	Dimensions				
	A +.0004	B -.0003	C	D	G
BNPLM600	6mm	10mm	13mm	8mm	2mm
BNPLM800	8mm	12mm	15mm	8mm	2mm
BNPLM1000	10mm	15mm	18mm	10mm	2mm
BNPLM1200	12mm	18mm	22mm	10mm	2mm

Easy-Cone Locator Pin



KEY FEATURES

- / Rapid location
- / Hardened and Blacked
- / 60° Conical Profile
- / Ground body for accurate setting
- / Metric and Inch

APPLICATION

Easy Cone Locators are a reduced precision location device. Accuracy is +/- 0.0003" on the OD of the bush and pin. But unlike other precision locators supplied by Boneham, they are not tied down on the conical location point. The 60° conical locating point provides rapid alignment properties. Misalignment is compensated for by the distance from the peak of the cone to edge of the entry point of the bush. This is the right solution for quick alignment of two workpieces in a repetitive production environment. A one operation preparation process can be used, boring both plates at the same time, with both OD's of the pin and bush being the same.

ORDERING INSTRUCTIONS

When ordering identify the diameter required and find the part number in the below table. Mating bushes are referenced in the table.

NOTES

Can't find what you are looking for? Boneham can manufacture special sizes and materials to specification.



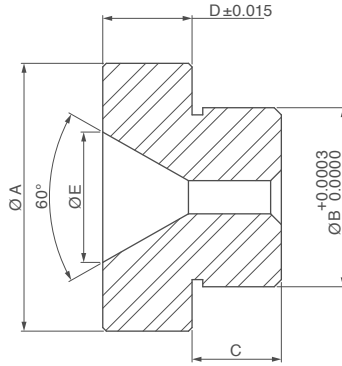
INCH

Part No.	A Dia	B Dia		C	D	E	F Dia	Clearance Between Bushing and Pin Assembly (Inch)
		NOM (Inch)	ACTUAL (Inch)					
CLP5014	3/4"	1/2"	0.5014	3/16"	3/8"	5/16"	0.438	.050-.068
CLP7515	1	3/4"	0.7515	3/16"	9/16"	1/2"	0.676	.043-.061

METRIC

Part No.	A Dia	B Dia		C	D	E	F Dia	Clearance Between Bushing and Pin Assembly (mm)
		NOM (mm)	ACTUAL (mm)					
CLPM1200	19	12	12.034	4.76	9.5	7.9	11.1	1.27-1.73
CLPM2000	25.5	20	20.038	4.76	14.5	12.7	17.2	1.09-1.55

Easy-Cone Locator Bush



KEY FEATURES

- / Rapid location
- / Hardened and Blacked
- / 60° Conical Profile
- / Ground body for accurate setting
- / Metric and Inch

APPLICATION

Easy Cone Locators are a reduced precision location device. Accuracy is $\pm 0.0003''$ on the OD of the bush and pin. But unlike other precision locators supplied by Boneham, they are not tied down on the conical location point. The 60° conical locating point provides rapid alignment properties. Misalignment is compensated for by the distance from the peak of the cone to edge of the entry point of the bush. This is the right solution for quick alignment of two workpieces in a repetitive production environment. A one operation preparation process can be used, boring both plates at the same time, with both OD's of the pin and bush being the same.

ORDERING INSTRUCTIONS

When ordering identify the diameter required and find the part number in the below table. Mating bushes are referenced in the table.

NOTES

Can't find what you are looking for? Boneham can manufacture special sizes and materials to specification.



IMPERIAL

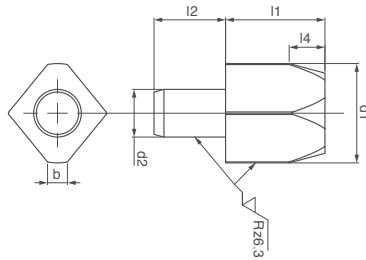
Part No.	A Dia	B Dia		C	D	E Dia	Clearance Between Bush and Pin Assembly (Inch)
		NOM (Inch)	ACTUAL (Inch)				
CLB5014	3/4	1/2	0.5014	1/4	1/4	0.37	.050-.068
CLB7515	1	3/4	0.7515	3/8	3/8	0.616	.043-.061

METRIC

Part No.	A Dia	B Dia		C	D	E Dia	Clearance Between Bush and Pin Assembly (mm)
		NOM (mm)	ACTUAL (mm)				
CLBM1200	19	12	12.034	6.4	6.35	9.4	1.27-1.73
CLBM2000	25.5	20	20.038	9.5	9.52	15.65	1.09-1.55

Location and Seating Pins

Diamond Type Form C / Flattened Locating Pin / DIN 6321

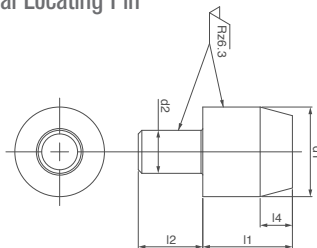


MATERIAL

/ Tool steel hardened and ground

REF	d1	l1		b	d2	l2	l4
	g6	short	long				
LPF1-3622	6	7	12	1-0	4	6	4
LPF2-3622	8	10	16	1-6	6	9	6
LPF3-3622	10	10	18	2-5	6	9	6
LPF4-3622	12	10	18	2-5	6	9	6
LPF5-3622	16	13	22	3-5	8	12	8
LPF6-3622	20	15	25	5-0	12	18	9
LPF7-3622	25	15	25	5-0	12	18	9

Round Type Form B / Cylindrical Locating Pin



MATERIAL

/ Tool steel hardened and ground

ORDERING INSTRUCTIONS

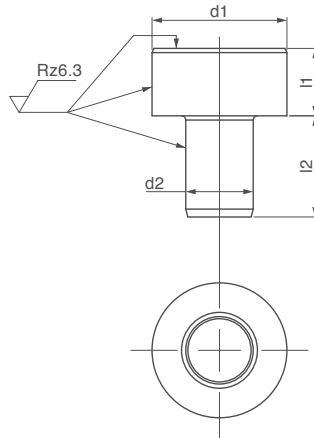
Advise ref and l1 size short or long.

Note: add suffix S or L to reference. (eg. LPF1-3622 s)

REF	d1	l1		d2	l2	l4
	g6	short	long			
LPR1-3622	6	7	12	4	6	4
LPR2-3622	8	10	16	6	9	6
LPR3-3622	10	10	18	6	9	6
LPR4-3622	12	10	18	6	9	6
LPR5-3622	16	13	22	8	12	8
LPR6-3622	20	15	25	12	18	9
LPR7-3622	25	15	25	12	18	9

Location and Seating Pins

Flat Type Form A / Seating Pin / DIN 6321



MATERIAL

/ Tool steel hardened and ground

ORDERING INSTRUCTIONS

Advise ref and l1 size short or long.

Note: add suffix S or L to reference. (eg. LPR1-3622 s)

/ $l_1 = h9$ and can be used at a bearing surface in jigs.

/ Location pins are used to locate work pieces and fixtures or as stops.

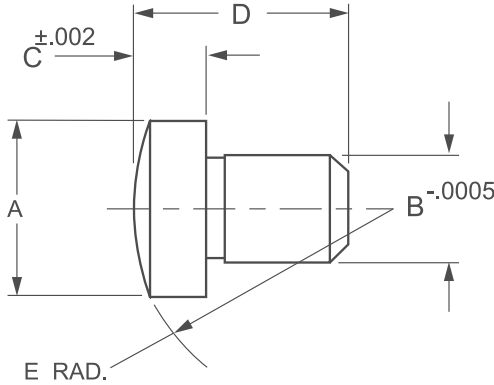


DIN 6321

REF	d1 g6	l1	l2	d2 n6
SP1-3622	6	5	6	4
SP2-3622	10	6	9	6
SP3-3622	16	8	12	8
SP4-3622	25	10	18	12

Location Pins

SLB Type Spherical Locator



KEY FEATURES

- / Case hardened
- / Black oxide finish
- / Pin tolerance -0.0005
- / Head thickness ± 0.002

APPLICATION

Boneham's Spherical Locator Buttons are designed for irregular work surface applications, the spherical radius creates a single point of contact on contoured workpieces. The features of the SLB allow for other uses such as jig feet and rest pads. The pin element of the button is ground to allow for press fit.

ORDERING INSTRUCTIONS

When ordering identify the pin diameter and head depth required and select the appropriate part number. Example: SLB5000

NOTES

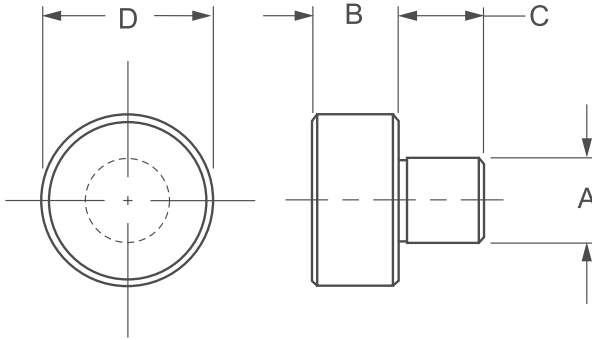
- / Stainless and specials can be manufactured upon request. Please talk to the technical sales team.
- / Metric sizes upon request.



Part No.	Dimensions				
	A	B $+ .0000 - .0005$	C $+ / - .002$	D	E
SLB3750	5/16	0.1890	1/8	3/8	1/2
SLB5000	3/8	0.2515	3/16	1/2	5/8
SLB5625	1/2	0.3765	3/16	9/16	3/4
SLB6250	1/2	0.3765	1/4	5/8	3/4
SLB7500	1/2	0.3765	3/8	3/4	3/4
SLB8750	1/2	0.3765	1/2	7/8	3/4

Rest Buttons

Round Rest Buttons



KEY FEATURES

- / Pin diameters from 0.1885 to 0.7515
- / Finish ground head thickness +/- 0.001
- / Pin tolerance -0.005
- / Case hardened
- / Black oxide finish

APPLICATION

Round Rest Buttons RB are a precise and accurate method of supporting, height setting or resting a work piece in a fixture. They are designed to press fit, with the head thickness also precision ground.

ORDERING INSTRUCTIONS

When ordering identify the pin diameter and head depth required and select the appropriate part number. Example: RB28

NOTES

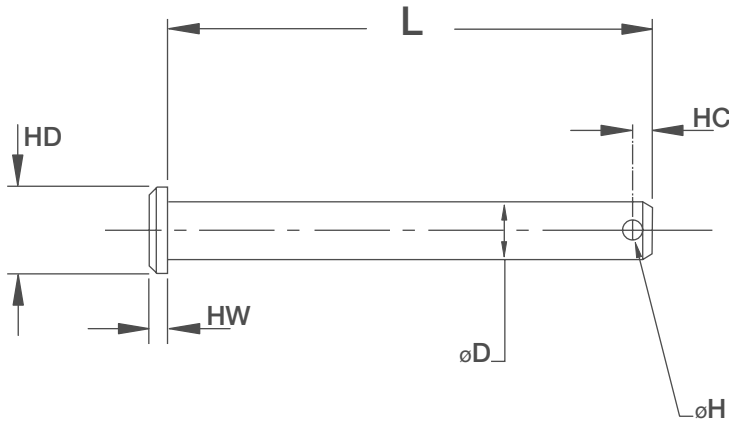
- / Stainless and specials can be manufactured upon request. Please talk to the technical sales team.
- / Metric sizes upon request.



Part No.	Dimensions				
	A +0.000 / -0.005		B -0.00 / +0.01	C	D
	NOMINAL	ACTUAL			
RB02	3/16	0.1885	0.250	3/8	3/8
RB04	3/16	0.1885	0.375	3/8	3/8
RB06	3/16	0.1885	0.500	3/8	3/8
RB08	1/4	0.2510	0.250	1/2	1/2
RB10	1/4	0.2510	0.375	1/2	1/2
RB12	1/4	0.2510	0.500	1/2	1/2
RB14	5/16	0.3135	0.250	1/2	9/16
RB16	5/16	0.3135	0.375	1/2	9/16
RB18	5/16	0.3135	0.500	1/2	9/16
RB20	3/8	0.3760	0.250	5/8	5/8
RB22	3/8	0.3760	0.375	5/8	5/8
RB24	3/8	0.3760	0.500	5/8	5/8
RB26	3/8	0.3760	0.625	5/8	5/8
RB28	3/8	0.3760	0.750	5/8	5/8
RB30	1/2	0.5010	0.375	5/8	7/8
RB32	1/2	0.5010	0.500	5/8	7/8
RB34	1/2	0.5010	0.625	5/8	7/8
RB36	1/2	0.5010	0.750	5/8	7/8
RB38	5/8	0.6260	0.375	3/4	1
RB40	5/8	0.6260	0.500	3/4	1
RB42	5/8	0.6260	0.625	3/4	1
RB44	5/8	0.6260	0.750	3/4	1
RB46	3/4	0.7515	0.500	7/8	1-1/4
RB48	3/4	0.7515	0.625	7/8	1-1/4

Clevis Pins – Metric

ISO 2341 B DIN 1444 B



HUGE STOCKS

VOLUME DISCOUNT

STAINLESS STEEL

MATERIAL

/ Steel Bright Zinc Plated (CPZP) –
Stainless Steel Type A2 (CPSS)

ORDERING INSTRUCTIONS

/ State CPSS for stainless steel or CPZP for Zinc Plated. When ordering give D x L

NOTES

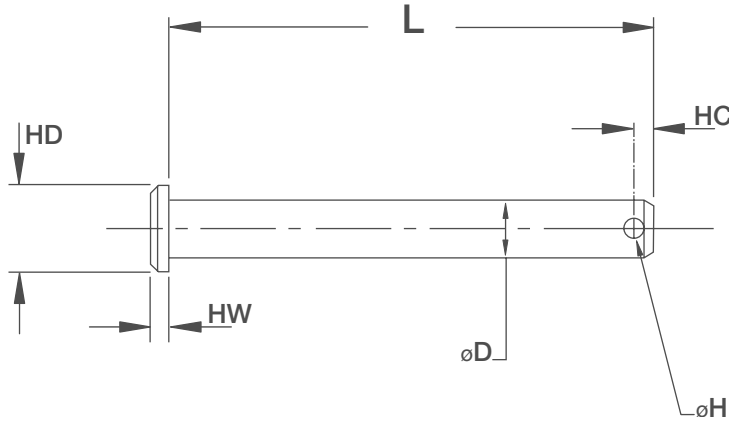
Some feature sizes on our clevis pins have been altered from the standard to improve functionality or to assemble with available retaining clips.



Dia	D	3	4	5	6	8	10	12	16	20	24
Head Dia	HD	4.5	6	8	10	14	18	20	25	30	36
Head Width	HW	1.2	1.5	1.6	2	3	4	4	4.5	5	6
Hole Dia	H	1.1	1.2	1.2	1.6	2	3.2	3.2	4	5	6.3
Hole Centre	HC	2.1	2.5	2.9	3.2	3.5	4.5	5.5	6	8	9

L \ D	3	4	5	6	8	10	12	16	20	24
10										
12										
16										
20										
25										
30										
35										
40										
50										
60										
70										
80										
90										
100										

Clevis Pins – Imperial



HUGE STOCKS

VOLUME DISCOUNT

STAINLESS STEEL

MATERIAL

/ Steel Bright Zinc Plated (CPZP) –
Stainless Steel Type A2 (CPSS)

ORDERING INSTRUCTIONS

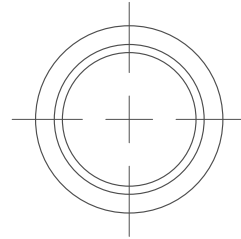
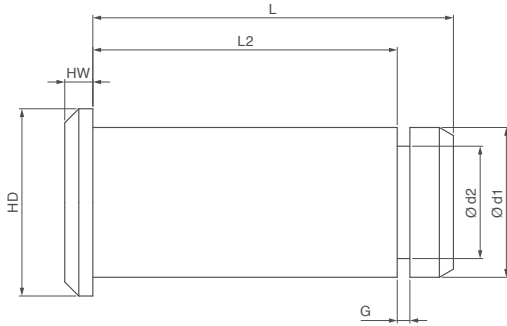
/ State CPSS for stainless steel or CPZP for Zinc Plated. When ordering give D x L



Dia	D	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
Head Dia	HD	5/16"	3/8"	7/16"	1/2"	5/8"	11/16"	15/16"	1.3/16"
Head Width	HW	1/16"	3/32"	3/32"	1/8"	5/32"	13/64"	1/4"	11/32"
Hole Dia	H	0.078"	0.078"	0.104"	0.104"	0.135"	0.156"	0.156"	0.156"
Hole Centre	HC	0.100"	0.100"	0.140"	0.160"	0.160"	0.160"	0.160"	0.210"

L \ D	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
1/2"								
5/8"								
3/4"								
1"								
1 1/4"								
1 1/2"								
1 3/4"								
2"								
2 1/4"								
2 1/2"								
2 3/4"								
3"								
3 1/4"								
3 1/2"								
3 3/4"								
4"								

Clevis Pins – Grooved Type



DESCRIPTION

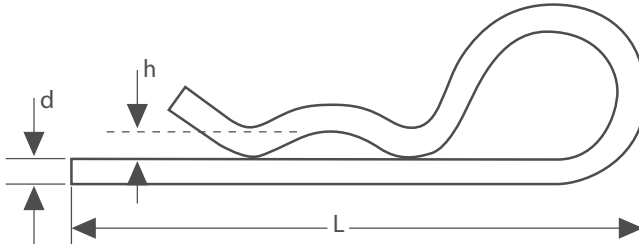
Clevis Pin for use with fork ends and circlips, or retaining ring for quick release.



Part Reference	d1	L	L2	d2	HW	HD	G
NBM4	4	10.5	8.5	3.2	1	6	0.64
NBM5	5	13	10.5	4	1.5	8	0.74
NBM6	6	15.5	12.5	5	1.5	9	0.74
NBM8	8	20	16.5	6	2	12	0.94
NBM10	10	25	20.5	8	2.5	14	1.05
NBM12	12	30	24.5	9	3	16	1.15
NBM14	14	33	27.5	10	3	18	1.25
NBM16	16	38.5	32.5	12	3.5	20	1.35

R-Clips

Metric Bright Zinc Plated



KEY FEATURES

- / Single coil design
- / Easy to use in production and field environments
- / Bright zinc plated steel
- / Use with Boneham Clevis Pins

ORDERING INSTRUCTIONS

If using with a Boneham Clevis Pins, check compatibility of the pin from the clevis pin diameters on the right hand side of the table and pick corresponding part reference.

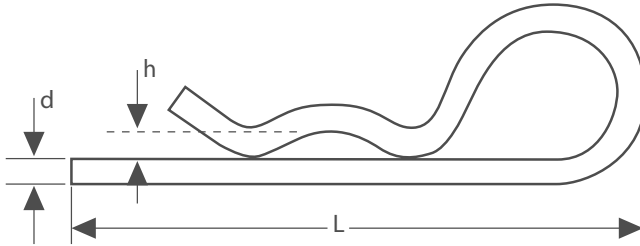


SINGLE COIL

Part Reference	d	H	L	For Clevis Pin
RC1.0BZP	1	2	20	3-5
RC1.2BZP	1.2	2	22	5-8
RC1.5BZP	1.6	2	26	6-10
RC2.0BZP	2	3	56	9-14
RC2.5BZP	2.5	4	48	9-14
RC3.0BZP	3	4.5	72	10-20
RC3.5BZP	3.5	6.57	76	16-25
RC4.5BZP	4.5	7	90	20-30
RC6.0BZP	6	8	124	28-40

R-Clips

Metric Stainless Steel



KEY FEATURES

- / Single coil design
- / Easy to use in production and field environments
- / Stainless steel
- / Use with Boneham Clevis Pins

ORDERING INSTRUCTIONS

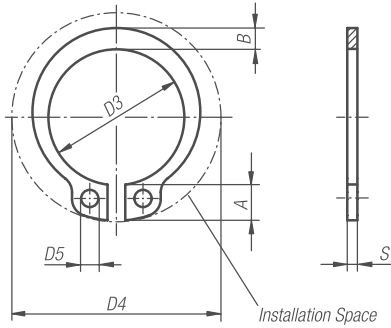
If using with a Boneham Clevis Pins, check compatibility of the pin from the clevis pin diameters on the right hand side of the table and pick corresponding part reference.



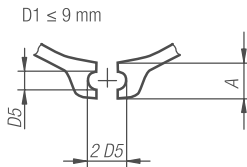
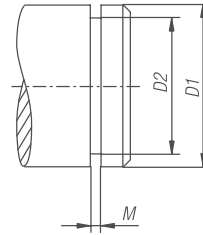
SINGLE COIL

Part Reference	d	H	L	For Clevis Pin
RC1.0SS	1	2	20	3-5
RC1.2SS	1.2	2	22	5-8
RC1.5SS	1.5	2	26	6-10
RC2.0SS	2	3	56	9-14
RC2.5SS	2.5	4	48	9-14
RC3.0SS	3	4.5	72	10-20
RC3.5SS	3.5	6.57	76	16-25
RC4.5SS	4.5	7	90	20-30
RC6.0SS	6	8	124	28-40

Circlips for Shafts



Assembly Dimensions



MATERIAL
/ Spring steel

SURFACE FINISH
/ Phosphated

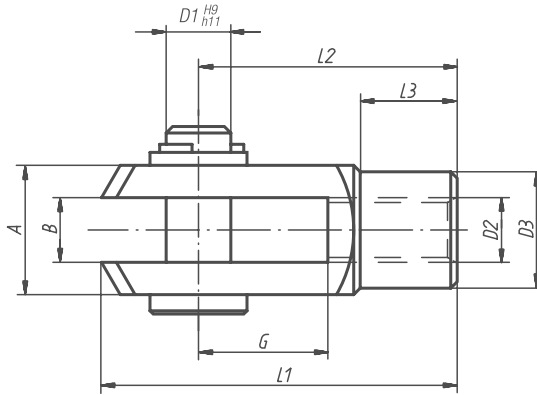
NOTES
The circlips per DIN 471 are universally usable, axially mountable securing elements for shafts. They can transmit large axial forces between the machine element (e.g. rolling-contact bearings) and the groove in which the ring is mounted.



Part Ref.	A	B	D1	D2	D3	D4	D5	M	S	Weight (g)
CC5MM	2,5	1,1	5	4,8	4,7	10,3	1	0,7	0,6	0,066
CC6MM	2,7	1,3	6	5,7	5,6	11,7	1,2	0,8	0,7	0,084
CC8MM	3,2	1,5	8	7,6	7,4	14,7	1,2	0,9	0,8	0,158
CC10MM	3,3	1,8	10	9,6	9,3	17	1,5	1,1	1	0,340
CC12MM	3,3	1,8	12	11,5	11	19	1,7	1,1	1	0,500
CC14MM	3,5	2,1	14	13,4	12,9	21,4	1,7	1,1	1	0,640
CC15MM	3,6	2,2	15	14,3	13,8	22,6	1,7	1,1	1	0,670
CC16MM	3,7	2,2	16	15,2	14,7	23,8	1,7	1,1	1	0,700

Clevis Pin Fork End

DIN 71751



MATERIAL

/ Free-cutting steel

SURFACE FINISH

/ Galvanized

ON REQUEST

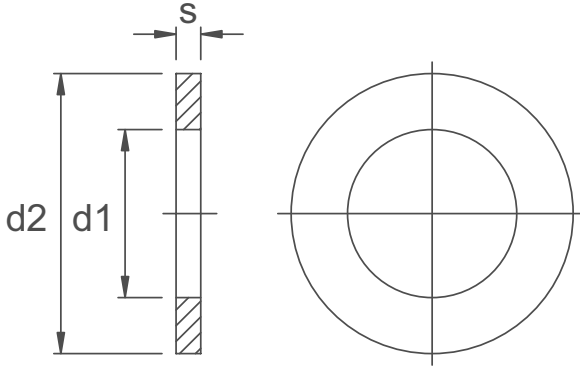
/ Left-handed thread



Part Ref.	Surface	Finish	B	G	D1	D2	D3	L1	L2	L3	A	Weight (g)
CPFE5MM	right-handed	thread	5	10	5	M5	9	26	20	7,5	10	10,0
CPFE6MM	right-handed	thread	6	12	6	M6	10	31	24	9	12	16,0
CPFE8MM	right-handed	thread	8	16	8	M8	14	42	32	12	16	38,0
CPFE10MM	right-handed	thread	10	20	10	M10	18	52	40	15	20	80,0
CPFE12MM	right-handed	thread	12	24	12	M12	20	62	48	18	24	125,0

Flat Washer

DIN 125



DESCRIPTION

Clevis Pin Spacing Washer: Metric



Clevis Pin Spacing Washer Zinc Plated

	Clevis Size	d1	d2	s
CPWZP 3MM	3mm	3.2mm	7mm	0.5
CPWZP 4MM	4mm	4.3mm	9mm	0.8
CPWZP 5MM	5mm	5.3mm	10mm	1
CPWZP 6MM	6mm	6.4mm	12mm	1.6
CPWZP 8MM	8mm	8.4mm	16mm	1.6
CPWZP 10MM	10mm	10.5mm	20mm	2
CPWZP 12MM	12mm	13mm	24mm	2.5
CPWZP 16MM	16mm	17mm	30mm	3

Clevis Pin Spacing Washer Stainless Steel

	Clevis Size	d1	d2	s
CPWSS 3MM	3mm	3.2mm	7mm	0.5
CPWSS 4MM	4mm	4.3mm	9mm	0.8
CPWSS 5MM	5mm	5.3mm	10mm	1
CPWSS 6MM	6mm	6.4mm	12mm	1.6
CPWSS 8MM	8mm	8.4mm	16mm	1.6
CPWSS 10MM	10mm	10.5mm	20mm	2
CPWSS 12MM	12mm	13mm	24mm	2.5
CPWSS 16MM	16mm	17mm	30mm	3

Special Parts to Customer Specification



Boneham & Turner Ltd's manufacturing plant has been the basis of its business since 1918 constantly improving machinery and passing on a wealth of experience through apprenticeships and dedicated long serving staff of up to 55 years. Customers know that when a drawing is passed to Boneham & Turner, they can expect the very best in precision engineered solutions and workmanship.



Areas of expertise

- / Turning
- / Milling
- / Internal Grinding / Honing
- / External Grinding

Specific Capabilities

- / Bar feed from 1mm upwards on multiple turning centres
- / Coil feed from 0.8mm to 6mm
- / Centreless grinding from 0.8mm
- / Internal grinding from 1.27mm
- / Cylindrical grinding
- / Plunge grinding from 3mm
- / CNC Milling with 4 axis capabilities

Boneham & Turner specialise in the manufacture of hardened and ground cylindrical components and welcome any drawing by fax +44 (0) 1623 445 451 or by email: sales@boneham.co.uk



BONEHAM USA Bushings – General Information

Standard Bushings

All of the bushings listed within this catalog are Boneham's range of standard sizes. The first section of this catalog contains our standard range of ANSI/ Boneham style bushings whose tolerances conform with the guidelines established by the American National Standards Institute (ANSI). Our range of standard bushing bores are those standard letter, number, and fractional sizes, in both drill and reamer tolerances, as defined by ANSI. For this range of bushings, selected millimeter bores from 2.3mm to 10.5mm, as designated by a box on the back cover, are also available as STANDARD. Any bore size not indicated as standard on the back cover is considered to be special. Our Sales Service Representatives will be glad to supply you with appropriate pricing for all specials.

The second section of this catalog offers our new range of "Total Metric" bushings. These dimensions and tolerances conform with the guidelines established by the International Standards Organization (ISO). Please refer to page 20 for ordering and technical information pertaining to these bushings.

Special Bushings

When required dimensions vary from the standard catalog listings of ID., O.D., Length, or Tolerance, the bushings are considered to be "specials". Many specials can be made from standard cataloged items by minor alterations. Others can be manufactured from standard bushing blanks. Some items are so completely different they must be custom made. Boneham is ready to manufacture all specials required – from the minor alteration to the complete "from scratch" special. Please forward your specifications, whether verbal, by sketch, or blueprint, along with your material requirements to our Sales Service Representatives for expeditious review and quotation.

Oversized Bushings

All ANSI/ Boneham Press Fit and Liner type bushings in the first section of this catalog are available with oversize (unground) O.D.'s. When ordering, use the same ANSI symbol system as for Finish Ground bushings and add a "U" at the end of the bushing length designation. Please note that all bushings will be considered to be Finish Ground unless specifically designated as Oversize or Unground.

For Example:

An Oversize Headless Liner with a 1" ID., a 1-3/8" O.D., and a 2-1/8" length would be described as L-88-34U. No drill size is required since liners have one standard bore size for a specific O.D. Also the "drill or reamer" specifications are not required due to the fact that renewable bushings are inserted into liners.

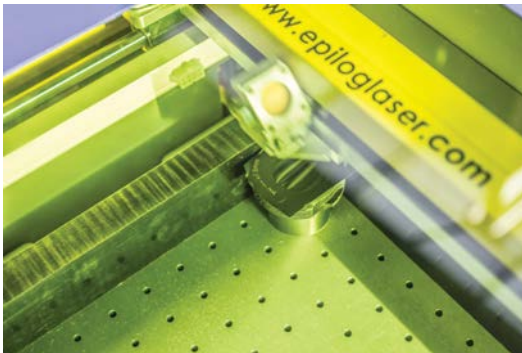
The following chart details the O.D. tolerances for oversize bushings:

Nom. O.D.	O/S Tol.	Nom. O.D.	O/S Tol.	Nom. O.D.	O/S Tol.
5/32	.166 .161	1/2	.520 .515	1-3/8	1.395 1.390
3/16	.198 .193	9/16	.582 .577	1-1/2	1.520 1.515
13/64	.213 .208	5/8	.645 .640	1-5/8	1.645 1.640
1/4	.260 .255	3/4	.770 .765	1-3/4	1.770 1.765
5/16	.327 .322	7/8	.895 .890	1-7/8	1.895 1.890
3/8	.393 .388	1	1.020 1.015	2-1/4	2.270 2.265
13/32	.421 .416	1-1/8	1.145 1.140	2-3/4	2.770 2.765
7/16	.455 .450	1-1/4	1.270 1.265		

Guarantee

Boneham Metal Products, Inc. Drill Bushings are guaranteed against defects in materials or workmanship. The tolerances of our products are guaranteed to conform to either ANSI, ISO, or catalog standards.

Boneham cannot accept returns or cancellations on special parts.



Part Marking

Ordering Information

ANSI/BMP Bushings

For ordering information on ISO style Total Metric Bushings, please see page 33.

For ANSI/Boneham style bushings please supply the following information:

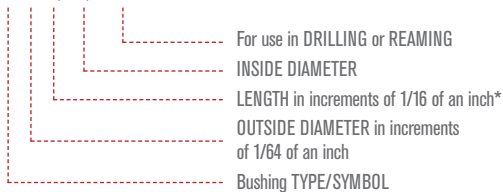
- / Bushing TYPE
- / OUTSIDE DIAMETER
- / Bushing LENGTH
- / INSIDE DIAMETER
- / Whether for a DRILL or REAMER

The bushings in this section of the catalog are defined by the ANSI Symbol System. This system is applied as follows:

Example Number 1:

A Headless Press Fit bushing with a 1/2" OD., a length of 3/4", a 1/4" bore, and to be used for drilling, would be described as:

P-32-12, 1/4, DRILL



*This is overall for headless press fit and all liner bushings and the "under-head" length for all head type press fit and renewable bushings.

Example Number 2:

A Slip-Fixed Renewable bushing with a 7/16" OD., a length of 1/2", a bore of 3mm, and to be used for Reaming, would be described as:

SF-TW-28-8, 3mm, REAMER

Bushing Type Designation

Bushing Type	ANSI/BMP Letter Designation	Thinwall Letter Designation
Headless Press Fit	P	P-TW
Head Press Fit	H	H-TW
Slip Fixed Renewable	SF	SF-TW
Headless Liner	L	L-TW
Head Type Liner	HL	-
Headless Metric	PM	-
Head Metric	HM	-
Serrated Press	SP	-
Serrated Press Metric	SPM	-
Diamond Groove	DG	-
Diamond Groove Metric	DGM	-
Slip Fixed Renewable Metric	SFM	-
U-Lock Liner	UL	-

Prices

ANSI/Boneham style bushings have the ANSI bushing symbol and Boneham price code in each identification box located in the charts on the following pages.

- / Please see separate price list for Boneham Standard Bushing Steel bushings.
- / Boneham NITRALLOY Nitrided drill bushings will be quoted upon request.
- / Please note that all prices may be subject to change without notice.

Technical Information

ANSI/BMP Bushings

Boneham Bushing Materials

- Standard Boneham Drill Bushings (over .0400" bore) are manufactured from steel which demonstrates excellent wear resistance and dimensional stability characteristics. This material is "hardened" to Rc 62-64.
- All Boneham Drill Bushings (.0625 bore and over), are offered in our Premium alloy NITRALLOY. Boneham NITRALLOY Nitrided Drill Bushings are "case hardened" to a case depth of .013" to Rc 67-69 equivalent. Hardness must be checked by using the 15Kg. Superficial Rockwell Scale. NITRALLOY Nitrided drill bushings demonstrate superior wear resistance and dimensional stability characteristics.
- Our Sales Service Representatives will be glad to provide you with a quotation on those bushings which have material requirements that are different from our standard materials, ie. M-2 HSS, Stainless Steel, O-6 Tool Steel, Carbide.

Bushing Body Characteristics

Entrance End

The entrance end of each Boneham Drill Bushing has a "blended radius". This permits easier tool entry and assistance in guiding the drill in cases of minor drill/drill bushing misalignment.

Counterbores

Any drill bushing with either a "small" bore, or with a "large" drill bushing length-to-bore ratio, is counterbored. This is to provide assistance with lubrication supply to the drill point, as well as expedient removal of chips. Those drill bushings that have standard counterbores are designated with either a • or †.

Please note that all drill bushings with standard counterbores can be supplied without counterbores. Our Sales Service Representatives will be glad to provide you with a quotation as per your requirements.

Chamfers/Leads

All Press Fit Bushings and Liners ground to Press Fit tolerances are supplied with a chamfer and ground concentric lead on the O.D. of the exit end. This chamfer/lead combination provides assistance by "starting" the bushing into the hole, resulting in easier insertion.

Bushing Bore Tolerances

For ANSI/BMP Standard and Thinwall Bushings for DRILLS

Bushing Type	Bore Tolerance Over Nominal
from .0135" to .2500"	+ .0001" - +.0004"
over. 2500" to 7500"	+ .0001" - +.0005"
over. 7500" to 1.500"	+ .0002" - +.0006"
over. 1.5000" to 1.8750"	+ .0003" - +.0007"

For ANSI/BMP Standard and Thinwall Bushings for REAMERS

Normal Bushing Bore	Bore Tolerance Over Nominal
from .0135" to .2500"	+ .0005" - +.0008"
over. 2500" to 1.0000"	+ .0006" - +.0010"
over. 1.0000"	+ .0008" - +.0012"

Concentricity Tolerances

Bores up to .5000"	.0003" T.I.R max
Bores over .5000"	.0005" T.I.R max
Metric Bores	.012mm T.I.R max

For ANSI/BMP Standard Drill Bushings

All Bore sizes	.0005" T.I.R max
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For Thinwall Drill Bushings

Please note that on Counterbored Drill Bushings, these concentricity specifications apply to the exit end of the bushing.

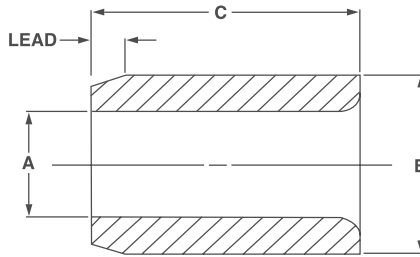
Bore Tolerances for ANSI Metric Bushings (G6)

Metric Sizes	Tolerance
.35 to 3.00	+ .002 / +.008
3.01 to 6.00	+ .004 / +.012
6.01 to 10.00	+ .005 / +.014
10.01 to 18.00	+ .006 / +.017
18.01 to 30.00	+ .007 / +.020
30.01 to 50.00	+ .009 / +.025
50.01 to 55.00	+ .010 / +.029

Metric Reamer Sizes	Tolerance
1.00 to 3.00	+ .006 / +.012
3.01 to 6.00	+ .010 / +.018
6.01 to 10.00	+ .013 / +.022
10.01 to 18.00	+ .016 / +.027
18.01 to 30.00	+ .020 / +.033

Headless Press Fit Drill Bushings

P Type ANSI Drill Bushings



KEY FEATURES

- / Diameters from 0.0156 to 1.7656
- / Hardened to 60-65 HRC
- / OD lead for easy installation
- / ID radius improves drill entry
- / OD ground to press fit size

APPLICATION

The 'P Type' drill bushing is normally used in jigs where an economically priced drill bushing is required, or where less space is available on the jig plate. Headless press fit bushings are pressed into the plate to achieve a flush surface in conjunction with a simple drilling and reaming operation.

ORDERING INSTRUCTIONS

When Ordering State: Quantity, Symbol, Bore Size and whether it's a Drill or Reamer. Example: 6, P-40-8-5/16

NOTES

- / For general ordering information and technical data see pages 97-98
- / To order Oversize Bushings; suffix symbol with the letter U Example: P-40-8U-5/16
- / Nitralloy Bushings quoted upon request
- / Price list codes detailed below; please see price list.



Bore Size A*	Outside Diameter B	C: Bushing Length and Price Code Number												
		Prefix	1/4"	5/16"	3/8"	1/2"	3/4"	1"	1 3/8"	1 3/4"	2 1/8"	2 1/2"	3"	
0.0135 to 0.0280	5/32	0.1578	P	-10-4	-10-5	-10-6	-10-8	-10-12						
		0.1575	POA	POA	POA	POA	POA							
0.0292 to 0.0591	5/32	0.1578	P	-10-4	-10-5	-10-6	-10-8†	-10-12†						
		0.1575	POA	POA	POA	POA	POA							
0.0595 to 0.0625	5/32	0.1578	P	-10-4	-10-5	-10-6	-10-8	-10-12*						
		0.1575	206	210	212	213	222							
0.0135 to 0.0280	13/64	0.2046	P	-13-4	-13-5	-13-6	-13-8	-13-12						
		0.2043	POA	POA	POA	POA	POA							
0.0292 to 0.0591	13/64	0.2046	P	-13-4	-13-5	-13-6	-13-8†	-13-12†						
		0.2043	POA	POA	POA	POA	POA							
0.0595 to 0.0625	13/64	0.2046	P	-13-4	-13-5	-13-6	-13-8	-13-12*	-13-16*					
		0.2043	206	210	212	213	222	237						
0.0635 to 0.0995	13/64	0.2046	P	-13-4	-13-5	-13-6	-13-8	-13-12*	-13-16*	-13-22*				
		0.2043	138	146	152	153	161	169	195					
0.0980 to 0.1406	1/4	0.2516	P	-16-4	-16-5	-16-6	-16-8	-16-12	-16-16*	-16-22*	-16-28*			
		0.2513	134	137	142	146	155	164	209	219				
0.1250 to 0.1935	5/16	0.3141	P	-20-4	-20-5	-20-6	-20-8	-20-12	-20-16	-20-22*	-20-28*			
		0.3138	123	126	129	130	135	140	169	201				
0.1875 to 0.2570	13/32	0.4078	P	-26-4	-26-5	-26-6	-26-8	-26-12	-26-16	-26-22*	-26-28*			
		0.4075	118	119	122	123	129	137	146	164				

Continued on next page

Headless Press Fit Drill Bushings

100

BONEHAM USA

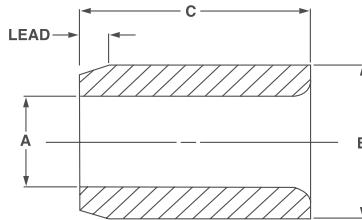
Bore Size A*	Outside Diameter B	C: Bushing Length and Price Code Number												
		Prefix	1/4"	5/16"	3/8"	1/2"	3/4"	1"	1 3/8"	1 3/4"	2 1/8"	2 1/2"	3"	
0.1875 to 0.3160	1/2	0.5017 P	-32-4	-32-5	-32-6	-32-8	-32-12	-32-16	-32-22*	-32-28*				
0.3125 to 0.4375	5/8	0.6267 P	-40-4	-40-5	-40-6	-40-8	-40-12	-40-16	-40-22	-40-28	-40-34	-40-40		
0.3125 to 0.5312	3/4	0.7518 P	-48-4	-48-5	-48-6	-48-8	-48-12	-48-16	-48-22	-48-28	-48-34	-48-40		
0.5000 to 0.6562	7/8	0.8768 P		-56-5	-56-6	-56-8	-56-12	-56-16	-56-22	-56-28	-56-34	-56-40	-56-48	
0.5000 to 0.7856	1	1.0018 P				-64-8	-64-12	-64-16	-64-22	-64-28	-64-34	-64-40	-64-48	
0.6250 to 1.0312	1-3/8	1.3772 P				-88-8	-88-12	-88-16	-88-22	-88-28	-88-34	-88-40	-88-48	
1.1000 to 1.3906	1-3/4	1.7523 P					-112-12	-112-16	-112-22	-112-28	-112-34	-112-40	-112-48	
1.3750 to 1.7856	2-1/4	2.2525 P						-144-16	-144-22	-144-28	-144-34	-144-40	-144-48	
		2.2521						207	218	227	272	299	342	

- * Standard bore sizes available are per chart shown in rear of catalog – including LETTER, NUMBER and FRACTIONAL SIZES. MILLIMETER – from 2.3 mm to 10.5 mm only for selected list designated by on back cover.
- COUNTERBORED – with adequate bearing length – can also be supplied without counterbore upon request.
- † COUNTERBORED – 0.0390 to 0.0469 with adequate bearing length; can also be supplied without counterbore upon request.
- *Price on Application, prices subject to change.



Headless Press Fit Drill Bushings

PM Type ANSI Metric Bushings



KEY FEATURES

- / Diameters from 1.50mm to 105mm
- / Hardened to 60-65 HRC
- / OD lead for easy installation
- / ID radius improves drill entry
- / OD ground to press fit size

APPLICATION

The 'PM Type' drill bushing is normally used in jigs where an economically priced drill bushing is required, or where less space is available on the jig plate. Headless press fit bushings are pressed into the plate to achieve a flush surface in conjunction with a simple drilling and reaming operation.

ORDERING INSTRUCTIONS

When Ordering State: Quantity, Symbol, Bore Size and whether it's a Drill or Reamer.
Example: 6, PM-10-10-6MM

NOTES

- / For general ordering information and technical data see pages 97-98
- / To order Oversize Bushings; suffix symbol with the letter U. Example: PM-4-7U-12
- / Nitralloy Bushings quoted upon request
- / Price list codes detailed below; please see price list.



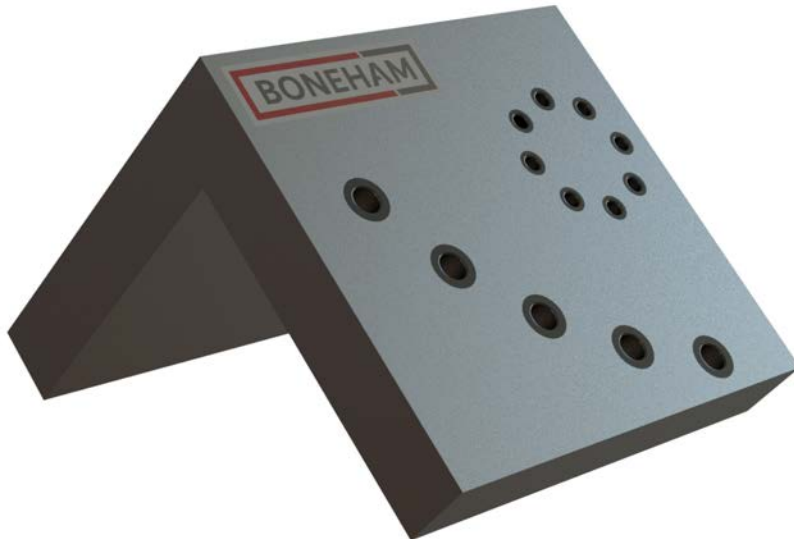
Bore Size Range From - To A (mm)	Outside Diameter B (mm)	Prefix	C (mm): Headless Press Fit & Liners (PM & LM)										
			8mm	10mm	12mm	16mm	20mm	25mm	28mm	36mm	45mm	56mm	67mm
1.500 - 1.800		PM	POA	POA	POA	POA	POA	POA	POA	POA	POA	POA	POA
1.801 - 2.600													
2.601 - 3.300	6 6.027-6.019	PM	-6-8 166		-6-12 183	-6-16 191							
3.301 - 4.000	7 7.032-7.023	PM	-7-8 148		-7-12 156	-7-16 166							
4.001 - 5.000	8 8.032-8.023	PM	-8-8 148		-8-12 156	-8-16 166							
5.001 - 6.000	10 10.032-10.023	PM		-10-10 139		-10-16 143	-10-20 152						
6.001 - 8.000	12 12.039-12.028	PM		-12-10 139		-12-16 143	-12-20 152						
8.001 - 10.000	15 15.039-15.028	PM			-15-12 137		-15-20 143	-15-25 148					
10.001 - 12.000	18 18.039-18.028	PM			-18-12 143		-18-20 148	-18-25 156					
12.001 - 15.000	22 22.048-22.035	PM				-22-16 161				-22-28 167	-22-36 189		
15.001 - 18.000	26 26.048-26.035	PM				-26-16 161				-26-28 168	-26-36 191		
18.001 - 22.000	30 30.048-30.035	PM						-30-20 161			-30-36 191	-30-45 199	
22.001 - 26.000	35 35.059-35.043	PM						-35-20 192			-35-36 226	-35-45 235	
26.001 - 30.000	42 42.059-42.043	PM								-42-25 217		-42-45 273	-42-56 318

*Price on Application, prices subject to change.

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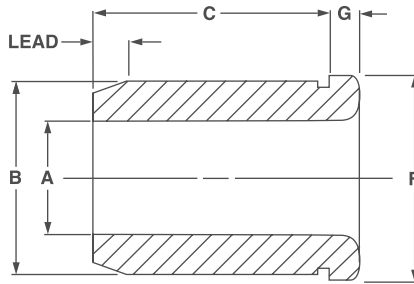
Headless Press Fit Drill Bushings

Bore Size Range From - To A (mm)	Outside Diameter B (mm)	Prefix	C (mm): Headless Press Fit & Liners (PM & LM)											
			8mm	10mm	12mm	16mm	20mm	25mm	28mm	36mm	45mm	56mm	67mm	
30.001 - 35.000	48 48.059-48.043	PM						-48-35 217				-48-45 274	-48-56 318	
35.001 - 42.000	55 55.072-55.053	PM						-55-30 303					-55-56 341	-55-67 358
42.001 - 48.000														
48.001 - 55.000														
55.001 - 63.000			POA	POA	POA	POA	POA	POA	POA	POA	POA	POA	POA	POA
63.001 - 78.000														



Head Press Fit Drill Bushings

H Type ANSI Drill Bushings



KEY FEATURES

- / Diameters from 0.0156 to 1.7656
- / Hardened to 60-65 HRC
- / OD lead for easy installation
- / ID radius improves drill entry
- / OD ground to press fit size

APPLICATION

The 'H Type' drill bushing features a head which allows for greater axial force, so not to slip out the plate, or to feed down to a dead stop if required. The head of the bush also allows it to be pressed into the plate easier and can be left either exposed above the plate surface or counterbored to sit flush.

ORDERING INSTRUCTIONS

When Ordering State: Quantity, Symbol, Bore Size and whether it's a Drill or Reamer. Example: 6, H-40-8-5/16

NOTES

- / For general ordering information and technical data see pages 97-98
- / To order Oversize Bushings; suffix symbol with the letter U. Example: H-40-8U-5/16
- / Nitralloy Bushings quoted upon request
- / Price list codes detailed below; please see price list.



Bore Size A*	Outside Diameter B	C: Length Under Head and Price Code Number											Head				
		Prefix	1/4"	5/16"	3/8"	1/2"	3/4"	1"	1 3/8"	1 3/4"	2 1/8"	2 1/2"	3"	Dia. F	Thk. G		
0.0135 to 0.0280	5/32	0.1578	H	-10-4	-10-5	-10-6	-10-8	-10-12*								1/4	3/32
		0.1575		POA	POA	POA	POA	POA									
0.0292 to 0.0591	5/32	0.1578	H	-10-4	-10-5	-10-6	-10-8†	-10-12*								1/4	3/32
		0.1575		POA	POA	POA	POA	POA									
0.0595 to 0.0625	5/32	0.1578	H	-10-4	-10-5	-10-6	-10-8†	-10-12*								1/4	3/32
		0.1575		211	212	213	214	226									
0.0135 to 0.0280	13/64	0.2046	H	-13-4	-13-5	-13-6	-13-8	-13-12†								19/64	3/32
		0.2043		POA	POA	POA	POA	POA									
0.0292 to 0.0591	13/64	0.2046	H	-13-4	-13-5	-13-6	-13-8†	-13-12†								19/64	3/32
		0.2043		POA	POA	POA	POA	POA									
0.0595 to 0.0625	13/64	0.2046	H	-13-4	-13-5	-13-6	-13-8*	-13-12*	-13-16*							19/64	3/32
		0.2043		211	212	213	214	226	264								
0.0635 to 0.0995	13/64	0.2046	H	-13-4	-13-5	-13-6	-13-8	-13-12*	-13-16*	-13-22*						19/64	3/32
		0.2043		158	159	164	167	187	205	264							
0.0980 to 0.1406	1/4	0.2516	H	-16-4	-16-5	-16-6	-16-8	-16-12	-16-16*	-16-22*						23/64	3/32
		0.2513		158	152	155	158	183	207	252							
0.1250 to 0.1935	5/16	0.3141	H	-20-4	-20-5	-20-6	-20-8	-20-12	-20-16*	-20-22*	-20-28*					27/64	1/8
		0.3138		134	137	140	142	144	159	210	223						
0.1875 to 0.2570	13/32	0.4078	H	-26-4	-26-5	-26-6	-26-8	-26-12	-26-16*	-26-22*	-26-28*					1/2	5/32
		0.4075		129	130	135	137	140	153	164	190						

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Head Press Fit Drill Bushings

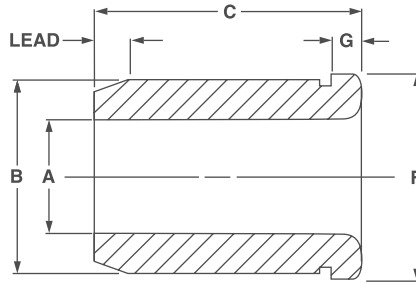
Bore Size A*	Outside Diameter B	C: Length Under Head and Price Code Number													Head		
		Prefix	1/4"	5/16"	3/8"	1/2"	3/4"	1"	1 3/8"	1 3/4"	2 1/8"	2 1/2"	3"	F	G		
0.1875 to 0.3160	1/2	0.5017 0.5014	H	-32-4 129	-32-5 130	-32-6 135	-32-8 137	-32-12 140	-32-16 153	-32-22* 165	-32-28* 190					39/64	7/32
0.3125 to 0.4375	5/8	0.6267 0.6264	H	-40-4 135	-40-5 129	-40-6 130	-40-8 130	-40-12 135	-40-16 140	-40-22 164	-40-28 183	-40-34 194				51/64	7/32
0.3125 to 0.5312	3/4	0.7518 0.7515	H	-48-4 140	-48-5 134	-48-6 135	-48-8 135	-48-12 140	-48-16 146	-48-22 167	-48-28 186	-48-34 196				59/64	7/32
0.5000 to 0.6562	7/8	0.8768 0.8765	H				-56-8 149	-56-12 151	-56-16 153	-56-22 161	-56-28 189	-56-34 196	-56-40 212			1-7/64	1/4
0.5000 to 0.7656	1	1.0018 1.0015	H				-64-8 152	-64-12 152	-64-16 158	-64-22 164	-64-28 193	-64-34 206	-64-40 221	-64-48 318		1-15/64	5/16
0.6250 to 1.0312	1-3/8	1.3772 1.3768	H				-88-8 199	-88-12 192	-88-16 200	-88-22 208	-88-28 222	-88-34 237	-88-40 291	-88-48 335		1-39/64	3/8
1.1000 to 1.3906	1-3/4	1.7523 1.7519	H					-112-12 227	-112-16 217	-112-22 227	-112-28 240	-112-34 294	-112-40 307	-112-48 347		1-63/64	3/8
1.3750 to 1.7656	2-1/4	2.2525 2.2521	H						-144-16 276	-144-22 302	-144-28 322	-144-34 332	-144-40 339	-144-48 357		2-31/64	3/8

* Standard bore sizes available are per chart shown in rear of catalog – including LETTER, NUMBER and FRACTIONAL SIZES. MILLIMETER – from 2.3 mm to 10.5 mm only for selected list designated by on back cover.
 • COUNTERBORED – with adequate bearing length – can also be supplied without counterbore upon request.
 † COUNTERBORED – 0.0390 to 0.0469 with adequate bearing length; can also be supplied without counterbore upon request.
 *Price on Application, prices subject to change.



Head Press Fit Drill Bushings

HM Type ANSI Metric Bushings



KEY FEATURES

- / Diameters from 1.50mm to 105mm
- / Hardened to 60-65 HRC
- / OD lead for easy installation
- / ID radius improves drill entry
- / OD ground to press fit size

APPLICATION

The 'HM Type' drill bushing features a head which allows for greater axial force, so not to slip out the plate, or to feed down to a dead stop if required. The head of the bush also allows it to be pressed into the plate easier and can be left either exposed above the plate surface or counterbored to sit flush.

ORDERING INSTRUCTIONS

When Ordering State: Quantity, Symbol, Bore Size and whether it's a Drill or Reamer.
Example: 6, HM-10-10-6MM

NOTES

- / For general ordering information and technical data see pages 97-98
- / To order Oversize Bushings; suffix symbol with the letter U. Example: HM-10-10U-6MM
- / Nitralloy Bushings quoted upon request
- / Price list codes detailed below; please see price list.



Bore Size Range From - To A (mm)	Outside Diameter B (mm)	C (mm): Headed Press Fit & Liners (HM & HLM) Symbol: Type - OD - Length												F	G	
		Prefix	8mm	10mm	12mm	16mm	20mm	25mm	28mm	36mm	45mm	56mm	67mm			
1.500 - 1.800		HM	POA	POA	POA	POA	POA	POA	POA	POA	POA	POA	POA			2
1.801 - 2.600																
2.601 - 3.300	6 6.027-6.019	HM	-6-8 190		-6-12 193	-6-16 211									9	2.5
3.301 - 4.000	7 7.032-7.023	HM	-7-8 161		-7-12 170	-7-16 185									10	2.5
4.001 - 5.000	8 8.032-8.023	HM	-8-8 161		-8-12 170	-8-16 185									11	2.5
5.001 - 6.000	10 10.032-10.023	HM		-10-10 161		-10-16 169	-10-20 208								13	3
6.001 - 8.000	12 12.039-12.028	HM		-12-10 161		-12-16 169	-12-20 191								15	3
8.001 - 10.000	15 15.039-15.028	HM			-15-12 156		-15-20 169	-15-25 170							18	3
10.001 - 12.000	18 18.039-18.028	HM			-18-12 161		-18-20 169	-18-25 185							22	4
12.001 - 15.000	22 22.048-22.035	HM				-22-16 190				-22-28 199	-22-36 206				26	4
15.001 - 18.000	26 26.048-26.035	HM				-26-16 190				-26-28 194	-26-36 213				30	4

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Head Press Fit Drill Bushings

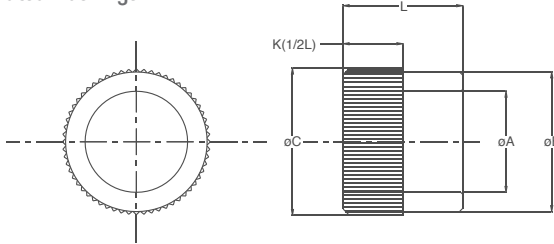
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BONEHAM USA

Bore Size Range From - To A (mm)	Outside Diameter B (mm)	C (mm): Headed Press Fit & Liners (HM & HLM) Symbol: Type - OD - Length												F	G		
		Prefix	8mm	10mm	12mm	16mm	20mm	25mm	28mm	36mm	45mm	56mm	67mm				
18.001 - 22.000	30 30.048-30.035	HM						-30-20 221				-30-36 294	-30-45 304			34	5
22.001 - 26.000	35 35.059-35.043	HM						-35-20 223				-35-36 296	-35-45 305			39	5
26.001 - 30.000	42 42.059-42.043	HM							-42-25 300				-42-45 305	-42-56 349		46	5
30.001 - 35.000	48 48.059-48.043	HM							-48-35 304				-48-45 327	-48-56 348		52	5
35.001 - 42.000	55 55.072-55.053	HM							-55-30 342					-55-56 359	-55-67 360	59	5
42.001 - 48.000																	
48.001 - 55.000																	
55.001 - 63.000			POA	POA	POA	POA	POA	POA	POA	POA	POA	POA	POA	POA	POA		
63.001 - 78.000																	

Serrata Press Fit Drill Bushings

SP Type Serrated Bushings



$$C = B + (0.014'' \text{ to } 0.020'')$$

KEY FEATURES

- / Diameters from 0.0595 to 0.7656
- / ID Hardened to 60-65 HRC
- / ID radius improves drill entry
- / Top OD serrated
- / Bottom ID ground

APPLICATION

The 'SP Type' drill bushing is similar to that of the 'P Type' bushing, they are designed to press into soft materials, such as wood and soft metals. The top of the OD is serrated to prevent rotational movement and increased

axial resistance in the jig. The rest of the bushing is finish ground to allow for accurate and easy location.

ORDERING INSTRUCTIONS

When Ordering State: Quantity, Symbol, Bore Size. Example: SP-5/16-3/4-1/2
If ordering specials, state ID, OD and Length.



NOTES

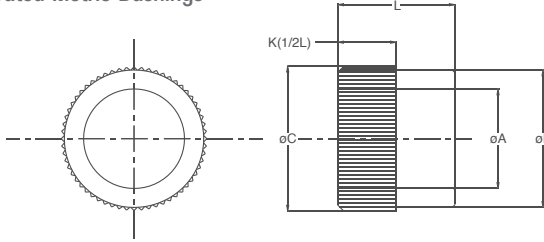
- / For general ordering information and technical data see pages 97-98
- / Price list codes detailed below; please see price list.

Bore Size Range A	Outside Diameter B		Prefix	Bushing Length L, Code Number & \$ L						
	Size	Tolerance		1/4	5/16	3/8	1/2	3/4	1	1-3/8
0.0595 0.0709	13/64	0.2031	SP	13-4	13-5	13-6	13-8			
0.0709 0.0995		0.2029		POA	POA	POA	POA			
0.0980 0.1181	1/4	0.2031	SP	13-4	13-5	13-6	13-8			
0.1181 0.1406		0.2029		167	187	190	191			
0.1562 0.1969	13/32	0.2500	SP	16-4	16-5	16-6	16-8			
0.1969 0.2362		0.2498		146	152	157	161			
0.2362 0.2570	13/32	0.2500	SP	16-4	16-5	16-6	16-8			
0.2570 0.3125		0.2498		146	152	157	161			
0.3125 0.5000	5/16	0.3125	SP	20-4	20-5	20-6	20-8	20-12		
0.5000 0.6562		0.3123		137	137	139	143	150		
0.6562 0.7656	13/32	0.4062	SP	26-4	26-5	26-6	26-8	26-12	26-16	
0.7656 0.8750		0.4060		127	128	131	134	139	152	
0.8750 1.0000	13/32	0.4062	SP	26-4	26-5	26-6	26-8	26-12	26-16	
1.0000 1.1812		0.4060		127	128	131	134	139	152	
1.1812 1.3125	1/2	0.5000	SP		32-5	32-6	32-8	32-12	32-16	
1.3125 1.4062		0.4998			128	131	134	139	152	
1.4062 1.5625	1/2	0.5000	SP		32-5	32-6	32-8	32-12	32-16	
1.5625 1.7656		0.4998			128	131	134	139	152	
1.7656 2.0000	5/8	0.6250	SP			40-6	40-8	40-12	40-16	
2.0000 2.3625		0.6248				129	129	134	137	
2.3625 2.5000	3/4	0.7500	SP			48-6	48-8	48-12	48-16	
2.5000 2.7656		0.7498				134	134	137	143	
2.7656 3.0000	3/4	0.7500	SP			48-6	48-8	48-12	48-16	
3.0000 3.3125		0.7498				134	134	137	143	
3.3125 3.6562	7/8	0.8750	SP			56-6	56-8	56-12	56-16	
3.6562 4.0000		0.8748				154	146	150	152	
4.0000 4.5000	1	1.0000	SP				64-8	64-12	64-16	64-22
4.5000 5.0000		0.9998					150	150	153	159

*Price on Application, prices subject to change.

Serrata Press Fit Drill Bushings

SPM Type Serrated Metric Bushings



$$C = B + (0.35 \text{ to } 0.5 \text{ mm})$$



KEY FEATURES

- / Diameters from 1.20mm to 18mm
- / ID Hardened to 60-65 HRC
- / ID radius improves drill entry
- / Top OD serrated
- / Bottom ID ground

APPLICATION

The 'SPM Type' drill bushing is similar to that of the 'P Type' bushing, they are designed to press into soft materials, such as wood and soft metals. The top of the OD is serrated to prevent rotational movement and increased axial resistance in the jig. The rest of the bushing is finish ground to allow for accurate and easy location.

ORDERING INSTRUCTIONS

When Ordering State: Quantity, Symbol, Bore Size. Example: 6, SPM-7-16-4MM
If ordering specials, state ID, OD and Length.

NOTES

- / For general ordering information and technical data see pages 97-98
- / Price list codes detailed below; please see price list.

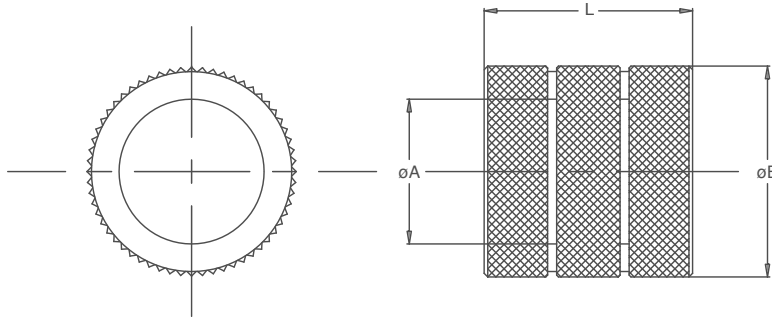


Bore Size A (mm) F7		OD B (mm)	OD B Tolerance (mm)	Length L (mm)	Part Code	Price Code
From	To					
1.20	1.8	5	5.000/4.995	6	SPM-5-6	POA
				9	SPM-5-9	POA
1.81	2.6	5	5.000/4.995	6	SPM-5-6	187
				9	SPM-5-9	198
2.61	3.3	6	6.000/5.995	8	SPM-6-8	160
				12	SPM-6-12	187
				16	SPM-6-16	190
3.31	4	7	7.000/6.995	8	SPM-7-8	143
				12	SPM-7-12	152
				16	SPM-7-16	159
4.01	5	8	8.000/7.994	8	SPM-8-8	143
				12	SPM-8-12	152
				16	SPM-8-16	159
5.01	6	10	10.000/9.994	10	SPM-10-10	139
				16	SPM-10-16	148
				20	SPM-10-20	159
6.01	8	12	12.000/11.992	10	SPM-12-10	139
				16	SPM-12-16	148
				20	SPM-12-20	159
8.01	10	15	15.000/14.992	12	SPM-15-12	134
				20	SPM-15-20	143
				25	SPM-15-25	148
10.01	12	18	18.000/17.992	12	SPM-18-12	139
				20	SPM-18-20	152
				25	SPM-18-25	160
12.01	15	22	22.000/21.991	16	SPM-22-16	159
				28	SPM-22-28	161
				36	SPM-22-36	170
15.01	18	26	26.000/25.991	16	SPM-26-16	159
				28	SPM-26-28	161
				36	SPM-26-36	170

* Price on Application, prices subject to change.

Diamond Groove Drill Bushings

DG Type 'Cast-in' Bushings



KEY FEATURES

- / Diameters from 0.0595 to 0.7656
- / ID Hardened to 60-65 HRC
- / ID radius improves drill entry
- / OD diamond knurling

APPLICATION

The 'DG Type' drill bushing is designed to be cast in the fixture or mold. Popular in the resin and composite industries as the composite runs through the grooves to lock the bushing in place. The groove and the diamond knurling are highly resistant to axial and rotational movement.

ORDERING INSTRUCTIONS

When Ordering State: Quantity, Symbol, Bore Size. Example: 6, DG-20-5-1/8
If ordering specials, state ID, OD and Length.

NOTES

- / For general ordering information and technical data see pages 97-98
- / Price list codes detailed below; please see price list.



Bore Size Range A	Outside Diameter B		Prefix	Bushing Length L And Price Code Numbers L							
	Size	Tolerance		1/4	5/16	3/8	1/2	3/4	1	1-3/8	1-1/2
0.0595 0.0709	13/64	0.2230 0.2130	DG	13-4 POA	13-5 POA	13-6 POA	13-8 POA				
0.0709 0.0995	13/64	0.2230 0.2130	DG	13-4 152	13-5 153	13-6 156	13-8 159				
0.0980 0.1181	1/4	0.2750 0.2600	DG	16-4 129	16-5 130	16-6 134	16-8 135	16-12 145			
0.1181 0.1406	1/4	0.2750 0.2600	DG	16-4 129	16-5 130	16-6 134	16-8 135	16-12 145			
0.1250 0.1935	5/16	0.3370 0.3220	DG	20-4 115	20-5 116	20-6 117	20-8 118	20-12 120	20-16 129		
0.1562 0.1969	13/32	0.4310 0.4160	DG	26-4 115	26-5 115	26-6 116	26-8 117	26-12 118	26-16 120		

Continued on next page

Diamond Groove Drill Bushings

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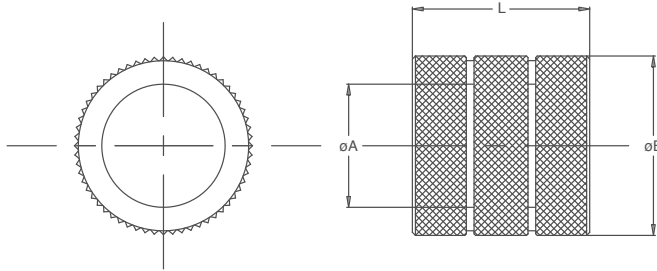
BONEHAM USA

Bore Size Range A	Outside Diameter B		Prefix	Bushing Length L And Price Code Numbers L							
	Size	Tolerance		1/4	5/16	3/8	1/2	3/4	1	1-3/8	1-1/2
0.1969 0.2362	13/32	0.4310 0.4160	DG	26-4 115	26-5 115	26-6 116	26-8 117	26-12 118	26-16 120		
0.2362 0.2570	13/32	0.4310 0.4160	DG	26-4 115	26-5 115	26-6 116	26-8 117	26-12 118	26-16 120		
0.1562 0.2362	1/2	0.5250 0.5100	DG		32-5 115	32-6 116	32-8 117	32-12 118	32-16 120		
0.2362 0.3160	1/2	0.5250 0.5100	DG		32-5 115	32-6 116	32-8 117	32-12 118	32-16 120		
0.3125 0.4375	5/8	0.6500 0.6350	DG			40-6 115	40-8 116	40-12 117	40-16 118	40-22 120	
0.3125 0.5000	3/4	0.7750 0.7600	DG			48-6 115	48-8 116	48-12 117	48-16 118	48-22 139	
0.5000 0.5312	3/4	0.7750 0.7600	DG			48-6 115	48-8 116	48-12 117	48-16 118	48-22 139	
0.5000 0.6562	7/8	0.9000 0.8850	DG			56-6 138	56-8 131	56-12 132	56-16 134	56-22 139	
0.5000 0.7656	1	1.0350 1.0100	DG				64-8 132	64-12 132	64-16 135	64-22 137	64-24 151

*Price on Application, prices subject to change.

Diamond Groove Drill Bushings

DGM Type METRIC 'Cast-in Bushings'



KEY FEATURES

- / Diameters from 1.20mm to 18mm
- / ID Hardened to 60-65 HRC
- / ID radius improves drill entry
- / OD diamond knurling

APPLICATION

The 'DGM Type' drill bushing is designed to be cast in the fixture or mold. Popular in the resin and composite industries as the composite runs through the grooves to lock the bushing in place. The groove and the diamond knurling are highly resistant to axial and rotational movement.

ORDERING INSTRUCTIONS

When Ordering State: Quantity, Symbol, Bore Size.
 Example: DGM-6-12-3MM
 If ordering specials, state ID, OD and Length.

NOTES

- / For general ordering information and technical data see pages 97-98
- / Price list codes detailed below; please see price list.

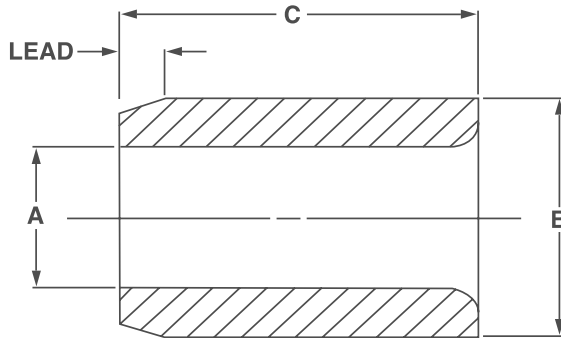


Bore Size A (mm) F7		OD B (mm)	OD B Tolerance (mm)	Length L (mm)	Part Code	No. of Grooves	Price Code
From	To						
1.20	1.8	5	5.50/5.25	6	DGM-5-6	1	POA
				9	DGM-5-9	1	POA
1.80	2.6	5	5.50/5.25	6	DGM-5-6	1	187
				9	DGM-5-9	1	198
				8	DGM-6-8	1	160
2.61	3.3	6	6.65/6.25	12	DGM-6-12	1	187
				16	DGM-6-16	2	190
3.31	4	7	7.65/7.25	8	DGM-7-8	1	143
				12	DGM-7-12	1	152
				16	DGM-7-16	2	159
4.01	5	8	8.65/8.25	8	DGM-8-8	1	143
				12	DGM-8-12	1	152
				16	DGM-8-16	2	159
5.01	6	10	10.65/10.25	10	DGM-10-10	1	139
				16	DGM-10-16	2	148
				20	DGM-10-20	2	159
6.01	8	12	12.65/12.25	10	DGM-12-10	1	139
				16	DGM-12-16	2	148
				20	DGM-12-20	2	159
8.01	10	15	15.65/15.25	12	DGM-15-12	1	134
				20	DGM-15-20	2	143
				25	DGM-15-25	2	148
10.01	12	18	18.65/18.25	12	DGM-18-12	1	139
				20	DGM-18-20	2	152
				25	DGM-18-25	2	160
12.01	15	22	22.65/22.25	16	DGM-22-16	2	159
				28	DGM-22-28	2	161
				36	DGM-22-36	3	170
15.01	18	26	26.90/26.25	16	DGM-26-16	2	159
				28	DGM-26-28	2	161
				36	DGM-26-36	3	170

* Price on Application, prices subject to change.

Headless Liner Drill Bushings

L Type ANSI Headless Liner



**VOLUME
DISCOUNT**

KEY FEATURES

- / Diameters from 5/16 to 2 1/4
- / Hardened to 60-65 HRC
- / OD lead for easy installation
- / ID radius improves SF location
- / OD ground to press fit size

APPLICATION

The 'L Type' liner bushing is permanently pressed into a drill jig or fixture plate. They provide a highly accurate location sleeve for the SF drill bushing whilst eradicating wear caused by drill bush replacement on the jig plate.

ORDERING INSTRUCTIONS

When Ordering State: Quantity and Symbol. Example: 6, L-32-22

NOTES

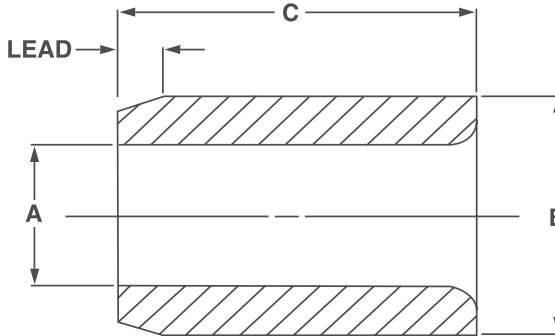
- / For general ordering information and technical data see pages 97-98
- / To order Oversize Bushings; suffix symbol with the letter U. Example: L-32-22U
- / Price list codes detailed below; please see price list.



Bore Size A	Outside Diameter B		C: Liner Length and Price Code Number													
			Prefix	1/4"	5/16"	3/8"	1/2"	3/4"	1"	1 3/8"	1 3/4"	2 1/8"	2 1/2"	3"		
3/16	0.1879	5/16	0.3141	L	-20-4	-20-5	-20-6	-20-8	-20-12							
	0.1876		0.3138		123	126	129	130	135							
5/16	0.3129	1/2	0.5017	L	-32-4	-32-5	-32-6	-32-8	-32-12	-32-16	-32-22					
	0.3126		0.5014		118	119	122	123	129	137	146					
1/2	0.5005	3/4	0.7518	L		-48-5	-48-6	-48-8	-48-12	-48-16	-48-22	-48-28	-48-34			
	0.5002		0.7515			119	123	123	126	130	145	158	174			
3/4	0.7506	1	1.0018	L				-64-8	-64-12	-64-16	-64-22	-64-28	-64-34	-64-40	-64-48	
	0.7503		1.0015					135	135	139	144	161	170	191	252	
1	1.0007	1-3/8	1.3772	L				-88-8	-88-12	-88-16	-88-22	-88-28	-88-34	-88-40	-88-48	
	1.0004		1.3768					170	155	170	189	201	213	225	305	
1-3/8	1.3760	1-3/4	1.7523	L					-112-12	-112-16	-112-22	-112-28	-112-34	-112-40	-112-48	
	1.3756		1.7519						196	189	196	206	222	235	329	
1-3/4	1.7512	2-1/4	2.2525	L					-144-12	-144-16	-144-22	-144-28	-144-34	-144-40	-144-48	
	1.7508		2.2521						218	207	218	227	272	299	342	
2-1/4	2.2515	2-3/4	2.7526	L					-176-12	-176-16	-176-22	-176-28	-176-34	-176-40	-176-48	
	2.2510		2.7522						228	218	229	260	294	308	344	

Headless Liner Drill Bushings

LTW Type Thin Wall Liner



KEY FEATURES

- / Diameters from 5/16 to 2 1/4
- / Hardened to 60-65 HRC
- / OD lead for easy installation
- / ID radius improves SF location
- / OD ground to press fit size
- / Thin wall space saving feature

APPLICATION

The 'LTW Type' liner bushing is permanently pressed into a drill jig or fixture plate. They provide a highly accurate location sleeve for the SF drill bushing whilst eradicating wear caused by drill bush replacement on the jig plate. The thin wall allows for greater space on the jig.

ORDERING INSTRUCTIONS

When Ordering State: Quantity and Symbol.
Example: 6, L-TW-40-4

NOTES

- / For general ordering information and technical data see pages 97-98
- / To order Oversize Bushings; suffix symbol with the letter U.
Example: L-TW-28-6U
- / Price list codes detailed below; please see price list.



Bore Size A	Outside Diameter B	C: Liner Length and Price Code Number													
		Prefix	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"	1 1/4"	1 1/2"	1 3/4"	2"	2 1/4"	
3/16	0.1879 0.1876	5/16	0.3141 0.3138	L-TW	-20-4	-20-5	-20-6	-20-8	-20-10	-20-12					
					123	126	129	130	134	135					
1/4	0.2504 0.2501	7/16	0.4392 0.4389	L-TW	-28-4	-28-5	-28-6	-28-8	-28-10	-28-12					
					118	119	122	123	126	129					
5/16	0.3129 0.3126	9/16	0.5642 0.5639	L-TW	-36-4	-36-5	-36-6	-36-8	-36-10	-36-12	-36-16				
					123	118	120	120	122	123	126				
3/8	0.3754 0.3751	5/8	0.6267 0.6264	L-TW	-40-4	-40-5	-40-6	-40-8	-40-10	-40-12	-40-16				
					123	118	120	120	122	123	126				
7/16	0.4380 0.4377	5/8	0.6267 0.6264	L-TW	-40-4X	-40-5X	-40-6X	-40-8X	-40-10X	-40-12X	-40-16X				
					123	118	120	120	122	123	126				
9/16	0.5630 0.5627	7/8	0.8768 0.8765	L-TW	-56-4	-56-5	-56-6	-56-8	-56-10	-56-12	-56-16				
					140	138	140	134	135	135	138				
5/8	0.6255 0.6252	7/8	0.8768 0.8765	L-TW		-56-5X	-56-6X	-56-8X	-56-10X	-56-12X	-56-16X	-56-20X			
						138	140	134	135	135	138	144			

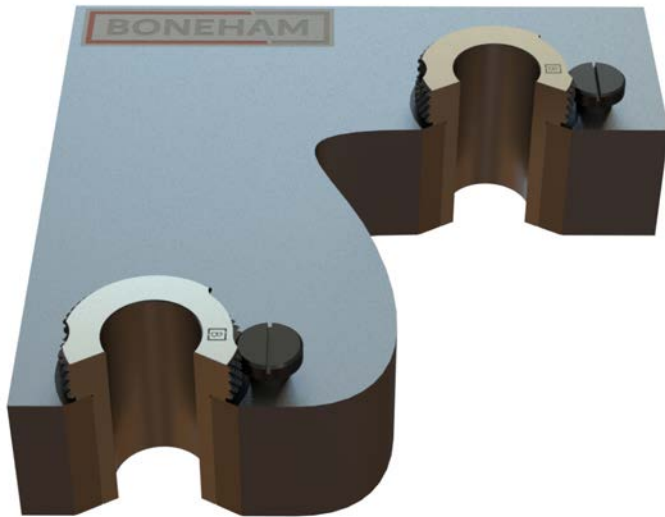
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Headless Liner Drill Bushings

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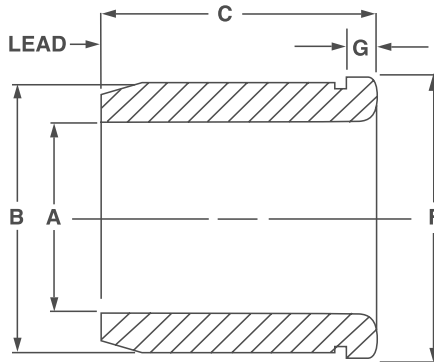
BONEHAM USA

Bore Size A	Outside Diameter B	C: Liner Length and Price Code Number														
		Prefix	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"	1 1/4"	1 1/2"	1 3/4"	2"	2 1/4"		
3/4	0.7506	1	1.0018	L-TW		-64-5	-64-6	-64-8	-64.10	-64-12	-64-16	-64-20				
	0.7503		1.0015			138	140	135	135	135	139	144				
7/8	0.8757	1-1/4	1.2520	L-TW			-80-6	-80-8	-80-10	-80-12	-80-16	-80-20	-80-24			
	0.8754		1.2517				169	169	164	155	169	188	192			
1	1.0007	1-3/8	1.3772	L-TW				-88-8	-88-10	-88-12	-88-16	-88-20	-88-24	-88-28		
	1.0004		1.3768					170	167	155	170	189	193	201		
1-1/8	1.1259	1-1/2	1.5022	L-TW				-96-8	-96-10	-96-12	-96-16	-96-20	-96-24	-96-28		
	1.1255		1.5018					190	190	196	189	196	203	206		
1-1/4	1.2509	1-5/8	1.6272	L-TW					-104-10	-104-12	-104-16	-104-20	-104-24	-104-28	-104-32	
	1.2505		1.6268						190	195	195	195	200	206	217	
1-3/8	1.3760	1-3/4	1.7523	L-TW					-112-10	-112-12	-112-16	-112-20	-112-24	-112-28	-112-32	
	1.3756		1.7519						196	196	189	196	200	206	222	
1-1/2	1.5010	1-7/8	1.8773	L-TW						-120-12	-120-16	-120-20	-120-24	-120-28	-120-32	-120-36
	1.5006		1.8769							195	195	195	200	198	218	225



Headless Liner Drill Bushings

HL Type ANSI Liner Bushings



KEY FEATURES

- / Diameters from 5/16 to 2 1/4
- / Hardened to 60-65 HRC
- / OD lead for easy installation
- / ID radius improves SF location
- / OD ground to press fit size

APPLICATION

The 'HL Type' liner bushing is permanently pressed into a drill jig or fixture plate. They provide a highly accurate location sleeve for the SF drill bushing whilst eradicating wear caused by drill bush replacement on the jig plate. The head prevents the liner from slipping out the jig when excess axial force is placed on the workpiece.

ORDERING INSTRUCTIONS

When Ordering State: Quantity and Symbol.
Example: 6, HL-32-22

NOTES

- / For general ordering information and technical data see pages 97-98
- / To order Oversize Bushings; suffix symbol with the letter U. Example: HL-32-22U
- / Price list codes detailed below; please see price list.



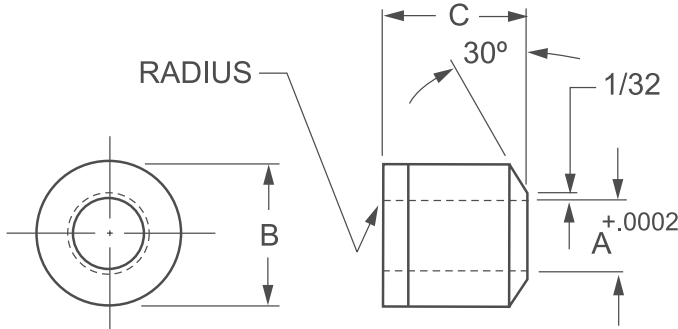
Bore Size A	Outside Diameter B		C: Overall and Price Code Number											Head				
			Prefix	5/16"	3/8"	1/2"	3/4"	1"	1 3/8"	1 3/4"	2 1/8"	2 1/2"	3"	Dia. F	Thk. G			
5/16	0.3129	1/2	0.5017	HL	-32-5	-32-6	-32-8	-32-12	-32-16	-32-22							5/8	3/32
	0.3126		0.5014		130	135	135	140	161	189								
1/2	0.5005	3/4	0.7518	HL	-48-5	-48-6	-48-8	-48-12	-48-16	-48-22	-48-28	-48-34					7/8	3/32
	0.5002		0.7515		134	135	135	140	152	164	187	196						
3/4	0.7506	1	1.0018	HL			-64-8	-64-12	-64-16	-64-22	-64-28	-64-34	-64-40	-64-48			1-1/8	1/8
	0.7503		1.0015		149	153	159	164	191	201	217	314						
1	1.0007	1-3/8	1.3772	HL			-88-8	-88-12	-88-16	-88-22	-88-28	-88-34	-88-40	-88-48			1-1/2	1/8
	1.0004		1.3768		180	164	180	190	201	211	225	335						
1-3/8	1.3760	1-3/4	1.7523	HL				-112-12	-112-16	-112-22	-112-28	-112-34	-112-40	-112-48			1-7/8	3/16
	1.3756		1.7519				198	203	210	222	237	291	350					
1-3/4	1.7512	2-1/4	2.2525	HL				-144-12	-144-16	-144-22	-144-28	-144-34	-144-40	-144-48			2-3/8	3/16
	1.7508		2.2521				233	224	234	276	301	320	353					
2-1/4	2.2515	2-3/4	2.7526	HL				-176-12	-176-16	-176-22	-176-28	-176-34	-176-40	-176-48			2-7/8	3/16
	2.2510		2.7522				299	268	301	316	330	338	359					

Gun Drill Bushings

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BONEHAM USA

GDI Type Gun Drill Inserts



KEY FEATURES

- / Diameters 5/64 to 3/4
- / Heat treated to HRC 62-65
- / ID / OD concentric within .0002 TIR
- / ID tolerance - .0000 / + .0002

APPLICATION

Boneham's 'GDI Type' Gun Drill Bushing Inserts are intended for use with Gun Drill Liner bushings, designed to interchange depending on the drill and workpiece requirements, or after wear.

ORDERING INSTRUCTIONS

When ordering please state part number followed by required bore / ID size.
Example: GDI-13-8 .0890

NOTES

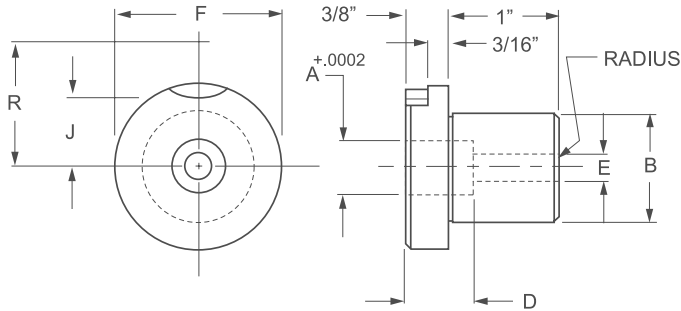
- / Gun-Drill Bushings are classed as special bushings and require finish machining. GDI bushings are non-returnable.
- / If you cannot find what you are looking for, Boneham can manufacture special sizes and materials to specification.
- / Boneham can manufacture the 3/4 and 1" length bushings as well as nitrided or carbide for longer life.



Part No.	A	B	C
GDI-13-8	.0635-.0995	13/64	1/2
	#52 - #39 1.65 - 2.50mm	0.2046 - 0.2043	
GDI-16-8	.0980 - .1406	1/4	1/2
	#40 - 9/64 2.50 - 3.50mm	0.2516 - 0.2513	
GDI-20-8	.1250 - .1935	5/16	1/2
	1/8 - #10 3.20 - 4.90mm	0.3141 - 0.3138	
GDI-32-8	.1875 - .3160	1/2	1/2
	3/16 - 0 4.8 - 8.00mm	0.5017 - 0.5014	
GDI-48-8	.3125 - .5312	3/4	1/2
	5/16 - 17/32 8.00 - 13.50mm	0.7518 - 0.7515	
GDI-64-12	.5000 - .7656	1"	3/4
	1/2 - 49/64 13.00 - 19.00mm	1.0018 - 1.0015	

Gun Drill Bushings

GDL Type Gun Drill Liners



KEY FEATURES

- / Diameters 0.2045 to 1.0017
- / Heat treated to HRC 62-65
- / ID / OD concentric within .0002 TIR
- / ID tolerance + .0002

APPLICATION

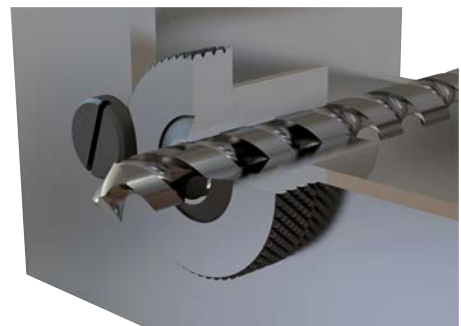
Boneham's 'GDL Type' Gun Drill Liners are high precision bushings for gun-drilling machines, and used in conjunction with removable Gun-Drill Inserts GDI, form a two piece system allowing more flexibility than the one piece system, with each liner able to hold a range of inserts.

ORDERING INSTRUCTIONS

When ordering please state part number followed by required bore / ID size.
Example: GDL-64-16 .0.5016

NOTES

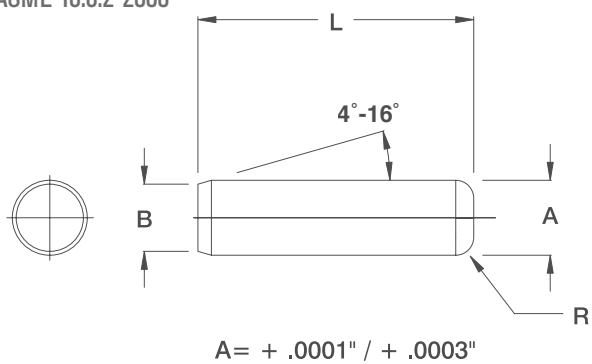
- / Gun-Drill Bushings are classed as special bushings and require finish machining. GDL bushings are non-returnable.
- / If you cannot find what you are looking for, Boneham can manufacture special sizes and materials to specification.



Part No.	A	B	D	E	F	J	R	Lock Screw	GDI Used
GDL-64-16	0.2045	1" 1.0000 - 0.9998	7/16	1/8	1-37/64	19/32	1-5/64	LS-2	GD1138
	0.2515			5/32					GD1168
	0.314			7/32					GD1208
	0.5016			11/32					GD1328
	0.7517			9/16					GD1488
GDL-88-16	0.2045	1-3/8 1.3750 - 1.3748	7/16	1/8	1-51/64	25/32	1-7/16	LS-2	GD1138
	0.2515			5/32					GD1168
	0.314			7/2					GD1208
	0.5016			11/32					GD1328
	0.7515			9/16					GD1488
	1.0017			11/16					51/64

Dowel Pins

INCH Dowel Pins to ASME 18.8.2-2000



KEY FEATURES

- / Precision ground alloy steel
- / Diameters from 1/16 to 1"
- / Surface hardness 60 HRC minimum
- / Core hardness 50-58 HRC
- / Chamfer and Radius
- / Oversize to fit reamed hole

ORDERING INSTRUCTIONS

When ordering identify the nominal diameter required and then choose the length from the chart below. Example: 1/16 x 5/8

NOTES

If you cannot find what you are looking for, Boneham can manufacture special sizes and materials to specification. Other available standards are listed on page 16.



APPLICATION

ANSI standard parallel dowel pins are chamfered at the insertion end for easy location. Dowel pins are ground with accurate tolerances for exact alignment.

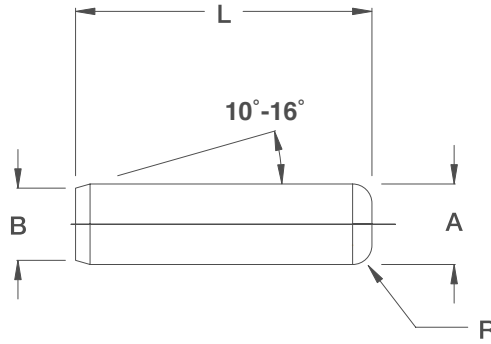
	B	Nominal Dia A												
		1/16"	3/32"	1/8"	3/16"	1/4"	5/16"	3/8"	7/16"	1/2"	5/8"	3/4"	7/8"	1"
		.058	.089	.120	.180	.240	.302	.365	.424	.486	.611	.735	.860	.980
		.048	.079	.110	.170	.230	.290	.350	.409	.471	.595	.715	.840	.960
	R min	.008	.012	.016	.023	.031	.039	.047	.055	.063	.078	.094	.109	.125
Length L	3/16"													
	1/4"													
	5/16"													
	3/8"													
	7/16"													
	1/2"													
	5/8"													
	3/4"													
	7/8"													
	1"													
	1 1/4"													
	1 1/2"													
	1 3/4"													
	2"													
	2 1/4"													
	2 1/2"													
	3"													
	3 1/2"													
	4"													
	4 1/2"													
5"														
5 1/2"														
6"														

Dowel Pins

Metric Dowel Pins to ASME 18.8. 100m-2000

Limits on Diam A

- 1.5 to 3mm + .003 / +.008mm
- 4mm to 6mm + .004 / +.009mm
- 8mm to 10mm + .006 / +.012mm
- 12mm to 16mm + .007 / +.013mm
- 20mm to 25mm + .008 / +.014mm



KEY FEATURES

- / Precision ground alloy steel
- / Diameters from 1.5mm to 25mm
- / Surface hardness 60 HRC minimum
- / Core hardness 50-58 HRC
- / Chamfer and Radius

APPLICATION

ANSI standard parallel dowel pins are chamfered at the insertion end for easy location. Dowel pins are ground with accurate tolerances for exact alignment.

ORDERING INSTRUCTIONS

When ordering identify the nominal diameter required and then choose the length from the chart below. Example: 4mm x 16mm

NOTES

If you cannot find what you are looking for, Boneham can manufacture special sizes and materials to specification. Other available standards are listed on page 16.



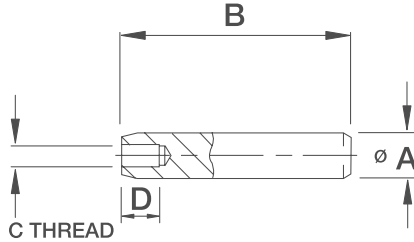
	B	Nominal Dia A												
		1.5	2	2.5	3	4	5	6	8	10	12	16	20	25
		1.4	1.9	2.4	2.9	3.9	4.9	5.8	7.8	9.8	11.8	15.8	19.8	24.8
	R min	0.2	0.2	0.3	0.3	0.4	0.4	0.4	0.5	0.6	0.6	0.8	0.8	1mm
Length L	6													
	8													
	10													
	12													
	16													
	20													
	25													
	30													
	35													
	40													
	45													
	50													
	60													
	70													
	80													
	90													
	100													
110														
120														
130														
140														
150														

Additional lengths can be supplied to order.

Pull Dowel Pins

INCH Pull Dowel Pins

Diam A = + .0001" / + .0003"
hardened 60-63 Rc



Supplied with or without air release flat.

**VOLUME
DISCOUNT**

KEY FEATURES

- / Precision ground alloy steel
- / Diameters from 3/16 to 1"
- / Surface hardness 60-63 HRC
- / Core hardness 50-58 HRC
- / Chamfer and Radius

APPLICATION

Pull dowel pins are chamfered at both ends for easy location into the hole. Pull dowel pins are ground with accurate tolerances for exact alignment. The internal thread allows for extraction by a tool (see pages 61-62). They can be supplied

with or without air release flats. Air release flats are ground on the dowel pin to allow for air displacement in blind holes.

ORDERING INSTRUCTIONS

When ordering identify the nominal diameter required and then choose the length from the chart below. Example: 1/4" x 1"

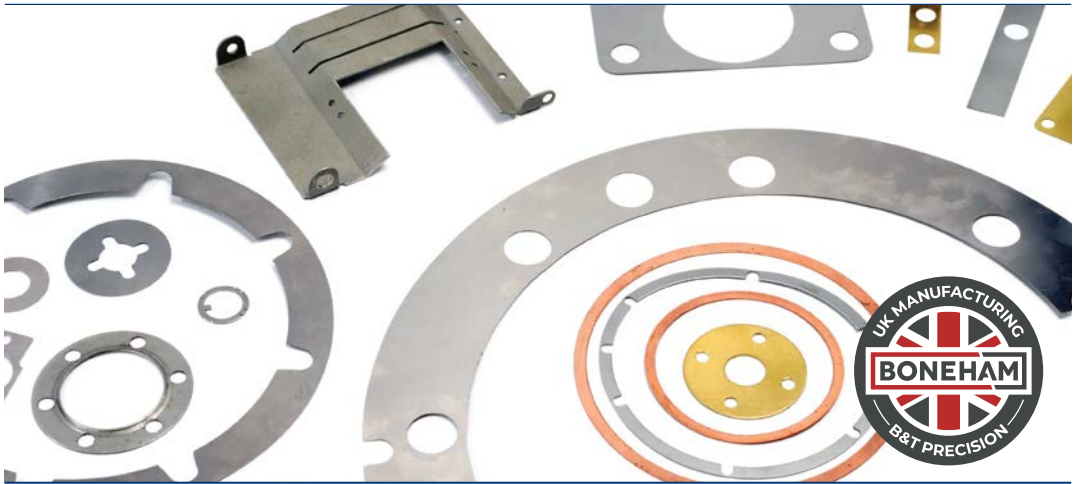
NOTES

If you cannot find what you are looking for, Boneham can manufacture special sizes and materials to specification. Other available standards are listed on page 16.



Diam A	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
1/2"								
5/8"								
3/4"								
1"								
1 1/4"								
1 1/2"								
1 3/4"								
2"								
2 1/4"								
2 1/2"								
3"								
C Thread	4-40	8-32	10-32	10-32	1/4-20	5/16-18	5/16-18	5/16-18
D	1/4"	1/4"	1/4"	3/8"	1/2"	1/2"	1/2"	1/2"

Shims to Order



Shims are commonly used for aligning or spacing between two components or surfaces to allow for wear compensation or tolerance accumulation (dimensional variance). The process of placing and removing pieces of shim for alignment acquired the name "shimming". Similarly shims are used for bearing adjustment. Shims can be manufactured from various materials and take many profiles.

Laminated shims provide peelable layers allowing for variable thicknesses to reduce working time, and the necessity to stock a large variety of shim thicknesses. Laminated shims can also be used to remove the wear out of rotating shafts and adjusting the tolerances on the top and bottom of the alignment.

The differing applications for shims are listed below and further information can be acquired from www.boneham.co.uk

Most commonly used in Construction, Aerospace, Automotive and Agriculture Engineering, and composites.

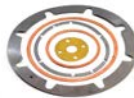
/ Brass

/ Stainless Steel

/ Laminated Steel
/ Laminated Brass
/ Laminated Aluminium
/ Aluminium

/ Copper

/ Steel (CS4 CR4)



- / Rectangular, circular or special shapes
- / Steel, brass, stainless, copper and laminated
- / Thickness range .001" (0.025mm) to .125" (3.125mm) dependent on material
- / Rapid quotation and manufacturing service
- / Competitive Prices
- / Quality Assured
- / Quality Materials
- / Large Tooling Range Available
- / Deliveries to suit your requirements

Various Applications

- / Pumps
- / Clutches
- / Actuators
- / Brakes
- / Valves
- / Compressors
- / Power Transmissions
- / Gear Boxes



Part Marking

We would be pleased to quote for your requirements / Tel: +44 (0) 1623 445 450 / Fax: +44 (0) 1623 445 451

Pre-packed Shim Stock

C110 Annealed Copper



FEATURES

- / Annealed
- / 99.9% Copper
- / Rockwell 15T47-57
- / 6" Widths

ORDERING INSTRUCTIONS

Identify thickness, width and length required from the tables below or identify part number. Other sizes can be cut to custom size.



APPLICATIONS

C110 Copper has high electrical and heat conductivity. Copper is extremely malleable with good cold working properties. Due to its outstanding heat conductivity and malleability, Copper is ideal for gaskets, washer's, heat exchanger components and shims. Copper's attributes also make it an ideal choice for electrical components.

6" x 50" C110 Copper Rolled Shim Stock

Part Reference	Thickness		Width (inch)	Length (Inch)	Kg
	Inch	Metric			
SHCUX-1	0.001	0.025mm	6"	50"	0.045
SHCUX-2	0.002	0.051mm	6"	50"	0.086
SHCUX-3	0.003	0.076mm	6"	50"	0.132
SHCUX-4	0.004	0.102mm	6"	50"	0.168
SHCUX-5	0.005	0.127mm	6"	50"	0.209
SHCUX-6	0.006	0.152mm	6"	50"	0.254
SHCUX-7	0.007	0.178mm	6"	50"	0.295
SHCUX-8	0.008	0.203mm	6"	50"	0.336
SHCUX-10	0.010	0.254mm	6"	50"	0.422
SHCUX-15	0.015	0.381mm	6"	50"	0.630
SHCUX-20	0.020	0.508mm	6"	50"	0.830
SHCUX-25	0.025	0.635mm	6"	50"	1.048
SHCUX-32	0.032	0.813mm	6"	50"	1.343

Continued on next page

6" x 100" C110 Copper Rolled Shim Stock

Part Reference	Thickness		Width (inch)	Length (Inch)	Kg
	Inch	Metric			
SHCU-1	0.001	0.025mm	6"	100"	0.086
SHCU-2	0.002	0.051mm	6"	100"	0.172
SHCU-3	0.003	0.076mm	6"	100"	0.259
SHCU-4	0.004	0.102mm	6"	100"	0.336
SHCU-5	0.005	0.127mm	6"	100"	0.417
SHCU-6	0.006	0.152mm	6"	100"	0.503
SHCU-7	0.007	0.178mm	6"	100"	0.585
SHCU-8	0.008	0.203mm	6"	100"	0.671
SHCU-10	0.010	0.254mm	6"	100"	0.839
SHCU-15	0.015	0.381mm	6"	100"	1.256
SHCU-20	0.020	0.508mm	6"	100"	1.660
SHCU-25	0.025	0.635mm	6"	100"	2.096
SHCU-32	0.032	0.813mm	6"	100"	2.681

Pre-packed Shim Stock

260 Half Hard Brass



FEATURES

- / Half Hard
- / Rockwell 30T56 - 68
- / 6" and 12" Widths

APPLICATIONS

260 (C26000) Brass has the highest formability of all yellow brasses. 260 Brass has high electrical and heat conductivity, as well as, significant corrosion resistance. These attributes make 260 Brass ideal for electronic, heating and plumbing components, shims, washers and fasteners. Brass is an attractive alloy, and as such, is perfect for decorative applications.

ORDERING INSTRUCTIONS

Identify thickness, width and length required from the tables below or identify part number. Other sizes can be cut to custom size.



6" x 100" 260 Brass Rolled Shim Stock

Part Reference	Thickness		Width (inch)	Length (Inch)	Kg
	Inch	Metric			
SHBRS-1	0.001	0.025	6"	100"	0.086
SHBRS-1X	0.0015	0.038	6"	100"	0.127
SHBRS-2	0.002	0.051	6"	100"	0.168
SHBRS-3	0.003	0.076	6"	100"	0.249
SHBRS-4	0.004	0.102	6"	100"	0.336
SHBRS-5	0.005	0.127	6"	100"	0.422
SHBRS-6	0.006	0.152	6"	100"	0.503
SHBRS-7	0.007	0.178	6"	100"	0.590
SHBRS-8	0.008	0.203	6"	100"	0.671
SHBRS-9	0.009	0.229	6"	100"	0.753
SHBRS-10	0.010	0.254	6"	100"	0.839
SHBRS-12	0.012	0.305	6"	100"	1.007
SHBRS-15	0.015	0.381	6"	100"	1.256
SHBRS-20	0.020	0.508	6"	100"	1.678
SHBRS-25	0.025	0.635	6"	100"	2.096
SHBRS-31	0.031	0.787	6"	100"	2.599

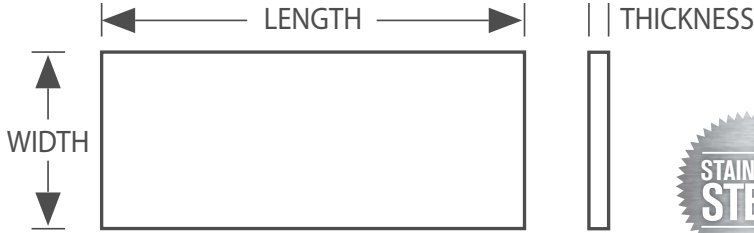
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12" x 120" 260 Brass Rolled Shim Stock

Part Reference	Thickness		Width (inch)	Length (Inch)	Kg
	Inch	Metric			
SHBRW-1	0.001	0.025	12"	120"	0.204
SHBRW-2	0.002	0.051	12"	120"	0.404
SHBRW-3	0.003	0.076	12"	120"	0.603
SHBRW-4	0.004	0.102	12"	120"	0.807
SHBRW-5	0.005	0.127	12"	120"	1.007
SHBRW-6	0.006	0.152	12"	120"	1.207
SHBRW-8	0.008	0.203	12"	120"	1.610
SHBRW-10	0.010	0.254	12"	120"	2.014
SHBRW-12	0.012	0.305	12"	120"	2.413
SHBRW-15	0.015	0.381	12"	120"	3.016
SHBRW-20	0.020	0.508	12"	120"	4.023
SHBRW-25	0.025	0.635	12"	120"	5.030
SHBRW-31	0.031	0.787	12"	120"	6.237

Pre-packed Shim Stock

302 Hardened Stainless Steel



FEATURES

- / Hardened
- / Rockwell C 40 - 45
- / 6" and 12" Widths

APPLICATIONS

302 Hardened Stainless Steel is resistive to corrosion, strong and durable. 302 Stainless is commonly used to make washers, gaskets, shim, brackets, springs and screens. 302 Stainless is easy to clean and is an attractive material which lends it to being used in decorative applications.

ORDERING INSTRUCTIONS

Identify thickness, width and length required from the tables below or identify part number. Other sizes can be cut to custom size.



6" x 50" 302 Hardened Stainless Steel Rolled Shim Stock

Part Reference	Thickness		Width (inch)	Length (Inch)	Kg
	Inch	Metric			
SHSS-X	0.0005	0.013	6"	50"	0.018
SHSS-1	0.001	0.025	6"	50"	0.041
SHSS-1X	0.0015	0.038	6"	50"	0.064
SHSS-2	0.002	0.051	6"	50"	0.082
SHSS-3	0.003	0.076	6"	50"	0.118
SHSS-4	0.004	0.102	6"	50"	0.159
SHSS-5	0.005	0.127	6"	50"	0.200
SHSS-6	0.006	0.152	6"	50"	0.240
SHSS-7	0.007	0.178	6"	50"	0.281
SHSS-8	0.008	0.203	6"	50"	0.318
SHSS-9	0.009	0.229	6"	50"	0.358
SHSS-10	0.010	0.254	6"	50"	0.399
SHSS-12	0.012	0.305	6"	50"	0.476
SHSS-15	0.015	0.381	6"	50"	0.599
SHSS-20	0.020	0.508	6"	50"	0.798
SHSS-25	0.025	0.635	6"	50"	0.993
SHSS-31	0.031	0.787	6"	50"	1.234

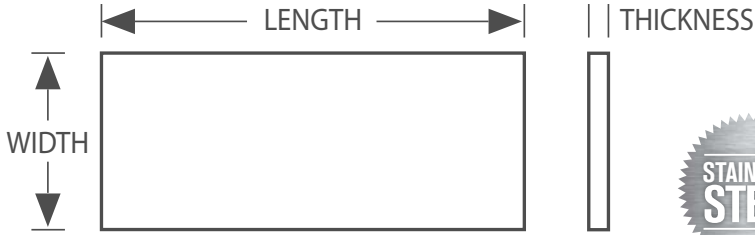
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12" x 100" 302 Hardened Stainless Steel Rolled Shim Stock

Part Reference	Thickness		Width (inch)	Length (Inch)	Kg
	Inch	Metric			
SHSSHW-X	0.0005	0.013	12"	100"	0.082
SHSSHW-1	0.001	0.025	12"	100"	0.163
SHSSHW-1X	0.0015	0.038	12"	100"	0.254
SHSSHW-2	0.002	0.051	12"	100"	0.327
SHSSHW-3	0.003	0.076	12"	100"	0.472
SHSSHW-4	0.004	0.102	12"	100"	0.635
SHSSHW-5	0.005	0.127	12"	100"	0.798
SHSSHW-6	0.006	0.152	12"	100"	0.962
SHSSHW-7	0.007	0.178	12"	100"	1.125
SHSSHW-8	0.008	0.203	12"	100"	1.270
SHSSHW-10	0.010	0.254	12"	100"	1.597
SHSSHW-12	0.012	0.305	12"	100"	1.905
SHSSHW-15	0.015	0.381	12"	100"	2.395
SHSSHW-20	0.020	0.508	12"	100"	3.193
SHSSHW-25	0.025	0.635	12"	100"	3.974
SHSSHW-31	0.031	0.787	12"	100"	4.935

Pre-packed Shim Stock

316 Annealed Stainless Steel



FEATURES

- / Annealed
- / Rockwell B95 max
- / 6" and 12" Widths

APPLICATIONS

316 Stainless Steel has a high corrosion and pitting resistance. Due to its high corrosion resistance and formability, 316 is common for shim manufacture, washers, gaskets, medical, food and marine applications.

ORDERING INSTRUCTIONS

Identify thickness, width and length required from the tables below or identify part number. Other sizes can be cut to custom size.



6" x 50" Rolled Shim Stock 316 Stainless

Part Reference	Thickness		Width (inch)	Length (Inch)	Kg
	Inch	Metric			
SH316SS-1	0.001	0.025	6"	50"	0.041
SH316SS-2	0.002	0.051	6"	50"	0.082
SH316SS-3	0.003	0.076	6"	50"	0.118
SH316SS-4	0.004	0.102	6"	50"	0.159
SH316SS-5	0.005	0.127	6"	50"	0.200
SH316SS-6	0.006	0.152	6"	50"	0.240
SH316SS-7	0.007	0.178	6"	50"	0.281
SH316SS-8	0.008	0.203	6"	50"	0.318
SH316SS-10	0.010	0.254	6"	50"	0.399
SH316SS-12	0.012	0.305	6"	50"	0.476
SH316SS-15	0.015	0.381	6"	50"	0.599
SH316SS-20	0.020	0.508	6"	50"	0.798
SH316SS-25	0.025	0.635	6"	50"	0.993
SH316SS-31	0.031	0.787	6"	50"	1.234

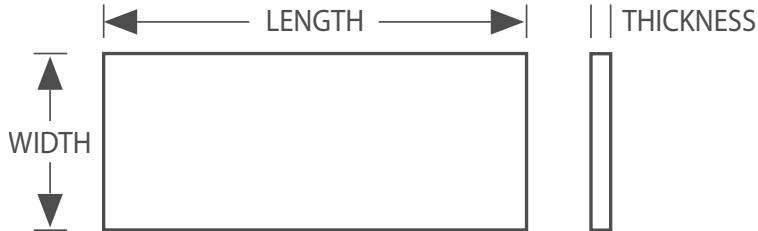
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12" x 100" Rolled Shim Stock 316 Stainless

Part Reference	Thickness		Width (inch)	Length (Inch)	Kg
	Inch	Metric			
SH316SSHW-1	0.001	0.025	12"	100"	0.163
SH316SSHW-2	0.002	0.051	12"	100"	0.327
SH316SSHW-3	0.003	0.076	12"	100"	0.472
SH316SSHW-4	0.004	0.102	12"	100"	0.635
SH316SSHW-5	0.005	0.127	12"	100"	0.798
SH316SSHW-6	0.006	0.152	12"	100"	0.962
SH316SSHW-7	0.007	0.178	12"	100"	1.125
SH316SSHW-8	0.008	0.203	12"	100"	1.270
SH316SSHW-10	0.010	0.254	12"	100"	1.597
SH316SSHW-12	0.012	0.305	12"	100"	1.905
SH316SSHW-15	0.015	0.381	12"	100"	2.395
SH316SSHW-20	0.020	0.508	12"	100"	3.193
SH316SSHW-25	0.025	0.635	12"	100"	3.974
SH316SSHW-31	0.031	0.787	12"	100"	4.935

Pre-packed Shim Stock

510 Phosphor Bronze Spring Tempered



FEATURES:

- / Spring Tempered
- / Grade A
- / Rockwell 30T76 - 80
- / 6" Widths

ORDERING INSTRUCTIONS

Identify thickness, width and length required from the tables below or identify part number. Other sizes can be cut to custom size.



APPLICATIONS

510 Spring Tempered Phosphor Bronze is hard and has a high resistance to fatigue and corrosion. 510 Phosphor Bronze has high formability with the added benefit of welding, brazing and soldering capabilities. Phosphor bronze has excellent cold working and electrical properties. Ideal applications are electrical components, washers, gaskets, shims, fasteners, springs and bearings.

6" x 50" 510 Phosphor Bronze Spring Tempered

Part Reference	Thickness		Width (inch)	Length (Inch)	Kg
	Inch	Metric			
SHPBX-5	0.005	0.127	6"	50"	0.195
SHPBX-8	0.008	0.203	6"	50"	0.313
SHPBX-10	0.010	0.254	6"	50"	0.390
SHPBX-13	0.013	0.330	6"	50"	0.508
SHPBX-16	0.016	0.406	6"	50"	0.621
SHPBX-20	0.020	0.508	6"	50"	0.780
SHPBX-25	0.025	0.635	6"	50"	0.971
SHPBX-32	0.032	0.813	6"	50"	1.243
SHPBX-40	0.040	1.016	6"	50"	1.556
SHPBX-50	0.050	1.270	6"	50"	1.941
SHPBX-64	0.064	1.626	6"	50"	2.486

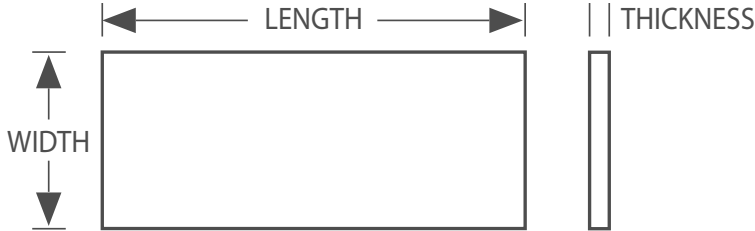
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6" x 96" 510 Phosphor Bronze Spring Tempered

Part Reference	Thickness		Width (inch)	Length (Inch)	Kg
	Inch	Metric			
SHPB-5	0.005	0.127	6"	96"	0.417
SHPB-8	0.008	0.203	6"	96"	0.671
SHPB-10	0.010	0.254	6"	96"	0.839
SHPB-13	0.013	0.330	6"	96"	1.089
SHPB-16	0.016	0.406	6"	96"	1.338
SHPB-20	0.020	0.508	6"	96"	1.674
SHPB-25	0.025	0.635	6"	96"	2.087
SHPB-32	0.032	0.813	6"	96"	2.676
SHPB-40	0.040	1.016	6"	96"	3.348
SHPB-50	0.050	1.270	6"	96"	4.182
SHPB-64	0.064	1.626	6"	96"	5.357

Pre-packed Shim Stock

AISI 1010 Cold Rolled Steel (CS4 / CR4)



FEATURES

- / Hardened and Tempered
- / Rockwell B 90 min
- / 6" and 12" Widths

APPLICATIONS

1010 Cold Rolled Steel has good formability and machinability, it is also magnetic. Ideal for the manufacture of shims, washers, gaskets, fasteners, plates and brackets.

ORDERING INSTRUCTIONS

Identify thickness, width and length required from the tables below or identify part number. Other sizes can be cut to custom size.



6" x 100" 1100 Cold Rolled Steel Shim Pack

Part Reference	Thickness		Width (inch)	Length (Inch)	Kg
	Inch	Metric			
SHCRS-1	0.001	0.025	6"	100"	0.113
SHCRS-1X	0.0015	0.038	6"	100"	0.118
SHCRS-2	0.002	0.051	6"	100"	0.191
SHCRS-3	0.003	0.076	6"	100"	0.263
SHCRS-4	0.004	0.102	6"	100"	0.327
SHCRS-5	0.005	0.127	6"	100"	0.435
SHCRS-6	0.006	0.152	6"	100"	0.517
SHCRS-7	0.007	0.178	6"	100"	0.594
SHCRS-8	0.008	0.203	6"	100"	0.689
SHCRS-9	0.009	0.229	6"	100"	0.753
SHCRS-10	0.010	0.254	6"	100"	0.830
SHCRS-12	0.012	0.305	6"	100"	1.016
SHCRS-15	0.015	0.381	6"	100"	1.252
SHCRS-20	0.020	0.508	6"	100"	1.746
SHCRS-25	0.025	0.635	6"	100"	2.286
SHCRS-31	0.031	0.787	6"	100"	2.985

Continued on next page

12" x 120" 1100 Cold Rolled Steel Shim Pack

Part Reference	Thickness		Width (inch)	Length (Inch)	Kg
	Inch	Metric			
SHCRW-1	0.001	0.025	12"	120"	0.848
SHCRW-2	0.002	0.051	12"	120"	0.494
SHCRW-3	0.003	0.076	12"	120"	0.671
SHCRW-4	0.004	0.102	12"	120"	0.862
SHCRW-5	0.005	0.127	12"	120"	1.034
SHCRW-6	0.006	0.152	12"	120"	1.234
SHCRW-7	0.007	0.178	12"	120"	1.383
SHCRW-8	0.008	0.203	12"	120"	1.647
SHCRW-9	0.009	0.229	12"	120"	1.882
SHCRW-10	0.010	0.254	12"	120"	2.105
SHCRW-12	0.012	0.305	12"	120"	2.427
SHCRW-15	0.015	0.381	12"	120"	3.035
SHCRW-20	0.020	0.508	12"	120"	4.209
SHCRW-25	0.025	0.635	12"	120"	5.103
SHCRW-31	0.031	0.787	12"	120"	6.160

Pre-packed Shim Stock

C1095 Blue Tempered Spring Steel



FEATURES

- / Tempered
- / Polished
- / Rockwell C 48 - 51
- / 3" and 6" Widths

ORDERING INSTRUCTIONS

Identify thickness, width and length required from the tables below or identify part number. Other sizes can be cut to custom size.



APPLICATIONS

1095 Blue Tempered Spring Steel combines high tensile strength with maximum fatigue life. Ideal for tool and die applications due to its toughness. Typically shims, washers and plates, but primarily springs are made from C1095.

3" x 50" C1095 Blue Tempered Rolled Shim Stock

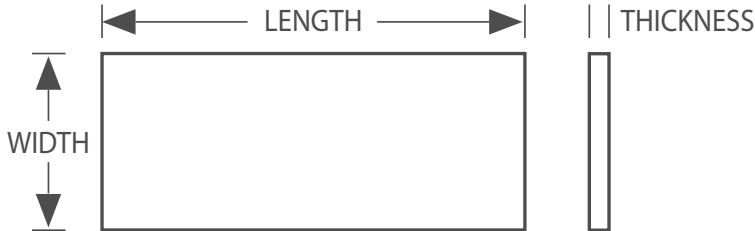
Part Reference	Thickness		Width (inch)	Length (Inch)	Kg
	Inch	Metric			
SHBTS-2	0.002	0.051	3"	50"	0.041
SHBTS-3	0.003	0.076	3"	50"	0.059

6" x 50" C1095 Blue Tempered Rolled Shim Stock

Part Reference	Thickness		Width (inch)	Length (Inch)	Kg
	Inch	Metric			
SHBTS-4	0.004	0.102	6"	50"	0.154
SHBTS-5	0.005	0.127	6"	50"	0.195
SHBTS-6	0.006	0.152	6"	50"	0.236
SHBTS-7	0.007	0.178	6"	50"	0.272
SHBTS-8	0.008	0.203	6"	50"	0.313
SHBTS-10	0.010	0.254	6"	50"	0.404
SHBTS-12	0.012	0.305	6"	50"	0.426
SHBTS-15	0.015	0.381	6"	50"	0.585
SHBTS-16	0.016	0.406	6"	50"	0.621
SHBTS-18	0.018	0.457	6"	50"	0.699
SHBTS-20	0.020	0.508	6"	50"	0.780
SHBTS-25	0.025	0.635	6"	50"	0.971
SHBTS-28	0.028	0.711	6"	50"	1.089
SHBTS-30	0.030	0.762	6"	50"	1.166
SHBTS-32	0.032	0.813	6"	50"	1.243

Pre-packed Shim Stock

1100 Aluminium Tempered



FEATURES

- / Tempered
- / Temper H-18/19
- / 6" Widths

APPLICATIONS

1100 Aluminium is highly malleable, incredibly light and strong. Aluminium has excellent cold working properties, high electrical and heat conductivity and resistance to corrosion. These properties make 1100 Aluminium ideal for automotive, aerospace and food processing components. Components such as washers, shims, gaskets and electrical pieces.

ORDERING INSTRUCTIONS

Identify thickness, width and length required from the tables below or identify part number. Other sizes can be cut to custom size.

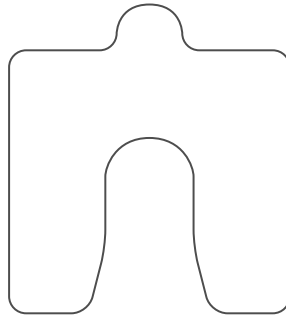


6" x 100" 1100 Aluminium Rolled Shim Stock

Part Reference	Thickness		Width (inch)	Length (Inch)	Kg
	Inch	Metric			
SHAL-1	0.001	0.025	6"	100"	0.027
SHAL-2	0.002	0.051	6"	100"	0.054
SHAL-3	0.003	0.076	6"	100"	0.082
SHAL-4	0.004	0.102	6"	100"	0.109
SHAL-5	0.005	0.127	6"	100"	0.132
SHAL-6	0.006	0.152	6"	100"	0.159
SHAL-8	0.008	0.203	6"	100"	0.213
SHAL-10	0.010	0.254	6"	100"	0.272
SHAL-15	0.015	0.381	6"	100"	0.408
SHAL-20	0.020	0.508	6"	100"	0.544
SHAL-25	0.025	0.635	6"	100"	0.662
SHAL-32	0.032	0.813	6"	100"	0.862

Slotted Alignment Shims

Stainless Steel Slotted Shim Packs



FEATURES

- / No Sharp Edges
- / 300 Series Stainless Steel
- / Universal Slot Widths
- / Etched Thicknesses on each Shim

APPLICATIONS

Alignment shims are used to correct alignment in many applications, such as machinery, motors and shafts. They can be easily added and removed due to the tab feature and rounded edges. Each thicknesses is easily identifiable on the shim.

ORDERING INSTRUCTIONS

Identify the kit required by either the slot width or the dimensions of the alignment shim, and quote the corresponding part number. For replacement kits, identify the dimensions of your kit and choose the replacement thicknesses and quote the corresponding part number.



Alignment Shim Packs 20 pcs

Part Reference	Dimensions	Thicknesses (20 Pcs)	Slot Size	Kg
SHSSFK-A	2" x 2"	.001, .002, .003, .004, .005, .010, .015, .020, .025, .050, .075, .100, .125	5/8"	5.307
SHSSFK-B	3" x 3"	.001, .002, .003, .004, .005, .010, .015, .020, .025, .050, .075, .100, .125	3/4"	11.657
SHSSFK-C	4" x 4"	.001, .002, .003, .004, .005, .010, .015, .020, .025, .050, .075, .100, .125	1-1/4"	19.595
SHSSFK-D	5" x 5"	.001, .002, .003, .004, .005, .010, .015, .020, .025, .050, .075, .100, .125	1-5/8"	28.350

Replacement Shims 20 pcs

Part Reference	Dimensions	Thicknesses (20 Pcs)	Slot Size	Kg
SHRPSS-A-001	2" x 2"	0.001	5/8"	0.014
SHRPSS-A-002	2" x 2"	0.002	5/8"	0.023
SHRPSS-A-003	2" x 2"	0.003	5/8"	0.032
SHRPSS-A-004	2" x 2"	0.004	5/8"	0.041
SHRPSS-A-005	2" x 2"	0.005	5/8"	0.050
SHRPSS-A-010	2" x 2"	0.010	5/8"	0.095
SHRPSS-A-015	2" x 2"	0.015	5/8"	0.145
SHRPSS-A-020	2" x 2"	0.020	5/8"	0.200
SHRPSS-A-025	2" x 2"	0.025	5/8"	0.245
SHRPSS-A-050	2" x 2"	0.050	5/8"	0.490
SHRPSS-A-075	2" x 2"	0.075	5/8"	0.708
SHRPSS-A-100	2" x 2"	0.100	5/8"	0.925
SHRPSS-A-125	2" x 2"	0.125	5/8"	1.143

Continued on next page

Replacement Shims 20 pcs

B

Part Reference	Dimensions	Thicknesses (20 Pcs)	Slot Size	Kg
SHRPSS-B-001	3" x 3"	0.001	3/4"	0.032
SHRPSS-B-002	3" x 3"	0.002	3/4"	0.054
SHRPSS-B-003	3" x 3"	0.003	3/4"	0.068
SHRPSS-B-004	3" x 3"	0.004	3/4"	0.095
SHRPSS-B-005	3" x 3"	0.005	3/4"	0.113
SHRPSS-B-010	3" x 3"	0.010	3/4"	0.218
SHRPSS-B-015	3" x 3"	0.015	3/4"	0.345
SHRPSS-B-020	3" x 3"	0.020	3/4"	0.445
SHRPSS-B-025	3" x 3"	0.025	3/4"	0.553
SHRPSS-B-050	3" x 3"	0.050	3/4"	1.107
SHRPSS-B-075	3" x 3"	0.075	3/4"	1.633
SHRPSS-B-100	3" x 3"	0.100	3/4"	2.214
SHRPSS-B-125	3" x 3"	0.125	3/4"	2.631

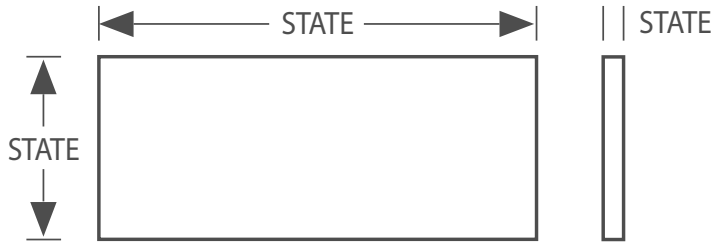
C

Part Reference	Dimensions	Thicknesses (20 Pcs)	Slot Size	Kg
SHRPSS-C-001	4" x 4"	0.001	1-1/4"	0.050
SHRPSS-C-002	4" x 4"	0.002	1-1/4"	0.086
SHRPSS-C-003	4" x 4"	0.003	1-1/4"	0.122
SHRPSS-C-004	4" x 4"	0.004	1-1/4"	0.159
SHRPSS-C-005	4" x 4"	0.005	1-1/4"	0.195
SHRPSS-C-010	4" x 4"	0.010	1-1/4"	0.367
SHRPSS-C-015	4" x 4"	0.015	1-1/4"	0.590
SHRPSS-C-020	4" x 4"	0.020	1-1/4"	0.771
SHRPSS-C-025	4" x 4"	0.025	1-1/4"	0.953
SHRPSS-C-050	4" x 4"	0.050	1-1/4"	1.869
SHRPSS-C-075	4" x 4"	0.075	1-1/4"	2.776
SHRPSS-C-100	4" x 4"	0.100	1-1/4"	3.756
SHRPSS-C-125	4" x 4"	0.125	1-1/4"	4.500

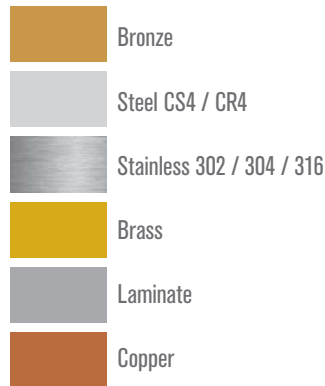
D

Part Reference	Dimensions	Thicknesses (20 Pcs)	Slot Size	Kg
SHRPSS-D-001	5" x 5"	0.001	1-5/8"	0.077
SHRPSS-D-002	5" x 5"	0.002	1-5/8"	0.136
SHRPSS-D-003	5" x 5"	0.003	1-5/8"	0.195
SHRPSS-D-004	5" x 5"	0.004	1-5/8"	0.245
SHRPSS-D-005	5" x 5"	0.005	1-5/8"	0.295
SHRPSS-D-010	5" x 5"	0.010	1-5/8"	0.581
SHRPSS-D-015	5" x 5"	0.015	1-5/8"	0.898
SHRPSS-D-020	5" x 5"	0.020	1-5/8"	1.179
SHRPSS-D-025	5" x 5"	0.025	1-5/8"	1.461
SHRPSS-D-050	5" x 5"	0.050	1-5/8"	3.012
SHRPSS-D-075	5" x 5"	0.075	1-5/8"	4.282
SHRPSS-D-100	5" x 5"	0.100	1-5/8"	5.697
SHRPSS-D-125	5" x 5"	0.125	1-5/8"	6.931

Shim Material – Cut to Size

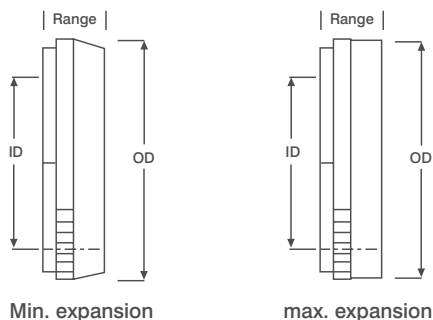


- / All thicknesses to standard gauge sizes.
- / Other materials available to order – Aluminium, Phosphor Bronze.
- / Also Laminated Steel, Brass, Aluminium, Stainless Steel.
- / Parallel flat services for use with other clamps or by itself.



Steel			CS4/CR4			Brass			CZ108			Stainless			302			
Thickness		Width	Thickness		Width	Thickness		Width	Thickness		Width	Thickness		Width	Thickness		Width	
.001	(.025mm)	12"	.002	(.05mm)	8"	.001	(.025mm)	12"										
.0015	(.038mm)	12"	.003	(.076mm)	12"	.002	(.05mm)	12"				.003	(.076mm)	12"				
.002	(.05mm)	24"	.004	(.1mm)	6"	.004	(.1mm)	12"				.004	(.1mm)	12"				
.003	(.076mm)	24"	.005	(.127mm)	12"	.005	(.127mm)	12"				.005	(.127mm)	12"				
.004	(.1mm)	24"	.010	(.25mm)	12"	.006	(.152mm)	12"				.006	(.152mm)	12"				
.005	(.127mm)	24"	.015	(.38mm)	12"	.008	(.2mm)	12"				.008	(.2mm)	12"				
.006	(.152mm)	24"	.020	(.5mm)	12"	.010	(.25mm)	12"				.010	(.25mm)	12"				
.007	(.177mm)	24"				.015	(.38mm)	6"				.015	(.38mm)	6"				
.008	(.2mm)	24"				.020	(.5mm)	12"				.020	(.5mm)	12"				
.010	(.25mm)	24"				.025	(.635mm)	12"				.025	(.635mm)	12"				
.012	(.30mm)	12"				.030	(.76mm)	TO ORDER				.030	(.76mm)	TO ORDER				
.015	(.38mm)	24"				.040	(1mm)	TO ORDER				.040	(1mm)	TO ORDER				
.020	(.5mm)	24"																
.025	(.635mm)	12"																
.030	(.76mm)	TO ORDER																
.030	(.91mm)	TO ORDER																
.040	(1mm)	TO ORDER																
.050	(1.27mm)	TO ORDER																
.060	(1.5mm)	TO ORDER																
.080	(2.03mm)	TO ORDER																
.100	(2.54mm)	TO ORDER																
.118	(3mm)	TO ORDER																
.125	(3.17mm)	TO ORDER																

Euco Milling Arbor Micrometer Spacers



/ The material used is an alloy steel specially selected for wear resistance and durability, satin chrome plated, faces lapped.

/ All spacers have a thread pitch of 1mm. The engraved scale on imperial spacers is provided with 40 divisions, every fourth division is numbered (0-9) each graduation is .001" and adjustment is accurate to approximately .0005". Any closer adjustment is easily made after a trial cut.

/ Metric spacers have 50 divisions, every fifth division is numbered (0-9) each graduation is .02mm and adjustment is accurate to approximately 0.1mm



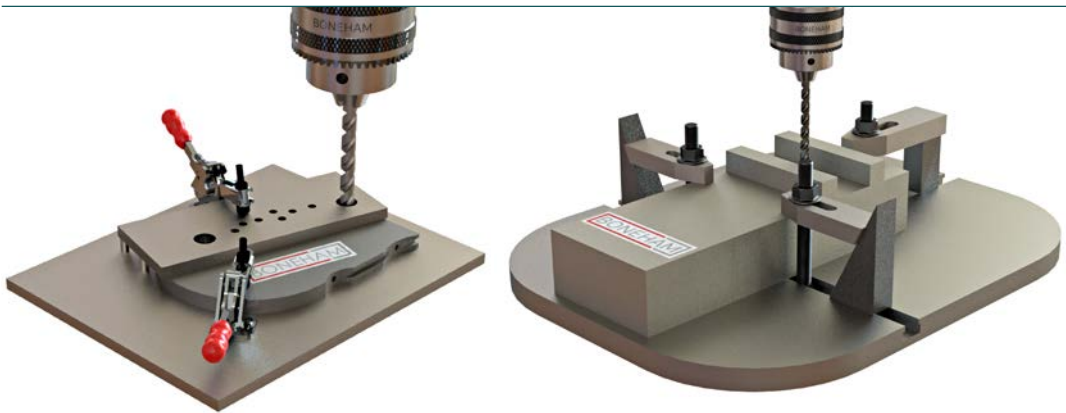
IMPERIAL

Ref.	Bore	OD	Key Way Width	Key Way Depth	Flange Dia.	Thread Dia.	Minimum Width	Expansion
MSS0	3/4	1.48	1/8	5/64	1.22	1.04	.250	.040
MSS0A	3/4	1.48	1/8	5/64	1.22	1.04	.438	.080
MSS1	1	1.88	1/4	3/32	1.50	1.44	.250	.040
MSS1A	1	1.88	1/4	3/32	1.50	1.44	.438	.080
MSS2	1.1/4	2.22	5/16	1/8	1.88	1.72	.250	.040
MSS2A	1.1/4	2.22	5/16	1/8	1.88	1.72	.438	.080
MSS3	1.1/2	2.56	3/8	5/32	2.19	2.10	.250	.040
MSS3A	1.1/2	2.56	3/8	5/32	2.19	2.10	.438	.080
MSS4B	2	3.31	1/2	3/16	2.81	2.68	.438	.080
MSS5	2.1/2	3.98	5/8	7/32	3.50	3.25	.438	.080

METRIC

Ref.	Bore	OD	Key Way Width	Key Way Depth	Flange Dia.	Thread Dia.	Minimum Width	Expansion
MSM5	16	34.30	4	2	27	23.30	6.30	1
MSM5A	16	34.30	4	2	27	23.30	11	2
MSM7	22	43.20	6	2.61	35	31.75	6.30	1
MSM7A	22	43.20	6	2.61	35	31.75	11.00	2
MSM1	27	50.20	7	3.25	43	38.90	6.30	1
MSM1A	27	50.20	7	3.25	43	38.90	11.00	2
MSM12	32	56.20	8	3.25	48	43.66	6.30	1
MSM12A	32	56.20	8	3.25	48	43.66	11.00	2
MSM12D	32	54.00					17.50	5
MSM15	40	67.10	10	4	58	55.70	6.30	1
MSM15A	40	67.10	10	4	58	55.70	11.00	2
MSM15D	40	62.00					17.50	5
MSM20A	50	83.60	12	4	71	68.26	11.00	2
MSM25A	60	100.80	14	4.50	89	81.15	11.00	2

Clamping & Fixing



CLAMPS

/ Plain Clamp / Swan-Neck Clamp / Double Goose-Neck Clamp / Pin Ended Forked Clamp
/ Shoed Forked Clamps

Pages 141-148

JACKS

/ Adjustable Vertical Jack / Screw Jack for Adjustable Vertical Jack
/ Supplements for Adjustable Vertical Jack

Pages 149-150

WASHERS

/ Spherical Seat and Dished Washers / Countersunk Washers / C-Shaped Washers

Pages 151-158

NUTS & BOLTS

/ T Slot Bolts / T. Nuts / T-Nut, system "Rhombus" / Blank for T-Nuts / Fixture Nut / Collar Nut
/ Eye Swing Bolts / Lifting Eye Bolts

Pages 159-171

HOIST RINGS

/ Safety Swivel Hoist Ring / Stainless Steel Safety Hoist Ring / Forged Swivel Hoist Ring

Pages 172-179

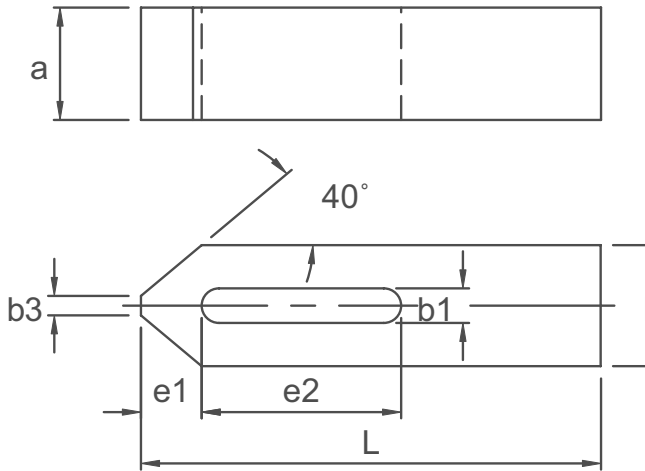
TOGGLE CLAMPS

/ Vertical Toggle Clamps: Flat Base Slotted Arm, Side Mounting Type / Horizontal Toggle Clamps: Flat Base
/ Push Pull Toggle Clamps: Flat Base, Nose Mounted / Nose Mounting Brackets / Push Pull Toggle Clamps:
Heavy Duty / Latch Toggle Clamps: Horizontal Versions / Toggle Presses: Manual Versions / Toggle Pliers

Pages 180-214

Plain Clamp

DIN 6314



MATERIAL

/ Carbon Steel, Enamelled finish.

/ Parallel flat surfaces to be used with other clamps or by itself.



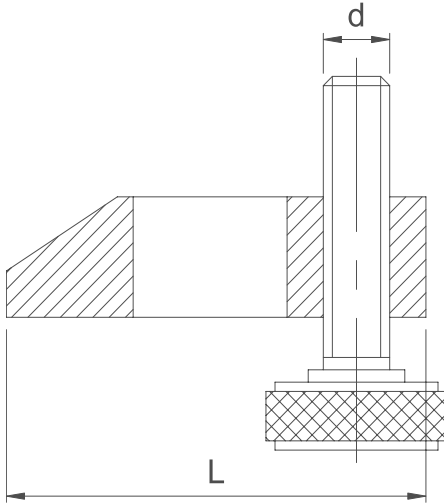
Part Reference	b1	L	Screw Size	a	b2	b3	e1	e2
PC1-0003	7	50	M6	10	20	8	10	20
PC2-0011	9	60	M8	12	25	10	13	22
PC3-0029	11	80	M10	15	30	12	15	30
PC4-0037	14	100	M12/14	20	40	14	21	40
PC5-0045	14	125	M12/14	20	40	14	21	50
PC6-0052	18	125	M16/18	25	50	18	26	45
PC7-0060	18	160	M16/18	25	50	18	26	65
PC8-0078	22	160	M20/22	30	60	22	30	60
PC9-0086	22	200	M20/22	30	60	22	30	80
PC10-0094	26	200	M24	30	70	26	35	80
PC11-0102	26	250	M24	35	70	26	35	105
PC12-0110	34	250	M30	40	80	34	45	100
PC13-0128	34	315	M30	50	80	34	45	130

Adjustable Plain Clamp (with Screw) Less T-Bolt Washer & Nut

142

CLAMPING & FIXING

DIN 6314AT



MATERIAL

/ Heat Treated and Enamelled

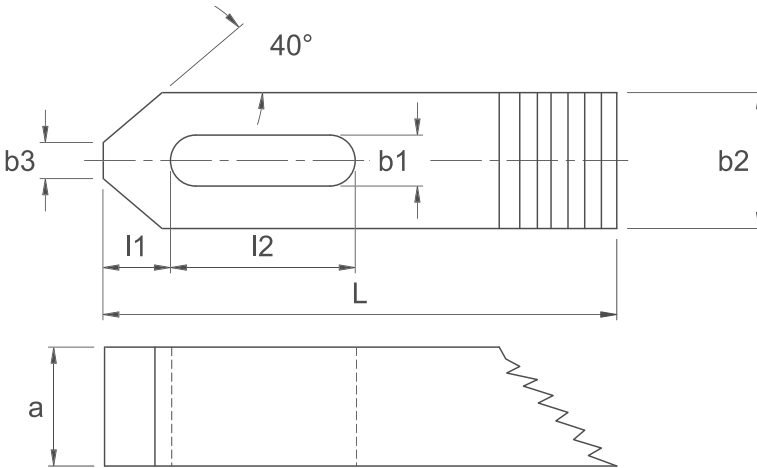


Part Reference	b1*	L	Screw Size	a	b2*	b3*	d	e1	e2
PCA1-0177	11	80	M10	15	30	12	m10	15	30
PCA2-0193	14	100	M12/14	20	40	14	m12	21	40
PCA3-0219	18	125	M16/18	25	50	18	m16	26	45
PCA4-0201	22	160	M20/22	30	60	22	m20	30	60

Complete with adjustable screw * as Plain Clamp Sketch

Step Clamp

DIN 6314Z



MATERIAL

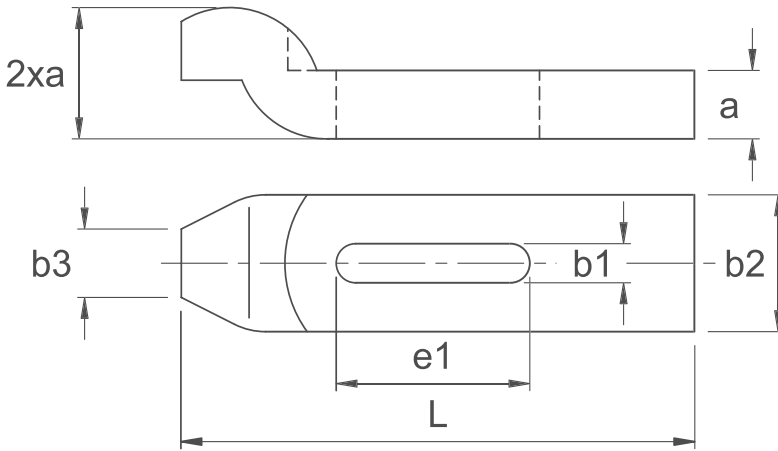
/ Heat treated steel, enamelled



Part Reference	b1	L	a	M	b2	b3	l1	l2
SPC1	7	50	10	M6	20	8	10	20
SPC2	9	60	12	M8	25	10	13	22
SPC3	11	80	15	M10	30	12	15	30
SPC4	14	100	20	M12+M14	40	14	21	40
SPC5	18	125	25	M16+M18	50	18	26	45
SPC6	22	160	30	M20+M22	60	22	30	60
SPC7	26	200	30	M24	70	26	35	80

Swan-Neck Clamp

DIN 6316



MATERIAL

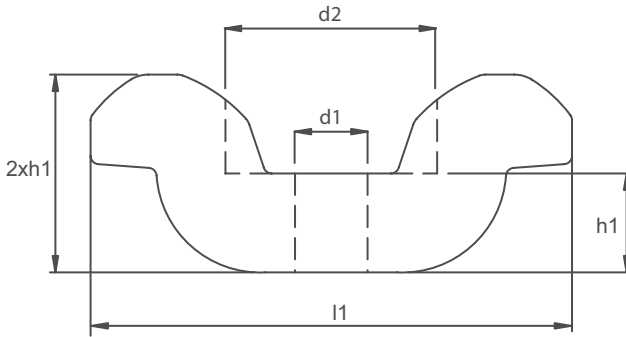
/ Heat treated steel, enamelled.



Part Reference	b1	L	M	a	b2	b3	e1
SNC1	7	60	M6	20	20	10	10
SNC2	9	80	M8	25	25	12	12
SNC3	11	100	M10	30	32	15	15
SNC5	18	125	M16+M18	50	50	25	25
SNC6	18	160	M16+M18	50	50	25	25
SNC7	22	160	M20	60	70	30	30
SNC8	22	200	M20	60	70	30	30
SNC9	26	200	M24	70	80	35	35
SNC10	26	250	M24	70	80	35	35
SNC11	34	315	M30	80	100	40	50

Double Goose-Neck Clamp

DIN 6316B

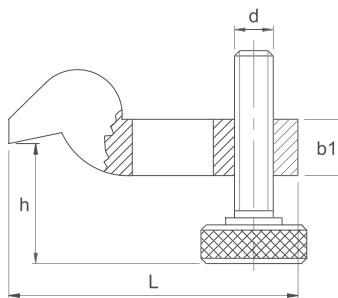


/ In refined steel, varnished.

Part Reference	d1	d2	h1	l1
DGNC1	18	40	20	100
DGNC2	25	60	30	140

Adjustable Clamp

DIN 6316T

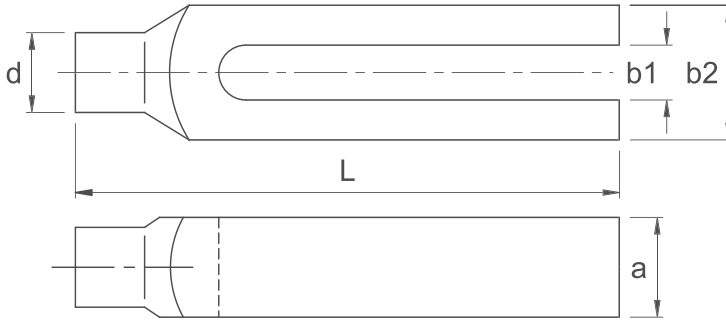


/ With levelling screw.

Part Reference	Nominal	L	d	h	m
AGNC1	11	100	M10	30-70	M10
AGNC2	14	125	M12	34-74	M12, M14
AGNC3	18	160	M16	43-93	M16, M18
AGNC4	22	200	M20	50-110	M20, M22

Pin Ended Forked Clamp

DIN 6315-C



MATERIAL

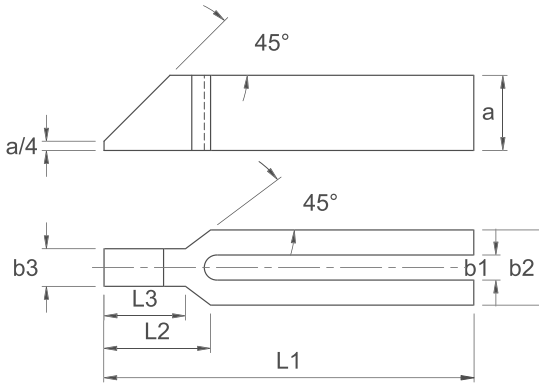
/ Heat treated steel, enamelled



Part Reference	b1	L	d	M	b2	a
PEFC1	7	80	12	M6	19	15
PEFC2	9	90	12	M8	25	15
PEFC3	11	125	16	M10	31	20
PEFC4	14	160	20	M12+M14	38	25
PEFC5	18	200	24	M16+M18	48	30
PEFC6	22	250	30	M20+M22	62	40
PEFC7	26	315	38	M24	66	40
PEFC8	34	400	45	M27+M30	74	50

Shoed Forked Clamps

DIN 6315GN



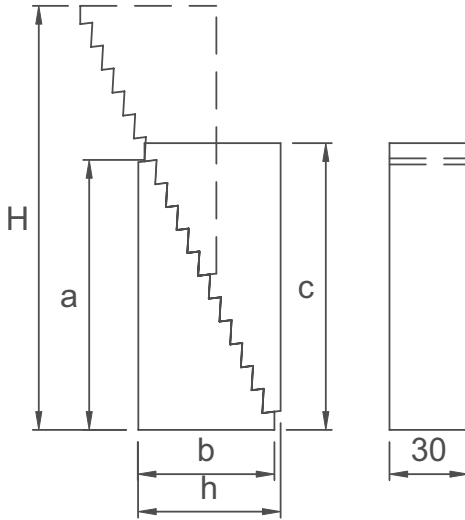
MATERIAL

/ Heat treated steel, enamelled.



Part Reference	b1	L1	a	M	b2	b3	L2	L3
SFC1	9	100	15	M8	30	16	32	18
SFC2	11	125	20	M10	30	20	38	24
SFC3	14	160	25	M12+M14	40	24	47	30
SFC4	14	200	25	M12+M14	40	24	47	30
SFC5	18	160	30	M16+M18	50	28	57	36
SFC6	18	200	30	M16+M18	50	28	57	36
SFC7	18	250	30	M16+M18	50	28	57	36
SFC8	22	200	40	M20+M22	60	35	68	45
SFC9	22	250	40	M20+M22	60	35	68	45
SFC10	22	315	40	M20+M22	60	35	68	45
SFC11	26	250	40	M24	70	43	83	56
SFC12	26	315	40	M24	70	43	83	56
SFC13	34	315	50	M30	80	50	88	56
SF14	34	400	50	M30	80	50	88	56

Universal Step Blocks



MATERIAL

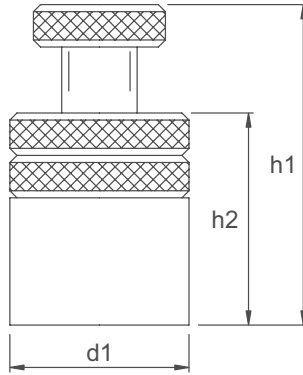
/ Carbon Steel, enamelled finish.



Part Reference	a	b	c	h	H
SB1-3296	36	22	40	25	50
SB2-3304	70	33	74	35	100
SB3-3312	120	60	124	60	190

Adjustable Vertical Jack

DIN 6400



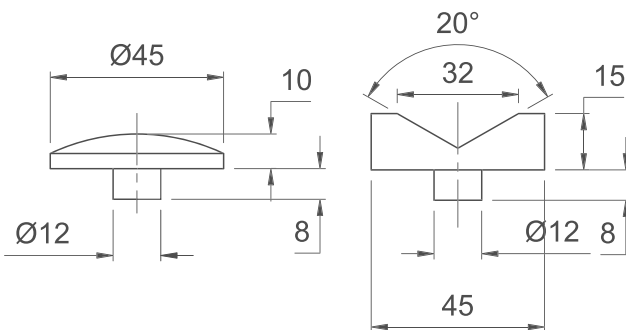
149

CLAMPING & FIXING

/ Type 6400, in refined steel, varnished, center hol diam. 12mm (from size 2).

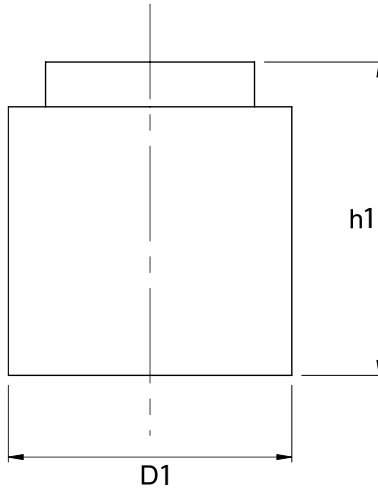
Part Reference	Size nr.	d1	h2	h1
AVJ1	1	28	30	45
AVJ2	2	38	45	65
AVJ3	3	45	65	95
AVJ4	4	60	90	140
AVJ5	5	80	125	190
AVJ6	6	100	190	280
AVJ7	7	100	275	500

Screw Jack for Adjustable Vertical Jack



Part Reference	Type	Intended for
SJAJ1	Ball pad	AVJ2
SJAJ2	V-pad	AVJ2

Supplements for Adjustable Vertical Screw Jack



KEY FEATURES

- / Base extension for vertical screw jack
- / Use in conjunction with AVJ (page 149)

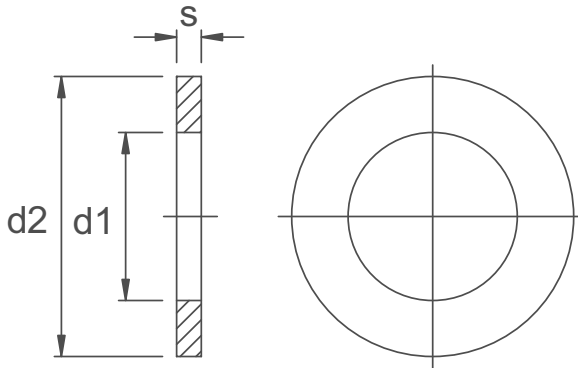


Part Reference	Size nr.	h1	D1
SVJ1	1	15	28
SVJ2	1	30	28
SVJ3	1	60	28
SVJ4	2	20	38
SVJ5	2	40	38
SVJ6	2	80	38
SVJ7	3	30	45
SVJ8	3	60	45
SVJ9	3	100	45
SVJ10	4	50	60
SVJ11	4	100	60
SVJ12	5	65	80
SVJ13	5	130	100

* The stock of this article will not be renewed.

Washers

DIN 6340



KEY FEATURES

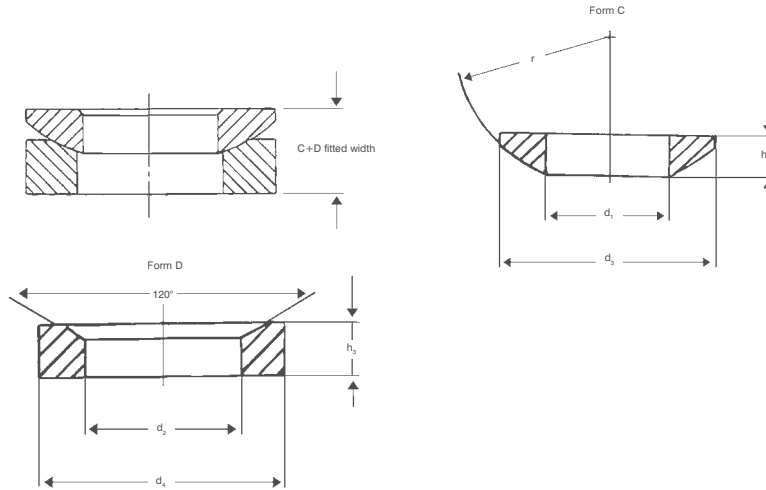
- / Hardened and tempered (350 + 80) HV 30
- / Black oxide
- / Ideal for clamping applications



Part Reference	Screw Size	d1	d2	s
W1-2818	M6	6.4	17	3
W2-2826	M8	8.4	23	4
W3-2834	M10	10.5	28	4
W4-2842	M12	13.0	35	5
W5-2859	M14	15.0	40	5
W6-2867	M16	17.0	45	6
W7-2875	M18	19.0	45	6
W8-2883	M20	21.0	50	6
W9-2891	M22	23.0	50	8
W10-2909	M24	25.0	60	8
W11-2917	M27	28.0	68	10
W12-2925	M30	31.0	68	10
W13-2933	M36	38	80	12

Spherical Seat and Dished Washers – Metric

DIN 6319 C/D



MATERIAL

/ DIN 6319 C/D
/ D: case-hardened steel (hardening depth 0.2 - 0.4mm)

APPLICATIONS

Concave and convex washers are suitable for locking mechanical parts on non-parallel surfaces.

ORDERING INSTRUCTIONS

Spherical washers are sold singularly but can be requested in pairs. When ordering please use the below part codes followed with either:

/ C: Form C for the convex washer
/ D: Form D for the concave washer

Example: S1728-1950C

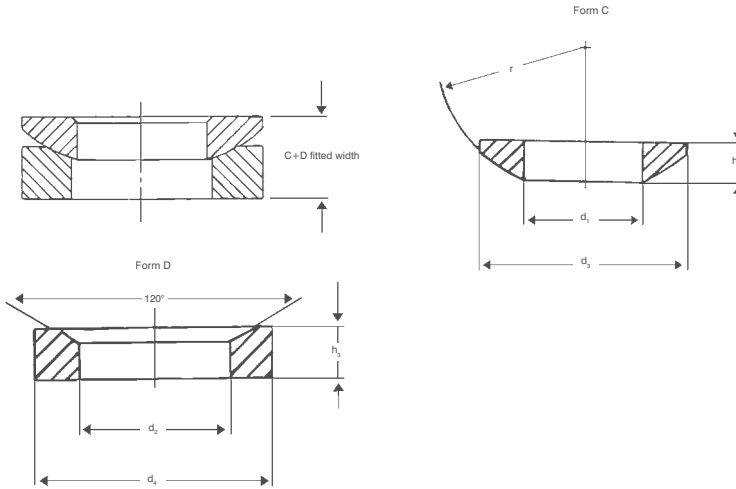
/ Dimensions are set out for both C & D under the same part code in the table below.



Part Reference	Screw	d1	d2	d3	d4	h2	h3	Total Width (c+d)	r
S1728-1950	M6	6.4	7.1	12	12	2.3	2.8	4.0	9
S1737-1869	M8	8.4	9.6	17	17	3.2	3.5	5.0	12
S1745-1877	M10	10.5	12.0	21	21	4.0	4.2	6.3	15
S1752-1885	M12	13.0	14.2	24	24	4.6	5.0	8.0	17
S1760-1893	M14	15.0	16.5	28	28	5.0	5.6	8.6	22
S1778-1901	M16	17.0	19.0	30	30	5.3	6.2	9.3	22
S1786-1919	M20	21.0	23.2	36	36	6.3	7.5	11.5	27
S1794-1927	M24	25.0	28.0	44	44	8.2	9.5	15.0	32
S1802-1935	M30	31.0	35.0	56	56	11.2	12.0	19.7	41
S1810-1943	M36	37.0	42.0	68	68	14.0	15.0	23.0	50
S1836-1968	M42	43.0	49.0	78	78	17.0	18.0	29.0	58
S1844-1976	M48	50.0	56.0	92	92	21.0	22.0	36.0	67

Spherical Seat and Dished Washers Stainless Steel

Metric



MATERIAL

/ AISI 303 stainless steel.

FEATURES AND APPLICATIONS

Concave and convex washers are suitable for locking mechanical parts on non-parallel surfaces. AISI 303 stainless steel, thanks to its high resistance to corrosion, allows the application of these washers on machines and equipment in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to use corrosion resistant materials.

ORDERING INSTRUCTIONS

Spherical washers are sold singularly but can be requested in pairs. When ordering please use the below part codes followed with either:

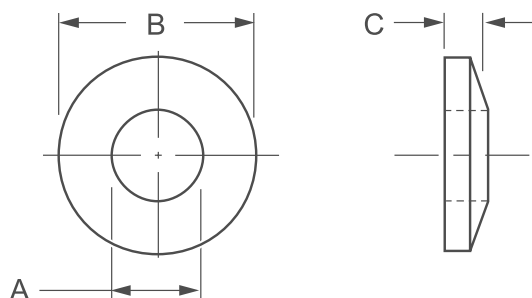
- / C: Form C for the convex washer
- / D: Form D for the concave washer
- Example: S1728-1950C
- / Dimensions are set out for both C & D under the same part code in the table below.



Part Reference	Screw	d1	d2	d3	d4	h2	h3	Total Width (c+d)	r
S1728-SS	M6	6.4	7.1	12	12	2.3	2.8	4.0	9
S1737-SS	M8	8.4	9.6	17	17	3.2	3.5	5.0	12
S1745-SS	M10	10.5	12.0	21	21	4.0	4.2	6.3	15
S1752-SS	M12	13.0	14.2	24	24	4.6	5.0	8.0	17
S1760-SS	M14	15.0	16.5	28	28	5.0	5.6	8.6	22
S1778-SS	M16	17.0	19.0	30	30	5.3	6.2	9.3	22
S1786-SS	M20	21.0	23.2	36	36	6.3	7.5	11.5	27
S1794-SS	M24	25.0	28.0	44	44	8.2	9.5	15.0	32
S1802-SS	M30	31.0	35.0	56	56	11.2	12.0	19.7	41
S1810-SS	M36	37.0	42.0	68	68	14.0	15.0	23.0	50
S1836-SS	M42	43.0	49.0	78	78	17.0	18.0	29.0	58
S1844-SS	M48	50.0	56.0	92	92	21.0	22.0	36.0	67

Spherical Washers - Imperial

Top Washer



KEY FEATURES

- / Case hardened (Steel)
- / Black oxide finish
- / Stainless are 300 series and natural finish
- / Hole to fit bolts and studs

APPLICATION

Boneham's 'SWT Type' spherical washers are designed to aid even fastening between parts with irregular alignment. The 'Top' washer features a convex spherical radius for aligning in the concaved bottom.

ORDERING INSTRUCTIONS

When ordering identify the bolt size required and use the corresponding part number. Example: SWT08

NOTES

Boneham sells spherical washers separately, please see page opposite for the bottom washer.



Steel Spherical Washer Top

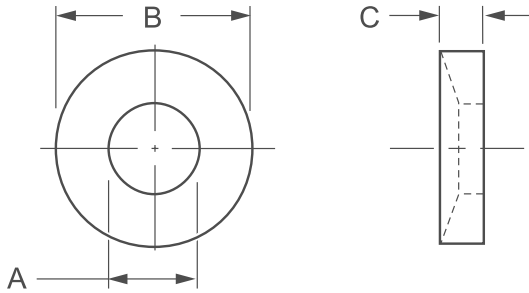
Part No.	Dimensions			Bolt Size
	A + / - 0.15	B + / - 0.15	C + / - 0.15	
SWT01	9/32	5/8	1/8	3/16 & 1/4
SWT02	11/32	3/4	5/32	5/16
SWT03	13/32	7/8	9/64	3/8
SWT04	17/32	1-1/8	3/16	7/16 & 1/2
SWT05	21/32	1-3/8	3/16	5/8
SWT06	25/32	1-5/8	7/32	3/4
SWT07	15/16	1-3/4	1/4	7/8
SWT08	1-1/16	2	11/32	1
SWT09	1-3/16	2-1/4	19/64	1-1/8
SWT10	1-5/16	2-5/8	11/32	1-1/4
SWT11	1-9/16	2-7/8	23/64	1-1/2

Stainless Steel Spherical Washer Top

Part No.	Dimensions			Bolt Size
	A + / - 0.15	B + / - 0.15	C + / - 0.15	
SWT01SS	9/32	5/8	1/8	3/16 & 1/4
SWT02SS	11/32	3/4	5/32	5/16
SWT03SS	13/32	7/8	9/64	3/8
SWT04SS	17/32	1-1/8	3/16	7/16 & 1/2
SWT05SS	21/32	1-3/8	3/16	5/8
SWT06SS	25/32	1-5/8	7/32	3/4
SWT07SS	15/16	1-3/4	1/4	7/8
SWT08SS	1-1/16	2	11/32	1

Spherical Washers – Imperial

Bottom Washer



KEY FEATURES

- / Case hardened (Steel)
- / Black oxide finish
- / Stainless are 300 series and natural finish
- / Hole to fit bolts and studs

APPLICATION

Boneham's 'SWB Type' spherical washers are designed to aid even fastening between parts with irregular alignment. The 'bottom' washer features a concave spherical radius for aligning with the convex top.

ORDERING INSTRUCTIONS

When ordering identify the bolt size required and use the corresponding part number. Example: SWB09

NOTES

Boneham sells spherical washers separately, please see page opposite for the top washer.



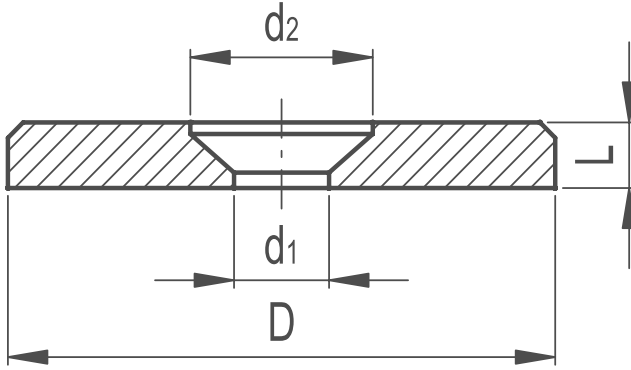
Steel Spherical Washer Bottom

Part No.	Dimensions			Bolt Size
	A + / - 0.15	B + / - 0.15	C + / - 0.15	
SWB01	5/16	5/8	1/8	3/16 & 1/4
SWB02	3/8	3/4	5/32	5/16
SWB03	7/16	7/8	5/32	3/8
SWB04	9/16	1-1/8	7/32	7/16 & 1/2
SWB05	11/16	1-3/8	7/32	5/8
SWB06	13/16	1-5/8	9/32	3/4
SWB07	1	1-3/4	1/4	7/8
SWB08	1-1/8	2	5/16	1
SWB09	1-1/4	2-1/4	11/32	1-1/8
SWB10	1-3/8	2-5/8	23/64	1-1/4
SWB11	1-5/8	2-7/8	27/64	1-1/2

Stainless Steel Spherical Washer Bottom

Part No.	Dimensions			Bolt Size
	A + / - 0.15	B + / - 0.15	C + / - 0.15	
SWB01SS	5/16	5/8	1/8	3/16 & 1/4
SWB02SS	3/8	3/4	5/32	5/16
SWB03SS	7/16	7/8	5/32	3/8
SWB04SS	9/16	1-1/8	7/32	7/16 & 1/2
SWB05SS	11/16	1-3/8	7/32	5/8
SWB06SS	13/16	1-5/8	9/32	3/4
SWB07SS	1	1-3/4	1/4	7/8
SWB08SS	1-1/8	2	5/16	1

Countersunk Washers

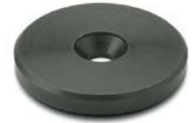


MATERIAL

/ Turned and black-oxide steel.

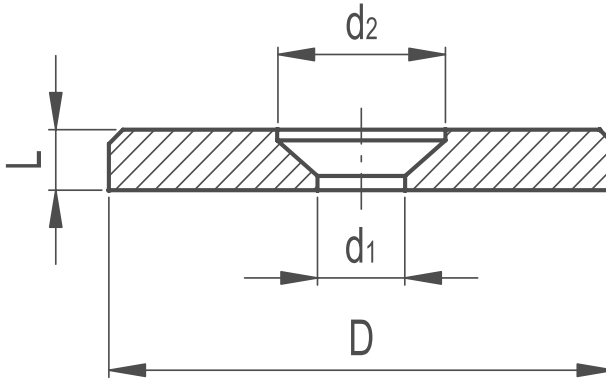
APPLICATIONS

Washers are generally used on shafts to fit handwheels.
To suit countersunk screws DIN 7991 & ISO 2009.



Part Reference	D	L	d1	d2	Countersunk screws
					DIN 7991
					DIN ISO 2009
CSW1	16	3	4.3	8	M4
CSW2	20	3	4.3	8	M4
CSW3	22	3.5	5.3	10	M5
CSW4	25	3.5	5.3	10	M5
CSW5	28	3.5	5.3	10	M5
CSW6	32	4	6.4	12	M6
CSW7	36	4	6.4	12	M6
CSW8	40	5	6.4	12	M6
CSW9	45	6	6.4	12	M6
CSW10	52	6	6.4	12	M6

Countersunk Washers Stainless Steel



MATERIAL

/ AISI 303 stainless steel, sandblasted matte finish.

FEATURES

Washers are generally used on shafts to fit handwheels. To suit countersunk screws DIN 7991 & ISO 2009.

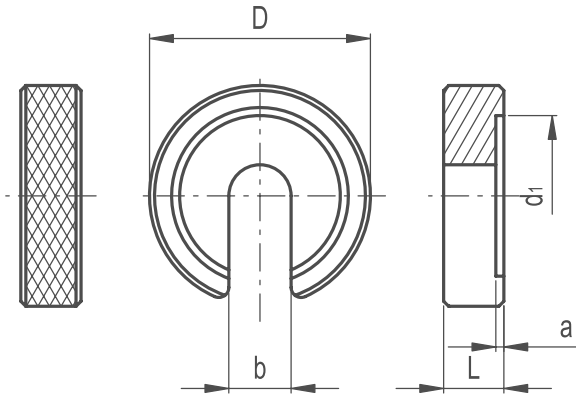
APPLICATIONS

AISI 303 stainless steel, thanks to its high resistance to corrosion, allows the application of these washers on machines and equipment in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to use corrosion resistant materials.



Part Reference	D	L	d1	d2	Countersunk screws
					DIN 7991
					DIN ISO 2009
CSW1SS	16	3	4.3	8	M4
CSW2SS	20	3	4.3	8	M4
CSW3SS	22	3.5	5.3	10	M5
CSW4SS	25	3.5	5.3	10	M5
CSW5SS	28	3.5	5.3	10	M5
CSW6SS	32	4	6.4	12	M6
CSW7SS	36	4	6.4	12	M6
CSW8SS	40	5	6.4	12	M6
CSW9SS	45	6	6.4	12	M6
CSW10SS	52	6	6.4	12	M6

C-Shaped Washers



MATERIAL

/ Case-hardened and black-oxide steel.

FEATURES

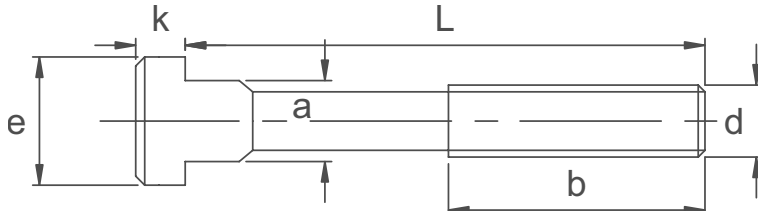
C-shaped washers are suitable for assembly on parts to be machined without removing the nut from the screw.



Part Reference	D	L	b	d1	a	For Threadings
CW1-3660	22	6	6.2	16	0.8	M6
CW1-3660-1	28	6	6.2	16	1	M6
CW2-3660	28	7	8.3	21	1	M8
CW2-3660-2	34	7	8.3	21	1.2	M8
CW3-3660	34	8	10.4	25	1.2	M10
CW4-3660	40	9	12.5	30	1.8	M12
CW4-3660-4	56	9	12.5	37	1.8	M12
CW5-3660	56	12	16.5	37	1.8	M16

T-Slot Bolts

DIN 787



MATERIAL

/ Forged steel with milled T.

FEATURES

- / Slot guide faces
- / Rolled thread. M6 - M12 strength class 10.9.
- / M14 - M30 class 8.8.



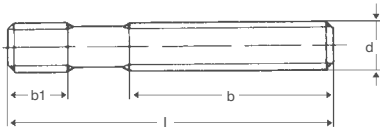
Part Ref.	d x * x L	b	a	e	k
TB-4004	M6 x 6 x 25	15	5.7	10	4
TB-4012	M6 x 6 x 40	28	5.7	10	4
TB-4020	M6 x 6 x 63	40	5.7	10	4
TB-4038	M8 x 8 x 32	22	7.7	13	6
TB-0374	M8 x 8 x 50	35	7.7	13	6
TB-0382	M8 x 8 x 80	50	7.7	13	6
TB-4046	M10 x 10 x 40	30	9.7	15	6
TB-0390	M10 x 10 x 63	45	9.7	15	6
TB-0408	M10 x 10 x 100	60	9.7	15	6
TB-0416	M12 x 12 x 50	35	11.7	18	7
TB-5605	M12 x 12 x 63	40	11.7	18	7
TB-0424	M12 x 12 x 80	55	11.7	18	7
TB-0432	M12 x 12 x 125	75	11.7	18	7
TB-0440	M12 x 12 x 200	120	11.7	18	7
TB-0457	M12 x 14 x 50	35	13.7	22	8
TB-5613	M12 x 14 x 63	45	13.7	22	8
TB-0465	M12 x 14 x 80	55	13.7	22	8
TB-0473	M12 x 14 x 125	75	13.7	22	8
TB-0481	M12 x 14 x 200	120	13.7	22	8
TB-0499	M14 x 16 x 63	45	15.7	25	9
TB-0507	M14 x 16 x 100	65	15.7	25	9
TB-0515	M14 x 16 x 160	100	15.7	25	9
TB-0523	M14 x 16 x 250	150	15.7	25	9
TB-0531	M16 x 16 x 63	45	15.7	25	9
TB-5621	M16 x 16 x 80	55	15.7	25	9
TB-0549	M16 x 16 x 100	65	15.7	25	9
TB-0556	M16 x 16 x 160	100	15.7	25	9
TB-5647	M16 x 16 x 200	125	15.7	25	9
TB-0564	M16 x 16 x 250	150	15.7	25	9
TB-0572	M16 x 18 x 63	45	17.8	28	10
TB-5639	M16 x 18 x 80	55	17.7	28	10
TB-0580	M16 x 18 x 100	65	17.7	28	10
TB-0598	M16 x 18 x 160	100	17.7	28	10
TB-5654	M16 x 18 x 200	125	17.7	28	10
TB-0606	M16 x 18 x 250	150	17.7	28	10

* Slot width

Part Ref.	d x * x L	b	a	e	k
TB-4103	M20 x 20 x 80	55	19.7	32	12
TB-4053	M20 x 20 x 100	65	19.7	32	12
TB-4111	M20 x 20 x 125	85	19.7	32	12
TB-5662	M20 x 20 x 160	110	19.7	32	12
TB-4129	M20 x 20 x 200	125	19.7	32	12
TB-4079	M20 x 20 x 250	150	19.7	32	12
TB-4137	M20 x 20 x 315	190	19.7	32	12
TB-0614	M20 x 22 x 80	55	21.7	35	14
TB-5829	M20 x 22 x 100	65	21.7	35	14
TB-0622	M20 x 22 x 125	85	21.7	35	14
TB-5670	M20 x 22 x 160	110	21.7	35	14
TB-0630	M20 x 22 x 200	125	21.7	35	14
TB-5845	M20 x 22 x 250	150	21.7	35	14
TB-0648	M20 x 22 x 315	190	21.7	35	14
TB-0770	M24 x 24 x 100	70	23.7	40	16
TB-5688	M24 x 24 x 125	85	23.7	40	16
TB-0788	M24 x 24 x 160	110	23.7	40	16
TB-5704	M24 x 24 x 200	125	23.7	40	16
TB-0796	M24 x 24 x 250	150	23.7	40	16
TB-4061	M24 x 24 x 315	190	23.7	40	16
TB-0804	M24 x 24 x 400	240	23.7	40	16
TB-0655	M24 x 28 x 100	70	27.7	44	18
TB-5696	M24 x 28 x 125	85	27.7	44	18
TB-0663	M24 x 28 x 160	110	27.7	44	18
TB-5712	M24 x 28 x 200	125	27.7	44	18
TB-0671	M24 x 28 x 250	150	27.7	44	18
TB-4087	M24 x 28 x 315	190	27.7	44	18
TB-0689	M24 x 28 x 400	240	27.7	44	18
TB-0697	M30 x 36 x 125	80	35.6	54	22
TB-5720	M30 x 36 x 160	110	35.6	54	22
TB-0705	M30 x 36 x 200	135	35.6	54	22
TB-5738	M30 x 36 x 250	150	35.6	54	22
TB-0713	M30 x 36 x 315	200	35.6	54	22
TB-0721	M30 x 36 x 500	300	35.6	54	22

Studs

DIN 6379



MATERIAL

/ Forged steel, rolled thread.

FEATURES

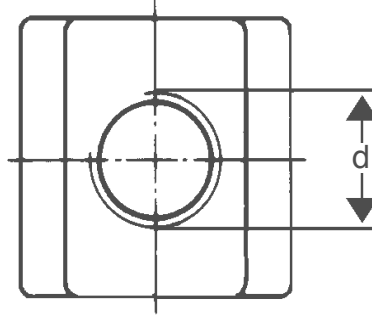
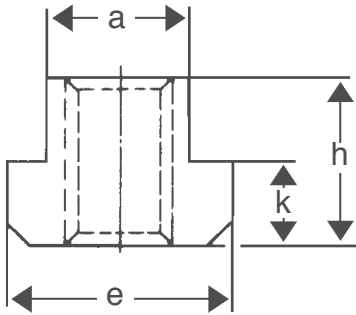
- / M6 to M12 heat treated to strength class 10.9.
- / M14 to M30 class 8.8.
- / Special sizes and materials considered.

Part Ref.	d x l	b	b1
SD1-4772	M6 x 32	16	9
SD1-6546	x 40	20	9
SD1-4780	x 50	30	9
SD1-5522	x 63	40	9
SD1-4798	x 80	50	9
SD2-1257	M8 x 40	20	11
SD2-4806	x 63	40	11
SD2-1273	x 90	50	11
SD2-4814	x 100	63	11
SD2-4822	x 160	100	11
SD3-1299	M10 x 50	25	13
SD3-4830	x 80	50	13
SD3-6041	x 100	75	13
SD3-1315	x 125	75	13
SD3-5928	x 160	100	13
SD3-4848	x 200	100	13
SD4-4855	M12 x 50	25	15
SD4-1331	x 63	32	15
SD4-4863	x 80	50	15
SD4-1349	x 100	63	15
SD4-4871	x 125	75	15
SD4-5480	x 160	100	15
SD4-4889	x 200	125	15
SD5-1372	M14 x 63	32	17
SD5-1380	x 100	63	17
SD5-1398	x 160	100	17
SD5-6553	x 200	125	17
SD5-4897	x 250	160	17
SD6-4905	M16 x 63	32	19
SD6-1414	x 80	50	19
SD6-4913	x 100	63	19
SD6-1422	x 125	75	19
SD6-4921	x 160	100	19
SD6-5498	x 200	125	19
SD6-4939	x 250	160	19
SD6-5548	x 315	180	19
SD6-5472	x 500	315	19

Part Ref.	d x l	b	b1
SD7-4947	M18 x 80	50	23
SD7-4954	x 125	75	23
SD7-6561	x 160	100	23
SD7-1471	x 200	125	23
SD7-1489	x 250	150	23
SD7-4962	x 315	180	23
SD8-4970	M20 x 80	32	27
SD8-4988	x 125	70	27
SD8-5506	x 160	100	27
SD8-1513	x 200	125	27
SD8-1521	x 250	160	27
SD8-4996	x 315	200	27
SD8-5977	x 400	250	27
SD8-5001	x 500	315	27
SD9-5019	M22 x 100	45	31
SD9-1539	x 160	100	31
SD9-6579	x 200	125	31
SD9-1554	x 250	160	31
SD9-6595	x 315	180	31
SD9-5027	x 400	250	31
SD10-5035	M24 x 100	45	35
SD10-5563	x 125	63	35
SD10-1570	x 160	100	35
SD10-5514	x 200	125	35
SD10-1596	x 250	160	35
SD10-6009	x 315	200	35
SD10-5043	x 400	250	35
SD10-6025	x 500	315	35
SD10-5050	x 630	315	35
SD11-1695	M27 x 125	56	39
SD11-1703	x 200	125	39
SD11-1711	x 315	200	39
SD11-6587	x 400	250	39
SD11-1729	x 500	315	39
SD12-5068	M30 x 125	56	43
SD12-1612	x 200	125	43
SD12-1620	x 315	200	43
SD12-1638	x 500	315	43
SD12-1646	x 700	400	43
SD12-1661	x 1000	400	43

T-Nuts

DIN 508



MATERIAL

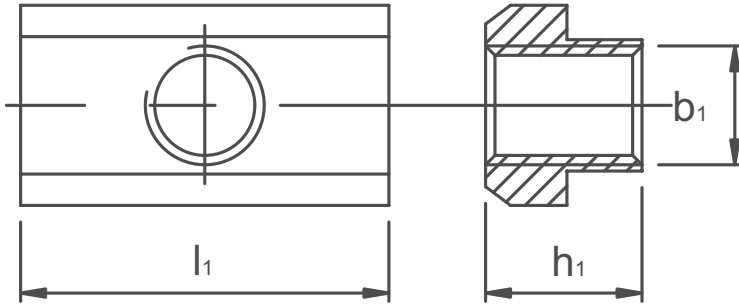
- / Refined Steel.
- / Heat treated to Strength Class 10.
- / Also available in stainless steel.



Part Reference	d x slot width	a	e	h	k
TN-0002	M5 x 6	5.7	10	8	4
TN-0010	M6 x 8	7.7	13	10	6
TN-0028	M8 x 10	9.7	15	12	6
TN-0036	M10 x 12	11.7	18	14	7
TN-0044	M12 x 14	13.7	22	16	8
TN-0366	M10 x 16	15.7	25	18	9
TN-1265	M10 x 18	17.7	28	20	10
TN-0069	M16 x 18	17.7	28	20	10
TN-0184	M16 x 20	19.7	32	24	12
TN-0242	M18 x 22	21.7	35	28	14
TN-0085	M20 x 22	21.7	35	28	14
TN-0358	M22 x 28	27.7	44	36	18
TN-0101	M24 x 28	27.7	44	36	18
TN-0127	M30 x 36	35.6	54	44	22

Extended T-Nut

DIN 508L

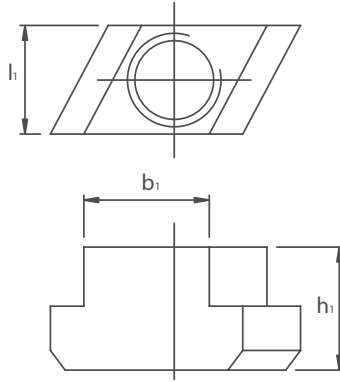


/ DIN 508L in refined steel, quality 10.



Part Reference	Nominal	l_1	h_1	b_1
TNE1	10M8	30	12	9.7
TNE2	12M10	36	14	11.7
TNE3	14M12	44	16	13.7
TNE4	16M14	50	18	15.7
TNE5	18M16	56	20	17.7
TNE6	20M18	64	24	19.7
TNE7	22M20	70	28	21.7
TNE8	24M22	80	32	23.7
TNE9	28M24	88	36	27.7
TNE10	32M27	100	40	31.5
TNE11	36M30	108	44	35.5

T-Nut, System “Rhombus”



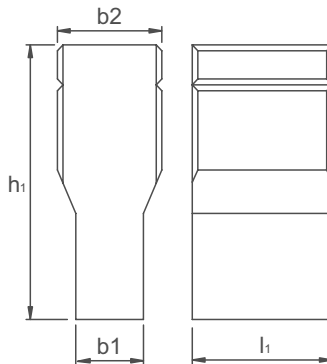
/ In refined steel.

Part Ref.	Nominal	l1	h1	b1
TNR1	10M8	15	12	9.7
TNR2	12M10	18	14	11.7
TNR3	14M12	22	16	13.7
TNR4	16M14	25	18	

Article nr.	Nominal	l1	h1	b1
TNR5	18M16	28	20	47.7
TNR6	22M20	32	24	21.7
TNR7	28M24	35	28	27.7

T-Block

DIN 6322B



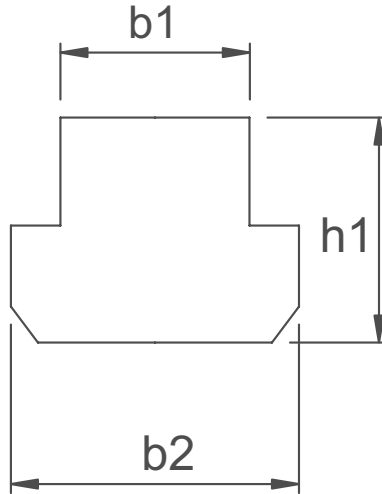
/ Carburized and ground.

Part Ref.	b1	h1	l1
TB 6322B 1	10	8	20
TB 6322B 2	12	8	20
TB 6322B 3	14	10	22
TB 6322B 4	16	10	22

Article nr.	b1	h1	l1
TB 6322B 5	18	10	22
TB 6322B 6	20	10	22
TB 6322B 7	22	12	32
TB 6322B 8	24	12	32

Blank for T-Nuts

DIN 508R



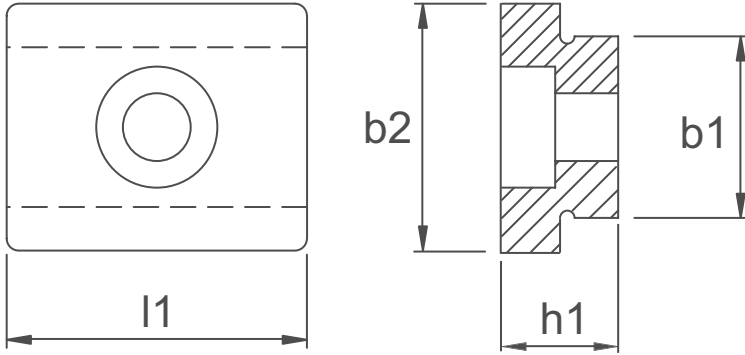
/ In refined steel.



Part Reference	Nominal	b2	h1	b1
BTN1	10	15	12	9.7
BTN2	12	18	14	11.7
BTN3	14	22	16	13.7
BTN4	16	25	18	15.7
BTN5	18	28	20	17.7
BTN6	20	32	24	19.7
BTN7	22	35	28	21.7
BTN8	24	40	32	23.7
BTN9	28	44	36	27.7
BTN10	32	50	40	31.5
BTN11	36	54	44	35.5

T-Block Tenon

DIN 6322A



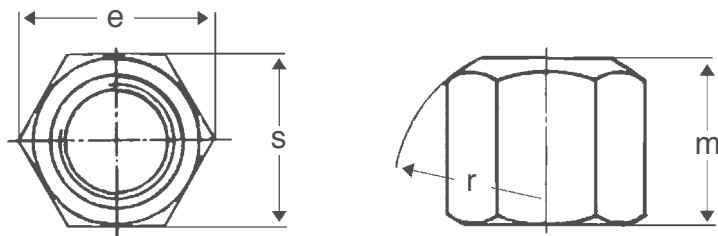
/ Carburized and ground, for aligning machine clamps, moulds etc.



Part Reference	b1	b2	h1	l1
TB 6322A 1	10	20	10	22
TB 6322A 2	12	20	10	22
TB 6322A 3	14	20	10	25
TB 6322A 4	18	20	10	25
TB 6322A 5	18	20	10	25
TB 6322A 6	20	20	10	25
TB 6322A 7	22	20	12	32
TB 6322A 8	24	20	12	32
TB 6322A 9	28	20	12	32
TB 6322A 10	36	20	12	32

Fixture Nut

DIN 6330B



MATERIAL

- / Black Oxide finish
- / Refined Steel
- / Heat treated to Strength Class 10

APPLICATIONS

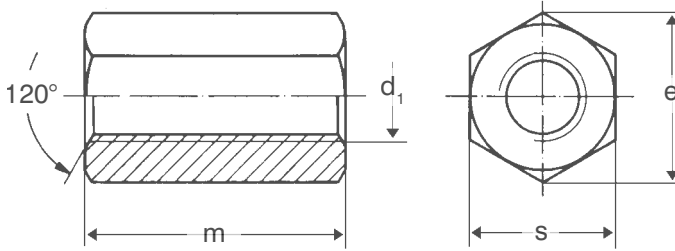
These nuts are often used in clamping applications, strong and durable, they feature a radius at the end to prevent snagging on studs and bolts.



Part Reference	Hole	s	e	m	r
FN1-2362	M6	10	11.5	9	9
FN2-2370	M8	13	15.0	12	12
FN3-2388	M10	16	19.6	15	15
FN4-2396	M12	18	21.9	18	17
FN5-2404	M14	21	25.4	21	20
FN6-2412	M16	24	27.7	24	22
FN7-2420	M18	27	31.2	27	24
FN8-2438	M20	30	34.6	30	27
FN9-2446	M22	33	36.9	33	30
FN10-2453	M24	36	41.6	36	32
FN11-2461	M27	41	47.3	40	36
FN12-2479	M30	46	53.1	45	41

Extension Nut

DIN 6334



MATERIAL

- / Black Oxide finish
- / Heat treated to Strength Class 10

APPLICATIONS

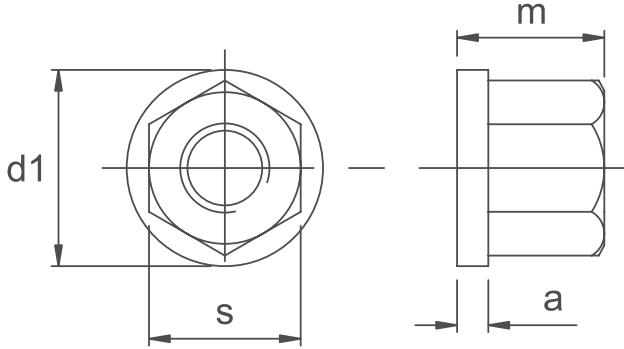
Commonly used for coupling two studs together.
This nut can also be known as a Coupling Nut



Part Reference	d1	s	e	m
EN1-2651	M6	10	11.5	18
EN2-2669	M8	13	15.0	24
EN3-2677	M10	17	19.6	30
EN4-2685	M12	19	21.9	36
EN5-2693	M14	22	25.4	42
EN6-2701	M16	24	27.7	48
EN7-2719	M18	27	31.2	54
EN8-2727	M20	30	34.6	60
EN9-2735	M22	32	36.9	66
EN10-2743	M24	36	41.6	72
EN11-2750	M27	41	47.3	81
EN12-2768	M30	46	53.1	90

Collar Nut

DIN 6331



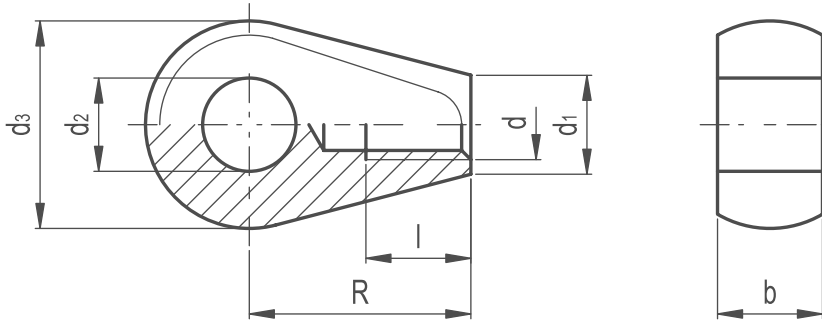
MATERIAL

- / Refined Steel
- / Heat treated to Strength Class 10
- / Turned and Milled



Part Reference	Hole	s	e	m	a	d1
CN1-2651	M6	10	11.5	9	3.0	14
CN2-2537	M8	13	15.0	12	3.5	18
CN3-2545	M10	16	19.6	15	4.0	22
CN4-2552	M12	18	21.9	18	4.0	25
CN5-2560	M14	21	25.4	21	4.5	28
CN6-2578	M16	24	27.7	24	5.0	31
CN7-2586	M18	27	31.2	27	5.0	34
CN8-2594	M20	30	34.6	30	6.0	37
CN9-2602	M22	33	36.9	33	6.0	40
CN10-2610	M24	36	41.6	36	6.0	45
CN11-2628	M27	41	47.3	40	8.0	51
CN12-2636	M30	46	53.1	45	8.0	58

Eye Nuts



MATERIAL

/ Black-oxide steel, class 5.8 (tensile strength 500 N/mm²).

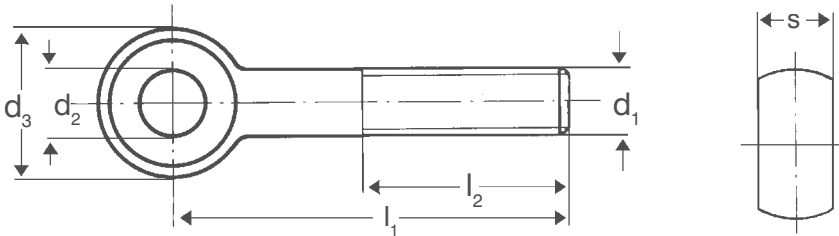
APPLICATIONS

Eye nuts can be used together with threaded studs of different lengths. They are used mainly for assembly equipment and connections.



Part Reference	d	d1	d2 H7	d3 -0.3	R	b -0.15	l
EYN1	M6	8.5	8	18	19	9	9
EYN2	M8	11	10	20	24	12	11
EYN3	M10	13.5	12	25	28	14	14
EYN4	M12	16	16	32	34	17	16

Eye Swing Bolts



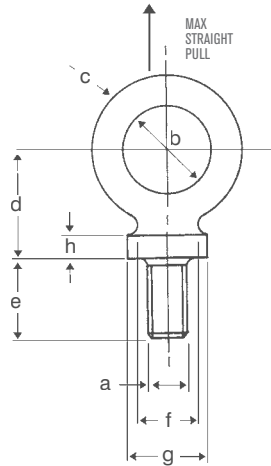
FEATURES

- / Heat Treated Steel, turned and thread rolled
- / Blackened finish
- / Also available in stainless steel



Part Reference	d1	l1	l2	d2 H7	d3	s -0.2
ESB1-1882	M6	50	32	6	14	7
ESB2-1882	M6	75	32	6	14	7
ESB3-1882	M8	50	22	8	18	9
ESB4-1882	M8	75	22	8	18	9
ESB5-1882	M10	50	40	10	20	12
ESB6-1882	M10	75	40	10	20	12
ESB7-1882	M10	100	40	10	20	12
ESB8-1882	M12	75	30	12	25	14
ESB9-1882	M12	100	30	12	25	14
ESB10-1882	M12	130	30	12	25	14
ESB11-1882	M16	75	38	16	32	17
ESB12-1882	M16	100	44	16	32	17
ESB14-1882	M20	100	63	18	40	22
ESB15-1882	M20	130	63	18	40	22
ESB16-1882	M20	160	63	18	40	22

Lifting Eye Bolts



FEATURES

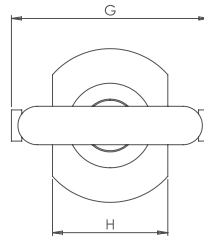
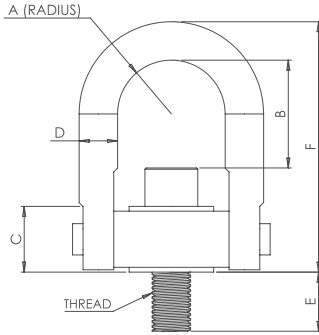
- / Forged Steel
- / Stamped with traceable reference
- / Machined contact face
- / Male thread



Part Ref	a thread	b dia	c dia	d	e	f dia	g dia	h	l kg
LEB1M	M8 x 1.25	22	9.5	27	19	16	19	6.4	114
LEB2M	M10 x 1.5	22	9.5	27	19	16	19	6.4	190
LEB3M	M12 x 1.75	29	10.3	35	25	19	25	7.9	360
LEB4M	M16 x 2.0	32	12.7	41	29	22	29	9.5	610
LEB5M	M20 x 2.5	41	16	54	32	27	35	11.1	930

Lifting eye bolts to B.S. 4278 available if required.

Metric Safety Swivel Hoist Ring



KEY FEATURES

- / 200% Proof-Load Tested with Serial Number for Traceability
- / Swivels 360° - Pivots 180°
- / Material: Alloy Steel
- / Finish: Black Oxide (Also available: Cadmium Plated, Electroless Nickel Plated, Zinc Plated)
- / Safety Factor: 5:1

- / Magnetic Particle Inspected
- / Certified Heat Treatment
- / Rated at 100% from 0°-90°
- / Fatigue Tested to 20,000 Cycles at 1-1/2x the Rated Load
- / Meets or Exceeds the Requirements of ASME B30.26
- / Thread: Longer Thread Projection and Fine Threads Available
- / Comforms to CE

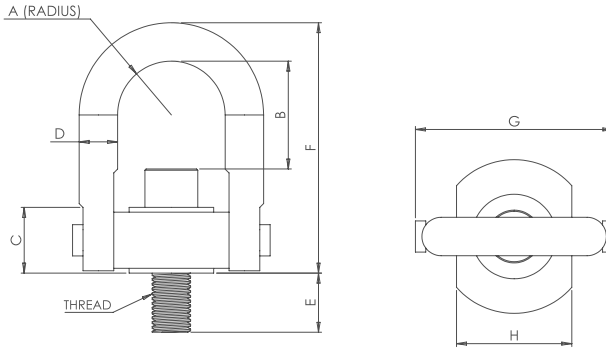


Rated Loads (KGS)	Thread Size	A	C	D	E	Standard U-Bar			Long U-Bar			G	H	Torque (N-M)	WT. (LBS)
						Part No.	B	F	Part No.	B	F				
400	M8x1.25	11	18	10	13	SHRM46912	32	68				47	25	9	0.4
400	M8x1.25	11	18	10	18	SHRM46913	32	68				47	25	9	0.4
500	M10x1.50	11	18	10	18	SHRM46916	30	68				47	25	16	0.4
625	M12x1.75	11	19	10	23	SHRM49301	28	68				47	25	37	0.4
1,050	M12x1.75	18	24	13	27	SHRM46608	48	96				66	38	37	1.0
1,050	M12x1.75	22	31	19	19	SHRM46924	60	121	SHRM47124	110	171	89	51	37	2.5
1,050	M14x2.00	22	31	19	29	SHRM46928	58	121	SHRM47128	108	171	89	51	40	2.5
1,900	M16x2.00	22	31	19	24	SHRM46933	56	121	SHRM47126	106	171	89	51	80	2.5
1,900	M16x2.00	22	31	19	29	SHRM46930	56	121	SHRM47130	106	171	89	51	80	2.5
1,900	M18x2.50	22	31	19	29	SHRM46934	54	121	SHRM47134	104	171	89	51	90	2.5
2,150	M20x2.50	22	31	19	29	SHRM46938	52	121	SHRM47132	102	171	89	51	135	2.7
2,150	M20x2.50	22	31	19	34	SHRM46936	52	121	SHRM47136	102	171	89	51	135	2.7
2,650	M22x2.50	22	32	19	39	SHRM49302	50	121	SHRM49351	100	171	89	51	311	3.0
2,850	M24x3.00	22	32	19	39	SHRM49303	48	121	SHRM49353	98	171	89	51	311	3.0
3,000	M20x2.50	36	43	25	27	SHRM46941	78	166	SHRM47140	118	206	131	76	135	6.7
3,000	M20x2.50	36	43	25	32	SHRM46942	78	166	SHRM47142	118	206	131	76	135	6.7
3,000	M22x2.50	36	43	25	37	SHRM46944	76	166	SHRM47144	116	206	131	76	135	7.0
4,200	M24x3.00	36	43	25	32	SHRM46947	74	166	SHRM47146	114	206	131	76	311	7.0
4,200	M24x3.00	36	43	25	37	SHRM46948	74	166	SHRM47148	114	206	131	76	311	7.0
4,200	M30x3.50	36	43	25	58				SHRM46950	108	206	131	76	637	7.0
5,000	M33x3.50	36	48	25	42	SHRM49304	65	166	SHRM49355	105	206	131	76	637	8.5
5,500	M36x4.00	36	48	25	52	SHRM49305	62	166	SHRM49357	102	206	131	76	1085	8.5

Continued on next page

Rated Loads (KGS)	Thread Size	A	C	D	E	Standard U-Bar			Long U-Bar			G	H	Torque (N-M)	WT. (LBS)
						Part No.	B	F	Part No.	B	F				
7,000	M30x3.50	45	54	32	42	SHRM46956	106	222				165	95	637	15.0
7,000	M30x3.50	45	54	32	46	SHRM46955	106	222				165	95	637	15.0
7,000	M30x3.50	45	54	32	62	SHRM46958	106	222				165	95	637	15.0
7,000	M30x3.50	45	54	32	67	SHRM46957	106	222				165	95	637	15.0
7,000	M33x3.50	45	54	32	67	SHRM46960	103	222				165	95	637	15.0
8,500	M36x4.00	45	55	32	56	SHRM49306	100	222				165	95	1085	16.0
9,000	M39x4.00	45	55	32	56	SHRM49307	97	222				165	95	1085	17.0
9,250	M42x4.50	45	55	32	66	SHRM49308	94	222				165	95	1085	18.0
9,500	M45x4.50	45	55	32	66	SHRM49309	91	222				165	95	1085	18.0
9,500	M46x5.00	45	55	32	66	SHRM49310	90	222				165	95	1085	18.0
10,000	M48x5.00	45	55	32	66	SHRM49311	88	222				165	95	1085	18.0
10,000	M33x3.50	50	62	38	58	SHRM46961	140	259				189	109	637	23.0
10,000	M33x3.50	50	62	38	68	SHRM46962	140	259				189	109	637	23.0
11,000	M36x4.00	57	71	44	58	SHRM46963	166	317				217	124	1085	35.0
11,000	M36x4.00	57	71	44	63	SHRM46966	166	317				217	124	1085	35.0
11,000	M36x4.00	57	71	44	68	SHRM46964	166	317				217	124	1085	35.0
12,500	M42x4.50	57	71	44	68	SHRM46965	160	317				217	124	1085	36.0
12,500	M42x4.50	57	71	44	83	SHRM46968	160	317				217	124	1085	36.0
13,500	M48x5.00	57	71	44	68	SHRM46980	154	317				217	124	1085	38.0
13,500	M48x5.00	57	71	44	83	SHRM46970	154	317				217	124	1085	38.0
13,500	M48x5.00	57	71	44	88	SHRM46979	154	317				217	124	1085	38.0
13,500	M56x5.50	57	71	44	88	SHRM46973	154	317				217	124	1085	38.0
14,500	M52x5.00	57	77	44	83	SHRM49312	150	317				217	124	1085	42.0
15,500	M56x5.50	57	77	44	83	SHRM49313	146	317				217	124	1085	42.0
16,500	M64x6.00	57	77	44	93	SHRM49314	138	317				217	124	2847	42.0
22,300	M64x6.00	76	104	57	101	SHRM46972	204	428				271	165	2847	86.0
24,500	M72x6.00	76	110	57	100	SHRM49315	196	428				296	165	5830	92.0
26,500	M80x6.00	76	110	57	110	SHRM49316	188	428				296	165	5830	92.0
31,500	M72x6.00	95	133	70	132	SHRM46988	220	495				359	206	5830	165.0
31,500	M80x6.00	95	133	70	132	SHRM46989	200	495				359	206	5830	165.0
33,000	M90x6.00	95	133	70	140	SHRM49317	200	495				359	206	6914	280.0
33,000	M100x6.00	95	133	70	150	SHRM49318	200	495				359	206	6914	280.0
44,600	M90x6.00	102	153	83	177	SHRM46990	235	561				404	218	6914	260.0
44,600	M100x6.00	102	153	83	200	SHRM46994	235	561				404	218	6914	280.0

Safety Swivel Hoist Ring



KEY FEATURES

- / 200% Proof-Load Tested with Serial Number for Traceability
- / Swivels 360° - Pivots 180°
- / Material: Alloy Steel
- / Finish: Black Oxide (Also available: Cadmium Plated, Electroless Nickel Plated, Zinc Plated)
- / Safety Factor: 5:1

- / Magnetic Particle Inspected
- / Certified Heat Treatment
- / Rated at 100% from 0°-90°
- / Fatigue Tested to 20,000 Cycles at 1-1/2x the Rated Load
- / Meets or Exceeds the Requirements of ASME B30.26
- / Thread: Longer Thread Projection and Fine Threads Available
- / Conforms to CE

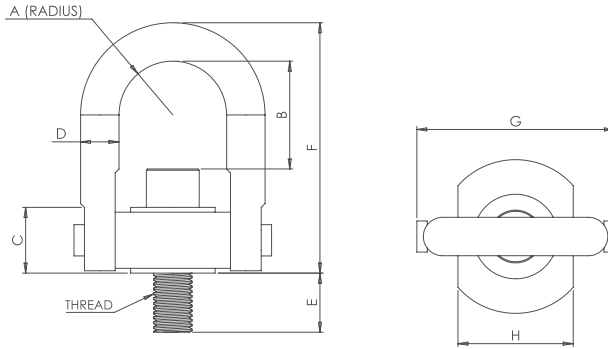


Rated Loads (LBS)	Thread Size	A	C	D	E	Standard U-Bar			Long U-Bar			G	H	Torque (FT-LBS)	WT. (LBS)
						Part No.	B	F	Part No.	B	F				
600	1/4-20	0.43	0.71	3/8	0.54	SHR46100	1.27	2.67				1.84	1.00	6	0.3
800	5/16-18	0.43	0.71	3/8	0.29	SHR46102	1.27	2.67				1.84	1.00	7	0.3
800	5/16-18	0.43	0.71	3/8	0.54	SHR46104	1.27	2.67				1.84	1.00	7	0.3
1,000	3/8-16	0.43	0.71	3/8	0.54	SHR46106	1.27	2.67				1.84	1.00	12	0.3
1,250	7/16-14	0.43	0.73	3/8	0.79	SHR46351	1.20	2.67				1.84	1.00	22	0.4
1,500	1/2-13	0.43	0.73	3/8	0.79	SHR46352	1.15	2.67				1.84	1.00	28	0.4
2,000	7/16-14	0.70	0.93	1/2	1.07	SHR46606	1.90	3.77				2.58	1.49	22	1.0
2,500	1/2-13	0.70	0.93	1/2	1.07	SHR46602	1.84	3.77				2.58	1.49	28	1.0
2,000	7/16-14	0.88	1.22	3/4	0.78	SHR46000	2.37	4.78	SHR46638	4.34	6.72	3.52	1.99	22	2.6
2,500	1/2-13	0.88	1.22	3/4	0.78	SHR46008	2.31	4.78	SHR46644	4.25	6.72	3.52	1.99	28	2.6
2,500	1/2-13	0.88	1.22	3/4	1.03	SHR46010	2.31	4.78	SHR46646	4.25	6.72	3.52	1.99	28	2.6
2,500	1/2-13	0.88	1.22	3/4	1.28	SHR46012	2.31	4.78	SHR46648	4.25	6.72	3.52	1.99	28	2.6
2,500	9/16-12	0.88	1.22	3/4	0.78	SHR46007	2.25	4.78	SHR46651	4.19	6.72	3.52	1.99	30	2.6
4,000	5/8-11	0.88	1.22	3/4	0.78	SHR46002	2.18	4.78	SHR46641	4.12	6.72	3.52	1.99	60	2.6
4,000	5/8-11	0.88	1.22	3/4	1.03	SHR46004	2.18	4.78	SHR46640	4.12	6.72	3.52	1.99	60	2.6
4,000	5/8-11	0.88	1.22	3/4	1.28	SHR46006	2.18	4.78	SHR46642	4.12	6.72	3.52	1.99	60	2.6
4,000	5/8-11	0.88	1.22	3/4	1.53	SHR46005	2.18	4.78	SHR46643	4.12	6.72	3.52	1.99	60	2.6
5,000	3/4-10	0.88	1.22	3/4	1.03	SHR46014	2.06	4.78	SHR46650	4.00	6.72	3.52	1.99	100	3.0
5,000	3/4-10	0.88	1.22	3/4	1.53	SHR46018	2.06	4.78	SHR46654	4.00	6.72	3.52	1.99	100	3.0
6,000	7/8-9	0.88	1.24	3/4	1.53	SHR46353	1.94	4.78	SHR41604	3.88	6.72	3.52	1.99	160	3.0
6,500	1-8	0.88	1.24	3/4	1.53	SHR46354	1.71	4.78	SHR41606	3.75	6.72	3.52	1.99	230	3.0
7,000	3/4-10	1.40	1.71	1	1.04	SHR46204	3.06	6.52	SHR46658	4.65	8.11	5.14	3.00	100	7.0

Continued on next page

Rated Loads (LBS)	Thread Size	A	C	D	E	Standard U-Bar			Long U-Bar			G	H	Torque (FT-LBS)	WT. (LBS)
						Part No.	B	F	Part No.	B	F				
7,000	3/4-10	1.40	1.71	1	1.54	SHR46206	3.06	6.52	SHR46660	4.65	8.11	5.14	3.00	100	7.0
8,000	7/8-9	1.40	1.71	1	1.04	SHR46202	2.93	6.52	SHR46656	4.52	8.11	5.14	3.00	160	7.0
8,000	7/8-9	1.40	1.71	1	1.29	SHR46203	2.93	6.52	SHR46657	4.52	8.11	5.14	3.00	160	7.0
8,000	7/8-9	1.40	1.71	1	1.54	SHR46205	2.93	6.52	SHR46655	4.52	8.11	5.14	3.00	160	7.0
10,000	1-8	1.40	1.71	1	1.29	SHR46210	2.81	6.52	SHR46662	4.40	8.11	5.14	3.00	230	7.5
10,000	1-8	1.40	1.71	1	1.54	SHR46212	2.81	6.52	SHR46664	4.40	8.11	5.14	3.00	230	7.5
10,000	1-8	1.40	1.71	1	2.29	SHR46214	2.81	6.52	SHR46666	4.40	8.11	5.14	3.00	230	7.5
10,000	1 1/8-7	1.40	1.71	1	2.29	SHR46216	2.69	6.52	SHR46668	4.28	8.11	5.14	3.00	230	7.5
10,000	1 1/8-8	1.40	1.71	1	2.29	SHR46217	2.69	6.52	SHR46669	4.28	8.11	5.14	3.00	230	7.5
11,500	1 1/4-7	1.40	1.88	1	2.10	SHR46355	2.44	6.52	SHR41612	4.24	8.11	5.14	3.00	470	8.0
12,000	1 3/8-6	1.40	1.88	1	2.10	SHR46356	2.31	6.52	SHR41614	4.13	8.11	5.14	3.00	470	8.0
12,500	1 1/2-6	1.40	1.88	1	2.10	SHR46357	2.19	6.52	SHR41616	4.00	8.11	5.14	3.00	800	8.0
15,000	1 1/4-7	1.75	2.11	1-1/4	1.89	SHR46802	4.12	8.73				6.50	3.76	470	14.0
15,000	1 1/4-8	1.75	2.11	1-1/4	1.89	SHR46805	4.12	8.73				6.50	3.76	470	14.0
15,000	1 3/8-6	1.75	2.11	1-1/4	1.89	SHR46806	4.06	8.73				6.50	3.76	470	14.5
15,000	1 3/8-8	1.75	2.11	1-1/4	1.89	SHR46807	4.06	8.73				6.50	3.76	470	14.5
16,500	1 1/2-6	1.75	2.17	1-1/4	2.80	SHR46359	4.02	8.73				6.50	3.76	800	16.0
17,000	1 5/8-5 1/2	1.75	2.17	1-1/4	2.80	SHR46360	3.90	8.73				6.50	3.76	800	16.0
17,500	1 3/4-5	1.75	2.17	1-1/4	2.80	SHR46361	3.77	8.73				6.50	3.76	800	16.0
18,000	1 7/8-5	1.75	2.17	1-1/4	2.80	SHR46362	3.65	8.73				6.50	3.76	800	16.0
18,500	2-4 1/2	1.75	2.17	1-1/4	2.80	SHR46363	3.52	8.73				6.50	3.76	800	16.0
20,000	1 3/8-6	2.00	2.43	1-1/2	2.50	SHR46702	5.50	10.20				7.46	4.31	540	23.0
24,000	1 1/2-6	2.25	2.81	1-3/4	2.70	SHR46404	6.41	12.47				8.55	4.87	800	34.0
24,000	1 1/2-8	2.25	2.81	1-3/4	2.70	SHR46405	6.41	12.47				8.55	4.87	800	34.0
24,000	1 3/4-5	2.25	2.81	1-3/4	3.20	SHR46408	6.16	12.47				8.55	4.87	800	34.0
24,000	1 3/4-8	2.25	2.81	1-3/4	3.20	SHR46406	6.16	12.47				8.55	4.87	800	34.0
30,000	2-4 1/2	2.25	2.81	1-3/4	3.20	SHR46400	5.91	12.47				8.55	4.87	800	36.0
30,000	2-8	2.25	2.81	1-3/4	3.20	SHR46440	5.91	12.47				8.55	4.87	800	36.0
30,000	2 1/4-4 1/2	2.25	2.81	1-3/4	3.20	SHR46431	5.66	12.47				8.55	4.87	800	40.0
30,000	2 1/4-8	2.25	2.81	1-3/4	3.20	SHR46435	5.66	12.47				8.55	4.87	800	40.0
32,500	2 1/4-4 1/2	2.25	3.03	1-3/4	2.90	SHR46364	5.86	12.47				8.55	4.87	800	40.0
35,000	2 1/2-4	2.25	3.03	1-3/4	3.90	SHR46365	5.63	12.47				8.55	4.87	2100	40.0
35,000	2 1/2-8	2.25	3.03	1-3/4	3.90	SHR46368	5.63	12.47				8.55	4.87	2100	40.0
50,000	2 1/2-8	3.00	4.09	2-1/4	4.00	SHR47002	8.03	16.87				10.67	6.52	2100	88.0
50,000	2 1/2-4	3.00	4.09	2-1/4	4.00	SHR47006	8.03	16.87				10.67	6.52	2100	88.0
50,000	2 3/4-4	3.00	4.09	2-1/4	4.00	SHR47008	7.75	16.87				10.67	6.52	2100	90.0
50,000	2 3/4-8	3.00	4.09	2-1/4	4.00	SHR47010	7.75	16.87				10.67	6.52	2100	90.0
55,000	2 3/4-4	3.00	4.34	2-1/4	4.00	SHR46366	6.16	16.87				11.67	6.52	2100	92.0
60,000	3-4	3.00	4.34	2-1/4	5.00	SHR46367	6.16	16.87				11.67	6.52	4300	92.0
75,000	3-4	3.75	5.27	2-3/4	5.25	SHR47200	8.48	19.50				14.15	8.10	4300	166.0
75,000	3-8	3.75	5.27	2-3/4	5.25	SHR47202	8.48	19.50				14.15	8.10	4300	166.0
80,000	3 1/2-4	3.75	5.27	2-3/4	5.00	SHR46332	7.98	19.50				14.15	8.10	5100	172.0
80,000	3 1/2-8	3.75	5.27	2-3/4	5.00	SHR46334	7.98	19.50				14.15	8.10	5100	172.0
100,000	3 1/2-4	4.00	6.06	3-1/4	7.00	SHR47402	9.28	22.09				15.90	8.60	5100	265.0
100,000	3 1/2-8	4.00	6.06	3-1/4	7.00	SHR47406	9.28	22.09				15.90	8.60	5100	265.0
250,000	6-4	6.00	14.00	5	9.00	SHR47602	14.00	33.00				25.00	13.00	9900	790.0

Metric Stainless Steel Safety Hoist Ring



VOLUME
DISCOUNT

STAINLESS
STEEL

KEY FEATURES

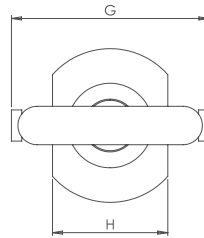
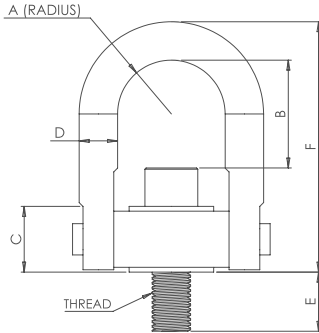
- / 200% Proof-Load Tested with Serial Number for Traceability
- / Swivels 360° - Pivots 180°
- / Material: 316 Stainless Steel
- / Safety Factor: 5:1
- / Liquid Penetrant

- / Rated at 100% from 0°-90°
- / Fatigue Tested to 20,000 Cycles at 1-1/2x the rated load
- / Meets or exceeds the requirements of ASME B30.26
- / Thread: Longer Thread Projection and Fine Threads available
- / Conforms to CE



Rated Loads (KGS)	Thread Size	A	C	D	E	Standard U-Bar			Long U-Bar			G	H	Torque (N-M)	WT. (LBS)
						Part No.	B	F	Part No.	B	F				
200	M8x1.25	11	18	10	13	SSHRM58912	32	68				47	25	4	0.4
250	M10x1.50	11	18	10	18	SSHRM58916	30	68				47	25	8	0.4
525	M12x1.75	22	30	19	19	SSHRM58924	60	121	SSHRM59124	110	171	89	51	18	2.5
950	M16x2.00	22	30	19	29	SSHRM58930	56	121	SSHRM59130	106	171	89	51	40	2.5
1,075	M20x2.50	22	30	19	34	SSHRM58936	52	121	SSHRM59136	102	171	89	51	68	2.5
1,500	M20x2.50	36	43	25	32	SSHRM58942	78	166	SSHRM59142	118	206	131	76	68	7.0
2,100	M24x3.00	36	43	25	37	SSHRM58948	74	166	SSHRM59148	114	206	131	76	108	7.0
2,100	M30x3.50	36	43	25	58				SSHRM58950	108	206	131	76	108	7.0
3,500	M30x3.50	45	54	32	42	SSHRM58956	106	222				165	95	318	15.0
3,500	M30x3.50	45	54	32	62	SSHRM58958	106	222				165	95	318	15.0
5,500	M36x4.00	57	71	44	64	SSHRM58966	166	317				217	124	542	35.0
6,250	M42x4.50	57	71	44	82	SSHRM58968	160	317				217	124	542	36.0
6,750	M48x5.00	57	71	44	82	SSHRM58970	154	317				217	124	542	38.0
11,150	M64x6.00	76	103	57	101	SSHRM58972	204	428				296	165	1423	86.0
15,750	M72x6.00	95	133	70	132	SSHRM58988	220	495				359	206	2915	165.0
22,300	M90x6.00	102	153	83	177	SSHRM58990	235	561				404	218	3459	260.0

Stainless Steel Safety Hoist Ring



KEY FEATURES

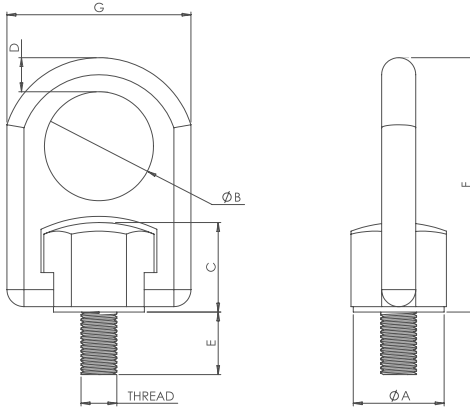
- / 200% Proof-Load Tested with Serial Number for Traceability
- / Swivels 360° - Pivots 180°
- / Material: 316 Stainless Steel
- / Safety Factor: 5:1
- / Liquid Penetrant

- / Rated at 100% from 0°-90°
- / Fatigue Tested to 20,000 Cycles at 1-1/2x the rated load
- / Meets or exceeds the requirements of ASME B30.26
- / Thread: Longer Thread Projection and Fine Threads available
- / Conforms to CE



Rated Loads (LBS)	Thread Size	A	C	D	E	Standard U-Bar			Long U-Bar			G	H	Torque (FT-LBS)	WT. (LBS)
						Part No.	B	F	Part No.	B	F				
300	1/4-20	0.43	0.71	3/8	0.54	SSHR58100	1.27	2.67				1.84	1.00	3	0.3
400	5/16-18	0.43	0.71	3/8	0.29	SSHR58102	1.27	2.57				1.84	1.00	3.5	0.3
400	5/16-18	0.43	0.71	3/8	0.54	SSHR58104	1.27	2.67				1.84	1.00	3.5	0.3
500	3/8-16	0.43	0.71	3/8	0.54	SSHR58106	1.27	2.67				1.84	1.00	6	0.3
1,250	1/2-13	0.70	0.93	1/2	1.07	SSHR58602	1.84	3.77				2.58	1.49	14	1.0
1,250	1/2-13	0.88	1.22	3/4	0.78	SSHR58008	2.31	4.78	SSHR58644	4.25	6.72	3.52	1.99	14	2.6
1,250	1/2-13	0.88	1.22	3/4	1.03	SSHR58010	2.31	4.78	SSHR58646	4.25	6.72	3.52	1.99	14	2.6
1,250	1/2-13	0.88	1.22	3/4	1.28	SSHR58012	2.31	4.78	SSHR58648	4.25	6.72	3.52	1.99	14	2.6
2,000	5/8-11	0.88	1.22	3/4	0.78	SSHR58002	2.18	4.78	SSHR58641	4.12	6.72	3.52	1.99	30	2.6
2,000	5/8-11	0.88	1.22	3/4	1.03	SSHR58004	2.18	4.78	SSHR58640	4.12	6.72	3.52	1.99	30	2.6
2,000	5/8-11	0.88	1.22	3/4	1.28	SSHR58006	2.18	4.78	SSHR58642	4.12	6.72	3.52	1.99	30	2.6
2,500	3/4-10	0.88	1.22	3/4	1.03	SSHR58014	2.06	4.78	SSHR58650	4.00	6.72	3.52	1.99	50	3.0
2,500	3/4-10	0.88	1.22	3/4	1.53	SSHR58018	2.06	4.78	SSHR58654	4.00	6.72	3.52	1.99	50	3.0
3,500	3/4-10	1.40	1.71	1	1.04	SSHR58204	3.06	6.52	SSHR58658	4.65	8.11	5.14	3.00	50	7.0
3,500	3/4-10	1.40	1.71	1	1.54	SSHR58206	3.06	6.52	SSHR58660	4.65	8.11	5.14	3.00	50	7.0
4,000	7/8-9	1.40	1.71	1	1.04	SSHR58202	2.93	6.52	SSHR58656	4.52	8.11	5.14	3.00	80	7.0
4,000	7/8-9	1.40	1.71	1	1.29	SSHR58203	2.93	6.52	SSHR58652	4.52	8.11	5.14	3.00	80	7.0
5,000	1-8	1.40	1.71	1	1.29	SSHR58210	2.81	6.52	SSHR58662	4.40	8.11	5.14	3.00	115	7.5
5,000	1-8	1.40	1.71	1	1.54	SSHR58212	2.81	6.52	SSHR58664	4.40	8.11	5.14	3.00	115	7.5
5,000	1-8	1.40	1.71	1	2.29	SSHR58214	2.81	6.52	SSHR58666	4.40	8.11	5.14	3.00	115	7.5
7,500	1 1/4-7	1.75	2.11	1-1/4	1.89	SSHR58802	4.12	8.73				6.50	3.76	235	14.0
12,000	1 1/2-6	2.25	2.81	1-3/4	2.70	SSHR58404	6.41	12.47				8.55	4.87	400	34.0
15,000	2-4 1/2	2.25	2.81	1-3/4	2.96	SSHR58400	5.91	12.47				8.55	4.87	400	36.0
25,000	2 1/2-8	3.00	4.09	2-1/4	4.00	SSHR59002	8.03	16.87				11.67	6.52	1050	88.0
25,000	2 1/2-4	3.00	4.09	2-1/4	4.00	SSHR59006	8.03	16.87				11.67	6.52	1050	88.0
37,500	3-4	3.75	5.27	2-3/4	5.00	SSHR59200	8.48	19.50				14.15	8.10	2150	166.0
50,000	3 1/2-4	4.00	6.06	3-1/4	7.00	SSHR59402	9.28	22.09				15.90	8.60	2550	265.0

Metric Forged Swivel Hoist Ring



KEY FEATURES

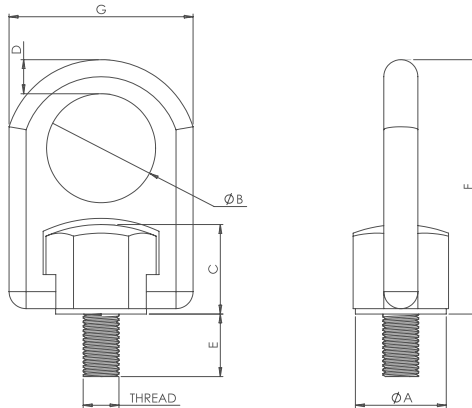
- / 200% Proof-Load Tested with Serial Number for Traceability
- / Swivels 360° - Pivots 180°
- / Material: Alloy Steel
- / Finish: Black Oxide (Also Available: Cadmium Plated, Electroless Nickel Plated, Zinc Plated)

- / Safety Factor: 5:1
- / Magnetic Particle Inspected
- / Certified Heat Treatment
- / Rated at 100% from 0°-90°
- / Meets or Exceeds the Requirements of ASME B30.26.
- / Conforms to CE



Part No.	Rated Load (KGS)	Thread Size	Standard							Torque (N-M)	Weight (LBS)
			A	B	C	D	E (mm)	F	G		
FHRM56912	400	M8x1.25	1.32	1.40	1.16	0.44	15	3.29	2.38	9	1.0
FHRM56914	400	M8x1.25	1.32	1.40	1.16	0.44	20	3.29	2.38	9	1.0
FHRM56916	500	M10x1.50	1.32	1.40	1.16	0.44	15	3.29	2.38	16	1.0
FHRM56918	500	M10x1.50	1.32	1.40	1.16	0.44	25	3.29	2.38	16	1.0
FHRM56923	1,050	M12x1.75	2.23	2.40	1.97	0.75	20	5.60	4.05	37	4.0
FHRM56924	1,050	M12x1.75	2.23	2.40	1.97	0.75	25	5.60	4.05	37	4.0
FHRM56926	1,050	M12x1.75	2.23	2.40	1.97	0.75	35	5.60	4.05	37	4.0
FHRM56928	1,050	M14x2.00	2.23	2.40	1.97	0.75	30	5.60	4.05	40	4.0
FHRM56930	1,900	M16x2.00	2.23	2.40	1.97	0.75	25	5.60	4.05	80	4.0
FHRM56932	1,900	M16x2.00	2.23	2.40	1.97	0.75	35	5.60	4.05	80	4.0
FHRM56936	2,150	M20x2.50	2.23	2.40	1.97	0.75	25	5.60	4.05	135	4.0
FHRM56937	2,150	M20x2.50	2.23	2.40	1.97	0.75	35	5.60	4.05	135	4.0
FHRM56938	2,150	M20x2.50	2.23	2.40	1.97	0.75	40	5.60	4.05	135	4.0
FHRM56942	3,000	M20x2.50	2.95	3.20	2.62	1.00	30	7.48	5.40	135	9.0
FHRM56946	4,200	M24x3.00	2.95	3.20	2.62	1.00	30	7.48	5.40	311	9.0
FHRM56948	4,200	M24x3.00	2.95	3.20	2.62	1.00	40	7.48	5.40	311	9.0
FHRM56949	4,500	M30x3.50	2.95	3.20	2.62	1.00	40	7.48	5.40	637	9.0
FHRM56950	4,500	M30x3.50	2.95	3.20	2.62	1.00	50	7.48	5.40	637	9.0
FHRM56956	7,000	M30x3.50	3.73	4.00	3.28	1.25	50	9.35	6.75	637	19.0
FHRM56958	7,000	M30x3.50	3.73	4.00	3.28	1.25	65	9.35	6.75	637	19.0
FHRM56960	7,000	M33x3.50	3.73	4.00	3.28	1.25	55	9.35	6.75	637	19.0
FHRM56966	11,000	M36x4.00	3.73	4.00	3.28	1.25	65	9.35	6.75	1085	20.0
FHRM56968	12,500	M42x4.50	3.73	4.00	3.28	1.25	80	9.35	6.75	1085	21.0

Forged Swivel Hoist Ring



KEY FEATURES

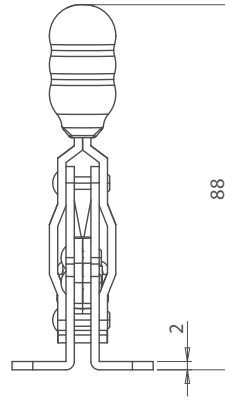
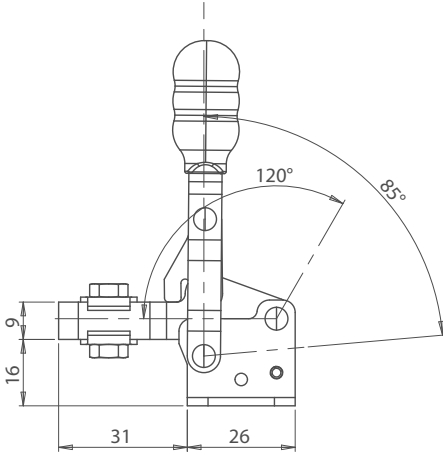
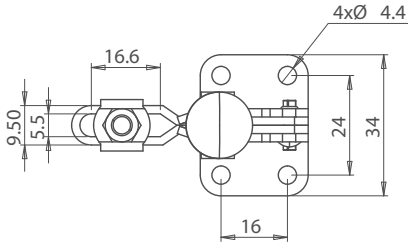
- / 200% Proof-Load Tested with Serial Number for Traceability
- / Swivels 360° - Pivots 180°
- / Material: Alloy Steel
- / Finish: Black Oxide (Also Available: Cadmium Plated, Electroless Nickel Plated, Zinc Plated)

- / Safety Factor: 5:1
- / Magnetic Particle Inspected
- / Certified Heat Treatment
- / Rated at 100% from 0°-90°
- / Meets or Exceeds the Requirements of ASME B30.26.
- / Conforms to CE



Part No.	Rated Load (LBS)	Thread Size	Standard							Torque (FT-LBS)	Weight (LBS)
			A	B	C	D	E	F	G		
FHR56100	600	1/4-20	1.32	1.40	1.16	0.44	0.50	3.29	2.38	5	1.0
FHR56102	800	5/16-18	1.32	1.40	1.16	0.44	0.50	3.29	2.38	7	1.0
FHR56104	800	5/16-18	1.32	1.40	1.16	0.44	1.00	3.29	2.38	7	1.0
FHR56106	1,000	3/8-16	1.32	1.40	1.16	0.44	0.50	3.29	2.38	12	1.0
FHR56107	1,000	3/8-16	1.32	1.40	1.16	0.44	1.00	3.29	2.38	12	1.0
FHR56008	2,500	1/2-13	2.23	2.40	1.97	0.75	0.75	5.60	4.05	28	4.0
FHR56010	2,500	1/2-13	2.23	2.40	1.97	0.75	1.00	5.60	4.05	28	4.0
FHR56012	2,500	1/2-13	2.23	2.40	1.97	0.75	1.25	5.60	4.05	28	4.0
FHR56002	4,000	5/8-11	2.23	2.40	1.97	0.75	0.75	5.60	4.05	60	4.0
FHR56004	4,000	5/8-11	2.23	2.40	1.97	0.75	1.00	5.60	4.05	60	4.0
FHR56006	4,000	5/8-11	2.23	2.40	1.97	0.75	1.25	5.60	4.05	60	4.0
FHR56014	5,000	3/4-10	2.23	2.40	1.97	0.75	1.00	5.60	4.05	100	4.0
FHR56018	5,000	3/4-10	2.23	2.40	1.97	0.75	1.50	5.60	4.05	100	4.0
FHR56204	7,000	3/4-10	2.95	3.20	2.62	1.00	1.00	7.48	5.40	100	9.0
FHR56203	7,000	3/4-10	2.95	3.20	2.62	1.00	1.25	7.48	5.40	100	9.0
FHR56206	7,000	3/4-10	2.95	3.20	2.62	1.00	1.50	7.48	5.40	100	9.0
FHR56202	8,000	7/8-9	2.95	3.20	2.62	1.00	1.00	7.48	5.40	160	9.0
FHR56205	8,000	7/8-9	2.95	3.20	2.62	1.00	1.25	7.48	5.40	160	9.0
FHR56210	10,000	1-8	2.95	3.20	2.62	1.00	1.25	7.48	5.40	230	9.0
FHR56212	10,000	1-8	2.95	3.20	2.62	1.00	1.50	7.48	5.40	230	9.0
FHR56214	10,000	1-8	2.95	3.20	2.62	1.00	2.25	7.48	5.40	230	9.0
FHR56802	15,000	1 1/4-7	3.73	4.00	3.28	1.25	2.00	9.35	6.75	470	18.0
FHR56804	15,000	1 1/4-7	3.73	4.00	3.28	1.25	2.75	9.35	6.75	470	18.0
FHR56702	20,000	1 3/8-6	3.73	4.00	3.28	1.25	2.75	9.35	6.75	540	19.0
FHR56404	24,000	1 1/2-6	3.73	4.00	3.28	1.25	2.75	9.35	6.75	800	19.0

Vertical Toggle Clamp Flat Base Slotted Arm

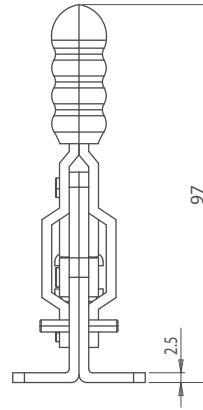
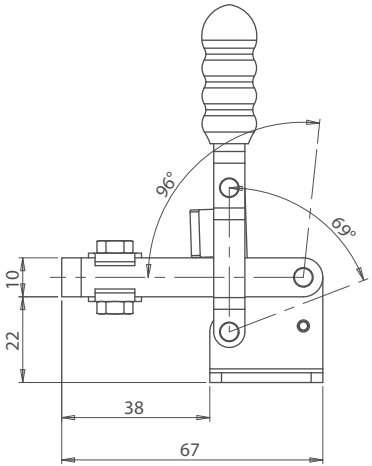
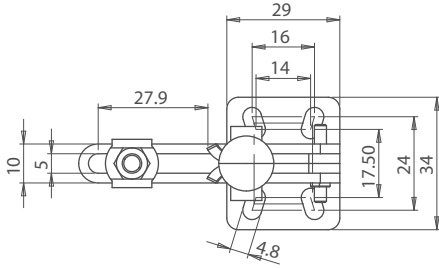


KEY INFORMATION

- / **Part No.**
TC10752B
- / **Holding Force**
75Kg
- / **Arm Opens**
130-195°
- / **Handle Opens**
90-125°
- / **Weight**
0.05Kg
- / **Spindle Supplied**
TC055008+TC05 Cap
- / **Flanged Washers Supplied**
FW-100



Vertical Toggle Clamp Flat Base Slotted Arm



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CLAMPING & FIXING

KEY INFORMATION

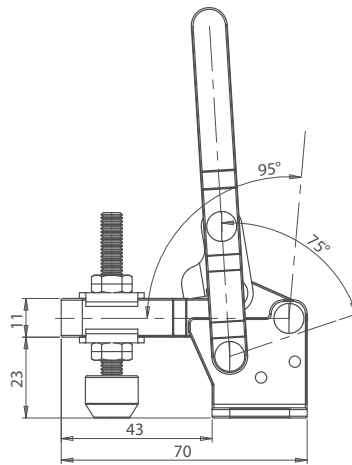
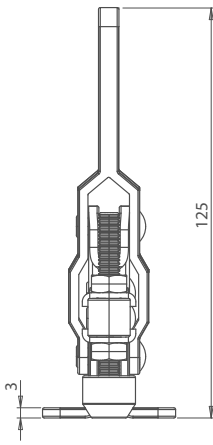
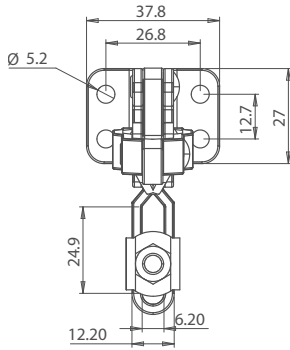
- / Part No.
TC11002B
- / Holding Force
75Kg
- / Arm Opens
96°
- / Handle Opens
66°
- / Weight
0.08Kg
- / Spindle Supplied
TC054008+



Vertical Toggle Clamp Flat Base Slotted Arm

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CLAMPING & FIXING

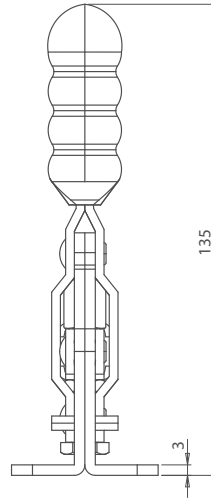
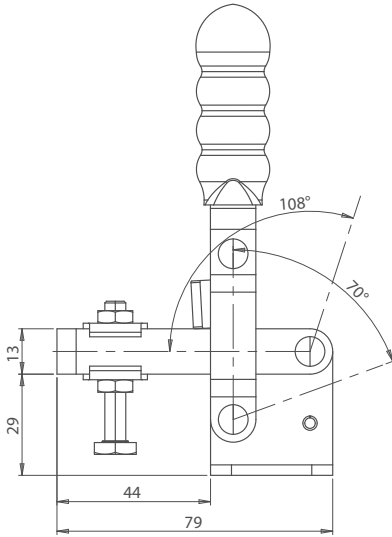
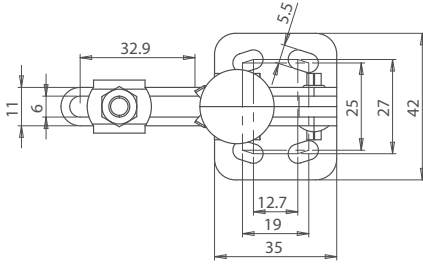


KEY INFORMATION

- / Part No.
TC11502B
- / Holding Force
150Kg
- / Arm Opens
185°
- / Handle Opens
110°
- / Weight
0.195Kg
- / Spindle Supplied
TC065010+TC06 Cap
- / Flanged Washers Supplied
FW-140



Vertical Toggle Clamp Flat Base Slotted Arm



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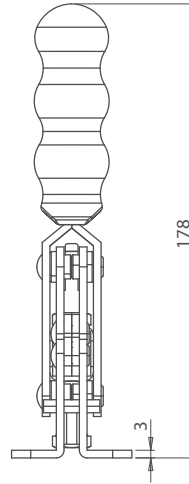
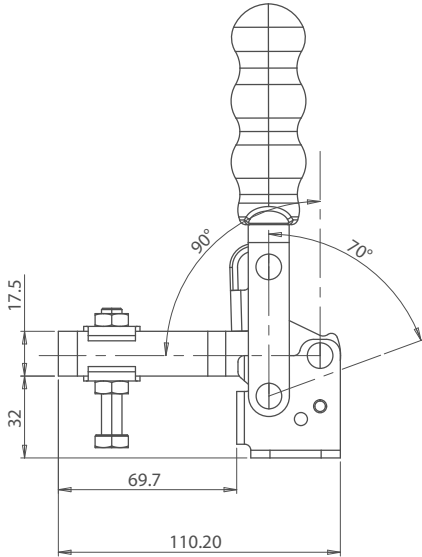
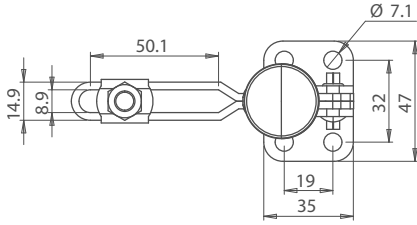
CLAMPING & FIXING

KEY INFORMATION

- / **Part No.**
TC12002B
- / **Holding Force**
150Kg
- / **Arm Opens**
108°
- / **Handle Opens**
70°
- / **Weight**
0.17Kg
- / **Spindle Supplied**
TC064010+TC06 Cap
- / **Flanged Washers Supplied**
FW-140



Vertical Toggle Clamp Flat Base Slotted Arm



KEY INFORMATION

- / **Part No.**
TC12502B
- / **Holding Force**
250Kg
- / **Arm Opens**
90-150°
- / **Handle Opens**
70-100°
- / **Weight**
0.38Kg
- / **Spindle Supplied**
TC085012
- / **Flanged Washers Supplied**
FW-516

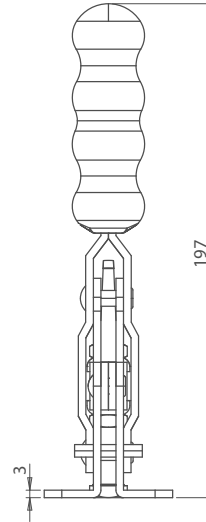
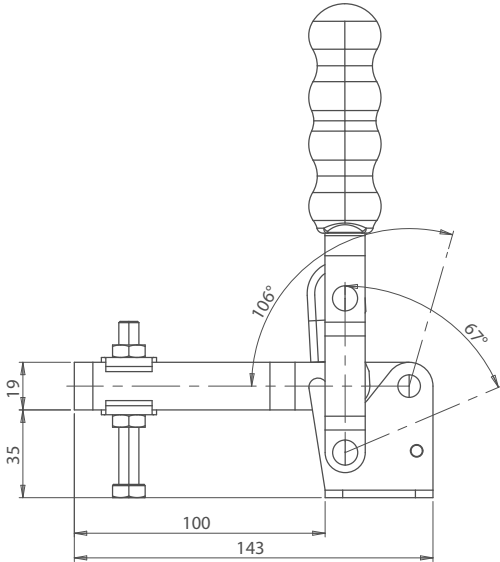
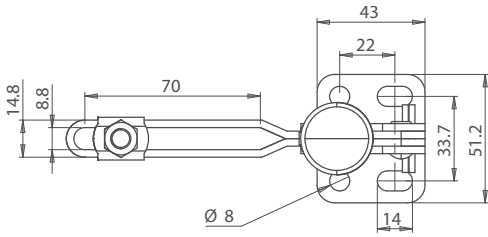


Vertical Toggle Clamp Flat Base Slotted Arm



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CLAMPING & FIXING



KEY INFORMATION

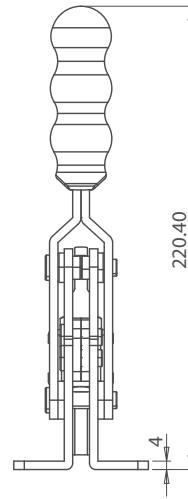
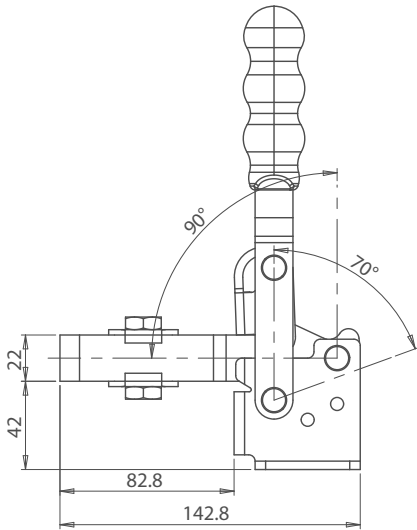
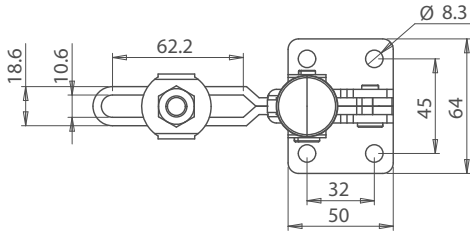
- / **Part No.**
TC13002B
- / **Holding Force**
250Kg
- / **Arm Opens**
106°
- / **Handle Opens**
67°
- / **Weight**
0.38Kg
- / **Spindle Supplied**
TC086512
- / **Flanged Washers Supplied**
FW-516



Vertical Toggle Clamp Flat Base Slotted Arm

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CLAMPING & FIXING

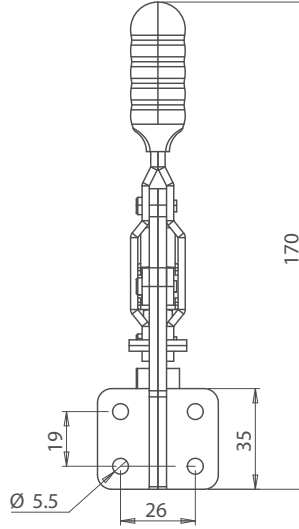
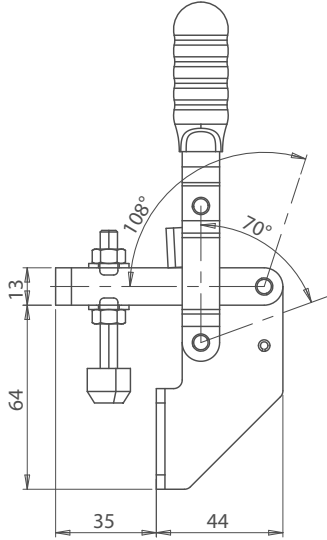
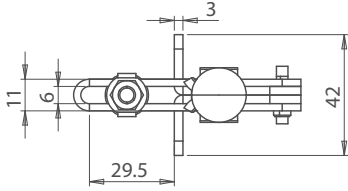


KEY INFORMATION

- / **Part No.**
TC13502B
- / **Holding Force**
350Kg
- / **Arm Opens**
90-180°
- / **Handle Opens**
70-100°
- / **Weight**
0.8Kg
- / **Spindle Supplied**
TC108015
- / **Flanged Washers Supplied**
FW-380



Vertical Toggle Clamp Side Mounting Type

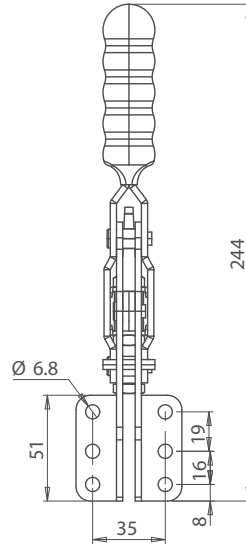
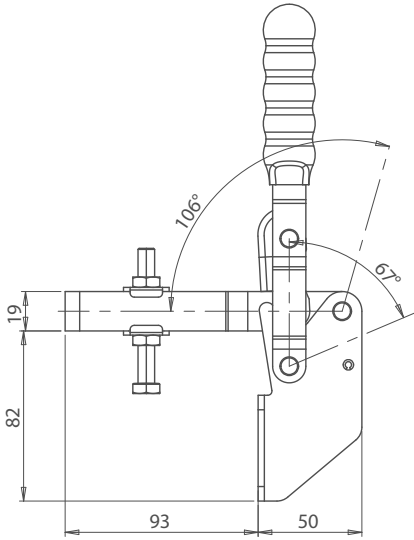
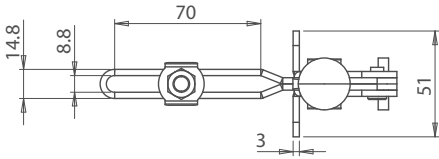


KEY INFORMATION

- / Part No.
TC12003B
- / Holding Force
150Kg
- / Arm Opens
108°
- / Handle Opens
70°
- / Weight
0.17Kg
- / Spindle Supplied
TC064010+TC06 Cap
- / Flanged Washers Supplied
FW-140



Vertical Toggle Clamp Side Mounting Type



KEY INFORMATION

- / **Part No.**
TC13003B
- / **Holding Force**
250Kg
- / **Arm Opens**
106°
- / **Handle Opens**
67°
- / **Weight**
0.38Kg
- / **Spindle Supplied**
TC086512
- / **Flanged Washers Supplied**
FW-516

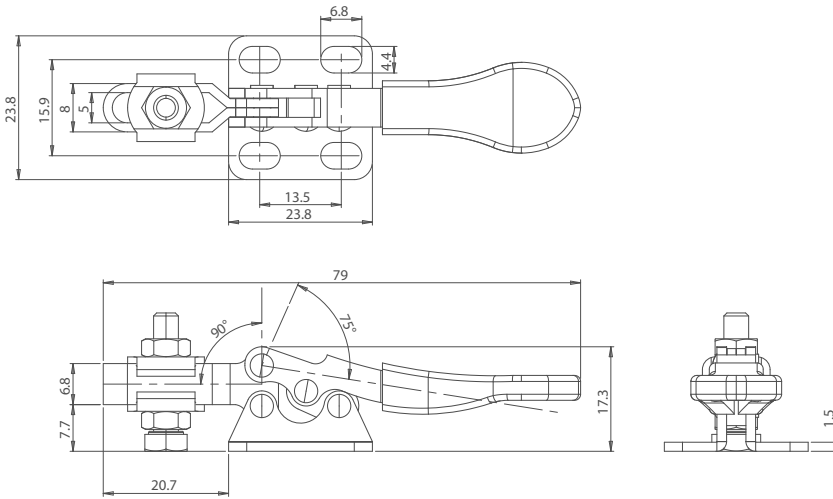


Horizontal Toggle Clamp Flat Base



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CLAMPING & FIXING



KEY INFORMATION

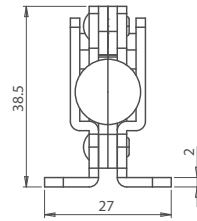
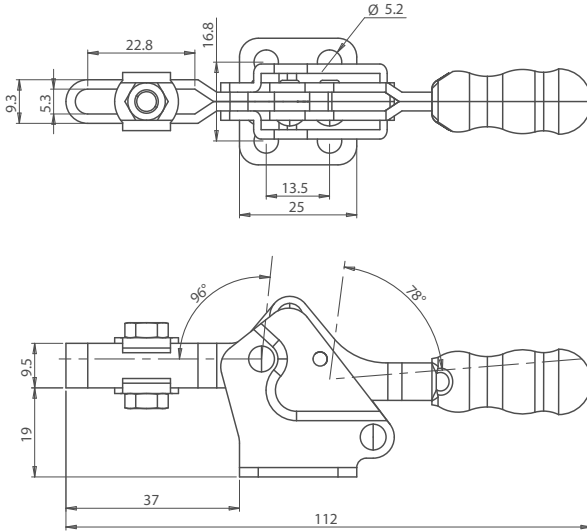
- / Part No.
TC201
- / Holding Force
38Kg
- / Arm Opens
90°
- / Handle Opens
80°
- / Weight
0.043Kg
- / Spindle Supplied
TC08034
- / Flanged Washers Supplied
FW-080



Horizontal Toggle Clamp Flat Base

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CLAMPING & FIXING



KEY INFORMATION

- / **Part No.**
TC20752B
- / **Holding Force**
65Kg
- / **Arm Opens**
 94°
- / **Handle Opens**
 76°
- / **Weight**
0.10Kg
- / **Spindle Supplied**
TC054008-BK+TC05 Cap
- / **Flanged Washers Supplied**
FW-100

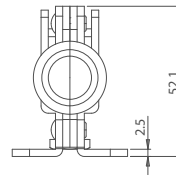
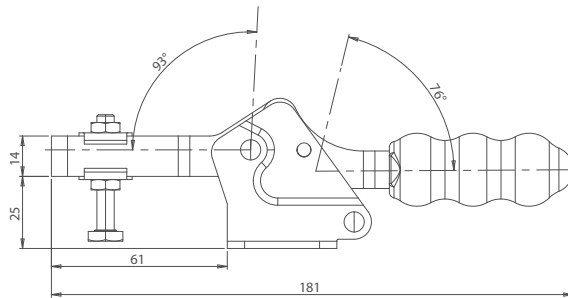
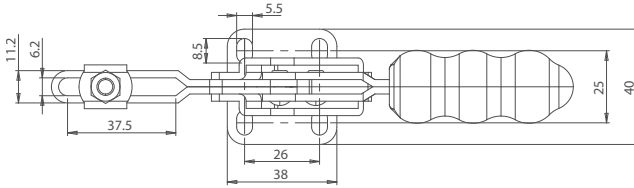


Horizontal Toggle Clamp Flat Base



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CLAMPING & FIXING



KEY INFORMATION

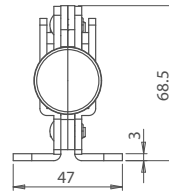
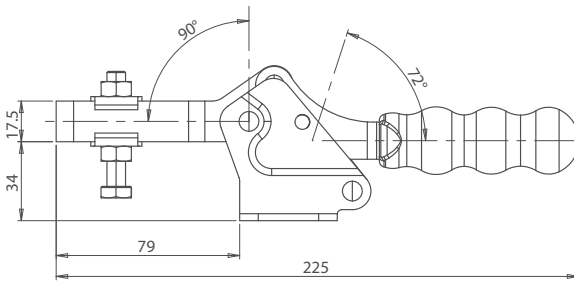
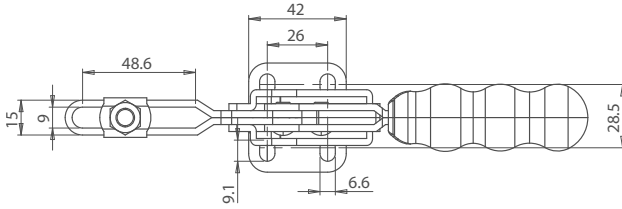
- / **Part No.**
TC21502B
- / **Holding Force**
145Kg
- / **Arm Opens**
94°
- / **Handle Opens**
76°
- / **Weight**
0.23Kg
- / **Spindle Supplied**
TC064010BK+TC06 Cap
- / **Flanged Washers Supplied**
FW-140



Horizontal Toggle Clamp Flat Base

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CLAMPING & FIXING



KEY INFORMATION

- / Part No.
TC22502B
- / Holding Force
235Kg
- / Arm Opens
94°
- / Handle Opens
76°
- / Weight
0.43Kg
- / Spindle Supplied
TC085012
- / Flanged Washers Supplied
FW-516

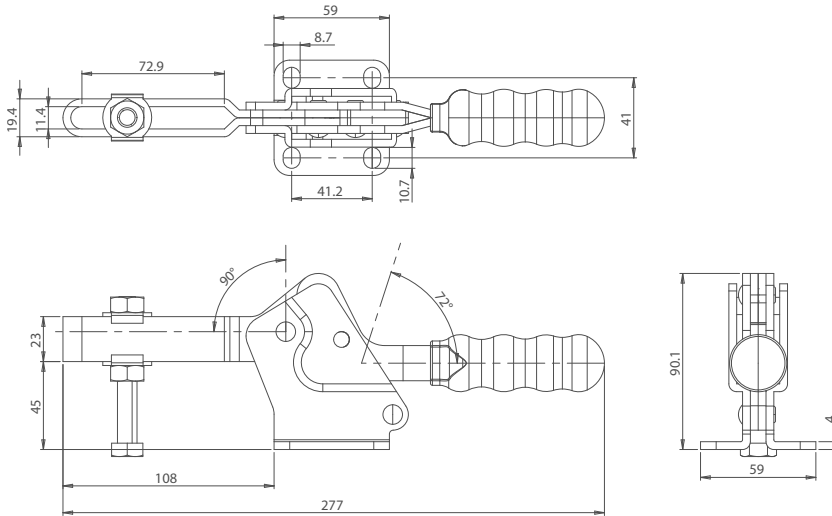


Horizontal Toggle Clamp Flat Base



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CLAMPING & FIXING



KEY INFORMATION

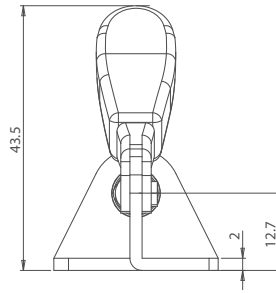
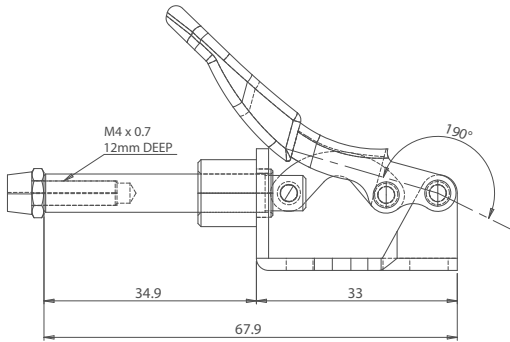
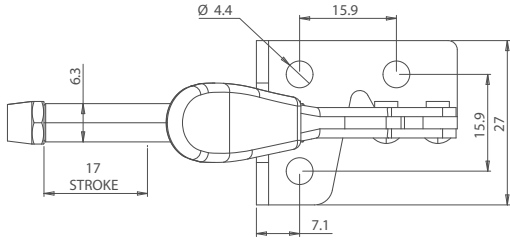
- / **Part No.**
TC23502B
- / **Holding Force**
350Kg
- / **Arm Opens**
94°
- / **Handle Opens**
76°
- / **Weight**
0.5Kg
- / **Spindle Supplied**
TC107515
- / **Flanged Washers Supplied**
FW-380



Push Pull Toggle Clamp Flat Base

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CLAMPING & FIXING



KEY INFORMATION

- / Part No.
TC301AM
- / Holding Force
45Kg
- / Plunger Stroke
16mm
- / Handle Opens
190°
- / Weight
0.05Kg
- / Spindle Supplied
TC042007
- / Flanged Washers Supplied
N/A



Push Pull Toggle Clamp Nose Mounted

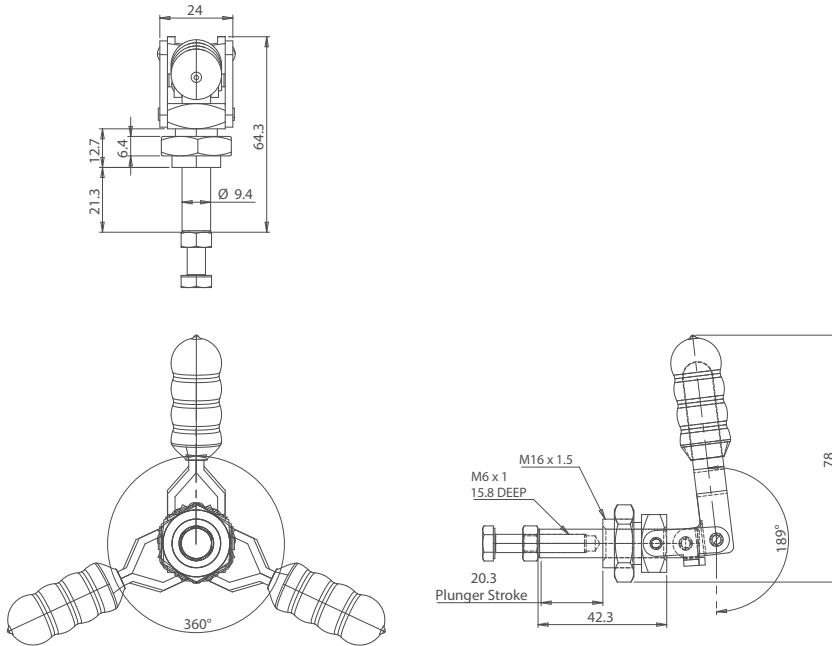
BONEHAM

195

CLAMPING & FIXING

**HUGE
STOCKS**

**VOLUME
DISCOUNT**

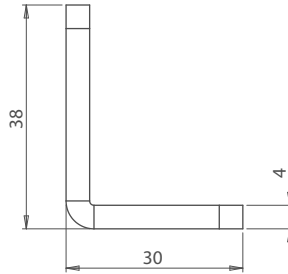
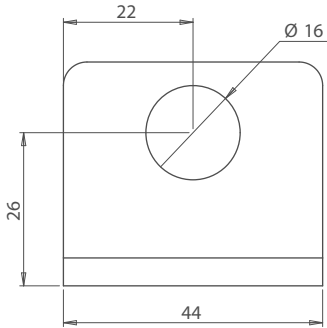
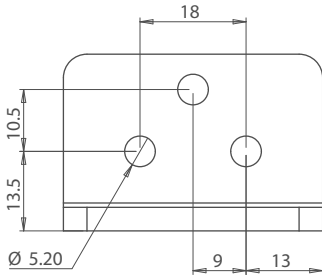


KEY INFORMATION

- / **Part No.**
TC36202M
- / **Holding Force**
91Kg
- / **Plunger Stroke**
19mm
- / **Weight**
0.113Kg
- / **Spindle Supplied**
TC064010
- / **Optional Bracket**
TC36203
- / **Locknut Supplied**
M16 x 1.5



Nose Mounting Brackets



KEY INFORMATION

- / **Part No.**
TC36203
- / **Bracket to suit**
TC36202M
- / **Finish**
Zinc plated

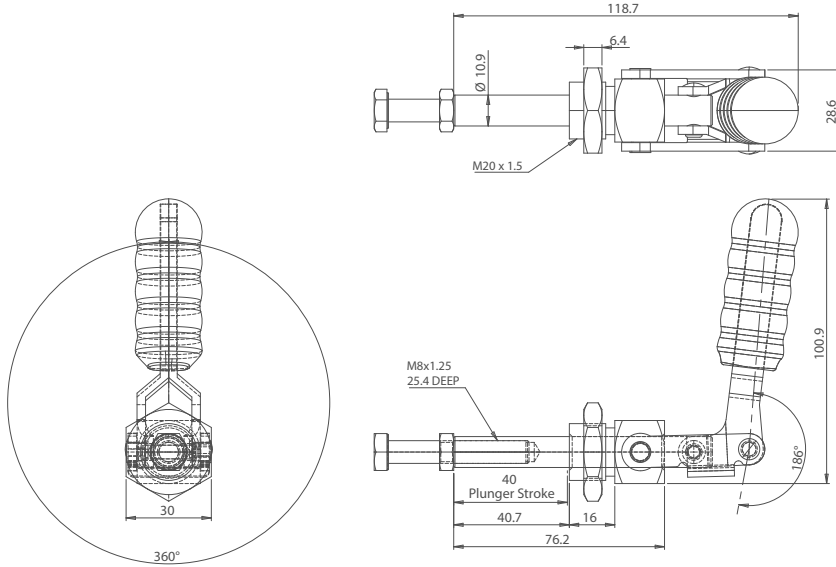


Push Pull Toggle Clamp Nose Mounted



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CLAMPING & FIXING



KEY INFORMATION

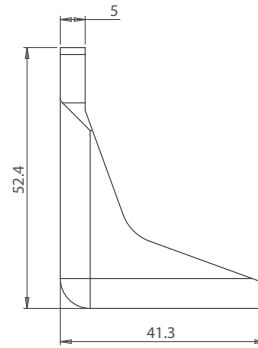
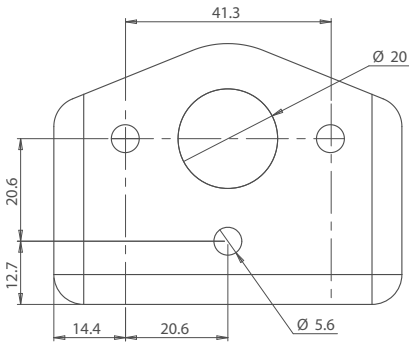
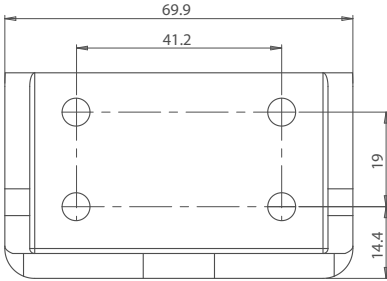
- / **Part No.**
TC36204M
- / **Holding Force**
136Kg
- / **Plunger Stroke**
38mm
- / **Weight**
0.27Kg
- / **Spindle Supplied**
TC085012
- / **Optional Bracket**
TC36205
- / **Locknut Supplied**
M20 x 1.5



Nose Mounting Brackets

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CLAMPING & FIXING



KEY INFORMATION

- / **Part No.**
TC36205
- / **Bracket to suit**
TC36204M
- / **Finish**
Zinc plated



Push Pull Toggle Clamp Nose Mounted

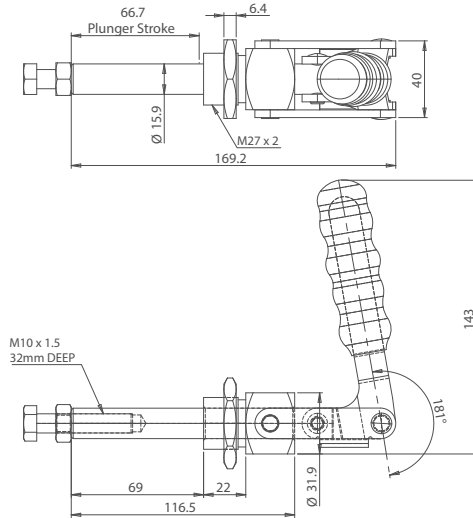
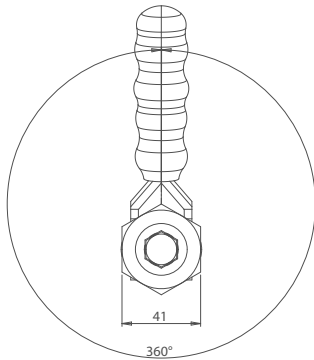
BONEHAM[®]

199

CLAMPING & FIXING

**HUGE
STOCKS**

**VOLUME
DISCOUNT**



KEY INFORMATION

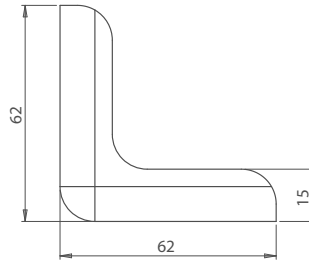
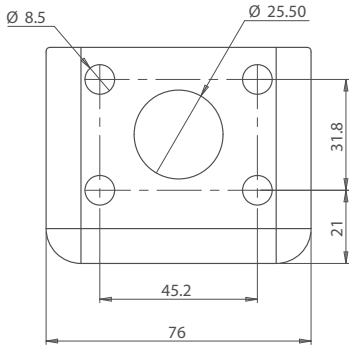
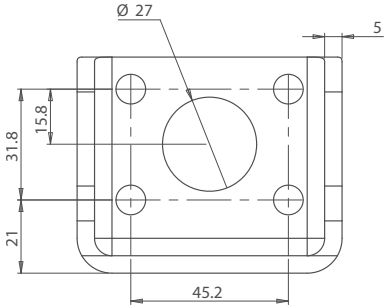
- / **Part No.**
TC36224M
- / **Holding Force**
318Kg
- / **Plunger Stroke**
66.8mm
- / **Weight**
0.69Kg
- / **Spindle Supplied**
TC105015
- / **Optional Bracket**
TC36225
- / **Locknut Supplied**
M27 x 1.5



Nose Mounting Brackets

200

CLAMPING & FIXING



KEY INFORMATION

- / **Part No.**
TC36225
- / **Bracket to suit**
TC36224M
- / **Finish**
Zinc plated

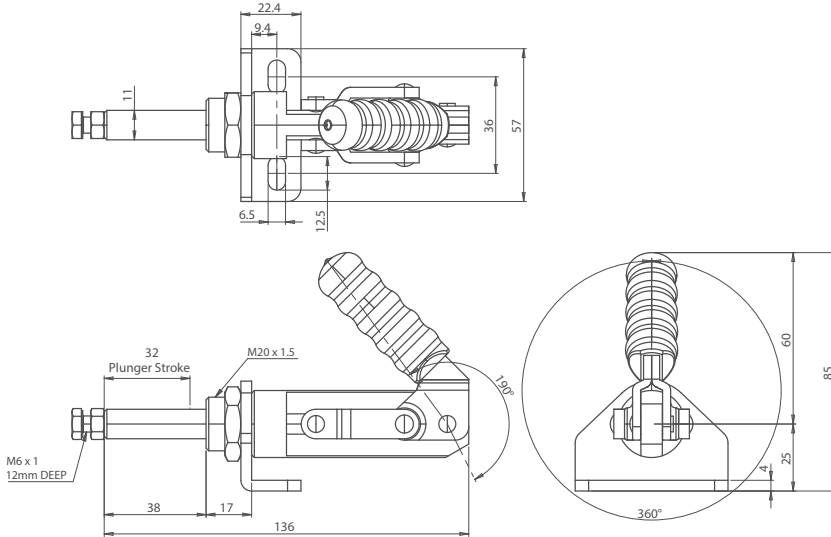


Push Pull Toggle Clamp Nose Mounted



201

CLAMPING & FIXING



KEY INFORMATION

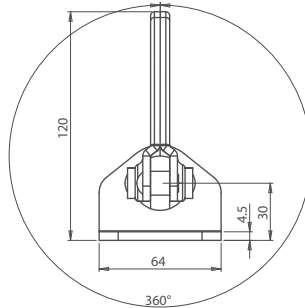
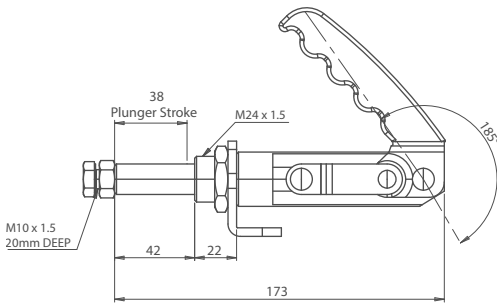
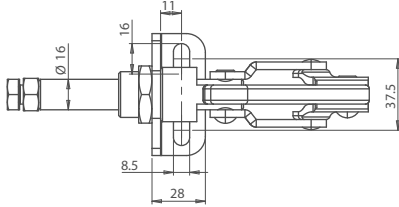
- / **Part No.**
TC30250M
- / **Holding Force**
250Kg
- / **Plunger Stroke**
32mm
- / **Handle Opens**
190°
- / **Weight**
0.385Kg
- / **Spindle Supplied**
TC062010
- / **Threaded Collar**
M20 x 1.5



Push Pull Toggle Clamp Nose Mounted

202

CLAMPING & FIXING



KEY INFORMATION

- / **Part No.**
TC30450M
- / **Holding Force**
450Kg
- / **Plunger Stroke**
38mm
- / **Handle Opens**
185°
- / **Weight**
0.774Kg
- / **Spindle Supplied**
TC103015
- / **Threaded Collar**
M24 x 1.5

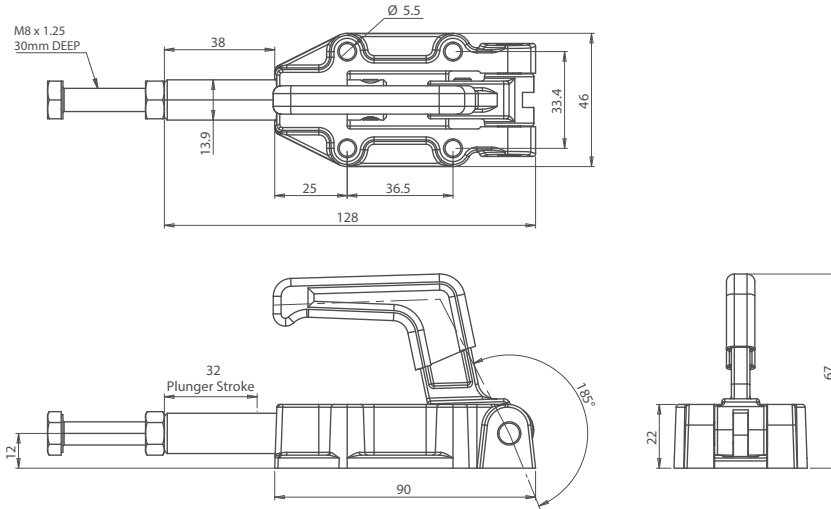


Push Pull Toggle Clamp Heavy Duty



203

CLAMPING & FIXING



KEY INFORMATION

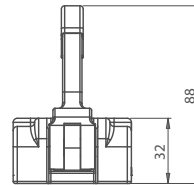
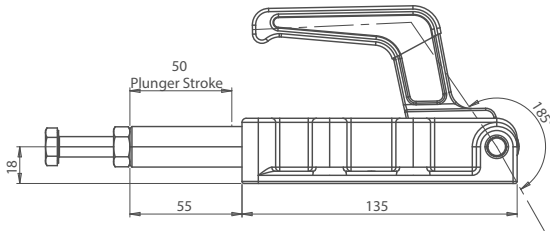
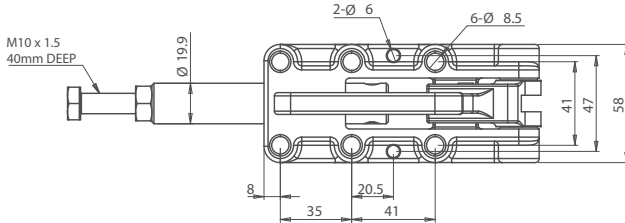
- / Part No.
TC30600M
- / Holding Force
600Kg
- / Plunger Stroke
32mm
- / Handle Opens
185°
- / Weight
0.48Kg
- / Spindle Supplied
TC086512
- / Flanged Washers Supplied
N/A



Push Pull Toggle Clamp Heavy Duty

204

CLAMPING & FIXING



KEY INFORMATION

- / Part No.
TC31200M
- / Holding Force
1200Kg
- / Plunger Stroke
51mm
- / Handle Opens
185°
- / Weight
1.5Kg
- / Spindle Supplied
TC107515
- / Flanged Washers Supplied
N/A

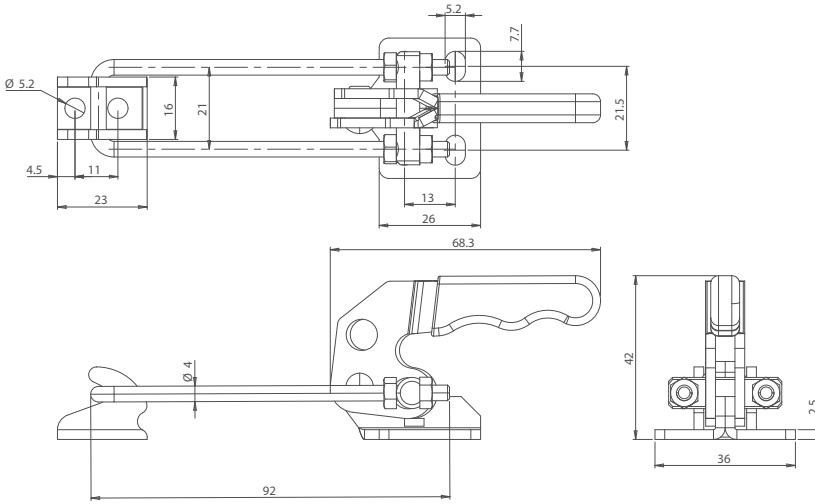


Latch Toggle Clamp Horizontal Versions



205

CLAMPING & FIXING



KEY INFORMATION

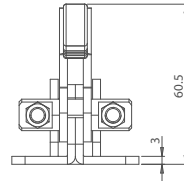
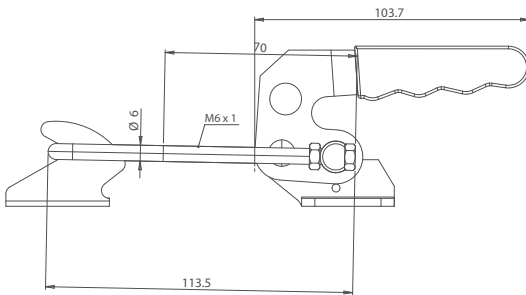
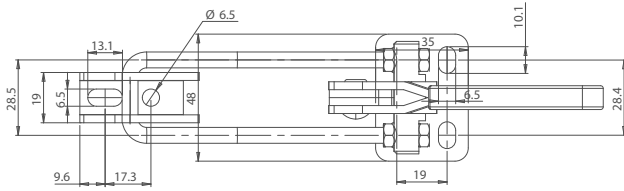
- / **Part No.**
TC40820
- / **Holding Force**
200Kg
- / **Weight**
0.12Kg
- / **Latch Plate Supplied**
TC40820LP



Latch Toggle Clamp Horizontal Versions

206

CLAMPING & FIXING



KEY INFORMATION

- / **Part No.**
TC40840
- / **Holding Force**
400Kg
- / **Weight**
0.306Kg
- / **Latch Plate Supplied**
TC40840LP

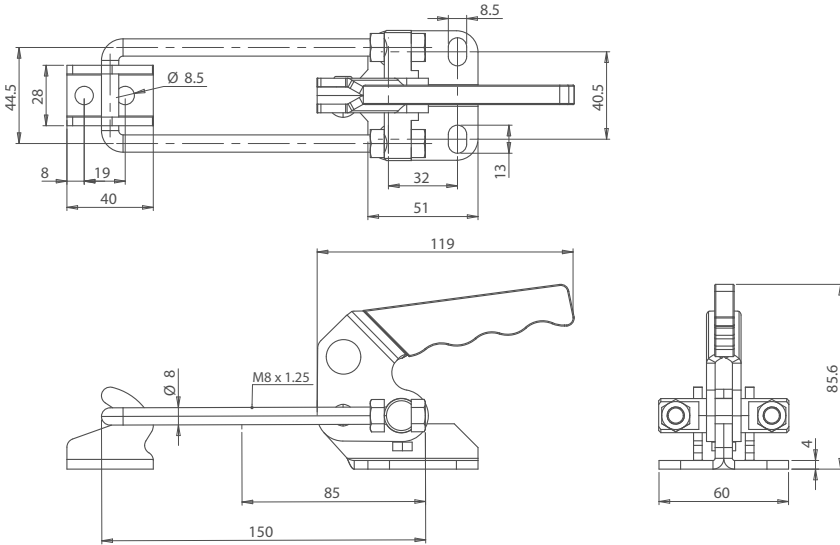


Latch Toggle Clamp Horizontal Versions



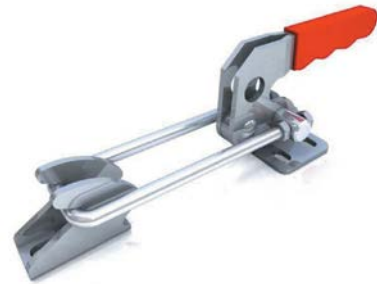
207

CLAMPING & FIXING



KEY INFORMATION

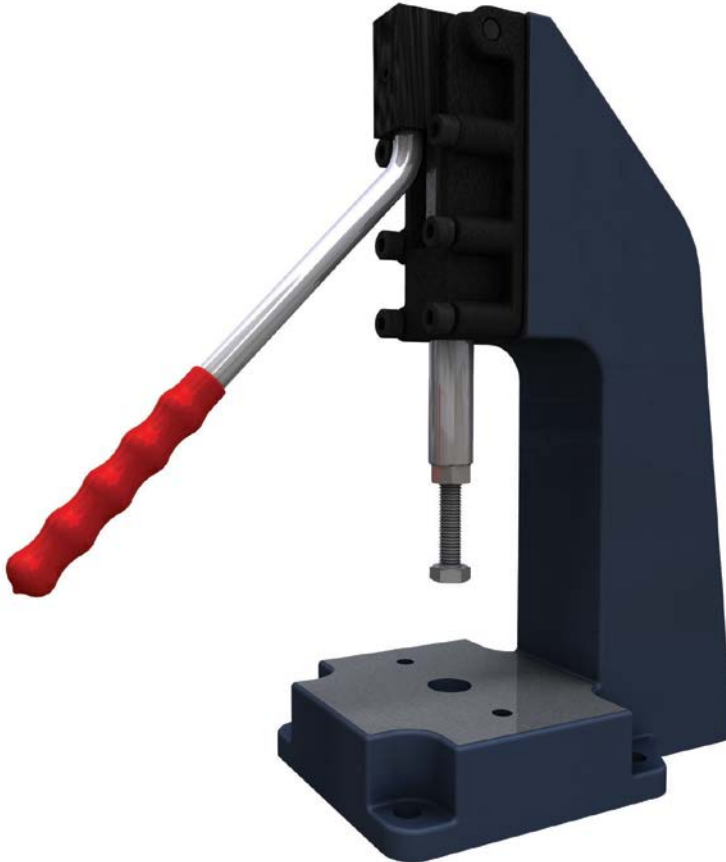
- / Part No.
TC40870
- / Holding Force
700Kg
- / Weight
0.7Kg
- / Latch Plate Supplied
TC40870LP



Toggle Presses

208

CLAMPING & FIXING



**HUGE
STOCKS**

**VOLUME
DISCOUNT**

All Boneham Toggle Presses incorporate a Push-Pull toggle clamp plunger mechanism to produce a positive straight-line action. They have the advantage of delivering the maximum output force in the fully extended position of the stroke and so are most suitable for applications such as shearing, piercing, swaging, punching and rivetting.

Features include:

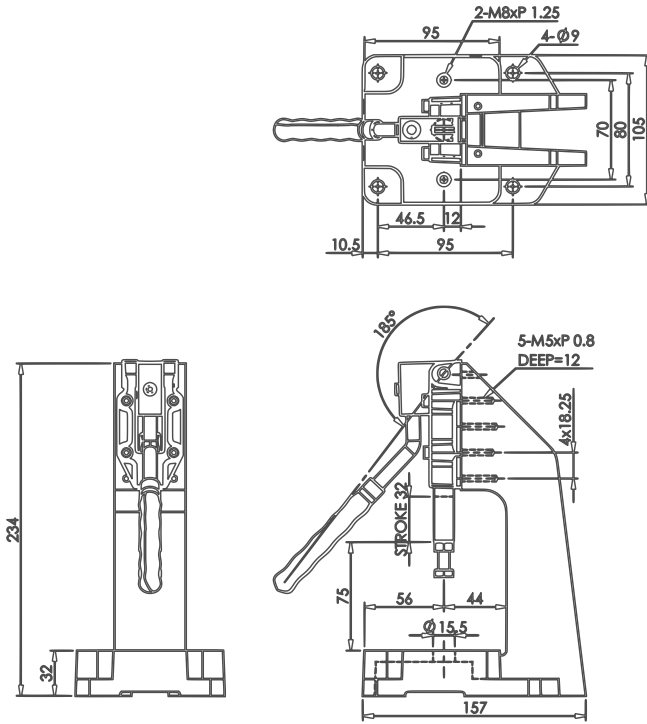
- / Heavy-duty ductile cast iron base and frame for strength and rigidity.
- / A close tolerance is maintained between the mounting base and plunger to allow use for pin location and gauging as well as clamping applications.
- / Dual height position option.
- / Long handle allows operator to generate high force with minimum effort.
- / All press frame bases are supplied with a pre drilled central location hole and threaded fixing holes for instant mounting of jig or fixture to the base.
- / Pivot points are fitted with hardened steel rivets to maintain accuracy and provide a long service life.

We would be pleased to quote for your requirements / Tel: +44 (0) 1623 445 450 / Fax: +44 (0) 1623 445 451

Toggle Presses Manual Versions

HUGE STOCKS

VOLUME DISCOUNT

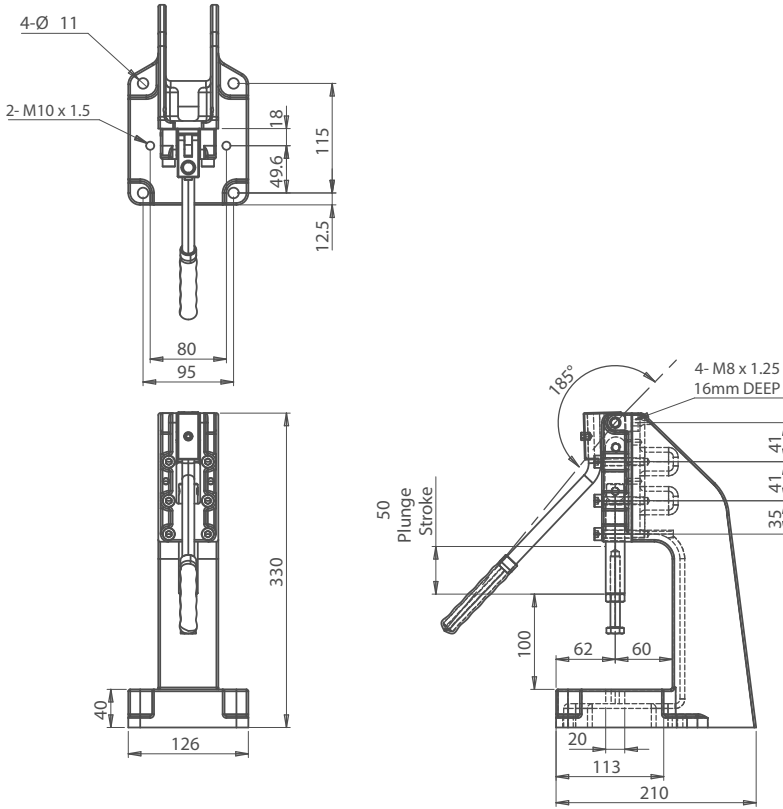


KEY INFORMATION

- / Part No.
TC30600HLP
- / Holding Force
600Kg
- / Plunger Stroke
32mm
- / Handle Opens
185°
- / Weight
3.6Kg
- / Spindle Supplied
TC086512



Toggle Presses Manual Versions



KEY INFORMATION

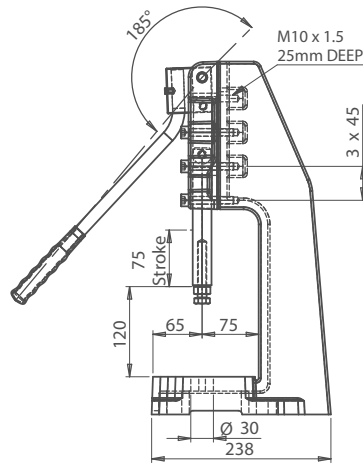
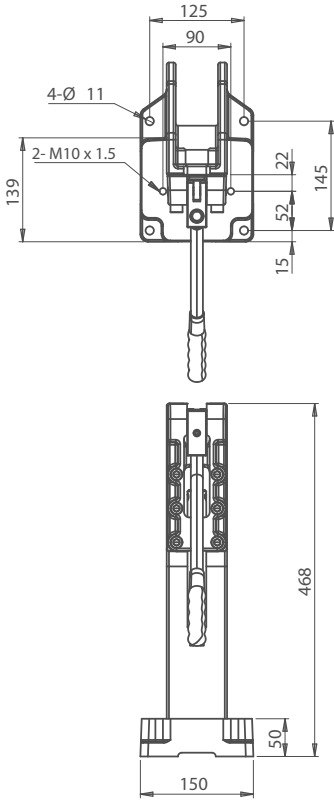
- / **Part No.**
TC31200HLP
- / **Holding Force**
1200Kg
- / **Plunger Stroke**
50mm
- / **Handle Opens**
185°
- / **Weight**
7.35Kg
- / **Spindle Supplied**
TC107515



Toggle Presses Manual Versions

HUGE STOCKS

VOLUME DISCOUNT

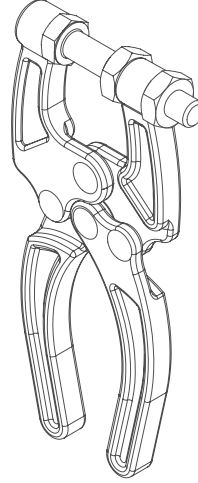
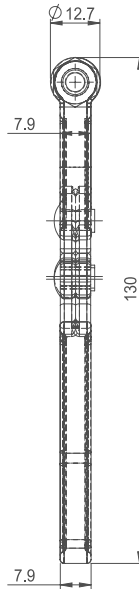
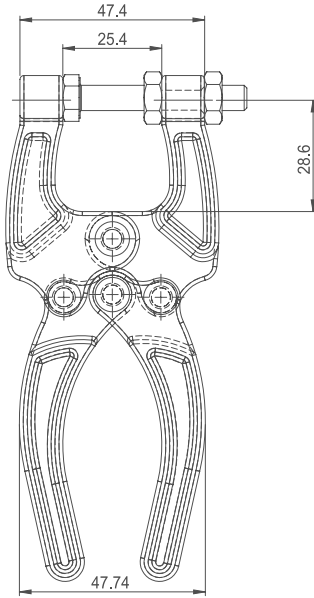


KEY INFORMATION

- / **Part No.**
TC32500HLP
- / **Holding Force**
2500Kg
- / **Plunger Stroke**
75mm
- / **Handle Opens**
185°
- / **Weight**
17.92Kg
- / **Spindle Supplied**
TC127517



Toggle Pliers



KEY INFORMATION

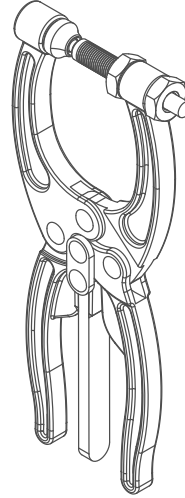
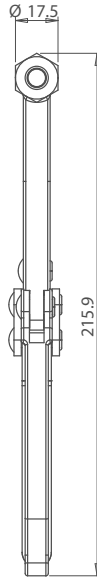
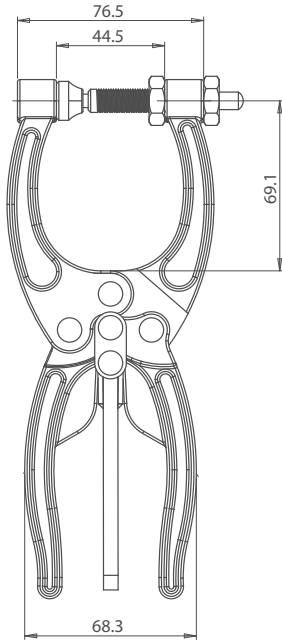
- / **Part No.**
TP50350
- / **Holding Force**
90Kg
- / **Weight**
0.19Kg
- / **Spindle Supplied**
TC14112



Toggle Pliers

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CLAMPING & FIXING



KEY INFORMATION

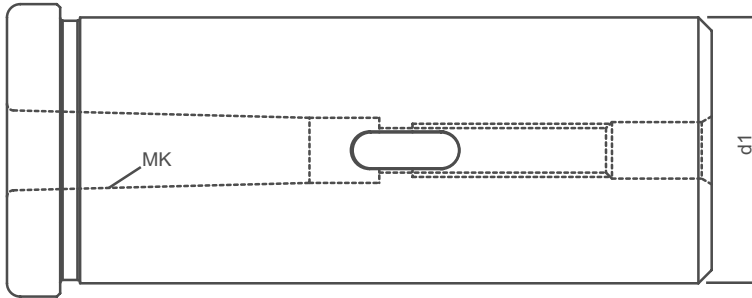
- / **Part No.**
TP50380
- / **Holding Force**
320Kg
- / **Weight**
0.66Kg
- / **Spindle Supplied**
TC38300



Morse Taper Bush, Type-L

214

CLAMPING & FIXING



- / To be fitted in boring bar holders.
- / To clamp/hold twist drills with taper shank.



Part No.	Type	d1	MK
MTBL01	MT 1 AL1	30	1
MTBL02	MT2 AL2	30	2
MTBL03	MT2 BL2	40	2
MTBL04	MT3 BL3	40	3
MTBL05	MT4 BL4	40	4
MTBL06	MT3 CL3	50	3
MTBL07	MT4 CL4	50	4
MTBL08	MT5 DL5	63	5

Knobs & Handles



CLAMPING LEVERS

/ Clamping Lever Butt Welded / Double Clamping Lever Butt Welded / Adjustable Clamping Levers / Adjustable Clamping Lever Straight Handle Hex Socket Female / Adjustable Clamping Lever Straight Handle / Adjustable Clamping Lever ERX Female / Adjustable Clamping Lever for Quick Assembly Female / Adjustable Clamping Lever Glass Fibre Reinforced ERZ / Adjustable Clamping Lever ERM SS

Pages 216-256

SPHERICAL & BALL HANDLES

/ Spherical Knobs Tapped / Plain Spherical Knobs Tapped Brass Boss / Spherical Knobs Press Fit / Ball Handles Female / Revolving Ball Handles

Pages 257-267

LOBE KNOBS

/ Lobe Knobs / Lobe Knobs Shortened Series / Lobe Knobs Type B / Lobe Knobs Stainless Steel AISI 304

Pages 268-275

GRIP KNOBS

/ Grip Knobs with Pin / Grip Knobs Blind Hole / Grip Knobs Through Hole

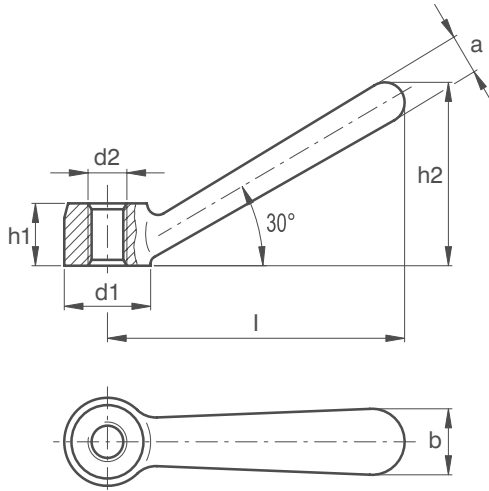
Pages 276-283

PULL HANDLES

/ Pull Handles / Curved Pull Handles / Bridge Handle

Pages 284-286

Clamping Levers



MATERIAL

/ Malleable cast iron, smooth finish, paintable.

ASSEMBLY

/ Tapped through hole.

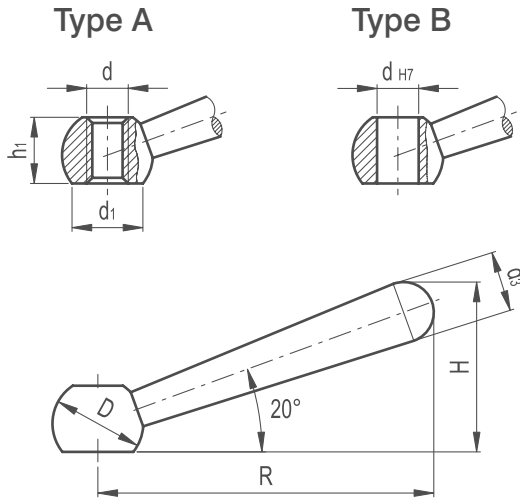
SPECIAL REQUESTS

(For sufficient quantities): clamping levers with two lever arms.



Part Reference	d1	d2	a	b	h1	h2	l
CL1-7400	16	M8	7	12	12	34.0	56
CL2-7400	20	M10	9	14	14	42.5	70
CL3-7400	25	M12	11	18	18	53.0	87
CL4-7400	32	M16	15	22	22	66.5	109
CL5-7400	40	M20	18	28	28	84.5	140

Clamping Lever Turned and Blacked



MATERIAL

/ Turned and black-oxide steel.

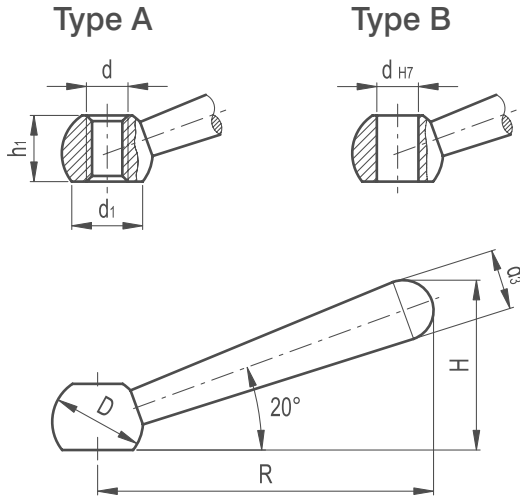
ASSEMBLY

/ Type B: plain through hole.
/ Type A: tapped through hole.



Part Reference	R	D	H	d1	d3	dH7	Mounting Hole	
							d	h1
CL1B	48	12	24	11	8	6	-	9.5
CL2A	48	12	24	11	8	-	M6	9.5
CL3B	60	16	30.5	12.5	10	8	-	12
CL3A	60	16	30.5	12.5	10	-	M8	12
CL5B	76	20	38	16	13	10	-	14.5
CL6A	76	20	38	16	13	-	M10	14.5
CL7B	95	25	47	20	16	12	-	18.5
CL8A	95	25	47	20	16	-	M12	18.5
CL9B	119	32	59.5	25	20	16	-	24
CL10A	119	32	59.5	25	20	-	M16	24
CL11B	152	40	76	31	25	20	-	30
CL12A	152	40	76	31	25	-	M20	30

Clamping Lever Stainless Steel



MATERIAL

/ AISI 303 stainless steel, sandblasted matte finish

ASSEMBLY

/ Type B: plain through hole
/ Type A: tapped through hole

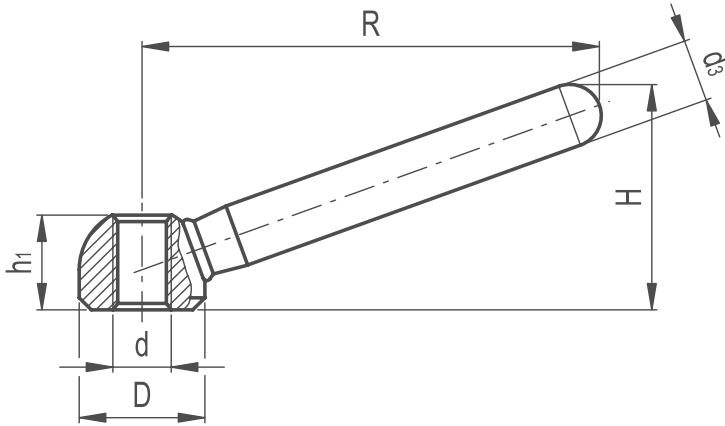
FEATURES AND APPLICATIONS

AISI 303 stainless steel, thanks to its high resistance to corrosion, allows the application of these clamping levers on machines and equipment in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to use corrosion resistant materials.



Part Reference	R	D	H	d1	d3	Mounting Hole		
						dH7	d	h1
CL1ASS	48	12	24	8	8	-	M6	9.5
CL2BSS	60	16	30.5	12.5	10	8	-	12
CL3ASS	60	16	30.5	12.5	10	-	M8	12
CL4BSS	76	20	38	16	13	10	-	14.5
CL5ASS	76	20	38	16	13	-	M10	14.5
CL6BSS	95	25	47	20	16	12	-	18.5
CL7ASS	95	25	47	20	16	-	M12	18.5
CL8ASS	119	32	59.5	25	20	-	M16	24

Clamping Lever Butt Welded



MATERIAL

- / Steel, sandblasted matte finish
- / The lever arm is butt-welded to the hub

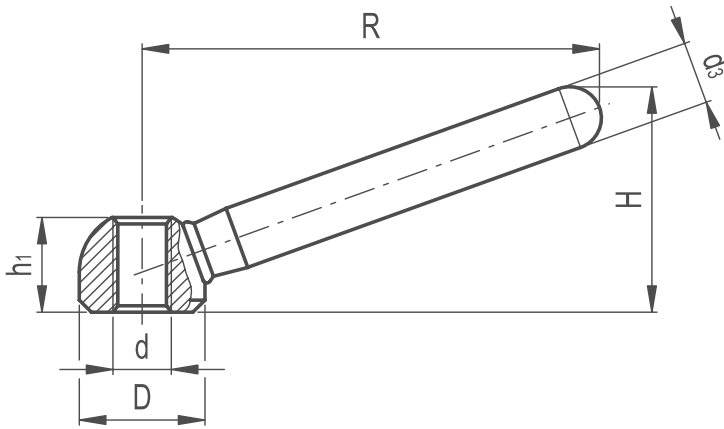
ASSEMBLY

- / Tapped through hole



Part Reference	R	D	H	d3	Mounting Hole	
					d	h1
CLBW1	60	16	30.5	9	M8	12.5
CLBW2	76	20	37	11	M10	15
CLBW3	95	25	46	14	M12	19
CLBW4	119	32	58.5	18	M16	25
CLBW5	152	40	73	20	M20	31

Clamping Lever Butt Welded Stainless Steel



MATERIAL

- / AISI 304 stainless steel, sandblasted matte finish
- / The lever arm is butt-welded to the hub

ASSEMBLY

- / Tapped through hole

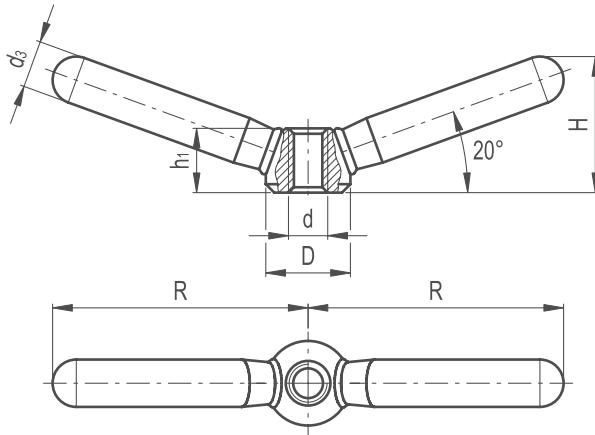
FEATURES AND APPLICATIONS

AISI 304 stainless steel, thanks to its high resistance to corrosion allows the application of these clamping levers on machines and equipment in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to use corrosion resistant materials.



Part Reference	R	D	H	d3	Mounting Hole	
					d	h1
CLBW1SS	60	16	30.5	9	M8	12.5
CLBW2SS	76	20	37	11	M10	15
CLBW3SS	95	25	46	14	M12	19
CLBW4SS	119	32	58.5	18	M16	25
CLBW5SS	152	40	73	20	M20	31

Double Clamping Lever Butt Welded



MATERIAL

- / Steel, sandblasted matte finish
- / The two lever arms are butt-welded to the hub

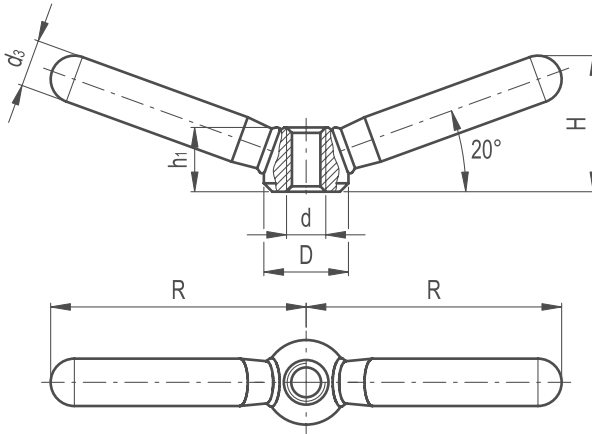
ASSEMBLY

- / Tapped through hole



Part Reference	D	R	H	d3	Mounting Hole	
					d	h1
DCLBW1	16	47.5	26	9	M8	12.5
DCLBW2	20	59.5	32	11	M10	15
DCLBW3	25	75.5	40	14	M12	19
DCLBW4	32	94.5	52	18	M16	25
DCLBW5	40	118	62	20	M20	31

Double Clamping Lever Butt Welded Stainless Steel



MATERIAL

- / AISI 304 stainless steel, sandblasted matte finish
- / The two lever arms are butt-welded to the hub

ASSEMBLY

- / Tapped through hole

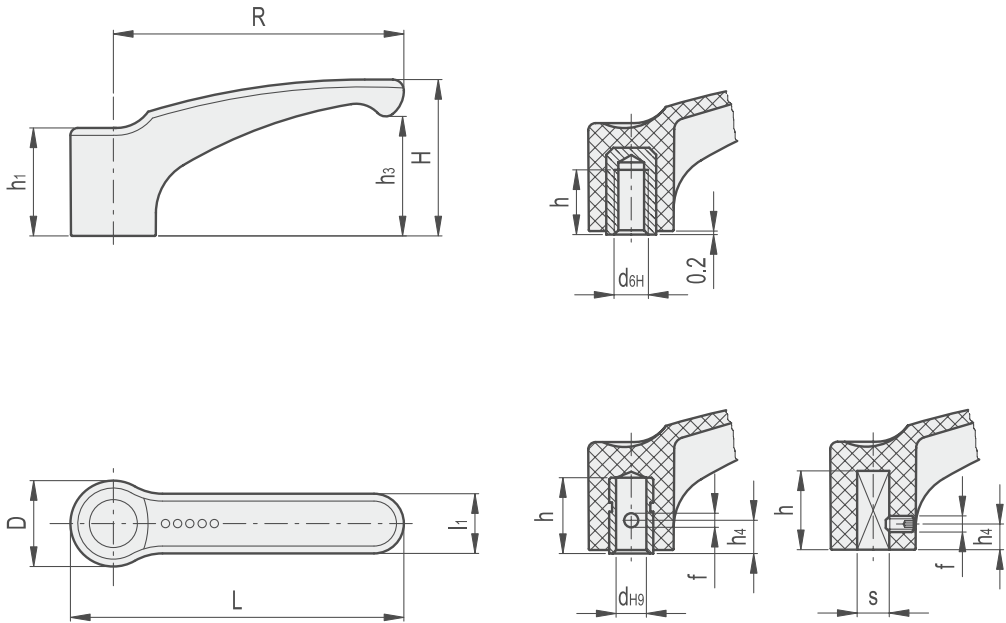
FEATURES AND APPLICATIONS

AISI 304 stainless steel, thanks to its high resistance to corrosion allows the application of these clamping nuts on machines and equipment in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to use corrosion resistant materials.



Part Reference	D	R	H	d3	Mounting Hole	
					d	h1
DCLBW1SS	16	47.5	26	9	M8	12.5
DCLBW2SS	20	59.5	32	11	M10	15
DCLBW3SS	25	75.5	40	14	M12	19
DCLBW4SS	32	94.5	52	18	M16	25
DCLBW5SS	40	118	62	20	M20	31

Lever Handles



MATERIAL

/ Glass-fibre reinforced polyamide based (PA) technopolymer. Resistant to solvents, oils, greases and other chemical agents

COLOUR

/ Grey-black, matte finish

STANDARD EXECUTIONS

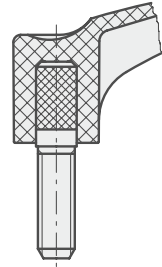
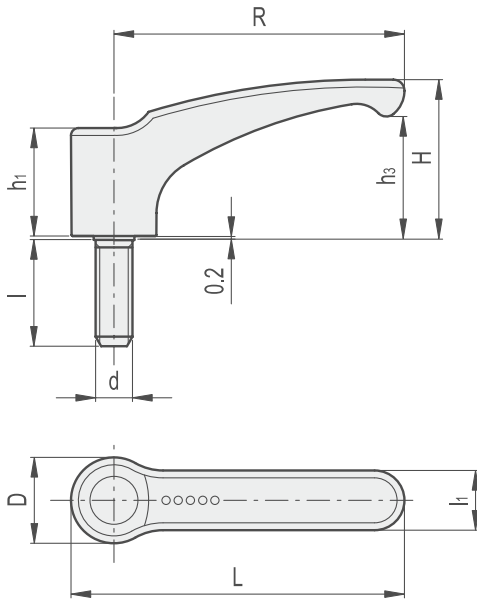
/ TYPE-B: brass boss, threaded blind hole
/ TYPE-N:

- cylindrical blind hole, brass reinforcement and transversal semi-machined hole for pinning to shaft.
- square blind hole with transversal set screw UNI 5929-85 (grub screws with hexagon socket and cup end).



Part Ref.	Description	R	L	D	H	h1	h3	l1	h4	f	d 6H	s H10	d H9	h	Weight (g)
LHM6BC1	44 B-M6-C1	44	52	15.5	26.5	19	19	11	-	-	M6	-	-	12	9
LH5X5NC1	44 N-5x5-C1	44	52	15.5	26.5	19	19	11	7	M4	-	5x5	-	15	5
LH6NC1	44 N-6-C1	44	52	15.5	26.5	19	19	11	7	3	-	-	6	15	5
LHM8BC1	63 B-M8-C1	63	73.5	19	35	24.5	26.5	13.5	-	-	M8	-	-	13	19
LH6X6NC1	63 N-6x6-C1	63	73.5	19	35	24.5	26.5	13.5	8	M4	-	6x6	-	20	11
LH8NC1	63 N-8-C1	63	73.5	19	35	24.5	26.5	13.5	8	4	-	-	8	20	11
LHM10BC1	78 B-M10-C1	78	90.5	23	42	29.5	32	16	-	-	M10	-	-	17	42
LH8X8NC1	78 N-8x8-C1	78	90.5	23	42	29.5	32	16	9	M5	-	8x8	-	25	31
LH10NC1	78 N-10-C1	78	90.5	23	42	29.5	32	16	9	4	-	-	10	25	31
LHM12BC1	95 B-M12-C1	95	109	26.5	51.5	34	40	18	-	-	M12	-	-	20	48
LH10X10NC1	95 N-10x10-C1	95	109	26.5	51.5	34	40	18	10	M5	-	10x10	-	30	37
LH12NC1	95 N-12-C1	95	109	26.5	51.5	34	40	18	10	5	-	-	12	30	37

Lever Handles



MATERIAL

/ Glass-fibre reinforced polyamide based (PA) technopolymer. Resistant to solvents, oils, greases and other chemical agents.

STANDARD EXECUTION

/ Zinc-plated steel threaded stud, chamfered flat end UNI 947 : ISO 4753.

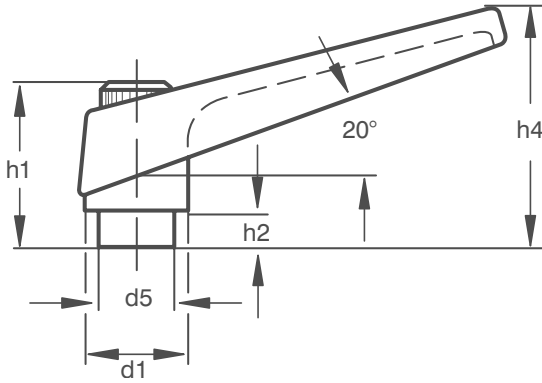
COLOUR

/ Grey-black, matte finish.



Part Ref.	Description	R	L	D	H	h1	h3	l1	d	g	l	Weight (g)
LH1C	M6x16	44	52	15.5	26.5	19	19	11	M6	16		13
LH2C	M8x25	63	73.5	19	35	24.5	26.5	13.5	M8	25		32
LH3C	M8x45	63	73.5	19	35	24.5	26.5	13.5	M8	45		42
LH4C	M10x30	78	90.5	23	42	29.5	32	16	M10	30		61
LH5C	M12x50	95	109	26.5	51.5	34	40	18	M12	50		85

Adjustable Clamping Levers



MATERIAL

/ Free Cutting Steel, blackened
 / Handle, zinc die casting, plastic coated

FEATURES AND APPLICATIONS

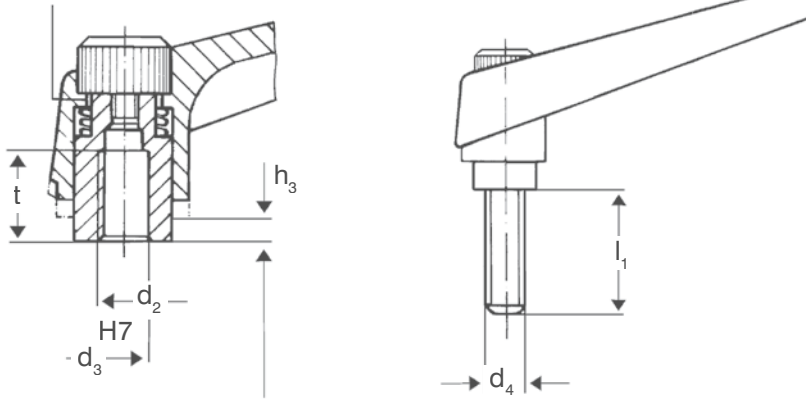
By pressing down the lever, the serrations are disengaged and the handle can then be swung to any desired position.



Female Ref	d1	d2	d4	l1	d5	h1	h2	h3	h4	l2	t	MALE REF
ACL7440-1	14	M5	M5	12	11.0	23	5.0	2.0	32	45	9	ACL7442-1
ACL7440-1	14	M5	M5	16	11.0	23	5.0	2.0	32	45	9	ACL7442-2
ACL7440-1	14	M5	M5	20	11.0	23	5.0	2.0	32	45	9	ACL7442-3
ACL7440-1	14	M5	M5	25	11.0	23	5.0	2.0	32	45	9	ACL7442-4
ACL7440-1	14	M5	M5	32	11.0	23	5.0	2.0	32	45	9	ACL7442-5
ACL7440-1	14	M5	M5	40	11.0	23	5.0	2.0	32	45	9	ACL7442-6
ACL7440-2	14	M6	M6	12	11.0	23	5.0	2.0	32	45	9	ACL7442-7
ACL7440-2	14	M6	M6	16	11.0	23	5.0	2.0	32	45	9	ACL7442-8
ACL7440-2	14	M6	M6	20	11.0	23	5.0	2.0	32	45	9	ACL7442-9
ACL7440-2	14	M6	M6	25	11.0	23	5.0	2.0	32	45	9	ACL7442-10
ACL7440-2	14	M6	M6	32	11.0	23	5.0	2.0	32	45	9	ACL7442-11
ACL7440-2	14	M6	M6	40	11.0	23	5.0	2.0	32	45	9	ACL7442-12
ACL7440-2	14	M6	M6	50	11.0	23	5.0	2.0	32	45	9	ACL7442-13
ACL7440-3	18	M6	M6	16	13.5	27	6.0	3.0	40	62	12	ACL7442-14
ACL7440-3	18	M6	M6	20	13.5	27	6.0	3.0	40	62	12	ACL7442-15
ACL7440-3	18	M6	M6	25	13.5	27	6.0	3.0	40	62	12	ACL7442-16
ACL7440-3	18	M6	M6	32	13.5	27	6.0	3.0	40	62	12	ACL7442-17
ACL7440-3	18	M6	M6	40	13.5	27	6.0	3.0	40	62	12	ACL7442-18
ACL7440-3	18	M6	M6	50	13.5	27	6.0	3.0	40	62	12	ACL7442-19
ACL7440-3	18	M6	M6	63	13.5	27	6.0	3.0	40	62	12	ACL7442-20
ACL7440-4	18	M8	M8	16	13.5	27	6.0	3.0	40	62	12	ACL7442-21
ACL7440-4	18	M8	M8	20	13.5	27	6.0	3.0	40	62	12	ACL7442-22
ACL7440-4	18	M8	M8	25	13.5	27	6.0	3.0	40	62	12	ACL7442-23
ACL7440-4	18	M8	M8	32	13.5	27	6.0	3.0	40	62	12	ACL7442-24
ACL7440-4	18	M8	M8	40	13.5	27	6.0	3.0	40	62	12	ACL7442-25
ACL7440-4	18	M8	M8	50	13.5	27	6.0	3.0	40	62	12	ACL7442-26
ACL7440-4	18	M8	M8	63	13.5	27	6.0	3.0	40	62	12	ACL7442-27

Adjustable Clamping Levers

30-33 serrations



MATERIAL

/ Free Cutting Steel, blackened
/ Handle, zinc die casting, plastic coated

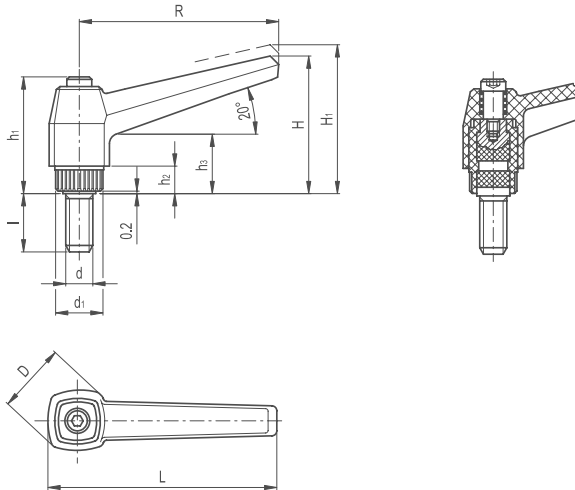
FEATURES AND APPLICATIONS

By pressing down the lever, the serrations are disengaged and the handle can then be swung to any desired position.



FEMALE REF	d1	d2	d4	l1	d5	h1	h2	h3	h4	l2	≧ t	MALE REF
ACL7440-5	22	M10	M10	20	16.0	33	7.0	4.0	50	74	15	ACL7442-28
ACL7440-5	22	M10	M10	25	16.0	33	7.0	4.0	50	74	15	ACL7442-29
ACL7440-5	22	M10	M10	32	16.0	33	7.0	4.0	50	74	15	ACL7442-30
ACL7440-5	22	M10	M10	40	16.0	33	7.0	4.0	50	74	15	ACL7442-31
ACL7440-5	22	M10	M10	50	16.0	33	7.0	4.0	50	74	15	ACL7442-32
ACL7440-5	22	M10	M10	63	16.0	33	7.0	4.0	50	74	15	ACL7442-33
ACL7440-5	22	M10	M10	80	16.0	33	7.0	4.0	50	74	15	ACL7442-34
ACL7440-6	25	M12	M12	25	19.0	38	9.5	5.5	58	89	18	ACL7442-35
ACL7440-6	25	M12	M12	32	19.0	38	9.5	5.5	58	89	18	ACL7442-36
ACL7440-6	25	M12	M12	40	19.0	38	9.5	5.5	58	89	18	ACL7442-37
ACL7440-6	25	M12	M12	50	19.0	38	9.5	5.5	58	89	18	ACL7442-38
ACL7440-6	25	M12	M12	63	19.0	38	9.5	5.5	58	89	18	ACL7442-39
ACL7440-6	25	M12	M12	80	19.0	38	9.5	5.5	58	89	18	ACL7442-40
ACL7440-7	30	M16	M16	32	23.0	45	10.5	6.0	70	108	24	ACL7442-41
ACL7440-7	30	M16	M16	40	23.0	45	10.5	6.0	70	108	24	ACL7442-42
ACL7440-7	30	M16	M16	50	23.0	45	10.5	6.0	70	108	24	ACL7442-43
ACL7440-7	30	M16	M16	63	23.0	45	10.5	6.0	70	108	24	ACL7442-44
ACL7440-7	30	M16	M16	80	23.0	45	10.5	6.0	70	108	24	ACL7442-45

Adjustable Clamping Levers



LEVER BODY

/ Glass-fibre reinforced polyamide based (PA) technopolymer. Resistant to solvents, oils, greases and other chemical agents

COLOUR

/ Black, orange, grey, matte finish
/ For sufficient quantities RAL 6011 green

CLAMPING ELEMENT

Glass-fibre reinforced technopolymer, black colour, with knurling on the protruding part to make initial tightening easier. Black-oxide steel retaining screw and AISI 302 stainless steel return spring.

ASSEMBLY

Black-oxide steel threaded stud, chamfered flat end according to UNI 947 : ISO 4753.

FEATURES AND APPLICATIONS

Particularly suitable when the lever turning angle is limited owing to lack of space. The adjustable handles can be quickly screwed during assembly by means of electric or pneumatic screwdrivers with controlled tightening torque system.

INSTRUCTIONS OF USE

For clamping, lift the lever to disengage the clamping device toothing and bring it back to start position. By releasing the lever, the return spring automatically engages the toothing. If the lever cannot make a 360° rotation, the clamping element can be easily screwed by means of the hexagon socket front head screw (after having disengaged the lever).



Part Reference	R	L	D	H	H1	h1	h2	h3	d1	d 6g	l	z
ACLHS1	42	50	18	32	36.5	29	6	14	12	M5	10	18
ACLHS2	42	50	18	32	36.5	29	6	14	12	M5	16	18
ACLHS3	42	50	18	32	36.5	29	6	14	12	M5	20	18
ACLHS4	42	50	18	32	36.5	29	6	14	12	M6	10	18
ACLHS5	42	50	18	32	36.5	29	6	14	12	M6	16	18
ACLHS6	42	50	18	32	36.5	29	6	14	12	M6	20	18
ACLHS7	42	50	18	32	36.5	29	6	14	12	M6	25	18
ACLHS8	42	50	18	32	36.5	29	6	14	12	M6	30	18
ACLHS9	42	50	18	32	36.5	29	6	14	12	M6	40	18
ACLHS10	42	50	18	32	36.5	29	6	14	12	M8	20	18

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Adjustable Clamping Levers

Part Reference - Black

Orange
Add 'O'

Grey
Add 'G'

RAL 9005

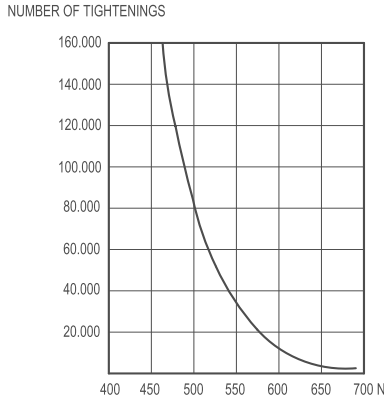
RAL 2004

RAL 7031



Part Reference	R	L	D	H	H1	h1	h2	h3	d1	d 6g	l	z
ACLHS11	63	73	23	43	47	36	8	17	15	M6	10	20
ACLHS12	63	73	23	43	47	36	8	17	15	M6	16	20
ACLHS13	63	73	23	43	47	36	8	17	15	M6	20	20
ACLHS14	63	73	23	43	47	36	8	17	15	M6	25	20
ACLHS15	63	73	23	43	47	36	8	17	15	M6	30	20
ACLHS16	63	73	23	43	47	36	8	17	15	M6	35	20
ACLHS17	63	73	23	43	47	36	8	17	15	M6	40	20
ACLHS18	63	73	23	43	47	36	8	17	15	M8	16	20
ACLHS19	63	73	23	43	47	36	8	17	15	M8	20	20
ACLHS20	63	73	23	43	47	36	8	17	15	M8	25	20
ACLHS21	63	73	23	43	47	36	8	17	15	M8	30	20
ACLHS22	63	73	23	43	47	36	8	17	15	M8	32	20
ACLHS23	63	73	23	43	47	36	8	17	15	M8	35	20
ACLHS24	63	73	23	43	47	36	8	17	15	M8	40	20
ACLHS25	63	73	23	43	47	36	8	17	15	M8	45	20
ACLHS26	63	73	23	43	47	36	8	17	15	M8	50	20
ACLHS27	63	73	23	43	47	36	8	17	15	M8	60	20
ACLHS28	63	73	23	43	47	36	8	17	15	M10	40	20
ACLHS29	80	92	28	54	59.5	45	10	22	19	M8	70	24
ACLHS30	80	92	28	54	59.5	45	10	22	19	M10	16	24
ACLHS31	80	92	28	54	59.5	45	10	22	19	M10	20	24
ACLHS32	80	92	28	54	59.5	45	10	22	19	M10	25	24
ACLHS33	80	92	28	54	59.5	45	10	22	19	M10	30	24
ACLHS34	80	92	28	54	59.5	45	10	22	19	M10	32	24
ACLHS35	80	92	28	54	59.5	45	10	22	19	M10	35	24
ACLHS36	80	92	28	54	59.5	45	10	22	19	M10	40	24
ACLHS37	80	92	28	54	59.5	45	10	22	19	M10	50	24
ACLHS38	80	92	28	54	59.5	45	10	22	19	M10	60	24
ACLHS39	80	92	28	54	59.5	45	10	22	19	M10	70	24
ACLHS40	80	92	28	54	59.5	45	10	22	19	M12	20	24
ACLHS41	80	92	28	54	59.5	45	10	22	19	M12	25	24
ACLHS42	80	92	28	54	59.5	45	10	22	19	M12	30	24
ACLHS43	80	92	28	54	59.5	45	10	22	19	M12	35	24
ACLHS44	80	92	28	54	59.5	45	10	22	19	M12	40	24
ACLHS45	80	92	28	54	59.5	45	10	22	19	M12	45	24
ACLHS46	80	92	28	54	59.5	45	10	22	19	M12	50	24
ACLHS47	80	92	28	54	59.5	45	10	22	19	M12	60	24
ACLHS48	80	92	28	54	59.5	45	10	22	19	M12	70	24
ACLHS49	80	92	28	54	59.5	45	10	22	19	M12	80	24
ACLHS50	80	92	28	54	59.5	45	10	22	19	M14	40	24
ACLHS51	100	114	33	65	70.5	53	12	25	25	M12	30	28
ACLHS52	100	114	33	65	70.5	53	12	25	25	M12	50	28
ACLHS53	100	114	33	65	70.5	53	12	25	25	M12	70	28
ACLHS54	100	114	33	65	70.5	53	12	25	25	M14	30	28
ACLHS55	100	114	33	65	70.5	53	12	25	25	M14	35	28
ACLHS56	100	114	33	65	70.5	53	12	25	25	M14	50	28
ACLHS57	100	114	33	65	70.5	53	12	25	25	M14	70	28
ACLHS58	100	114	33	65	70.5	53	12	25	25	M16	30	28
ACLHS59	100	114	33	65	70.5	53	12	25	25	M16	50	28
ACLHS60	100	114	33	65	70.5	53	12	25	25	M16	70	28

Adjustable Clamping Lever Straight Handle Hex Socket Female



LEVER BODY

/ Glass-fibre reinforced polyamide based (PA) technopolymer. Resistant to solvents, oils, greases and other chemical agents

COLOUR

/ Black, orange, grey, matte finish
/ For sufficient quantities RAL 6011 green

CLAMPING ELEMENT

/ Glass-fibre reinforced technopolymer, black colour, with knurling on the protruding part to make initial tightening easier

ASSEMBLY

/ Execution A: black-oxide steel boss, plain or tapped blind hole. Black-oxide steel retaining screw, AISI 302 stainless steel return spring
/ Execution B: brass boss, tapped blind hole. Brass retaining screw, AISI 302 stainless steel return spring

FEATURES AND APPLICATIONS

Particularly suitable when the lever turning angle is limited owing to lack of space. Adjustable handles can be quickly screwed during assembly by means of electric or pneumatic screwdrivers with controlled tightening torque system.

INSTRUCTIONS OF USE

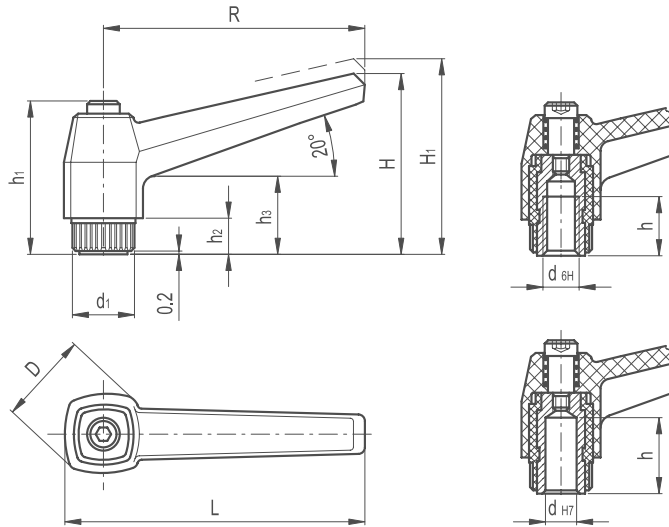
For clamping, lift the lever to disengage the clamping device tothing and bring it back to start position. By releasing the lever, the return spring automatically engages the tothing. If the lever cannot make a 360° rotation, the clamping element can be easily screwed by means of the hexagon socket front head screw (after having disengaged the lever).

STRESS RESISTANCE

Adjustable handles are generally used for repetitive clamping operations sometimes with very high-frequency. Therefore, the stress resistance (i.e. the resistance to repeated tightening cycles) of the handle unit is particularly important and, especially, the strength of the toothed element which transmits the tightening force from the handle to the threaded element (boss or stud). In fact, the results of several laboratory tests, performed with a special instrument that simulates the most severe use conditions, have shown that e.g. the adjustable handle can withstand without yielding more than 100,000 tightening cycles, under the action of a force of 490 N (see graphic).



Adjustable Clamping Lever Straight Handle Hex Socket Female



Part Reference - Black Orange Grey
Add 'O' Add 'G'

RAL 9005 RAL 2004 RAL 7031

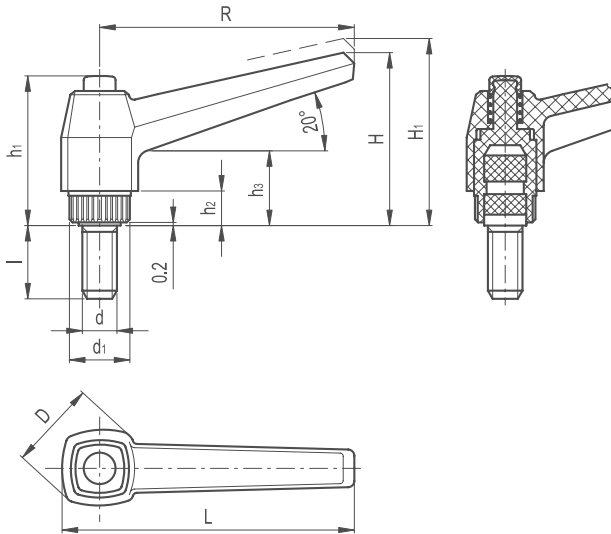
Part Reference	R	L	D	H	H1	h1	h2	h3	d1	Mounting Hole			Teeth z	Bosses	
										d H7	d 6H	h		Steel	Brass
ACLHSF1	42	50	18	32	36.5	29	6	14	12	5	-	10	18	•	
ACLHSF2	42	50	18	32	36.5	29	6	14	12	-	M4	10	18	•	
ACLHSF3	42	50	18	32	36.5	29	6	14	12	-	M5	10	18	•	
ACLHSF4	42	50	18	32	36.5	29	6	14	12	-	M6	10	18	•	
ACLHSF5	42	50	18	32	36.5	29	6	14	12	-	M6	10	18		•
ACLHSF6	63	73	23	43	47	36	8	17	15	6	-	15	20	•	
ACLHSF7	63	73	23	43	47	36	8	17	15	-	M6	12	20	•	
ACLHSF8	63	73	23	43	47	36	8	17	15	-	M8	12	20	•	
ACLHSF9	63	73	23	43	47	36	8	17	15	-	M8	12	20		•
ACLHSF10	80	92	28	54	59.5	45	10	22	19	8	-	20	24	•	
ACLHSF11	80	92	28	54	59.5	45	10	22	19	-	M8	17	24	•	
ACLHSF12	80	92	28	54	59.5	45	10	22	19	-	M10	17	24	•	
ACLHSF13	80	92	28	54	59.5	45	10	22	19	-	M12	17	24	•	
ACLHSF14	80	92	28	54	59.5	45	10	22	19	-	M10	17	24		•
ACLHSF15	100	114	33	65	70.5	53	12	25	25	10	-	25	28	•	
ACLHSF16	100	114	33	65	70.5	53	12	25	25	-	M10	20	28	•	
ACLHSF17	100	114	33	65	70.5	53	12	25	25	-	M12	20	28	•	
ACLHSF18	100	114	33	65	70.5	53	12	25	25	-	M14	20	28	•	
ACLHSF19	100	114	33	65	70.5	53	12	25	25	-	M16	20	28	•	

Adjustable Clamping Lever Straight Handle Stainless Steel

BONEHAM

231

KNOBBS & HANDLES



LEVER BODY

/ Glass-fibre reinforced polyamide based (PA) technopolymer
/ Resistant to solvents, oils, greases and other chemical agents

COLOUR

/ Black, matte finish

PUSH BUTTON

/ Technopolymer, black colour, matte finish

CLAMPING ELEMENT WITH RETAINING PIN

Glass-fibre reinforced technopolymer, black colour, with knurling on the protruding part to make initial tightening easier. AISI 302 stainless steel return spring.

ASSEMBLY

AISI 303 stainless steel threaded stud, chamfered flat end according to UNI 947 : ISO 4753.

SPECIAL EXECUTIONS ON REQUEST

(For sufficient quantities)

/ Lever body RAL 2004 orange, RAL 6011 green, RAL 7031 grey

FEATURES AND APPLICATIONS

Particularly suitable when the lever turning angle is limited owing to lack of space. Compared to other types of adjustable handles with metal retaining screw this solution offers:

/ absolute electric insulation for the operator's hand
/ more comfortable lever release.

AISI 303 stainless steel, thanks to its high resistance to corrosion, allows the application of these adjustable handles on machines and equipment working in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to use corrosion resistant materials.

INSTRUCTIONS OF USE

For clamping, lift the lever to disengage the clamping device tooting and bring it back to start position. By releasing the lever, the return spring automatically engages the tooting.

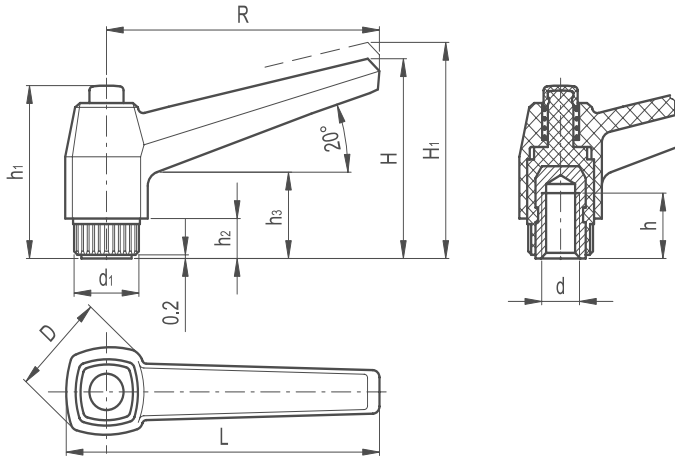


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Adjustable Clamping Lever Straight Handle Stainless Steel

Part Reference	R	L	D	H	H1	h1	h2	h 3	d1	Threaded Stud		Teeth
										d 6g	l	z
ACLSH1SS	42	50	18	32	35.5	29	6	14	12	M6	16	18
ACLSH2SS	42	50	18	32	35.5	29	6	14	12	M6	20	18
ACLSH3SS	42	50	18	32	35.5	29	6	14	12	M6	25	18
ACLSH4SS	42	50	18	32	35.5	29	6	14	12	M6	30	18
ACLSH5SS	63	73	23	43	46.5	37	8	17	15	M8	16	20
ACLSH6SS	63	73	23	43	46.5	37	8	17	15	M8	20	20
ACLSH7SS	63	73	23	43	46.5	37	8	17	15	M8	25	20
ACLSH8SS	63	73	23	43	46.5	37	8	17	15	M8	30	20
ACLSH9SS	63	73	23	43	46.5	37	8	17	15	M8	40	20
ACLSH10SS	63	73	23	43	46.5	37	8	17	15	M8	50	20
ACLSH11SS	80	92	28	54	58.5	47	10	22	19	M10	20	24
ACLSH12SS	80	92	28	54	58.5	47	10	22	19	M10	30	24
ACLSH13SS	80	92	28	54	58.5	47	10	22	19	M10	40	24
ACLSH14SS	80	92	28	54	58.5	47	10	22	19	M12	30	24
ACLSH15SS	80	92	28	54	58.5	47	10	22	19	M12	40	24
ACLSH16SS	80	92	28	54	58.5	47	10	22	19	M12	50	24
ACLSH17SS	100	114	33	65	69.5	54	12	25	25	M12	30	28
ACLSH18SS	100	114	33	65	69.5	54	12	25	25	M12	40	28
ACLSH19SS	100	114	33	65	69.5	54	12	25	25	M12	50	28
ACLSH20SS	100	114	33	65	69.5	54	12	25	25	M12	70	28

Adjustable Clamping Lever Straight Handle Female Stainless Steel



LEVER BODY

/ Glass-fibre reinforced polyamide based (PA) technopolymer
/ Resistant to solvents, oils, greases and other chemical agents

COLOUR

/ Black, matte finish

PUSH BUTTON

/ Technopolymer, black colour, matte finish

CLAMPING ELEMENT WITH RETAINING PIN

Glass-fibre reinforced technopolymer, black colour, with knurling on the protruding part to make initial tightening easier. AISI 302 stainless steel return spring.

ASSEMBLY

AISI 303 stainless steel boss, tapped blind hole.

SPECIAL EXECUTIONS ON REQUEST

(For sufficient quantities)

/ Lever body in RAL 2004 orange, RAL 6011 green, RAL 7031 grey

FEATURES AND APPLICATIONS

Particularly suitable when the lever turning angle is limited owing to lack of space. Compared to other types of adjustable handles with metal retaining screw this solution offers:

/ absolute electric insulation for the operator's hand
/ more comfortable lever release.

AISI 303 stainless steel, thanks to its high resistance to corrosion, allows the application of these adjustable handles on machines and equipment in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to use corrosion resistant materials.

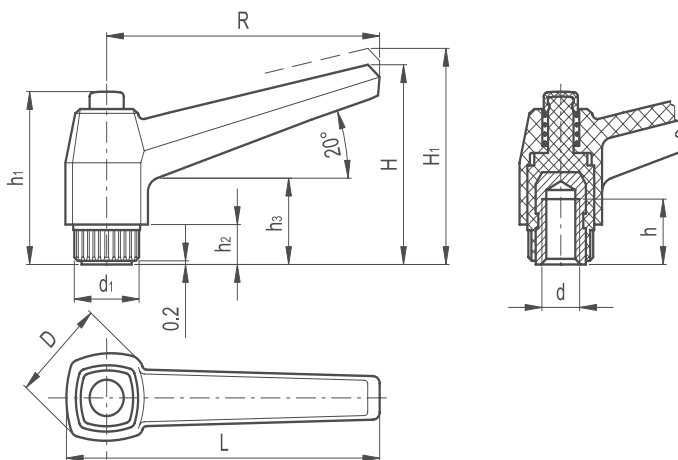
INSTRUCTIONS OF USE

For clamping, lift the lever to disengage the clamping device toothing and bring it back to start position. By releasing the lever, the return spring automatically engages the toothing.



Part Reference	R	L	D	H	H1	h1	h2	h3	d1	Mounting hole		Teeth No.	
										d	6h	h	z
ACLSHF1SS	42	50	18	32	35.5	29	6	14	12	M5	6	18	18
ACLSHF2SS	42	50	18	32	35.5	29	6	14	12	M6	10	18	18
ACLSHF3SS	63	73	23	43	46.5	37	8	17	15	M6	12	20	20
ACLSHF4SS	63	73	23	43	46.5	37	8	17	15	M8	13	20	20
ACLSHF5SS	80	92	28	54	58.5	47	10	22	19	M8	13	24	24
ACLSHF6SS	80	92	28	54	58.5	47	10	22	19	M10	17	24	24
ACLSHF7SS	100	114	33	65	69.5	54	12	25	25	M12	20	28	28

Adjustable Clamping Lever Straight Handle Female



LEVER BODY

/ Glass-fibre reinforced polyamide based (PA) technopolymer
/ Resistant to solvents, oils, greases and other chemical agents

COLOUR

/ Black, matte finish

PUSH BUTTON

/ Technopolymer, black colour, matte finish

CLAMPING ELEMENT WITH RETAINING PIN

Glass-fibre reinforced technopolymer, black colour, with knurling on the protruding part to make initial tightening easier. AISI 302 stainless steel return spring.

ASSEMBLY

Brass boss, tapped blind hole.

SPECIAL EXECUTIONS ON REQUEST

(For sufficient quantities)
/ Lever body in RAL 2004 orange, RAL 6011 green, RAL 7031 grey

FEATURES AND APPLICATIONS

Particularly suitable when the lever turning angle is limited owing to lack of space. Compares to other types of adjustable handles with metal retaining screw this solution offers:

- / absolute electric insulation for the operator's hand
- / no visible steel parts subject to rust
- / more comfortable lever release.

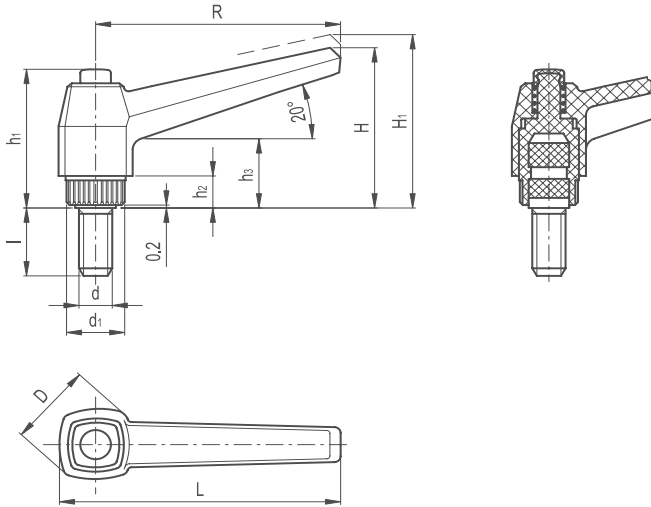
INSTRUCTIONS OF USE

For clamping, lift the lever to disengage the clamping device toothing and bring it back to start position. By releasing the lever, the return spring automatically engages the toothing.



Part Reference	R	L	D	H	H1	h1	h2	h3	d1	Mounting hole d 6h	h	Teeth No. z
ACLSHF1	42	50	18	32	35.5	29	6	14	12	M5	10	18
ACLSHF2	42	50	18	32	35.5	29	6	14	12	M5	10	18
ACLSHF3	63	73	23	43	46.5	37	8	17	15	M6	16	20
ACLSHF4	63	73	23	43	46.5	37	8	17	15	M8	13	20
ACLSHF5	80	92	28	54	58.5	47	10	22	19	M8	20	24
ACLSHF6	80	92	28	54	58.5	47	10	22	19	M10	18	24
ACLSHF7	80	92	28	54	58.5	47	10	22	19	M12	17	24
ACLSHF8	100	114	33	65	69.5	54	12	25	25	M10	20	28
ACLSHF9	100	114	33	65	69.5	54	12	25	25	M12	20	28
ACLSHF10	100	114	33	65	69.5	54	12	25	25	M14	20	28
ACLSHF11	100	114	33	65	69.5	54	12	25	25	M10	22	28

Adjustable Clamping Lever Straight Handle



LEVER BODY

/ Glass-fibre reinforced polyamide based (PA) technopolymer
/ Resistant to solvents, oils, greases and other chemical agents

COLOUR

/ Black, matte finish

PUSH BUTTON

/ Technopolymer, black colour, matte finish

CLAMPING ELEMENT WITH RETAINING PIN

Glass-fibre reinforced technopolymer, black colour, with knurling on the protruding part to make initial tightening easier. AISI 302 stainless steel return spring.

ASSEMBLY

Zinc-plated steel threaded stud, chamfered flat end according to UNI 947 : ISO 4753.

SPECIAL EXECUTIONS ON REQUEST

(For sufficient quantities)
/ Lever body RAL 2004 orange, RAL 6011 green, RAL 7031 grey

FEATURES AND APPLICATIONS

Particularly suitable when the lever turning angle is limited owing to lack of space. Compared to other types of adjustable handles with metal retaining screw this solution offers:

- / absolute electric insulation for the operator's hand
- / no visible steel parts subject to rust
- / more comfortable lever release.

INSTRUCTIONS OF USE

For clamping, lift the lever to disengage the clamping device tooting and bring it back to start position. By releasing the lever, the return spring automatically engages the tooting.



Part Reference	R	L	D	H	H1	h1	h2	h3	d1	Threaded Stud		Teeth No.
										d 6g	l	
ACLSH1	42	50	18	32	35.5	29	6	14	12	M5	10	18
ACLSH2	42	50	18	32	35.5	29	6	14	12	M5	16	18
ACLSH3	42	50	18	32	35.5	29	6	14	12	M5	20	18
ACLSH4	42	50	18	32	35.5	29	6	14	12	M6	10	18
ACLSH5	42	50	18	32	35.5	29	6	14	12	M6	16	18
ACLSH6	42	50	18	32	35.5	29	6	14	12	M6	20	18
ACLSH7	42	50	18	32	35.5	29	6	14	12	M6	25	18
ACLSH8	42	50	18	32	35.5	29	6	14	12	M6	30	18

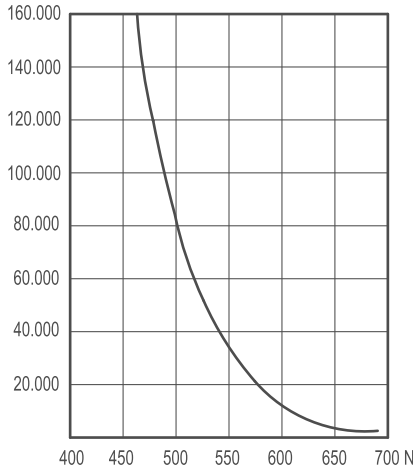
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Adjustable Clamping Lever Straight Handle

Part Reference	R	L	D	H	H1	h1	h2	h3	d1	Threaded Stud		Teeth No.
										d 6g	l	z
ACLSH9	42	50	18	32	35.5	29	6	14	12	M6	40	18
ACLSH10	63	73	23	43	46.5	37	8	17	15	M6	10	20
ACLSH11	63	73	23	43	46.5	37	8	17	15	M6	16	20
ACLSH12	63	73	23	43	46.5	3	78	17	15	M6	20	20
ACLSH13	63	73	23	43	46.5	3	78	17	15	M6	25	20
ACLSH14	63	73	23	43	46.5	3	78	17	15	M6	30	20
ACLSH15	63	73	23	43	46.5	3	78	17	15	M6	35	20
ACLSH16	63	73	23	43	46.5	3	78	17	15	M6	40	20
ACLSH17	63	73	23	43	46.5	3	78	17	15	M8	16	20
ACLSH18	63	73	23	43	46.5	3	78	17	15	M8	20	20
ACLSH19	63	73	23	43	46.5	3	78	17	15	M8	25	20
ACLSH20	63	73	23	43	46.5	3	78	17	15	M8	30	20
ACLSH21	63	73	23	43	46.5	3	78	17	15	M8	35	20
ACLSH22	63	73	23	43	46.5	3	78	17	15	M8	40	20
ACLSH23	63	73	23	43	46.5	3	78	17	15	M8	45	20
ACLSH24	63	73	23	43	46.5	3	78	17	15	M8	50	20
ACLSH25	63	73	23	43	46.5	3	78	17	15	M8	60	20
ACLSH26	80	92	28	54	58.5	47	10	22	19	M10	20	24
ACLSH27	80	92	28	54	58.5	47	10	22	19	M10	25	24
ACLSH28	80	92	28	54	58.5	47	10	22	19	M10	30	24
ACLSH29	80	92	28	54	58.5	47	10	22	19	M10	35	24
ACLSH30	80	92	28	54	58.5	47	10	22	19	M10	40	24
ACLSH31	80	92	28	54	58.5	47	10	22	19	M10	50	24
ACLSH32	80	92	28	54	58.5	47	10	22	19	M10	60	24
ACLSH33	80	92	28	54	58.5	47	10	22	19	M10	70	24
ACLSH34	80	92	28	54	58.5	47	10	22	19	M12	20	24
ACLSH35	80	92	28	54	58.5	47	10	22	19	M12	25	24
ACLSH36	80	92	28	54	58.5	47	10	22	19	M12	30	24
ACLSH37	80	92	28	54	58.5	47	10	22	19	M12	35	24
ACLSH38	80	92	28	54	58.5	47	10	22	19	M12	40	24
ACLSH39	80	92	28	54	58.5	47	10	22	19	M12	45	24
ACLSH40	80	92	28	54	58.5	47	10	22	19	M12	50	24
ACLSH41	80	92	28	54	58.5	47	10	22	19	M12	60	24
ACLSH42	80	92	28	54	58.5	47	10	22	19	M12	70	24
ACLSH43	80	92	28	54	58.5	47	10	22	19	M12	80	24
ACLSH44	100	114	33	65	69.5	54	12	25	25	M12	30	28
ACLSH45	100	114	33	65	69.5	54	12	25	25	M12	50	28
ACLSH46	100	114	33	65	69.5	54	12	25	25	M12	70	28
ACLSH47	100	114	33	65	69.5	54	12	25	25	M14	30	28
ACLSH48	100	114	33	65	69.5	54	12	25	25	M14	50	28
ACLSH49	100	114	33	65	69.5	54	12	25	25	M14	70	28
ACLSH50	100	114	33	65	69.5	54	12	25	25	M16	30	28
ACLSH51	100	114	33	65	69.5	54	12	25	25	M16	50	28
ACLSH52	100	114	33	65	69.5	54	12	25	25	M16	70	28

Adjustable Clamping Lever ERX Female

NUMBER OF TIGHTENINGS



LEVER BODY

/ Glass-fibre reinforced polyamide based (PA) technopolymer
/ Resistant to solvents, oils, greases and other chemical agents

COLOUR

/ Grey-black, matte finish

PUSH BUTTON

/ Technopolymer in Ergostyle colours, glossy finish

CLAMPING ELEMENT WITH RETAINING PIN

Glass-fibre reinforced technopolymer, black colour, with knurling on the protruding part to make initial tightening easier. AISI 302 stainless steel return spring.

ASSEMBLY

Brass boss, tapped blind hole.

SPECIAL EXECUTIONS ON REQUEST

(For sufficient quantities)
/ Lever body in orange colour

FEATURES AND APPLICATIONS

Particularly suitable when the lever turning angle is limited owing to lack of space. Compared to other types of adjustable handles with metal retaining screw this solution offers:

- / absolute electric insulation for the operator's hand
- / no visible steel parts subject to rust
- / more comfortable lever release.

STRESS RESISTANCE

Adjustable handles are generally used for repetitive clamping operations sometimes with very high-frequency. Therefore, the stress resistance (i.e. the resistance to repeated tightening cycles) of the handle unit is particularly important and, especially, the strength of the toothed element which transmits the tightening force from the handle to the threaded element (boss or stud).

In fact, the results of several laboratory tests, performed with a special instrument that simulates the most severe use conditions, have shown that e.g. the adjustable handle can withstand without yielding more than 100,000 tightening cycles, under the action of a force of 490 N (see graphic).

INSTRUCTIONS OF USE

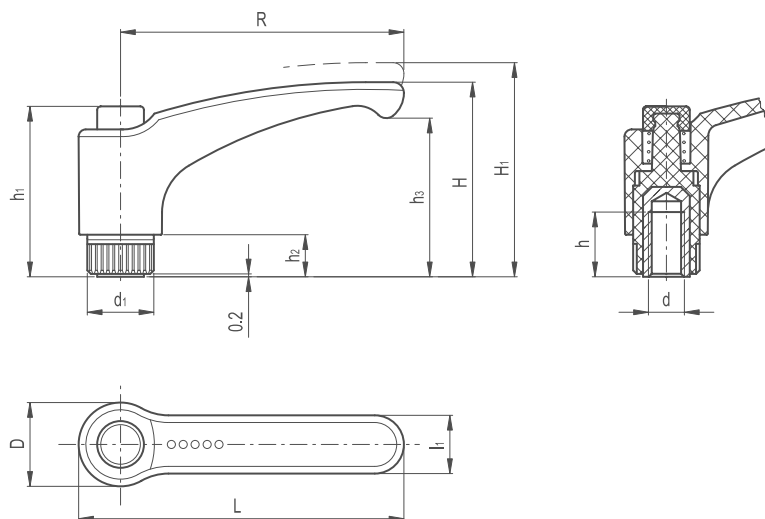
For clamping, lift the lever to disengage the clamping device toothing and bring it back to start position. By releasing the lever, the return spring automatically engages the toothing.

ERGONOMY AND DESIGN

The slightly arched shape of the lever and the ergonomic terminal enlargement give the operator a comfortable and safe grip and make the design of the handle more elegant, while the thumb rests naturally on the push button.



Adjustable Clamping Lever ERX Female

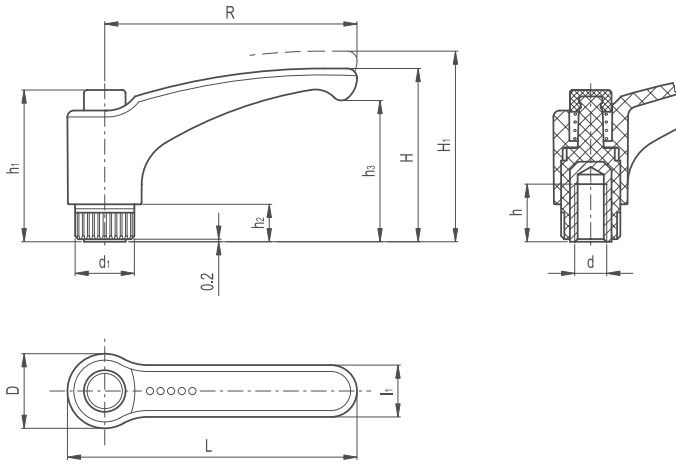


RAL 7021 RAL 2004 RAL 7035 RAL 1021 RAL 5024 RAL 3000



Part Reference	R	L	D	H	H1	h1	h2	h3	d1	L1	Mounting Hole		Teeth No.
											d 6h	h	
ACLERXF1	44	52	15.5	32.5	36	29.5	6	25	12	11	M5	10	18
ACLERXF2	44	52	15.5	32.5	36	29.5	6	25	12	11	M6	10	18
ACLERXF3	63	73.5	19	43	47	37.5	8	34.5	15	13.5	M6	16	20
ACLERXF4	63	73.5	19	43	47	37.5	8	34.5	15	13.5	M8	13	20
ACLERXF5	78	90.5	23	54	58	47	12	44	19	16	M8	20	24
ACLERXF6	78	90.5	23	54	58	47	12	44	19	16	M10	18	24
ACLERXF7	78	90.5	23	54	58	47	12	44	19	16	M12	17	24
ACLERXF8	95	109	26.5	64.5	69	54.5	13	53	21.5	18	M12	20	26
ACLERXF9	95	109	26.5	64.5	69	54.5	13	53	21.5	18	M14	20	26

Adjustable Clamping Lever ERX Stainless Steel Female



LEVER BODY

- / Glass-fibre reinforced polyamide based (PA) technopolymer
- / Resistant to solvents, oils, greases and other chemical agents

COLOUR

- / Grey-black, matte finish

PUSH BUTTON

- / Technopolymer in Ergostyle colours, glossy finish

CLAMPING ELEMENT WITH RETAINING PIN

- / Glass-fibre reinforced technopolymer, black colour, with knurling on the protruding part to make initial tightening easier. AISI 302 stainless steel return spring.

ASSEMBLY

- / AISI 303 stainless steel boss, tapped blind hole.

SPECIAL EXECUTIONS ON REQUEST

- (For sufficient quantities)
- / Lever body in orange colour.

FEATURES AND APPLICATIONS

- Particularly suitable when the lever turning angle is limited owing to lack of space. Compared to other types of adjustable handles with metal retaining screw this solution offers:
 - / absolute electric insulation for the operator's hand
 - / more comfortable lever release.

- AISI 303 stainless steel, thanks to its high resistance to corrosion, allows the application of these adjustable handles on machines and equipment in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to use corrosion resistant materials.

INSTRUCTIONS OF USE

- For clamping, lift the lever to disengage the clamping device tooting and bring it back to start position. By releasing the lever, the return spring automatically engages the tooting.

ERGONOMY AND DESIGN

- The slightly arched shape of the lever and the ergonomic terminal enlargement give the operator a comfortable and safe grip and make the design of this handle more elegant, while the thumb rests naturally on the push button.

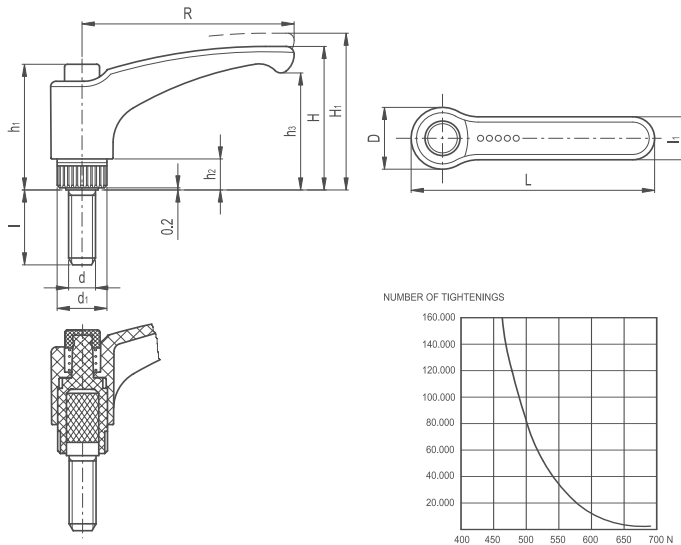


RAL 7021 RAL 2004 RAL 7035 RAL 1021 RAL 5024 RAL 3000



Part Reference	R	L	D	H	H1	h1	h2	h3	d1	L1	Mounting Hole		Teeth No. z
											d 6h	h	
ACLERXF1SS	44	52	15.5	32.5	36	29.5	6	25	12	11	M5	10	18
ACLERXF2SS	44	52	15.5	32.5	36	29.5	6	25	12	11	M6	10	18
ACLERXF3SS	63	73.5	19	43	47	37.5	8	34.5	15	13.5	M6	16	20
ACLERXF4SS	63	73.5	19	43	47	37.5	8	34.5	15	13.5	M8	13	20
ACLERXF5SS	78	90.5	23	54	58	47	12	44	19	16	M8	20	24
ACLERXF6SS	78	90.5	23	54	58	47	12	44	19	16	M10	18	24
ACLERXF7SS	78	90.5	23	54	58	47	12	44	19	16	M12	17	24
ACLERXF8SS	95	109	26.5	64.5	69	54.5	13	53	21.5	18	M12	20	26
ACLERXF9SSS	95	109	26.5	64.5	69	54.5	13	53	21.5	18	M14	20	26

Adjustable Clamping Lever ERX



LEVER BODY

- / Glass-fibre reinforced polyamide based (PA) technopolymer
- / Resistant to solvents, oils, greases and other chemical agents

COLOUR

- / Grey-black, matte finish

PUSH BUTTON

- / Technopolymer in Ergostyle colours, glossy finish

CLAMPING ELEMENT WITH RETAINING PIN

Glass-fibre reinforced technopolymer, black colour, with knurling on the protruding part to make initial tightening easier. AISI 302 stainless steel return spring.

ASSEMBLY

Zinc-plated steel threaded stud, chamfered flat end according to UNI 947 : ISO 4753.

SPECIAL EXECUTIONS ON REQUEST

- (For sufficient quantities)
- / Lever body in orange colour

FEATURES AND APPLICATIONS

Particularly suitable when the lever turning angle is limited owing to lack of space. Compared to other types of adjustable handles with metal retaining screw this solution offers:

- / absolute electric insulation for the operator's hand
- / no visible steel parts subject to rust
- / more comfortable lever release.

STRESS RESISTANCE

Adjustable handles are generally used for repetitive clamping operations sometimes with very high-frequency. Therefore, the stress resistance (i.e. the resistance to repeated tightening cycles) of the handle unit is particularly important and, especially, the strength of the toothed element which transmits the tightening force from the handle to the threaded element (boss or stud).

In fact, the results of several laboratory tests, performed with a special instrument that simulates the most severe use conditions, have shown that e.g. the adjustable handle can withstand without yielding more than 100,000 tightening cycles, under the action of a force of 490 N (see graphic).

INSTRUCTIONS OF USE

For clamping, lift the lever to disengage the clamping device toothing and bring it back to start position. By releasing the lever, the return spring automatically engages the toothing.

ERGONOMY AND DESIGN

The slightly arched shape of the lever and the ergonomic terminal enlargement give the operator a comfortable and safe grip and make the design of the handle more elegant, while the thumb rests naturally on the push button.

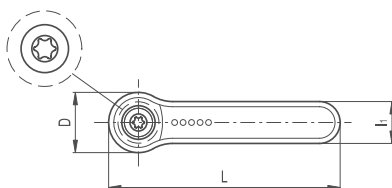
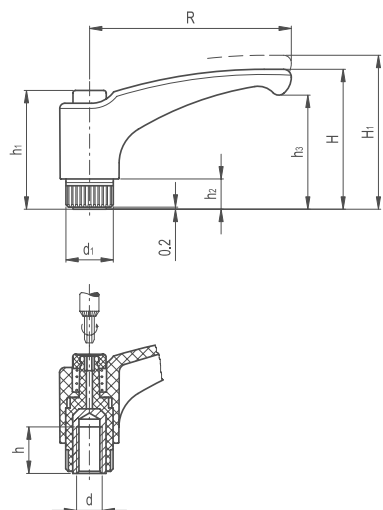


RAL 7021 RAL 2004 RAL 7035 RAL 1021 RAL 5024 RAL 3000



Part Reference	R	L	D	H	H1	h1	h2	h3	d1	L1	Threaded Stud		Teeth No.
											d	Gh	l
ACLERX1	44	52	15.5	32.5	36	29.5	6	25	12	11	M5	10	18
ACLERX2	44	52	15.5	32.5	36	29.5	6	25	12	11	M5	16	18
ACLERX3	44	52	15.5	32.5	36	29.5	6	25	12	11	M5	20	18
ACLERX4	44	52	15.5	32.5	36	29.5	6	25	12	11	M6	10	18
ACLERX5	44	52	15.5	32.5	36	29.5	6	25	12	11	M6	16	18
ACLERX6	44	52	15.5	32.5	36	29.5	6	25	12	11	M6	20	18
ACLERX7	44	52	15.5	32.5	36	29.5	6	25	12	11	M6	25	18
ACLERX8	44	52	15.5	32.5	36	29.5	6	25	12	11	M6	30	18
ACLERX9	44	52	15.5	32.5	36	29.5	6	25	12	11	M6	40	18
ACLERX10	63	73.5	19	43	47	37.5	8	34.5	15	13.5	M6	10	20
ACLERX11	63	73.5	19	43	47	37.5	8	34.5	15	13.5	M6	16	20
ACLERX12	63	73.5	19	43	47	37.5	8	34.5	15	13.5	M6	20	20
ACLERX13	63	73.5	19	43	47	37.5	8	34.5	15	13.5	M6	25	20
ACLERX14	63	73.5	19	43	47	37.5	8	34.5	15	13.5	M6	30	20
ACLERX15	63	73.5	19	43	47	37.5	8	34.5	15	13.5	M6	35	20
ACLERX16	63	73.5	19	43	47	37.5	8	34.5	15	13.5	M6	40	20
ACLERX17	63	73.5	19	43	47	37.5	8	34.5	15	13.5	M8	16	20
ACLERX18	63	73.5	19	43	47	37.5	8	34.5	15	13.5	M8	20	20
ACLERX19	63	73.5	19	43	47	37.5	8	34.5	15	13.5	M8	25	20
ACLERX20	63	73.5	19	43	47	37.5	8	34.5	15	13.5	M8	30	20
ACLERX21	63	73.5	19	43	47	37.5	8	34.5	15	13.5	M8	35	20
ACLERX22	63	73.5	19	43	47	37.5	8	34.5	15	13.5	M8	40	20
ACLERX23	63	73.5	19	43	47	37.5	8	34.5	15	13.5	M8	45	20
ACLERX24	63	73.5	19	43	47	37.5	8	34.5	15	13.5	M8	50	20
ACLERX26	78	90.5	23	54	58	47	12	44	19	16	M10	20	24
ACLERX27	78	90.5	23	54	58	47	12	44	19	16	M10	25	24
ACLERX28	78	90.5	23	54	58	47	12	44	19	16	M10	30	24
ACLERX29	78	90.5	23	54	58	47	12	44	19	16	M10	35	24
ACLERX30	78	90.5	23	54	58	47	12	44	19	16	M10	40	24
ACLERX31	78	90.5	23	54	58	47	12	44	19	16	M10	50	24
ACLERX32	78	90.5	23	54	58	47	12	44	19	16	M10	60	24
ACLERX33	78	90.52	3	54	58	47	12	44	19	16	M10	70	24
ACLERX34	78	90.5	23	54	58	47	12	44	19	16	M12	20	24
ACLERX35	78	90.5	23	54	58	47	12	44	19	16	M12	25	24
ACLERX36	78	90.5	23	54	58	47	12	44	19	16	M12	30	24
ACLERX37	78	90.5	23	54	58	47	12	44	19	16	M12	35	24
ACLERX38	78	90.5	23	54	58	47	12	44	19	16	M12	40	24
ACLERX39	78	90.5	23	54	58	47	12	44	19	16	M12	45	24
ACLERX40	78	90.5	23	54	58	47	12	44	19	16	M12	50	24
ACLERX41	78	90.5	23	54	58	47	12	44	19	16	M12	60	24
ACLERX42	78	90.5	23	54	58	47	12	44	19	16	M12	70	24
ACLERX43	78	90.5	23	54	58	47	12	44	19	16	M12	80	24
ACLERX44	95	109	26.5	64.5	69	54.5	13	53	21.5	18	M12	30	26
ACLERX45	95	109	26.5	64.5	69	54.5	13	53	21.5	18	M12	50	26
ACLERX46	95	109	26.5	64.5	69	54.5	13	53	21.5	18	M12	70	26
ACLERX47	95	109	26.5	64.5	69	54.5	13	53	21.5	18	M16	30	26
ACLERX48	95	109	26.5	64.5	69	54.5	13	53	21.5	18	M16	50	26
ACLERX49	95	109	26.5	64.5	69	54.5	13	53	21.5	18	M16	70	26

Adjustable Clamping Lever for Quick Assembly Female



LEVER BODY

/ Glass-fibre reinforced polyamide based (PA) technopolymer
/ Resistant to solvents, oils, greases and other chemical agents

COLOUR

/ Grey-black, matte finish

PUSH BUTTON

/ Technopolymer, RAL 2004 orange colour, glossy finish
/ On request and for sufficient quantities it can be supplied in one of the other Ergostyle colours

CLAMPING ELEMENT WITH RETAINING PIN

Glass-fibre reinforced technopolymer, black colour, with knurling on the protruding part to make initial tightening easier. AISI 302 stainless steel return spring.

ASSEMBLY

Brass boss, tapped blind hole.

SPECIAL EXECUTIONS ON REQUEST

(For sufficient quantities)
/ Lever body in orange colour

FEATURES AND APPLICATIONS

Even if it has a plastic push button, adjustable handle offers the possibility of a quick initial screwing during assembly by means of electric or pneumatic screwdrivers with controlled tightening torque system.

INSTRUCTIONS OF USE

For clamping, lift the lever to disengage the clamping device toothing and bring it back to start position. By releasing the lever, the return spring automatically engages the toothing.

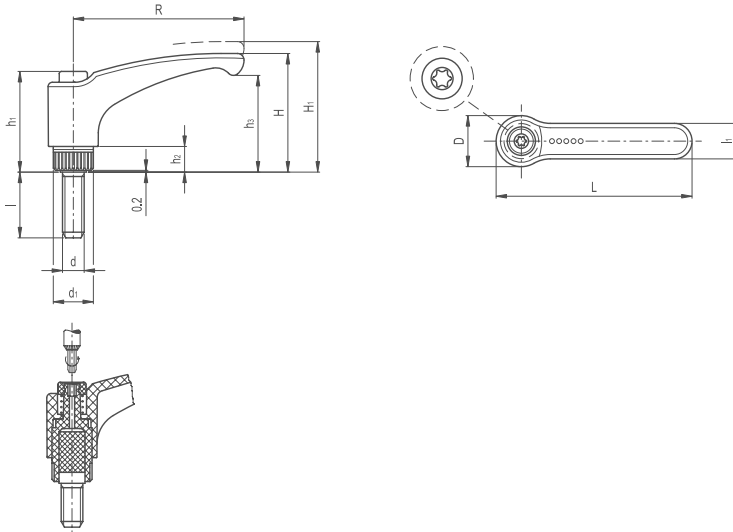
ERGONOMY AND DESIGN

The slightly arched shape of the lever and the ergonomic terminal enlargement give the operator a comfortable and safe grip and make the design of the handle more elegant, while the thumb rests naturally on the push button.



Part Reference	R	L	D	H	H1	h1	h2	h3	d1	L1	Mounting Hole		Teeth No.
											d 6h	h	z
ACLQAF1	78	90.5	23	54	58	45	12	44	19	16	M10	18	24
ACLQAF2	78	90.5	23	54	58	45	12	44	19	16	M12	17	24

Adjustable Clamping Lever for Quick Assembly



LEVER BODY

/ Glass-fibre reinforced polyamide based (PA) technopolymer
/ Resistant to solvents, oils, greases and other chemical agents

COLOUR

/ Grey-black, matte finish

PUSH BUTTON

/ Technopolymer RAL 2004 orange colour, glossy finish
/ On request and for sufficient quantities it can be supplied in one of the other Ergostyle colours

CLAMPING ELEMENT WITH RETAINING PIN

Glass-fibre reinforced technopolymer, black colour, with knurling on the protruding part to make initial tightening easier. AISI 302 stainless steel return spring.

ASSEMBLY

Zinc-plated steel threaded stud, chamfered flat end according to UNI 947 : ISO 4753.

SPECIAL EXECUTIONS ON REQUEST

(For sufficient quantities)
/ Lever body in orange colour

FEATURES AND APPLICATIONS

Even if it has a plastic push button, adjustable handle offers the possibility of a quick initial screwing during assembly by means of electric or pneumatic screwdrivers with controlled tightening torque system.

INSTRUCTIONS OF USE

For clamping, lift the lever to disengage the clamping device toothing and bring it back to start position. By releasing the lever, the return spring automatically engages the toothing.

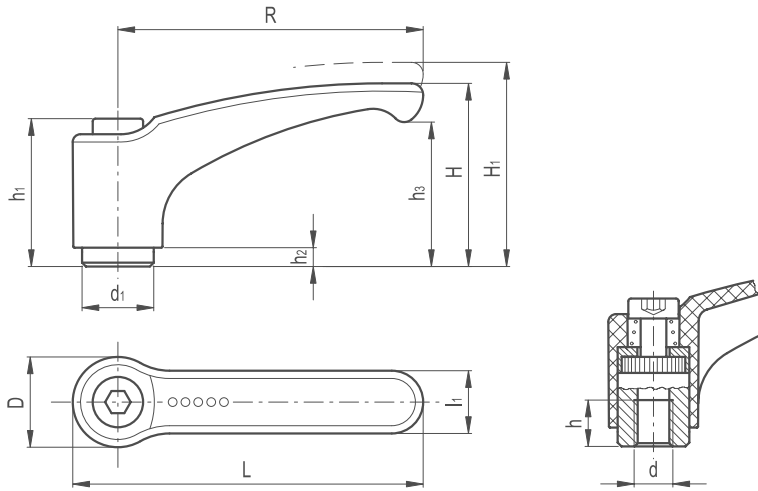
ERGONOMY AND DESIGN

The slightly arched shape of the lever and the ergonomic terminal enlargement give the operator a comfortable and safe grip and make the design of the handle more elegant, while the thumb rests naturally on the push button.



Part Reference	R	L	D	H	H1	h1	h2	h3	d1	L1	Mounting Hole		Teeth No.
											d	h	z
ACLQA1	78	90.5	23	54	58	45	12	44	19	16	M10	20	24
ACLQA2	78	90.5	23	54	58	45	12	44	19	16	M10	30	24
ACLQA3	78	90.5	23	54	58	45	12	44	19	16	M10	40	24
ACLQA4	78	90.5	23	54	58	45	12	44	19	16	M10	50	24

Adjustable Clamping Lever Stainless Steel Glass Fibre Reinforced Female



LEVER BODY

- / Glass-fibre reinforced polyamide based (PA) technopolymer
- / Resistant to solvents, oils, greases and other chemical agents
- / Built-in zinc alloy toothed insert for coupling to the metal clamping element

COLOUR

- / Grey-black with matte finish

CLAMPING ELEMENT

AISI 303 stainless steel with threaded bore and toothed element for coupling to the built-in zinc alloy insert, AISI 303 stainless steel retaining screw and return spring.

SPECIAL EXECUTIONS ON REQUEST

- (For sufficient quantities)
- / Lever body in orange colour

FEATURES AND APPLICATIONS

Particularly suitable when the lever turning angle is limited owing to lack of space. The metal tothing of the built-in zinc alloy insert allows the assembly of clamping elements completely made out of metal, which can be easily modified by machining in case of special assembly requirements.

AISI 303 stainless steel, thanks to its high resistance to corrosion, allows the application of these adjustable handles on machines and equipment in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to use corrosion resistant materials.

INSTRUCTIONS OF USE

For clamping, lift the lever to disengage the clamping device tothing and bring it back to start position. By releasing the lever, the return spring automatically engages the tothing. If the lever cannot make a 360° rotation, the clamping element can be easily screwed by means of the hexagon socket front head screw (after having disengaged the lever).

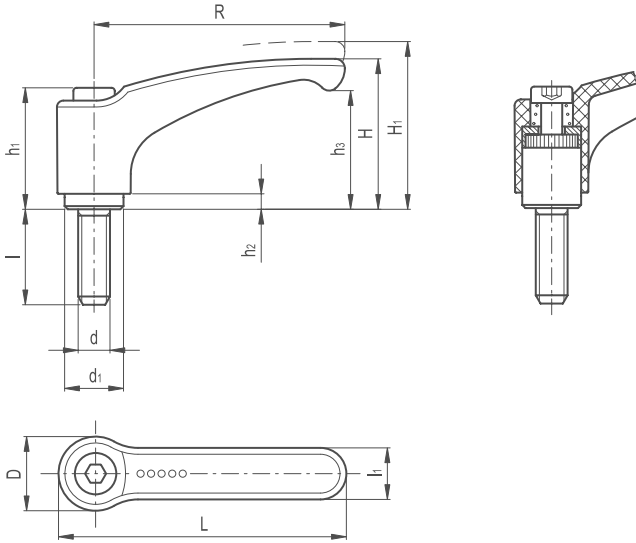
ERGONOMY AND DESIGN

The slightly arched shape of the lever and the ergonomic terminal enlargement give the operator a comfortable and safe grip and make the design of the handle more elegant.



Part Reference	R	L	D	H	H1	h1	h2	h3	d1	L1	Mounting Hole		Teeth No.	
											d	6h	h	z
ACLGFF1SS	44	52	15.5	30.5	34	24.5	3.5	22.5	10	11	M5	8	18	
ACLGFF2SS	44	52	15.5	30.5	34	24.5	3.5	22.5	10	11	M6	8	18	
ACLGFF3SS	63	73.5	19	38.5	42	31	3.5	30	13.5	13.5	M6	10	24	
ACLGFF4SS	63	73.5	19	38.5	42	31	3.5	30	13.5	13.5	M8	10	24	
ACLGFF5SS	78	90.5	23	46.5	50.5	36	3.5	36.5	16	16	M8	14	26	
ACLGFF6SS	78	90.5	23	46.5	50.5	36	3.5	36.5	16	16	M10	14	26	
ACLGFF7SS	95	109	26.5	56.5	61.5	43	5	45	19	18	M10	17	28	
ACLGFF8SS	95	109	26.5	56.5	61.5	43	5	45	19	18	M12	17	28	

Adjustable Clamping Lever Glass Fibre Reinforced ERZ



LEVER BODY

- / Glass-fibre reinforced polyamide based (PA) technopolymer
- / Resistant to solvents, oils, greases and other chemical agents
- / Built-in zinc alloy toothed insert for coupling to the metal clamping element

COLOUR

- / Grey-black, matte finish

CLAMPING ELEMENT

Black-oxide steel with toothed element for coupling to the built-in zinc alloy insert, black-oxide steel retaining screw and return spring.

SPECIAL EXECUTIONS ON REQUEST

- (For sufficient quantities)
- / Lever body in orange colour

FEATURES AND APPLICATIONS

Particularly suitable when the lever turning angle is limited owing to lack of space. The metal toothing of the built-in zinc alloy insert allows the assembly of clamping elements completely made out of metal, which can be easily modified by machining in case of special assembly requirements.

INSTRUCTIONS OF USE

For clamping, lift the lever to disengage the clamping device toothing and bring it back to start position. By releasing the lever, the return spring automatically engages the toothing. If the lever cannot make a 360° rotation, the clamping element can be easily screwed by means of the hexagon socket front head screw (after having disengaged the lever).

ERGONOMY AND DESIGN

The slightly arched shape of the lever and the ergonomic terminal enlargement give the operator a comfortable and safe grip and make the design of the handle more elegant.

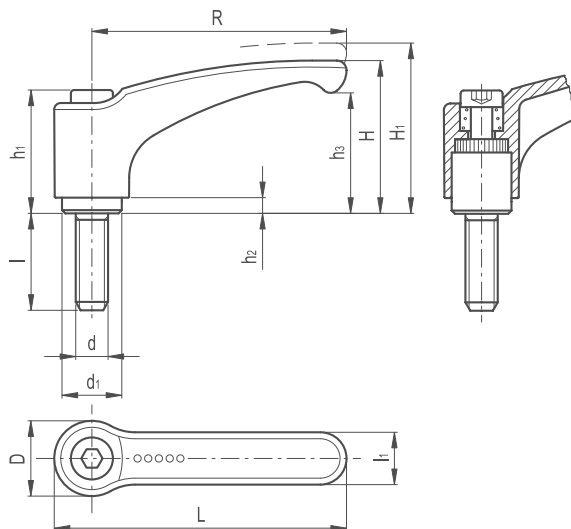


Adjustable Clamping Lever Glass Fibre Reinforced ERZ

Part Reference	R	L	D	H	H1	h1	h2	h3	d1	L1	Thread		Teeth No.	
											d 6h	l	z	
ACLGF1	44	52	15.5	30.5	34	24.5	3.5	22.5	10	11	M4	12	18	
ACLGF2	44	52	15.5	30.5	34	24.5	3.5	22.5	10	11	M4	16	18	
ACLGF3	44	52	15.5	30.5	34	24.5	3.5	22.5	10	11	M4	20	18	
ACLGF4	44	52	15.5	30.5	34	24.5	3.5	22.5	10	11	M4	25	18	
ACLGF5	44	52	15.5	30.5	34	24.5	3.5	22.5	10	11	M4	32	18	
ACLGF6	44	52	15.5	30.5	34	24.5	3.5	22.5	10	11	M5	12	18	
ACLGF7	44	52	15.5	30.5	34	24.5	3.5	22.5	10	11	M5	16	18	
ACLGF8	44	52	15.5	30.5	34	24.5	3.5	22.5	10	11	M5	20	18	
ACLGF9	44	52	15.5	30.5	34	24.5	3.5	22.5	10	11	M5	25	18	
ACLGF10	44	52	15.5	30.5	34	24.5	3.5	22.5	10	11	M5	32	18	
ACLGF11	44	52	15.5	30.5	34	24.5	3.5	22.5	10	11	M5	40	18	
ACLGF12	44	52	15.5	30.5	34	24.5	3.5	22.5	10	11	M5	50	18	
ACLGF13	44	52	15.5	30.5	34	24.5	3.5	22.5	10	11	M6	12	18	
ACLGF14	44	52	15.5	30.5	34	24.5	3.5	22.5	10	11	M6	16	18	
ACLGF15	44	52	15.5	30.5	34	24.5	3.5	22.5	10	11	M6	20	18	
ACLGF16	44	52	15.5	30.5	34	24.5	3.5	22.5	10	11	M6	25	18	
ACLGF17	44	52	15.5	30.5	34	24.5	3.5	22.5	10	11	M6	32	18	
ACLGF18	44	52	15.5	30.5	34	24.5	3.5	22.5	10	11	M6	40	18	
ACLGF19	44	52	15.5	30.5	34	24.5	3.5	22.5	10	11	M6	50	18	
ACLGF20	63	73.5	19	38.5	42	31	3.5	30	13.5	13.5	M6	12	24	
ACLGF21	63	73.5	19	38.5	42	31	3.5	30	13.5	13.5	M6	16	24	
ACLGF22	63	73.5	19	38.5	42	31	3.5	30	13.5	13.5	M6	20	24	
ACLGF23	63	73.5	19	38.5	42	31	3.5	30	13.5	13.5	M6	25	24	
ACLGF24	63	73.5	19	38.5	42	31	3.5	30	13.5	13.5	M6	32	24	
ACLGF25	63	73.5	19	38.5	42	31	3.5	30	13.5	13.5	M6	40	24	
ACLGF26	63	73.5	19	38.5	42	31	3.5	30	13.5	13.5	M6	50	24	
ACLGF27	63	73.5	19	38.5	42	31	3.5	30	13.5	13.5	M6	63	24	
ACLGF28	63	73.5	19	38.5	42	31	3.5	30	13.5	13.5	M8	12	24	
ACLGF29	63	73.5	19	38.5	42	31	3.5	30	13.5	13.5	M8	16	24	
ACLGF30	63	73.5	19	38.5	42	31	3.5	30	13.5	13.5	M8	20	24	
ACLGF31	63	73.5	19	38.5	42	31	3.5	30	13.5	13.5	M8	25	24	
ACLGF32	63	73.5	19	38.5	42	31	3.5	30	13.5	13.5	M8	32	24	
ACLGF33	63	73.5	19	38.5	42	31	3.5	30	13.5	13.5	M8	40	24	
ACLGF34	63	73.5	19	38.5	42	31	3.5	30	13.5	13.5	M8	50	24	
ACLGF35	63	73.5	19	38.5	42	31	3.5	30	13.5	13.5	M8	63	24	
ACLGF36	63	73.5	19	38.5	42	31	3.5	30	13.5	13.5	M10	20	24	
ACLGF37	63	73.5	19	38.5	42	31	3.5	30	13.5	13.5	M10	25	24	
ACLGF38	63	73.5	19	38.5	42	31	3.5	30	13.5	13.5	M10	32	24	
ACLGF39	63	73.5	19	38.5	42	31	3.5	30	13.5	13.5	M10	40	24	
ACLGF40	63	73.5	19	38.5	42	31	3.5	30	13.5	13.5	M10	50	24	
ACLGF41	63	73.5	19	38.5	42	31	3.5	30	13.5	13.5	M10	63	24	
ACLGF42	63	73.5	19	38.5	42	31	3.5	30	13.5	13.5	M10	80	24	

Part Reference	R	L	D	H	H1	h1	h2	h3	d1	L1	Thread		Teeth No.
											d	h	l
ACLGf43	78	90.5	23	46.5	50.5	36	3.5	36.5	16	16	M8	16	26
ACLGf44	78	90.5	23	46.5	50.5	36	3.5	36.5	16	16	M8	20	26
ACLGf45	78	90.5	23	46.5	50.5	36	3.5	36.5	16	16	M8	25	26
ACLGf46	78	90.5	23	46.5	50.5	36	3.5	36.5	16	16	M8	32	26
ACLGf47	78	90.5	23	46.5	50.5	36	3.5	36.5	16	16	M8	40	26
ACLGf48	78	90.5	23	46.5	50.5	36	3.5	36.5	16	16	M8	50	26
ACLGf49	78	90.5	23	46.5	50.5	36	3.5	36.5	16	16	M8	63	26
ACLGf50	78	90.5	23	46.5	50.5	36	3.5	36.5	16	16	M8	80	26
ACLGf51	78	90.5	23	46.5	50.5	36	3.5	36.5	16	16	M10	16	26
ACLGf52	78	90.5	23	46.5	50.5	36	3.5	36.5	16	16	M10	20	26
ACLGf53	78	90.5	23	46.5	50.5	36	3.5	36.5	16	16	M10	25	26
ACLGf54	78	90.5	23	46.5	50.5	36	3.5	36.5	16	16	M10	32	26
ACLGf55	78	90.5	23	46.5	50.5	36	3.5	36.5	16	16	M10	40	26
ACLGf56	78	90.5	23	46.5	50.5	36	3.5	36.5	16	16	M10	50	26
ACLGf57	78	90.5	23	46.5	50.5	36	3.5	36.5	16	16	M10	63	26
ACLGf58	78	90.5	23	46.5	50.5	36	3.5	36.5	16	16	M10	80	26
ACLGf59	78	90.5	23	46.5	50.5	36	3.5	36.5	16	16	M12	25	26
ACLGf60	78	90.5	23	46.5	50.5	36	3.5	36.5	16	16	M12	32	26
ACLGf61	78	90.5	23	46.5	50.5	36	3.5	36.5	16	16	M12	40	26
ACLGf62	78	90.5	23	46.5	50.5	36	3.5	36.5	16	16	M12	50	26
ACLGf63	78	90.5	23	46.5	50.5	36	3.5	36.5	16	16	M12	63	26
ACLGf64	78	90.5	23	46.5	50.5	36	3.5	36.5	16	16	M12	80	26
ACLGf65	95	109	26.5	56.5	61.5	43	5	45	19	18	M10	16	28
ACLGf66	95	109	26.5	56.5	61.5	43	5	45	19	18	M10	20	28
ACLGf67	95	109	26.5	56.5	61.5	43	5	45	19	18	M10	25	28
ACLGf68	95	109	26.5	56.5	61.5	43	5	45	19	18	M10	32	28
ACLGf69	95	109	26.5	56.5	61.5	43	5	45	19	18	M10	40	28
ACLGf70	95	109	26.5	56.5	61.5	43	5	45	19	18	M10	50	28
ACLGf71	95	109	26.5	56.5	61.5	43	5	45	19	18	M10	63	28
ACLGf72	95	109	26.5	56.5	61.5	43	5	45	19	18	M10	80	28
ACLGf73	95	109	26.5	56.5	61.5	43	5	45	19	18	M12	16	28
ACLGf74	95	109	26.5	56.5	61.5	43	5	45	19	18	M12	20	28
ACLGf75	95	109	26.5	56.5	61.5	43	5	45	19	18	M12	25	28
ACLGf76	95	109	26.5	56.5	61.5	43	5	45	19	18	M12	32	28
ACLGf77	75	109	26.5	56.5	61.5	43	5	45	19	18	M12	40	28
ACLGf78	95	109	26.5	56.5	61.5	43	5	45	19	18	M12	50	28
ACLGf79	95	109	26.5	56.5	61.5	43	5	45	19	18	M12	63	28
ACLGf80	95	109	26.5	56.5	61.5	43	5	45	19	18	M12	80	28
ACLGf81	95	109	26.5	56.5	61.5	43	5	45	19	18	M16	25	28
ACLGf82	95	109	26.5	56.5	61.5	43	5	45	19	18	M16	32	28
ACLGf83	95	109	26.5	56.5	61.5	43	5	45	19	18	M16	40	28
ACLGf84	95	109	26.5	56.5	61.5	43	5	45	19	18	M16	50	28
ACLGf85	95	109	26.5	56.5	61.5	43	5	45	19	18	M16	63	28
ACLGf86	95	109	26.5	56.5	61.5	43	5	45	19	18	M16	80	28

Adjustable Clamping Lever ERM



LEVER BODY

/ Zinc alloy die-cast, epoxy resin coating

COLOUR

/ RAL 2004 orange, RAL 3000 red, RAL 9006 grey,
RAL 9005 black matte finish

CLAMPING ELEMENT

Black-oxide steel with toothed element for coupling to the lever body, treated steel retaining screw and return spring.

SPECIAL EXECUTIONS ON REQUEST

(For sufficient quantities)

- / Lever body in different colours
- / Chrome-plated lever
- / Clamping element with different threadings and lengths

FEATURES AND APPLICATIONS

Particularly suitable when the lever turning angle is limited owing to lack of space.

INSTRUCTIONS OF USE

For clamping, lift the lever to disengage the clamping device tooting and bring it back to start position. By releasing the lever, the return spring automatically engages the tooting. If the lever cannot make a 360° rotation, the clamping element can be easily screwed by means of the hexagon socket front head screw (after having disengaged the lever).

ERGONOMY AND DESIGN

The slightly arched shape of the lever and the ergonomic terminal enlargement give the operator a comfortable and safe grip and make the design of the handle more elegant.

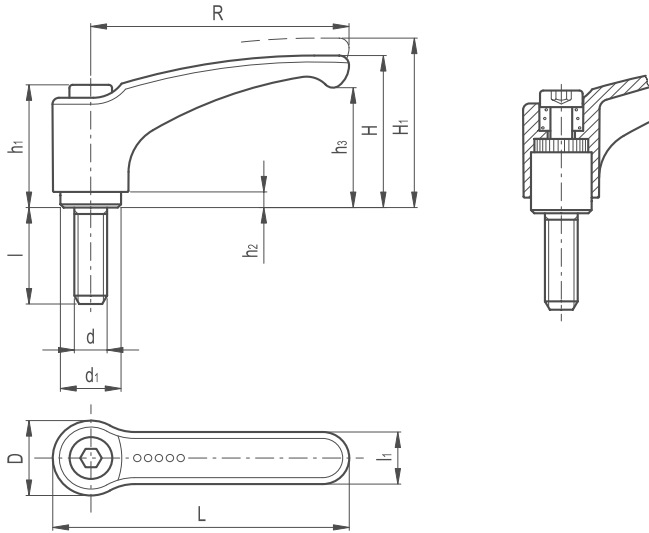


Part Reference	R	L	D	H	H1	h1	h2	h3	d1	L1	Thread		Teeth No.	
											d	Gh	l	z
ACLP1	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M4	12	18	
ACLP2	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M4	16	18	
ACLP3	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M4	20	18	
ACLP4	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M4	25	18	
ACLP5	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M4	32	18	
ACLP6	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M5	12	18	
ACLP7	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M5	16	18	
ACLP8	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M5	20	18	
ACLP9	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M5	25	18	
ACLP10	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M5	32	18	
ACLP11	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M5	40	18	
ACLP12	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M5	50	18	
ACLP13	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M6	12	18	
ACLP14	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M6	16	18	
ACLP15	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M6	20	18	
ACLP16	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M6	25	18	
ACLP17	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M6	32	18	
ACLP18	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M6	40	18	
ACLP19	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M6	50	18	
ACLP20	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M6	12	24	
ACLP21	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M6	16	24	
ACLP22	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M6	20	24	
ACLP23	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M6	25	24	
ACLP24	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M6	32	24	
ACLP25	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M6	40	24	
ACLP26	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M6	50	24	
ACLP27	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M6	63	24	
ACLP28	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M8	12	24	
ACLP29	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M8	16	24	
ACLP30	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M8	20	24	
ACLP31	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M8	25	24	
ACLP32	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M8	32	24	
ACLP33	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M8	40	24	
ACLP34	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M8	50	24	
ACLP35	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M8	63	24	
ACLP36	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M10	20	24	
ACLP37	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M10	25	24	
ACLP38	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M10	32	24	
ACLP39	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M10	40	24	
ACLP40	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M10	50	24	
ACLP41	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M10	63	24	
ACLP42	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M10	80	24	

Adjustable Clamping Lever ERM

Part Reference	R	L	D	H	H1	h1	h2	h3	d1	L1	Thread		Teeth No.
											d	Gh	l
ACLP43	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M8	16	26
ACLP44	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M8	20	26
ACLP45	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M8	25	26
ACLP46	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M8	32	26
ACLP47	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M8	40	26
ACLP48	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M8	50	26
ACLP49	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M8	63	26
ACLP50	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M10	16	26
ACLP51	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M10	20	26
ACLP52	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M10	25	26
ACLP53	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M10	32	26
ACLP54	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M10	40	26
ACLP55	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M10	50	26
ACLP56	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M10	63	26
ACLP57	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M10	80	26
ACLP58	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M12	25	26
ACLP59	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M12	32	26
ACLP60	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M12	40	26
ACLP61	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M12	50	26
ACLP62	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M12	63	26
ACLP63	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M12	80	26
ACLP64	95	109	25	56	61	43	5	42	19	18	M10	16	28
ACLP65	95	109	25	56	61	43	5	42	19	18	M10	20	28
ACLP66	95	109	25	56	61	43	5	42	19	18	M10	25	28
ACLP67	95	109	25	56	61	43	5	42	19	18	M10	32	28
ACLP68	95	109	25	56	61	43	5	42	19	18	M10	40	28
ACLP69	95	109	25	56	61	43	5	42	19	18	M10	50	28
ACLP70	95	109	25	56	61	43	5	42	19	18	M10	63	28
ACLP71	95	109	25	56	61	43	5	42	19	18	M10	80	28
ACLP72	95	109	25	56	61	43	5	42	19	18	M12	16	28
ACLP73	95	109	25	56	61	43	5	42	19	18	M12	20	28
ACLP74	95	109	25	56	61	43	5	42	19	18	M12	25	28
ACLP75	95	109	25	56	61	43	5	42	19	18	M12	32	28
ACLP76	95	109	25	56	61	43	5	42	19	18	M12	40	28
ACLP77	95	109	25	56	61	43	5	42	19	18	M12	50	28
ACLP78	95	109	25	56	61	43	5	42	19	18	M12	63	28
ACLP79	95	109	25	56	61	43	5	42	19	18	M12	80	28
ACLP80	95	109	25	56	61	43	5	42	19	18	M16	25	28
ACLP81	95	109	25	56	61	43	5	42	19	18	M16	32	28
ACLP82	95	109	25	56	61	43	5	42	19	18	M16	40	28
ACLP83	95	109	25	56	61	43	5	42	19	18	M16	50	28
ACLP84	95	109	25	56	61	43	5	42	19	18	M16	63	28
ACLP85	95	109	25	56	61	43	5	42	19	18	M16	80	28

Adjustable Clamping Lever ERM SS



LEVER BODY

/ Zinc alloy die-cast, epoxy resin coating

COLOUR

/ RAL 2004 orange, RAL 3000 red, RAL 9006 grey,
RAL 9005 black matte finish

CLAMPING ELEMENT

AISI 303 stainless steel with toothed element for coupling to the lever body, stainless steel retaining screw and return spring.

SPECIAL EXECUTIONS ON REQUEST

(For sufficient quantities)

- / Lever body in different colours
- / Chrome-plated lever
- / Clamping element with different threadings and lengths

FEATURES AND APPLICATIONS

Particularly suitable when the lever turning angle is limited owing to lack of space. AISI 303 stainless steel, thanks to its high resistance to corrosion, allows the application of these adjustable handles on machines and equipment in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to use corrosion resistant materials.

INSTRUCTIONS OF USE

For clamping, lift the lever to disengage the clamping device tothing and bring it back to start position. By releasing the lever, the return spring automatically engages the tothing. If the lever cannot make a 360° rotation, the clamping element can be easily screwed by means of the hexagon socket front head screw (after having disengaged the lever).

ERGONOMY AND DESIGN

The slightly arched shape of the lever and the ergonomic terminal enlargement give the operator a comfortable and safe grip and make the design of the handle more elegant.



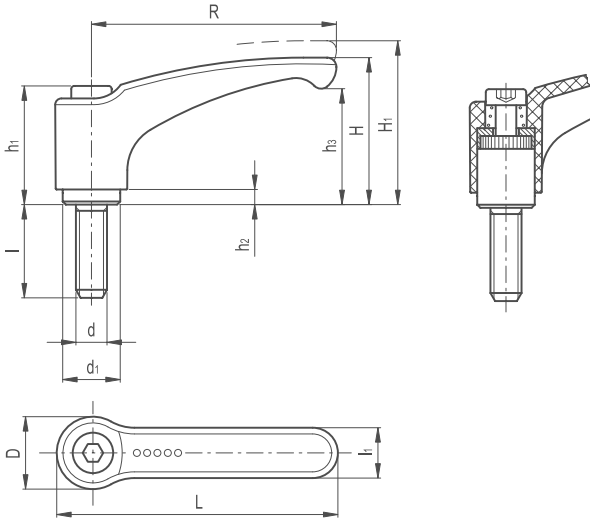
Adjustable Clamping Lever ERM SS

RAL 2004 RAL 3000 RAL 9006 RAL 9005



Part Reference	R	L	D	H	H1	h1	h2	h3	d1	L1	Thread		Teeth No. z
											d 6h	l	
ACLP1SS	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M5	12	18
ACLP2SS	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M5	16	18
ACLP3SS	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M5	20	18
ACLP4SS	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M5	25	18
ACLP5SS	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M5	32	18
ACLP6SS	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M5	40	18
ACLP7SS	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M5	50	18
ACLP8SS	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M6	12	18
ACLP9SS	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M6	16	18
ACLP10SS	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M6	20	18
ACLP11SS	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M6	25	18
ACLP12SS	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M6	32	18
ACLP13SS	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M6	40	18
ACLP14SS	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M6	50	18
ACLP15SS	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M6	16	24
ACLP16SS	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M6	20	24
ACLP17SS	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M6	25	24
ACLP18SS	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M6	32	24
ACLP19SS	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M6	40	24
ACLP20SS	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M6	50	24
ACLP21SS	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M6	63	24
ACLP22SS	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M8	16	24
ACLP23SS	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M8	20	24
ACLP24SS	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M8	25	24
ACLP25SS	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M8	32	24
ACLP26SS	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M8	40	24
ACLP27SS	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M8	50	24
ACLP28SS	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M8	63	24
ACLP29SS	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M10	20	26
ACLP30SS	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M10	25	26
ACLP31SS	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M10	32	26
ACLP32SS	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M10	40	26
ACLP33SS	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M10	50	26
ACLP34SS	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M10	63	26
ACLP35SS	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M10	80	26
ACLP36SS	95	109	25	56	61	43	5	42	19	18	M10	20	28
ACLP37SS	95	109	25	56	61	43	5	42	19	18	M10	25	28
ACLP38SS	95	109	25	56	61	43	5	42	19	18	M10	32	28
ACLP39SS	95	109	25	56	61	43	5	42	19	18	M10	40	28
ACLP40SS	95	109	25	56	61	43	5	42	19	18	M10	50	28
ACLP41SS	95	109	25	56	61	43	5	42	19	18	M10	63	28
ACLP42SS	95	109	25	56	61	43	5	42	19	18	M10	80	28
ACLP43SS	95	109	25	56	61	43	5	42	19	18	M12	20	28
ACLP44SS	95	109	25	56	61	43	5	42	19	18	M12	25	28
ACLP45SS	95	109	25	56	61	43	5	42	19	18	M12	32	28
ACLP46SS	95	109	25	56	61	43	5	42	19	18	M12	40	28
ACLP47SS	95	109	25	56	61	43	5	42	19	18	M12	50	28
ACLP48SS	95	109	25	56	61	43	5	42	19	18	M12	63	28
ACLP49SS	95	109	25	56	61	43	5	42	19	18	M12	80	28

Adjustable Clamping Lever Stainless Steel Glass Fibre Reinforced



LEVER BODY

- / Glass-fibre reinforced polyamide based (PA) technopolymer
- / Resistant to solvents, oils, greases and other chemical agents
- / Built-in zinc alloy toothed insert for coupling to the metal clamping element

COLOUR

- / Grey-black, matte finish

CLAMPING ELEMENT

AISI 303 stainless steel with toothed element for coupling to the built-in zinc alloy insert, AISI 303 stainless steel retaining screw and return spring.

SPECIAL EXECUTIONS ON REQUEST

- (For sufficient quantities)
- / Lever body in orange colour

FEATURES AND APPLICATIONS

Particularly suitable when the lever turning angle is limited owing to lack of space. The metal tothing of the built-in zinc alloy insert allows the assembly of clamping elements completely made out of metal, which can be easily modified by machining in case of special assembly requirements.

AISI 303 stainless steel, thanks to its high resistance to corrosion, allows the application of these adjustable handles on machines and equipment in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to use corrosion resistant materials.

INSTRUCTIONS OF USE

For clamping, lift the lever to disengage the clamping device tothing and bring it back to start position. By releasing the lever, the return spring automatically engages the tothing. If the lever cannot make a 360° rotation, the clamping element can be easily screwed by means of the hexagon socket front head screw (after having disengaged the lever).

ERGONOMY AND DESIGN

The slightly arched shape of the lever and the ergonomic terminal enlargement give the operator a comfortable and safe grip and make the design of the handle more elegant.



Adjustable Clamping Lever Stainless Steel Glass Fibre Reinforced

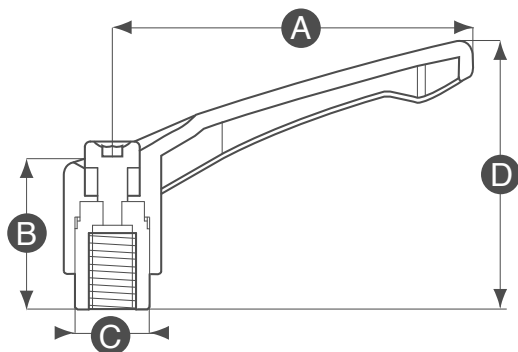
Part Reference	R	L	D	H	H1	h1	h2	h3	d1	L1	Thread		Teeth No.	
											d	Gh	l	z
ACLG1SS	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M5	12	18	
ACLG2SS	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M5	16	18	
ACLG3SS	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M5	20	18	
ACLG4SS	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M5	25	18	
ACLG5SS	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M5	32	18	
ACLG6SS	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M5	40	18	
ACLG7SS	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M5	50	18	
ACLG8SS	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M6	12	18	
ACLG9SS	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M6	16	18	
ACLG10SS	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M6	20	18	
ACLG11SS	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M6	25	18	
ACLG12SS	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M6	32	18	
ACLG13SS	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M6	40	18	
ACLG14SS	44	52	14.5	30	33	24.5	3.5	20.5	10	11	M6	50	18	
ACLG15SS	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M6	16	24	
ACLG16SS	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M6	20	24	
ACLG17SS	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M6	25	24	
ACLG18SS	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M6	32	24	
ACLG19SS	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M6	40	24	
ACLG20SS	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M6	50	24	
ACLG21SS	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M6	63	24	
ACLG22SS	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M8	16	24	
ACLG23SS	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M8	20	24	
ACLG24SS	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M8	25	24	
ACLG25SS	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M8	32	24	
ACLG26SS	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M8	40	24	
ACLG27SS	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M8	50	24	
ACLG28SS	63	73.5	18	38	41	31	3.5	27	13.5	13.5	M8	63	24	
ACLG29SS	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M10	20	26	
ACLG30SS	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M10	25	26	
ACLG31SS	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M10	32	26	
ACLG32SS	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M10	40	26	
ACLG33SS	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M10	50	26	
ACLG34SS	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M10	63	26	
ACLG35SS	78	90.5	21.5	46	50	36	3.5	34.5	16	16	M10	80	26	
ACLG36SS	95	109	25	56	61	43	5	42	19	18	M10	20	28	
ACLG37SS	95	109	25	56	61	43	5	42	19	18	M10	25	28	
ACLG38SS	95	109	25	56	61	43	5	42	19	18	M10	32	28	
ACLG39SS	95	109	25	56	61	43	5	42	19	18	M10	40	28	
ACLG40SS	95	109	25	56	61	43	5	42	19	18	M10	50	28	
ACLG41SS	95	109	25	56	61	43	5	42	19	18	M10	63	28	
ACLG42SS	95	109	25	56	61	43	5	42	19	18	M10	80	28	
ACLG43SS	95	109	25	56	61	43	5	42	19	18	M12	20	28	
ACLG44SS	95	109	25	56	61	43	5	42	19	18	M12	25	28	
ACLG45SS	95	109	25	56	61	43	5	42	19	18	M12	32	28	
ACLG46SS	95	109	25	56	61	43	5	42	19	18	M12	40	28	
ACLG47SS	95	109	25	56	61	43	5	42	19	18	M12	50	28	
ACLG48SS	95	109	25	56	61	43	5	42	19	18	M12	63	28	
ACLG49SS	95	109	25	56	61	43	5	42	19	18	M12	80	28	

Female Stainless Steel Indexed Clamping Handle



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KNOBS & HANDLES



KEY FEATURES

- / 304 Stainless steel handle
- / 304 Stainless steel internal thread
- / Quick release button for easy adjustment
- / Ergonomic design

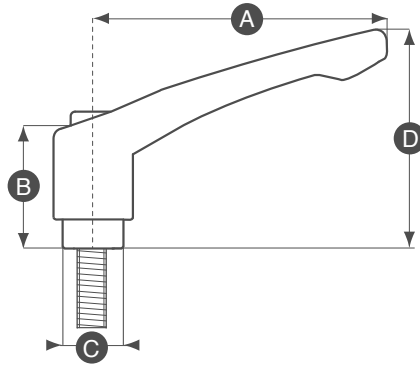
ORDERING INSTRUCTIONS

Choose the thread size required. Order using the corresponding part number in the table.



Part No.	A	B	C	D	Thread size
FICH42M5	42	18	10	34	M5
FICH42M6	42	18	10	34	M6
FICH65M6	65	21	14	44	M6
FICH65M8	65	21	14	44	M8
FICH78M8	78	24	16	51	M8
FICH78M10	78	24	16	51	M10
FICH92M10	92	28	19	60	M10
FICH92M12	92	28	19	60	M12
FICH108M12	108	33	23	69	M12
FICH108M16	108	33	23	69	M16

Male Stainless Steel Indexed Clamping Handle



KEY FEATURES

- / 304 Stainless steel handle
- / 304 Stainless steel internal thread
- / Quick release button for easy adjustment
- / Ergonomic design

ORDERING INSTRUCTIONS

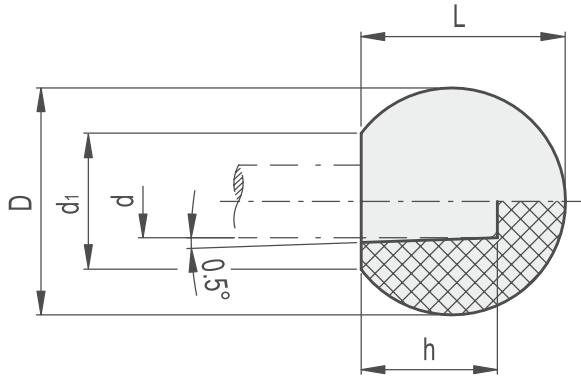
Choose the thread size required. Order using the corresponding part number in the table.



Part No.	A	B	C	D	Thread size	Thread length (mm)
MICH20M6	42	18	10	34	M6	20
MICH32M6	42	18	10	34	M6	32
MICH40M6	42	18	10	34	M6	40
MICH16M8	65	21	14	44	M8	16
MICH20M8	65	21	14	44	M8	20
MICH25M8	65	21	14	44	M8	25
MICH32M8	65	21	14	44	M8	32
MICH40M8	65	21	14	44	M8	40
MICH50M8	65	21	14	44	M8	50
MICH20M10	78	24	16	51	M10	20
MICH32M10	78	24	16	51	M10	32
MICH40M10	78	24	16	51	M10	40
MICH50M10	78	24	16	51	M10	50
MICH63M10	78	24	16	51	M10	63

Ball Knobs

Press Fit



MATERIAL

/ Phenolic based (PF) Duroplast
/ Resistant to solvents, oils, greases and other chemical agents

COLOUR

/ Black, glossy finish

STANDARD EXECUTION

Slightly cone-shaped plain blind hole. The coupling, by press-fit assembly on h9 tolerance drawn stock bars, is not affected by vibrations and prevents the handle from slipping off.

ASSEMBLY INSTRUCTIONS

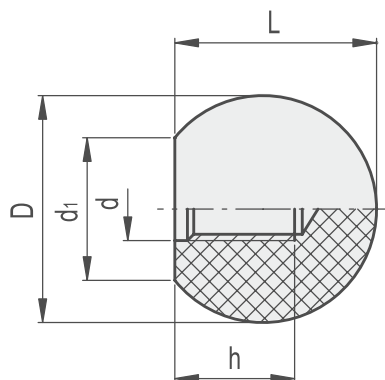
Fit the handle onto slight chamfered shaft end and push as far as possible by hand or by means of a small press. Alternatively it is possible to tap the handle with a plastic or wooden mallet until firmly in place. In this case we strongly recommend to use a cloth or other suitable soft material over the product to avoid any surface damage.



Part Ref.	Description	D	L	d1	d	h	Weight (g)
BKPF1	16-N4	16	15	8	4	10	3
BKPF2	16-N6	16	15	8	6	10	3
BKPF3	20-N5	20	18	12	5	12	6
BKPF4	20-N6	20	18	12	6	12	6
BKPF5	25-N6	25	23	14	6	16	10
BKPF6	25-N8	25	23	14	8	16	9
BKPF7	30-N8	30	28	15	8	19	14
BKPF8	30-N10	30	28	15	10	19	13
BKPF9	32-N8	32	29	18	8	17	23
BKPF10	32-N10	32	29	18	10	17	22
BKPF11	35-N8	35	33	19	8	24	27
BKPF12	35-N10	35	33	19	10	24	26
BKPF13	40-N10	40	37	22	10	18	42
BKPF14	40-N12	40	37	22	12	18	40
BKPF15	45-N12	45	43	22	12	28	60
BKPF16	45-N14	45	43	22	14	28	58
BKPF17	50-N12	50	46	26	12	30	76
BKPF18	50-N14	50	46	26	14	30	75
BKPF19	50-N16	50	46	26	16	30	73

Ball Knobs

Tapped Hole



MATERIAL

/ Phenolic based (PF) Duroplast
/ Resistant to solvents, oils, greases and other chemical agents

COLOUR

/ Black or red, glossy finish

STANDARD EXECUTION

Threaded blind hole.



RAL 9005 RAL 3002

 Black

 Red

Part Ref.		Description	Main dimensions			Mounting hole		Weight g
Black	Red		D	L	d1	d	h min.	
BK19005	BK13002	16-M4	16	15	8	M4	7	3
BK29005	-	16-M5	16	15	8	M5	7	3
BK39005	BK23002	20-M4	20	18	12	M4	9	6
BK49005	-	20-M5	20	18	12	M5	9	6
BK59005	-	20-M6	20	18	12	M6	9	5
BK69005	-	20-M8	20	18	12	M8	9	5
BK79005	-	25-M4	25	22.5	15	M4	11	10
BK89005	-	25-M5	25	22.5	15	M5	11	10
BK99005	BK33002	25-M6	25	22.5	15	M6	11	10
BK109005	BK43002	25-M8	25	22.5	15	M8	11	9
BK119005	-	25-M10	25	22.5	15	M10	11	9
BK129005	-	30-M5	30	28	15	M5	14.5	20
BK139005	-	30-M6	30	28	15	M6	14.5	19
BK149005	BK53002	30-M8	30	28	15	M8	14.5	19
BK159005	-	30-M10	30	28	15	M10	14.5	18
BK169005	-	32-M6	32	29	18	M6	14.5	20
BK179005	-	32-M8	32	29	18	M8	14.5	20
BK189005	-	32-M10	32	29	18	M10	14.5	19
BK199005	-	35-M6	35	32.5	18	M6	18	30

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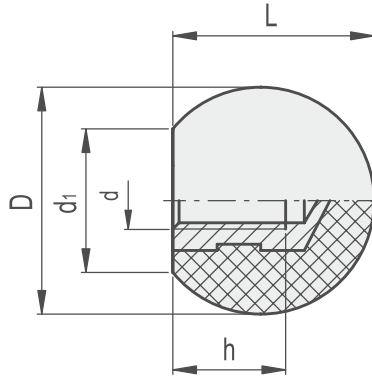
Part Ref.		Description	Main dimensions			Mounting hole		Weight g
Black	Red		D	L	d1	d	h min.	
BK209005	-	35-M8	35	32.5	18	M8	18	30
BK219005	BK63002	35-M10	35	32.5	18	M10	18	29
BK229005	-	35-M12	35	32.5	18	M12	18	29
BK239005	-	40-M6	40	37	22	M6	18	38
BK249005	-	40-M8	40	37	22	M8	18	37
BK259005	BK73002	40-M10	40	37	22	M10	18	36
BK269005	-	40-M12	40	37	22	M12	18	35
BK279005	-	40-M14	40	37	22	M14	18	34
BK289005	-	40-M16	40	37	22	M16	18	33
BK299005	-	45-M8	45	42.5	22	M8	20	59
BK309005	-	45-M10	45	42.5	22	M10	20	58
BK319005	BK83002	45-M12	45	42.5	22	M12	20	57
BK329005	-	45-M14	45	42.5	22	M14	20	56
BK339005	-	45-M16	45	42.5	22	M16	20	55
BK349005	-	50-M8	50	46	27	M8	21	86
BK359005	-	50-M10	50	46	27	M10	21	85
BK369005	-	50-M12	50	46	27	M12	21	84
BK379005	-	50-M14	50	46	27	M14	21	83
BK389005	-	50-M16	50	46	27	M16	21	82

Ball Knobs

260

KNOBS & HANDLES

Tapped Brass Hole



MATERIAL

- / Phenolic based (PF) Duroplast
- / Resistant to solvents, oils, greases and other chemical agents

COLOUR

- / Black, glossy finish

STANDARD EXECUTION

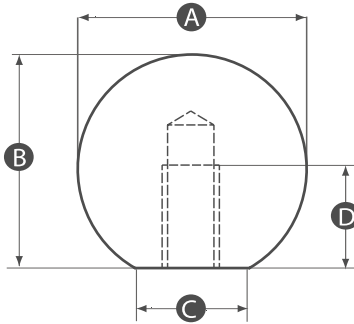
Brass boss, tapped blind hole.



Part Ref.	Description	D	L	d1	d	hmin.	Weight (g)
BKBB1	20 B-M4	20	18	12	M4	12	9
BKBB2	20 B-M5	20	18	12	M5	10	9
BKBB3	20 B-M6	20	18	12	M6	10	9
BKBB4	25 B-M6	25	22.5	15	M6	10	13
BKBB5	25 B-M8	25	22.5	15	M8	16	18
BKBB6	25 B-M10	25	22.5	15	M10	15	17
BKBB7	30 B-M5	30	28	15	M5	10	28
BKBB8	30 B-M6	30	28	15	M6	10	27
BKBB9	30 B-M8	30	28	15	M8	16	26
BKBB10	30 B-M10	30	28	15	M10	18	25
BKBB11	32 B-M8	32	29	18	M8	16	22
BKBB12	32 B-M10	32	29	18	M10	18	21
BKBB13	35 B-M8	35	32.5	18	M8	16	32
BKBB14	35 B-M10	35	32.5	18	M10	18	30
BKBB15	40 B-M8	40	37	22	M8	16	35
BKBB16	40 B-M10	40	37	22	M10	18	45
BKBB17	40 B-M12	40	37	22	M12	27	43
BKBB18	45 B-M10	45	42.5	22	M10	18	55
BKBB19	45 B-M12	45	42.5	22	M12	27	60
BKBB20	50 B-M8	50	46	27	M8	16	98
BKBB21	50 B-M10	50	46	27	M10	18	100
BKBB22	50 B-M12	50	46	27	M12	27	107

Ball Knobs

Polished Tapped Stainless Steel



MATERIAL

/ Stainless steel – 304 – Providing an attractive finish as well as high resistance to corrosion from oxidising acids, often found in clean and food environments

ASSEMBLY

/ Tapped hole one piece ball

FINISH

/ Highly polished



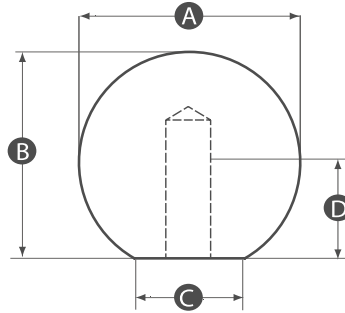
Part No.	A	B	C	D	Thread size
BKM416SS	16	15	8	7	M4
BKM516SS	16	15	8	7	M5
BKM616SS	16	15	8	7	M6
BKM420SS	20	18	12	9	M4
BKM520SS	20	18	12	9	M5
BKM620SS	20	18	12	9	M6
BKM825SS	25	23	15	11	M6
BKM825SS	25	23	15	11	M8
BKM1025SS	25	23	15	11	M10
BKM632SS	32	29	18	15	M6
BKM832SS	32	29	18	15	M8
BKM1032SS	32	29	18	15	M10
BKM638SS	38	35	22	18	M6
BKM838SS	38	35	22	18	M8
BKM1038SS	38	35	22	18	M10
BKM1044SS	44	37	32	20	M10
BKM1050SS	50	46	28	21	M10

Ball Knobs

Polished Stainless Steel Press Fit

262

KNOBS & HANDLES



MATERIAL

/ Stainless steel – 304 – Providing an attractive finish as well as high resistance to corrosion from oxidising acids, often found in clean and food environments

ASSEMBLY

/ H7 press fit hole, one piece ball

FINISH

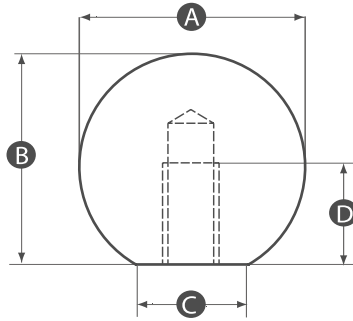
/ Highly polished



Part No.	A	B	C	D	Bore size (mm) - H7 Tolerance
BK416SS	16	15	8	10	4
BK516SS	16	15	8	10	5
BK520SS	20	18	12	12	5
BK620SS	20	18	12	12	6
BK625SS	25	23	15	16	6
BK825SS	25	23	15	16	8
BK632SS	32	29	18	20	6
BK832SS	32	29	18	20	8
BK638SS	38	35	22	24	6
BK838SS	38	35	22	24	8
BK1038SS	38	35	22	24	10
BK1044SS	44	37	32	28	10

Ball Knobs

Polished Aluminium Threaded



MATERIAL

/ Aluminium – Providing high corrosion resistance, low density and an attractive appearance

ASSEMBLY

/ Tapped hole, one piece ball

FINISH

/ Highly polished



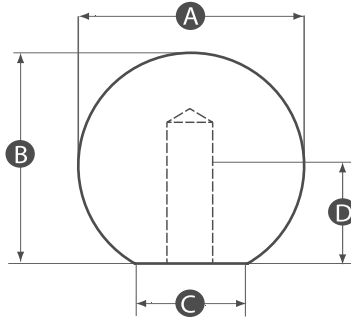
Part No.	A	B	C	D	Thread size
BKM416A	16	15	8	7	M4
BKM516A	16	15	8	7	M5
BKM616A	16	15	8	7	M6
BKM420A	20	18	12	9	M4
BKM520A	20	18	12	9	M5
BKM620A	20	18	12	9	M6
BKM625A	25	23	15	11	M6
BKM825A	25	23	15	11	M8
BKM1025A	25	23	15	11	M10
BKM632A	32	29	18	15	M6
BKM832A	32	29	18	15	M8
BKM1032A	32	29	18	15	M10
BKM638A	38	35	22	18	M6
BKM838A	38	35	22	18	M8
BKM1038A	38	35	22	18	M10
BKM1044A	44	37	32	20	M10
BKM1050A	50	46	28	21	M10

Ball Knobs

Polished Aluminium Push-Fit

264

KNOBS & HANDLES



MATERIAL

/ Aluminium – Providing high corrosion resistance, low density and an attractive appearance

ASSEMBLY

/ Push fit hole to H7, one piece ball

FINISH

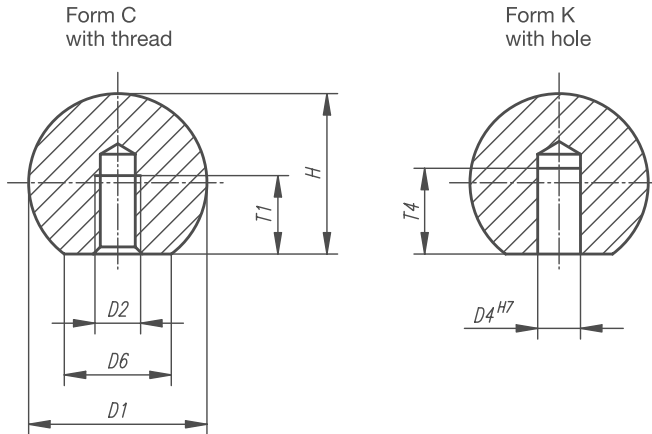
/ Highly polished



Part No.	A	B	C	D	Bore size (mm) - H7 Tolerance
BK416A	16	15	8	10	4
BK516A	16	15	8	10	5
BK520A	20	18	12	12	5
BK620A	20	18	12	12	6
BK825A	25	23	15	16	6
BK825A	25	23	15	16	8
BK632A	32	29	18	20	6
BK832A	32	29	18	20	8
BK638A	38	35	22	24	6
BK838A	38	35	22	24	8
BK1038A	38	35	22	24	10
BK1044A	44	37	32	28	10

Ball Knobs

Stainless steel or aluminium DIN 319



MATERIAL

/ Stainless steel 1.4305 or aluminium

SURFACE FINISH

/ Polished



BALL KNOBS IN STAINLESS STEEL TO DIN 319

Part Ref. (Form C)	Part Ref. (Form K)	D1	D2	D4	~D6	~H	T1 min.	T4 min.
BKSSM4C	BKSSM4K	16	M4	6	8	15	7,2	10
BKSSM5C	BKSSM5K	20	M5	8	12	18	9,1	12
BKSSM5C	BKSSM5K	25	M6	10	15	22,5	11	16
BKSSM8C	BKSSM8K	32	M8	12	18	29	14,5	20
BKSSM10C	BKSSM10K	40	M10	16	22	37	18	25
BKSSM12C	BKSSM12K	50	M12	20	28	46	21	32

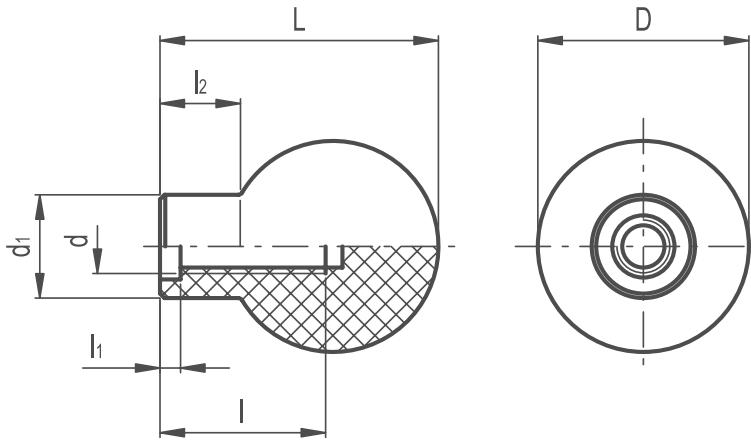
BALL KNOBS IN ALUMINIUM DIN 319

Part Ref. (Form C)	Part Ref. (Form K)	D1	D2	D4	~D6	~H	T1 min.	T4 min.
BKALM4C	BKALM4K	16	M4	6	8	15	7,2	10
BKALM5C	BKALM5K	20	M5	8	12	18	9,1	12
BKALM6C	BKALM6K	25	M6	10	15	22,5	11	16
BKALM8C	BKALM8K	32	M8	12	18	29	14,5	20
BKALM10C	BKALM10K	40	M10	16	22	37	18	25
BKALM12C	BKALM12K	50	M12	20	28	46	21	32

Ball Handles Female

266

KNOBBS & HANDLES



MATERIAL

/ Phenolic based (PF) Duroplast
/ Resistant to solvents, oils, greases and other chemical agents

COLOUR

/ Black, glossy finish

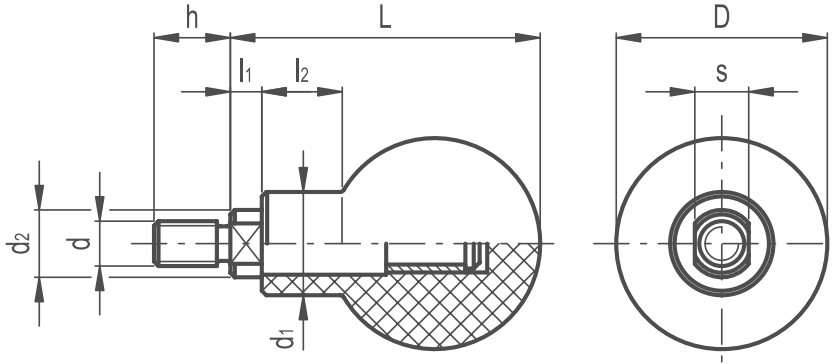
ASSEMBLY

Tapped blind hole.



Part Reference	D	L	d1	l2	Mounting Hole		
					d	l	l1
BH1	37	47	18	13	M8	16	4
BH2	47	62	23	17	M10	26	5

Revolving Ball Handles



MATERIAL

/ Phenolic based (PF) Duroplast
 / Resistant to solvents, oils, greases and other chemical agents

COLOUR

/ Black, glossy finish

ASSEMBLY

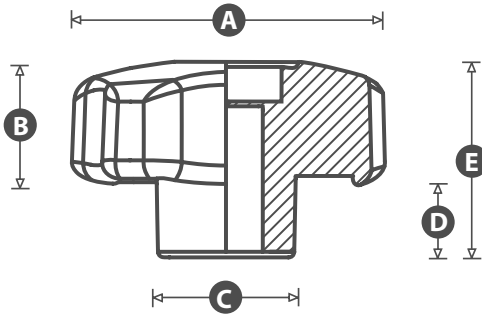
Zinc-plated steel threaded shank, two flat faces for fitting with 12mm spanner.



Part Reference	D	L	d1	l2	d6g	Threaded Shank			
						h	d2	l1	s
RBH1	37	54	18	13	M8	15	15	7	12
RBH2	47	69	23	17	M10	17	15	7	12

Lobe Knobs

Female Soft Touch



MATERIAL

/ Two-part mouldings – Inner moulding Polypropylene –
Over moulded with 'Soft Touch' TPE

FEMALE INSERT MATERIAL

/ Brass

STANDARD COLOUR

/ Black

CAP COLOURS

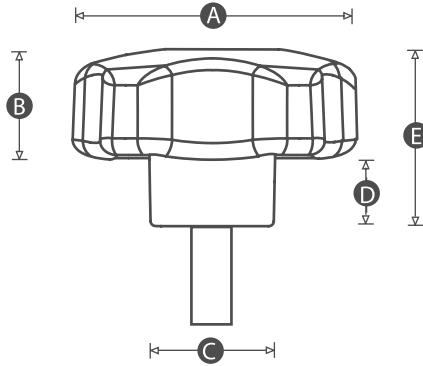
/ Available with caps in many different colours (MOQs apply)



Part No.	A	B	C	D	E	Thread size
STKBM528	28	16	12	10	26	M5
STKBM628	28	16	12	10	26	M6
STKBM640	40	17	18	12	29	M6
STKBM840	40	17	18	12	29	M8
STKBM650	50	19	21	12	31	M6
STKBM850	50	19	21	12	31	M8
STKBM1050	50	19	21	12	31	M10
STKBM860	60	21	23	13	34	M8
STKBM1060	60	21	23	13	34	M10
STKBM1260	60	21	23	13	34	M12

Lobe Knobs

Male Soft Touch



MATERIAL

/ Two-part mouldings – Inner moulding Polypropylene –
Over moulded with 'Soft Touch' TPE

MALE THREAD MATERIAL

/ Zinc plated steel

STANDARD COLOUR

/ Black

CAP COLOURS

/ Available with caps in many different colours (MOQs apply)



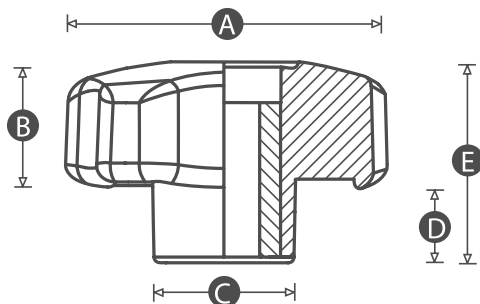
Part No.	A	B	C	D	E	Thread size	Thread length (mm)
STKZPM510	28	16	12	10	26	M5	10
STKZPM515	28	16	12	10	26	M5	15
STKZPM520	28	16	12	10	26	M5	20
STKZPM615	28	16	12	10	26	M6	15
STKZPM620	28	16	12	10	26	M6	20
STKZPM624	40	17	18	12	29	M6	20
STKZPM625	40	17	18	12	29	M6	25
STKZPM815	40	17	18	12	29	M8	15
STKZPM816	40	17	18	12	29	M8	16
STKZPM825	40	17	18	12	29	M8	25
STKZPM835	40	17	18	12	29	M8	35
STKZPM635	50	19	21	12	31	M6	35
STKZPM8250	50	19	21	12	31	M8	25
STKZPM8350	50	19	21	12	31	M8	35
STKZPM840	50	19	21	12	31	M8	40
STKZPM1025	50	19	21	12	31	M10	25
STKZPM1040	50	19	21	12	31	M10	40
STKZPM820	60	21	23	13	34	M8	20
STKZPM830	60	21	23	13	34	M8	30
STKZPM1030	60	21	23	13	34	M10	30
STKZPM1240	60	21	23	13	34	M12	40

Lobe Knobs

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KNOBS & HANDLES

Female



MATERIAL

/ High impact resistant thermoplastic

STANDARD COLOUR

/ Black

FINISH

/ Matt

FEMALE INSERT MATERIAL

/ Brass, zinc plated steel or stainless steel

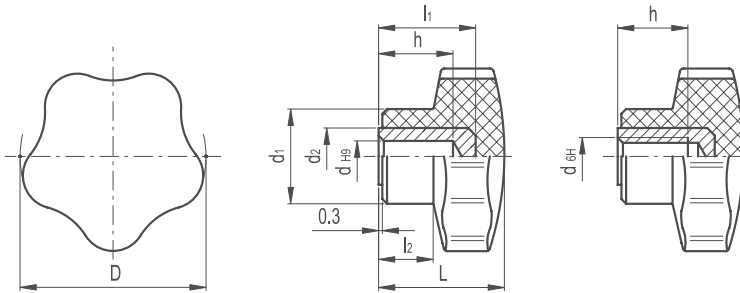
CAP COLOURS

/ Available with caps in many different colours (MOQs apply)



Part No.	A	B	C	D	E	Thread size	Thread length (mm)
VLKM528B	28	16	14	9	25	M5	Brass
VLKM628B	28	16	14	9	25	M6	Brass
VLKM628ZP	28	16	14	9	25	M6	Zinc plated steel
VLKM628SS	28	16	14	9	25	M6	Stainless steel
VLKM640B	40	17	18	12	29	M6	Brass
VLKM840ZP	40	17	18	12	29	M8	Zinc plated steel
VLKM840B	40	17	18	12	29	M8	Brass
VLKM840SS	40	17	18	12	29	M8	Stainless steel
VLKM650B	50	19	21	12	31	M6	Brass
VLKM850B	50	19	21	12	31	M8	Brass
VLKM850ZP	50	19	21	12	31	M8	Zinc plated steel
VLKM850SS	50	19	21	12	31	M8	Stainless steel
VLKM1050B	50	19	21	12	31	M10	Brass
VLKM1050ZP	50	19	21	12	31	M10	Zinc plated steel
VLKM1050SS	50	19	21	12	31	M10	Stainless steel
VLKM860B	60	21	21	13	34	M8	Brass
VLKM1060B	60	21	21	13	34	M10	Brass
VLKM1060ZP	60	21	21	13	34	M10	Zinc plated steel
VLKM1060SS	60	21	21	13	34	M10	Stainless steel
VLKM1260B	60	21	21	13	34	M12	Brass
VLKM1260ZP	60	21	21	13	34	M12	Zinc plated steel
VLKM1260SS	60	21	21	13	34	M12	Stainless steel

Lobe Knobs



BODY

- / Phenolic based (PF) Duroplast
- / Resistant to solvents, oils, greases and other chemical agents

COLOUR

- / Black, glossy finish

ASSEMBLY

- / Execution A: black-oxide steel boss, plain blind hole
- / Execution B: brass boss, plain or tapped blind hole

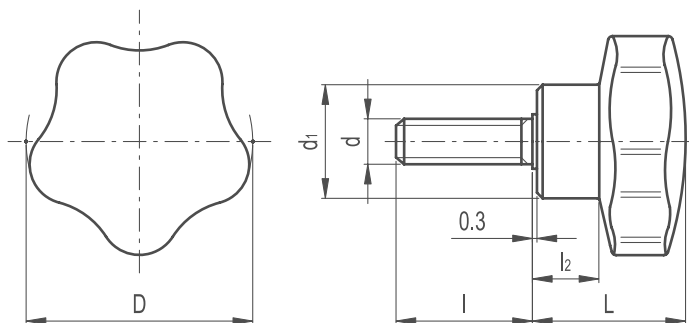
FEATURES

The exclusive five-lobe shape offers the operator's fingers a proper grip and prevents unhealthy residues from depositing thanks to its solid shape without cavities.



Part Reference	D	L	d1	d2	l1	l2	Mounting Hole			Bosses	
							dH9	d 6h	h	Steel	Brass
LBKB1	25	21	15	11	14	9	4	-	11		
LBKB2	25	21	15	-	-	9	-	M4	10		
LBKB3	32	23	19	12	17	11	6	-	14		
LBKB4	32	23	19	-	-	11	-	M5	10		
LBKB5	32	23	19	-	-	11	-	M6	12		
LBKB6	40	27	21	12	17	12	6	-	14		
LBKB7	40	27	21	12	18	12	8	-	14		
LBKB8	40	27	21	-	-	12	-	M6	12		
LBKB9	40	27	21	-	-	12	-	M8	13		
LBKA10	50	33	25	15	23	14	6	-	18		
LBKA11	50	33	25	15	25	14	8	-	20		
LBKA12	50	33	25	16	25	14	10	-	21		
LBKB13	50	33	25	15	23	14	6	-	18		
LBKB14	50	33	25	15	25	14	8	-	20		
LBKB15	50	33	25	-	-	14	-	M8	20		
LBKB16	50	33	25	-	-	14	-	M10	17		
LBKA17	60	37	27	18	28	17	6	-	20		
LBKA18	60	37	27	15	25	17	8	-	20		
LBKA19	60	37	27	18	31	17	10	-	25		
LBKB20	60	37	27	-	-	17	-	M10	17		
LBKB21	60	37	27	-	-	17	-	M12	20		
LBKA22	70	44	30	20	35	20	8	-	26		
LBKA23	70	44	30	18	31	20	10	-	25		
LBKB24	70	44	30	-	-	20	-	M12	20		
LBKB25	70	44	30	-	-	20	-	M14	20		
LBKA26	85	55	35	22	38	30	8	-	25		
LBKB27	85	55	35	-	-	30	-	M16	22		
LBKA28	100	60	38	22	38	31	8	-	25		
LBKA29	100	60	38	-14	-25	31	-	M16	22		

Lobe Knobs



MATERIAL

- / Phenolic based (PF) Duroplast
- / Resistant to solvents, oils, greases and other chemical agents

COLOUR

- / Black, glossy finish

ASSEMBLY

- Zinc-plated steel threaded stud, chamfered flat end according to UNI 947 : ISO 4753.

FEATURES

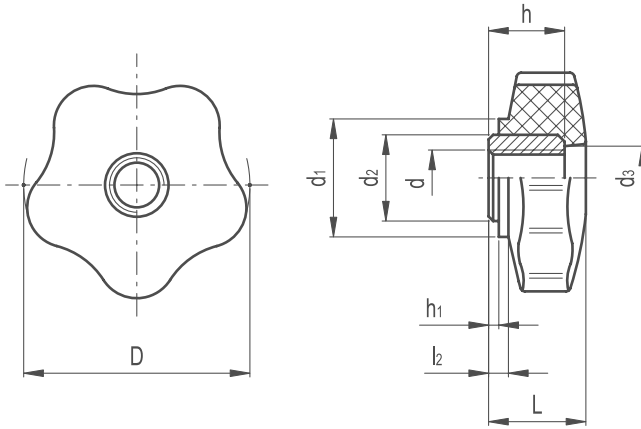
- The exclusive five-lobe shape offers the operator's finger a proper grip and prevents unhealthy residues from depositing thanks to its solid shape without cavities.



Part Reference	D	L	d1	l2	Thread	
					d Gg	l
LBKP1	25	21	15	9	M5	10
LBKP2	25	21	15	9	M5	16
LBKP3	25	21	15	9	M6	10
LBKP4	25	21	15	9	M6	16
LBKP5	25	21	15	9	M6	20
LBKP6	25	21	15	9	M6	30
LBKP7	32	23	19	11	M6	10
LBKP8	32	23	19	11	M6	16
LBKP9	32	23	19	11	M6	20
LBKP10	32	23	19	11	M6	35
LBKP11	32	23	19	11	M8	20
LBKP12	32	23	19	11	M8	30
LBKP13	32	23	19	11	M8	40
LBKP14	40	27	21	12	M6	10
LBKP15	40	27	21	12	M6	20
LBKP16	40	27	21	12	M6	30
LBKP17	40	27	21	12	M8	16
LBKP18	40	27	21	12	M8	25
LBKP19	40	27	21	12	M8	35
LBKP20	40	27	21	12	M8	45
LBKP21	50	33	25	14	M8	16
LBKP22	50	33	25	14	M8	20

Part Reference	D	L	d1	l2	Thread	
					d Gg	l
LBKP23	50	33	25	14	M8	25
LBKP24	50	33	25	14	M8	30
LBKP25	50	33	25	14	M8	40
LBKP26	50	33	25	14	M10	20
LBKP27	50	33	25	14	M10	30
LBKP28	50	33	25	14	M10	40
LBKP29	50	33	25	14	M10	50
LBKP30	60	37	27	17	M10	20
LBKP31	60	37	27	17	M10	30
LBKP32	60	37	27	17	M10	40
LBKP33	60	37	27	17	M10	50
LBKP34	60	37	27	17	M12	25
LBKP35	60	37	27	17	M12	30
LBKP36	60	37	27	17	M12	40
LBKP37	60	37	27	17	M12	50
LBKP38	70	44	30	20	M12	30
LBKP39	70	44	30	20	M12	50
LBKP40	70	44	30	20	M12	60
LBKP41	70	44	30	20	M12	70
LBKP42	70	44	30	20	M14	50
LBKP43	70	44	30	20	M14	70
LBKP44	85	55	35	30	M16	50

Lobe Knobs Shortened Series



MATERIAL

- / Phenolic based (PF) Duroplast
- / Resistant to solvents, oils, greases and other chemical agents

COLOUR

- / Black, glossy finish

ASSEMBLY

- / Black-oxide steel boss, tapped through hole

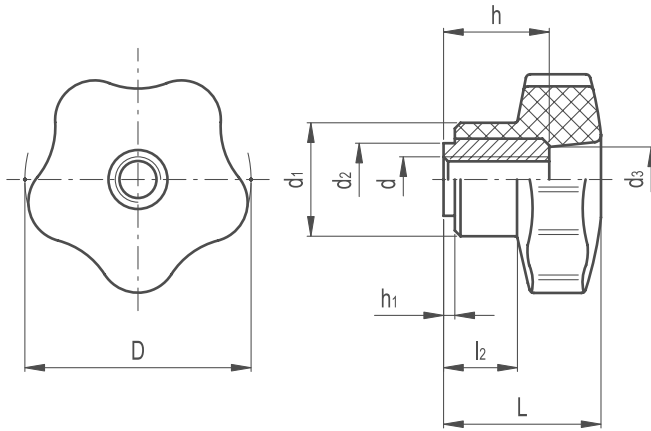
FEATURES

The exclusive five-lobe shape offers the operator's fingers a proper grip and prevents unhealthy residues from depositing thanks to its solid shape without cavities.



Part Reference	D	L	d1	d2	d3	l2	h1	d 6H	h
LBKS1	40	19	23	17	14	3	1.5	M8	15
LBKS2	40	19	23	17	14	3	1.5	M10	15
LBKS3	40	19	23	17	14	3	1.5	M12	15
LBKS4	50	21	26	19	14	3	1.5	M12	16
LBKS5	60	24	30	19	16	4	1.5	M12	16
LBKS6	85	30	32	18	18	6	1.5	M14	22

Lobe Knobs Type-B



MATERIAL

/ Phenolic based (PF) Duroplast
/ Resistant to solvents, oils, greases and other chemical agents

COLOUR

/ Black, glossy finish

ASSEMBLY

/ Brass boss, tapped through hole and large metal locking face

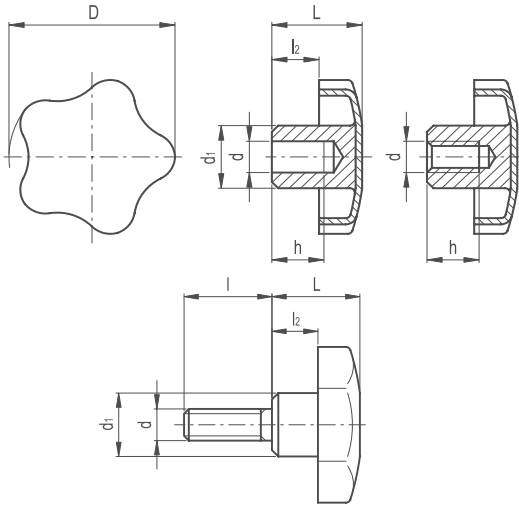
FEATURES

The exclusive five-lobe shape offers the operator's fingers a proper grip and prevents unhealthy residues from depositing thanks to its solid shape without cavities.



Part Reference	D	L	d1	d2	d3	l2	h1	Mounting Hole	
								d 6H	h
LBKSB1	40	28	21	14	13	13	1.5	M6	18
LBKSB2	40	28	21	14	13	13	1.5	M8	18
LBKSB3	40	28	21	14	13	13	1.5	M10	18
LBKSB4	50	34	25	16	13	15	1.5	M10	22
LBKSB5	50	34	25	16	13	15	1.5	M12	22
LBKSB6	60	38	27	17	15	18	1.5	M10	26
LBKSB7	60	38	27	17	15	18	1.5	M12	26
LBKSB8	60	38	27	17	15	18	1.5	M14	26
LBKSB9	70	45	30	17	17	21	1.5	M12	26
LBKSB10	70	45	30	17	17	21	1.5	M14	26
LBKSB11	85	56	35	24	18	32	2	M16	35

Lobe Knobs Stainless Steel AISI 304



MATERIAL

/ AISI 304 stainless steel, sandblasted matte finish

ASSEMBLY

/ Execution C: butt-welded hub, H7 reamed blind hole
 / Execution E: butt-welded hub, tapped blind hole
 / Execution with pin: butt-welded hub, AISI 304 stainless steel threaded pin

FEATURES AND APPLICATIONS

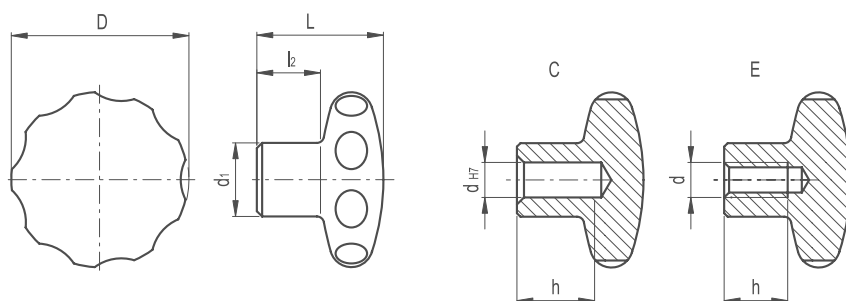
AISI 304 stainless steel, thanks to its high resistance to corrosion, allows the application of these knobs on machines and equipment in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to use corrosion resistant materials.



Part Reference	D	L	d1	l2	d H7	d	h
LBK1SSC	40	24	14	12	8	-	15
LBK2SSE	40	24	14	12	-	M8	15
LBK3SSC	50	31	18	17.5	10	-	18
LBK4SSE	50	31	18	17.5	-	M10	18
LBK5SSC	60	39	20	21	12	-	22
LBK6SSE	60	39	20	21	-	M12	22

Part Reference	D	L	d1	l2	d	l
LBKP7SS	40	24	14	12	M8	20
LBKP8SS	40	24	14	12	M8	30
LBKP9SS	40	24	14	12	M8	40
LBKP10SS	50	31	18	17.5	M10	20
LBKP11SS	50	31	18	17.5	M10	30
LBKP12SS	50	31	18	17.5	M10	40
LBKP13SS	60	39	20	21	M12	30
LBKP14SS	60	39	20	21	M12	40
LBKP15SS	60	39	20	21	M12	50

Star Knobs Stainless Steel AISI 304



MATERIAL

/ AISI 303 stainless steel, sandblasted matte finish

ASSEMBLY

/ Execution C: hub, H7 reamed blind hole

/ Execution E: hub, tapped blind hole

SPECIAL EXECUTIONS ON REQUEST

(For sufficient quantities)

/ Hub, tapped through hole

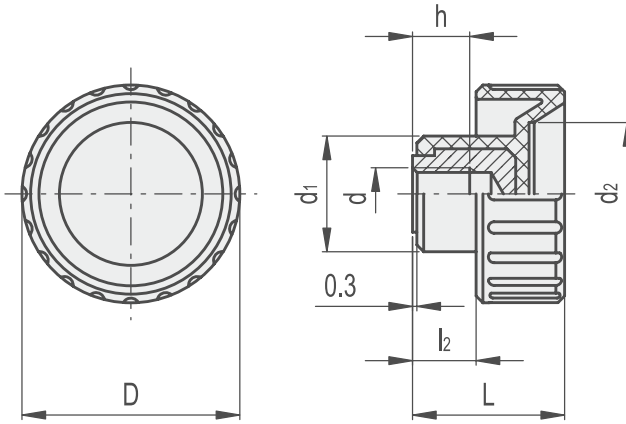
FEATURES AND APPLICATIONS

AISI 303 stainless steel, thanks to its high resistance to corrosion, allows the application of these knobs on machines and equipment in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to use corrosion resistant materials.



Part Reference	D	L	d1	l2	d H7	d	h
SRK1SSC	40	26.5	18	15	8	-	15
SRK2SSE	40	26.5	18	15	-	M6	12
SRK3SSE	40	26.5	18	15	-	M8	15
SRK4SSC	50	29	21	17	10	-	18
SRK5SSE	50	29	21	17	-	M8	15
SRK6SSE	50	29	21	17	-	M10	15
SRK7SSC	60	33	25	18	12	-	22
SRK8SSE	60	33	25	18	-	M10	18
SRK9SSE	60	33	25	18	-	M12	22

Fluted Grip Knobs



MATERIAL

/ Polyamide based (PA) technopolymer
/ Resistant to solvents, oils, greases and other chemical agents

COLOUR

/ Black, matte finish

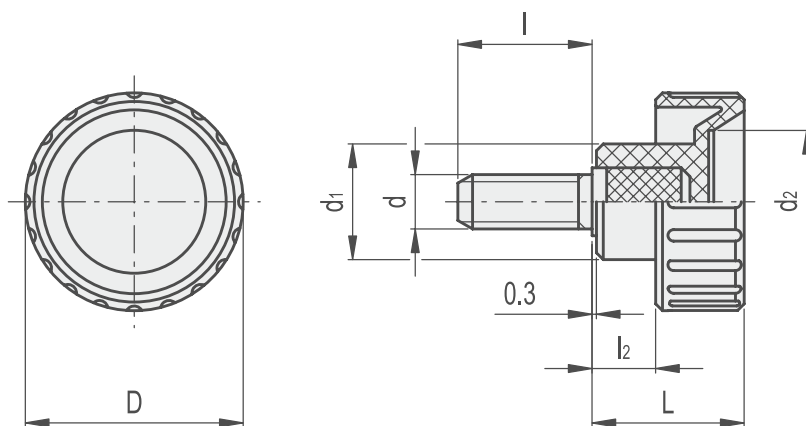
STANDARD EXECUTION

/ Brass boss, threaded blind hole



Part Ref.	Description	D	L	d1	d2	l2	d 6H	h	Weight (g)
FGKBH1	16 M3	16	13	11	9	5	M3	6	6
FGKBH2	16 M4	16	13	11	9	5	M4	6	5
FGKBH3	16 M5	16	13	11	9	5	M5	6	4
FGKBH4	20 M5	20	16	11.5	11	6	M5	6	6
FGKBH5	20 M6	20	16	11.5	11	6	M6	6	7
FGKBH6	25 M5	25	19	16	15	8	M5	6	10
FGKBH7	25 M6	25	19	16	15	8	M6	8	9
FGKBH8	32 M8	32	22	17	21	9	M8	10	11
FGKBH9	40 M8	40	27	19	25	13	M8	13	21
FGKBH10	40 M10	40	27	19	25	13	M10	13	19
FGKBH11	50 M10	50	28.5	22	31	13.5	M10	13	25

Fluted Grip Knobs



MATERIAL

- / Polyamide based (PA) technopolymer
- / Resistant to solvents, oils, greases and other chemical agents

COLOUR

- / Black, matte finish

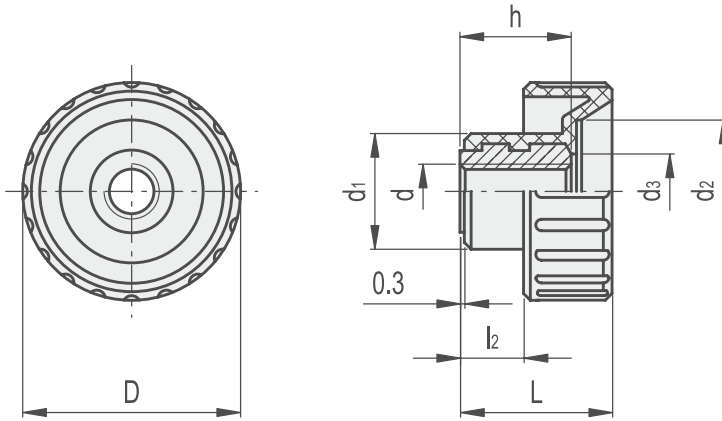
STANDARD EXECUTION

Zinc-plated steel threaded stud, chamfered flat end according to UNI 947 : ISO 4753.



Part Ref.	Description	D	L	d1	d2	l2	d 6g	l	Weight (g)
FGK1	M4x10	16	13	11	9	5	M4	10	4
FGK2	M4x16	16	13	11	9	5	M4	16	5
FGK3	M5x10	16	13	11	9	5	M5	10	6
FGK4	M5x16	16	13	11	9	5	M5	16	7
FGK5	M5x10	20	16	11.5	11	6	M5	10	7
FGK6	M5x16	20	16	11.5	11	6	M5	16	8
FGK7	M5x25	20	16	11.5	11	6	M5	25	9
FGK8	M6x10	20	16	11.5	11	6	M6	10	9
FGK9	M6x16	20	16	11.5	11	6	M6	16	11
FGK10	M6x40	20	16	11.5	11	6	M6	40	16
FGK11	M6x16	25	19	16	15	8	M6	16	18
FGK12	M6x20	25	19	16	15	8	M6	20	20
FGK13	M6x25	25	19	16	15	8	M6	25	22
FGK14	M6x50	25	19	16	15	8	M6	25	32
FGK15	M8x16	25	19	16	15	8	M8	16	15
FGK16	M8x16	32	22	17	21	9	M8	16	18
FGK17	M8x25	25	19	16	15	8	M8	25	18
FGK18	M8x25	32	22	17	21	9	M8	25	21
FGK19	M8x40	32	22	17	21	9	M8	40	25
FGK20	M10x20	32	22	17	21	9	M10	20	25
FGK21	M10x30	32	22	17	21	9	M10	30	28
FGK22	M10x40	32	22	17	21	9	M10	40	34
FGK23	M10x30	40	27	19	25	13	M10	30	37
FGK24	M10x30	50	28.5	22	31	13.5	M10	30	44

Fluted Grip Knobs



MATERIAL

/ Polyamide based (PA) technopolymer
 / Resistant to solvents, oils, greases and other chemical agents

COLOUR

/ Black, matte finish

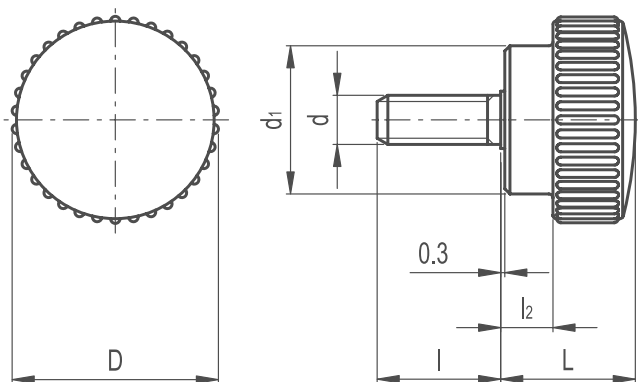
STANDARD EXECUTION

/ Brass boss, threaded pass-through hole



Part Ref.	D	L	d1	d2	d3	l2	d 6H	h	Weight (g)
FGKTH1	16	13	11	9	5	5	M4	10	4
FGKTH2	16	13	11	9	6	5	M5	10	5
FGKTH3	20	16	11.5	11	7	6	M6	12	7
FGKTH4	25	19	16	15	7	8	M6	14	9
FGKTH5	25	19	16	15	9	8	M8	14	11
FGKTH6	32	22	17	21	7	9	M6	16	18
FGKTH7	32	22	17	21	10	9	M8	16	15
FGKTH8	32	22	17	21	11	9	M10	16	13
FGKTH9	40	27	19	25	14	13	M10	20	25
FGKTH10	50	28.5	22	31	14	13.5	M10	20	32

Grip Knobs with Pin



MATERIAL

- / Phenolic based (PF) Duroplast
- / Resistant to solvents, oils, greases and other chemical agents

COLOUR

- / Black, glossy finish

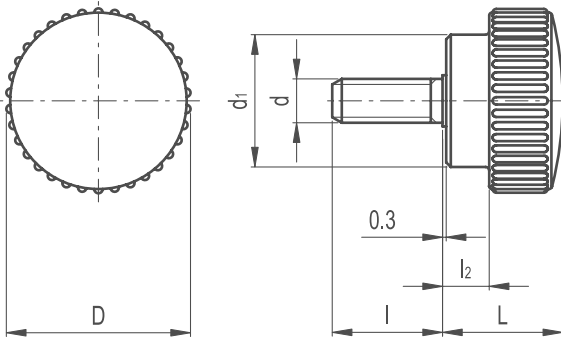
ASSEMBLY

Zinc-plated steel threaded stud, chamfered flat end according to UNI 947 : ISO 4753.



Part Reference	d	L	d1	l2	d 6g	l
GKP1	15	44	44	2	M4	6
GKP2	15	44	44	2	M4	10
GKP3	15	44	44	2	M4	16
GKP4	15	44	44	2	M5	10
GKP5	15	44	44	2	M5	16
GKP6	18	12	13	3	M5	10
GKP7	18	12	13	3	M5	10
GKP8	18	12	13	3	M5	40
GKP9	22	14	15	4	M6	10
GKP10	22	14	15	4	M6	16
GKP11	22	14	15	4	M6	25
GKP12	22	14	15	4	M6	40
GKP13	26	18	19	6	M6	16
GKP14	26	18	19	6	M6	25
GKP15	26	18	19	6	M8	16
GKP16	26	18	19	6	M8	25
GKP17	31	18	24	6	M8	16
GKP18	31	18	24	6	M8	25
GKP19	31	18	24	6	M8	40
GKP20	36	23	27	8	M8	25
GKP21	36	23	27	8	M8	40
GKP22	40	26	29	10	M10	30
GKP23	50	32	36	12	M10	40

Grip Knobs Stainless Steel with Pin



MATERIAL

- / Phenolic based (PF) Duroplast
- / Resistant to solvents, oils, greases and other chemical agents

COLOUR

- / Black, glossy finish

ASSEMBLY

AISI 303 stainless steel threaded stud, chamfered flat end according to UNI 947 : ISO 4753.

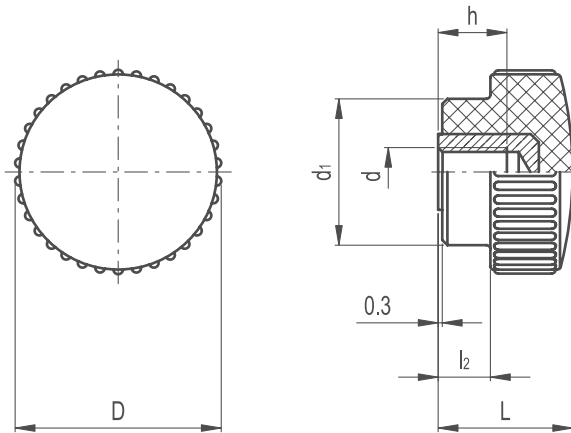
FEATURES AND APPLICATIONS

AISI 303 stainless steel, thanks to its high resistance to corrosion, allows the application of these knobs on machines and equipment in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to use corrosion resistant materials.



Part Reference	d	L	d1	l2	d 6g	l
GKP1SS	15	11	11	2	M4	6
GKP2SS	15	11	11	2	M4	10
GKP3SS	15	11	11	2	M4	16
GKP4SS	22	14	15	4	M6	10
GKP5SS	22	14	15	4	M6	16
GKP6SS	26	19	18	6	M6	16
GKP7SS	26	19	18	6	M6	25

Grip Knobs Blind Hole



MATERIAL

- / Phenolic based (PF) Duroplast.
- / Resistant to solvents, oils, greases and other chemical agents

COLOUR

- / Black, glossy finish

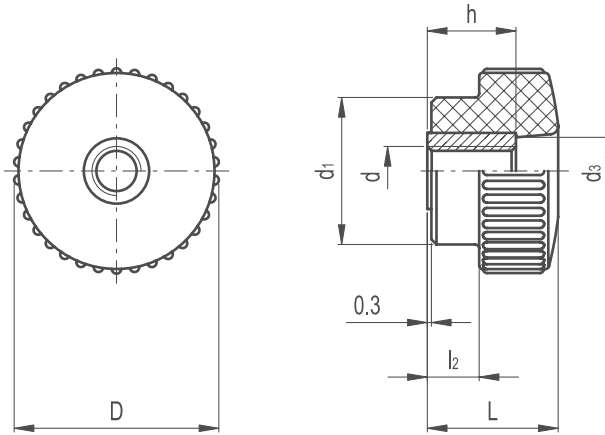
ASSEMBLY

- / Brass boss, tapped blind hole



Part Reference	D	L	d1	l2	d	h
GKBH1	15	11	11	2	M3	6
GKBH2	15	11	11	2	M4	6
GKBH3	15	11	11	2	M5	5
GKBH4	18	12	13	3	M5	5
GKBH5	22	14	15	4	M6	6
GKBH6	26	18	19	6	M6	10
GKBH7	31	18	24	6	M8	10
GKBH8	36	23	27	8	M8	10
GKBH9	40	26	29	10	M10	13
GKBH10	50	32	36	12	M10	17
GKBH11	50	32	36	12	M12	20

Grip Knobs Through Hole



MATERIAL

- / Phenolic based (PF) Duroplast
- / Resistant to solvents, oils, greases and other chemical agents

COLOUR

- / Black, glossy finish

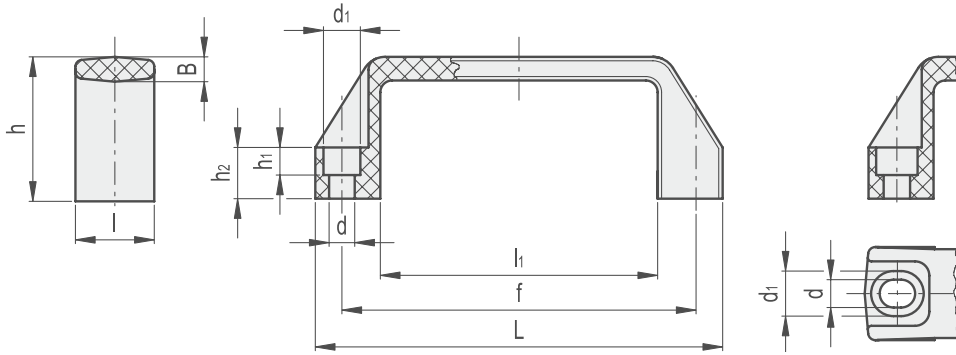
ASSEMBLY

- / Brass boss, tapped through hole



Part Reference	D	L	d1	d3	l2	d 6H	h
GKTH1	15	11	11	6	2	M4	10
GKTH2	18	12	13	7	3	M5	10
GKTH3	22	14	15	8	4	M6	11
GKTH4	26	18	19	10	6	M6	15
GKTH5	26	18	19	10	6	M8	15
GKTH6	31	18	24	13	6	M6	15
GKTH7	31	18	24	13	6	M8	15
GKTH8	31	18	24	13	6	M10	15
GKTH9	31	18	24	13	6	M12	15
GKTH10	36	22.5	27	14	8	M10	15
GKTH11	36	22.5	27	14	8	M12	15
GKTH12	40	26	29	14	10	M10	15
GKTH13	40	26	29	14	10	M12	15
GKTH14	50	32	36	20	12	M12	21

Pull Handles



MATERIAL

- / Glass-fibre reinforced polyamide based (PA) technopolymer
- / Resistant to solvents, oils, greases and other chemical agents

COLOUR

- / Black, orange, grey, red, matte finish

STANDARD EXECUTION

- / Pass-through holes for cylindrical-head screws with hexagon socket
- / Slotted assembly holes for fitting hole centres from 149 to 152 mm

TECHNICAL DATA

Tensile stress and impact strength: F1, F2, L1 and L2 values reported in the table are the result of breaking tests carried out with the appropriate dynamometric equipment under the test conditions shown in the figure with ambient temperature.

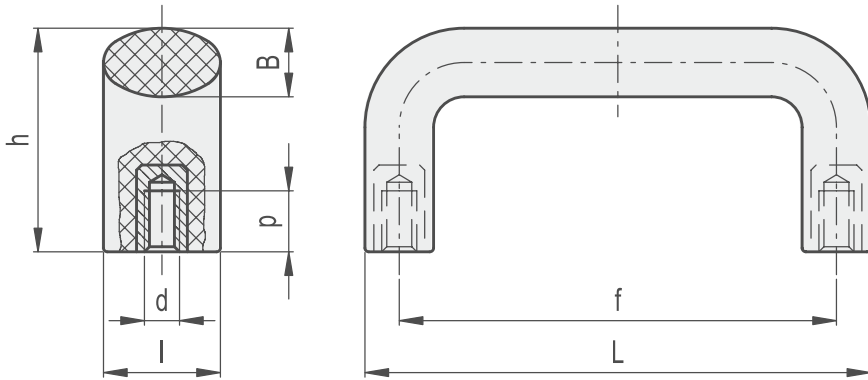


RAL 9005 RAL 2004 RAL 7031 RAL 3000



Part Ref.				Desc.	Main dimensions							Mounting holes				F1 [N]	F2 [N]	L1 [J]	L2 [J]	Weight g
C9	C2	C31	C6		L	f	h	B	l	l1	d	d1	h1	h2						
PH37001	PH37002	PH37004	-	74 x 109	109	93.5±0.5	38	6	21	74	6.5	10.5	7	13	3500	2500	15	8	26	
PH37111	-	-	-	93 x 137	137	117±1	41	7	26	93	6.5	10.5	6	15	4500	2500	20	13	44	
PH37101	PH37102	PH37104	PH37105	93 x 137	137	117±1	41	7	26	93	8.5	13.5	8.5	15	4500	2500	20	13	42	
PH37145	-	-	-	100 x 142	142	120÷122±1	41	7	26	100	8.5	13.5	8.5	15	3700	2500	25	14	44	
PH37151	PH37152	PH37154	-	108 x 150	150	132±1	45	7	27	108	8.5	13.5	8.5	16	3500	2500	27	14	47	
PH37183	PH37184	PH37185	-	113 x 160	160	140±1	46	7	27	113	8.5	13.5	8.5	16	3400	2600	27	20	50	
PH37191	PH37192	PH37193	-	125 x 172	172	149÷152±1	47	7	27	125	8.5	13.5	8.5	17	3000	2700	27	20	53	
PH37241	PH37242	PH37244	-	132 x 179	179	160±1	50	7.5	28	132	8.5	13.5	8.5	17	3300	2700	29	20	60	
PH37201	PH37202	PH37204	PH37205	151 x 196	196	179±1	50	7.5	28	151	8.5	13.5	8.5	17	2800	2700	33	20	70	
PH37251	PH37252	PH37254	-	201 x 260	260	235±1	54	8.5	30	201	10.5	16.5	10.5	20	3200	3500	40	34	118	

Curved Pull Handles



MATERIAL

- / Glass-fibre reinforced polypropylene based (PP) or polyamide based (PA) technopolymer
- / Resistant to solvents, oils, greases and other chemical agents

COLOUR

- / Black, matte finish

STANDARD EXECUTIONS

- / CPH: high-resilience polypropylene based (PP) technopolymer, brass bosses, threaded blind holes
- / TYPE (reduced version h=45); polyamide based (PA) technopolymer, brass bosses, threaded blind holes

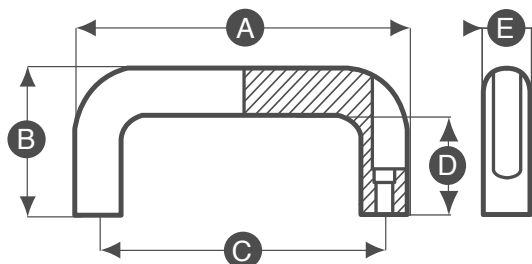
TECHNICAL DATA

Tensile stress and impact strength: F1, F2, L1 and L2 values reported in the table are the result of breaking tests carried out with the appropriate dynamometric equipment under the test conditions shown in the figure with ambient temperature.



Part Ref.	Description	Main dimensions						Threaded bosses		F1 [N]	F2 [N]	L1 [J]	L2 [J]	Weight g
		L	f	h	B	l	d	6H	p					
CPH37300	100 B-M5	100	86±0.5	44	14	23	M5	10	2400	2400	12	6	46	
CPH37301	100 B-M6	100	86±0.5	44	14	23	M6	12	2400	2400	12	6	45	
CPH37305	110 B-M5	108	94±0.5	48	14	24	M5	10	2300	2300	10	8	60	
CPH37306	110 B-M6	108	94±0.5	48	14	24	M6	12	2300	2300	10	8	59	
CPH37308	140-117 B-M4	134	117±0.5	49	15	25	M4	10	2250	2650	8	12	63	
CPH37309	140-117 B-M5	134	117±0.5	49	15	25	M5	10	2250	2650	8	12	64	
CPH37310	140-117 B-M6	134	117±0.5	49	15	25	M6	12	2250	2650	8	12	65	
CPH37311	140-117 B-M8	134	117±0.5	49	15	25	M8	13	2250	2650	8	12	67	
CPH37314	140-120 B-M5	134	120±0.5	49	15	25	M5	10	2250	2650	8	12	68	
CPH37315	140-120 B-M6	134	120±0.5	49	15	25	M6	12	2250	2650	8	12	69	
CPH37316	140-120 B-M8	134	120±0.5	49	15	25	M8	13	2250	2650	8	12	70	
CPH37320	150 B-M5	148	132±0.5	53	16	26	M5	10	2200	2450	8	12	71	
CPH37321	150 B-M6	148	132±0.5	53	16	26	M6	12	2200	2450	8	12	72	
CPH37322	150 B-M8	148	132±0.5	53	16	26	M8	13	2200	2450	8	12	73	
CPH37331	180 B-M6	166	150±1	56	16	27	M6	12	2000	2550	8	13	81	
CPH37332	180 B-M8	166	150±1	56	16	27	M8	13	2000	2550	8	13	82	
CPH37333	180 B-M10	166	150±1	56	16	27	M10	17	2000	2550	8	13	83	
CPH37351	200 B-M8	196	179±1	57	16	27	M8	13	1900	2000	11	13	130	
CPH37352	200 B-M10	196	179±1	57	16	27	M10	17	1900	2000	11	13	132	
CPH37361	260 B-M8	253	235±1	61	18.5	29	M8	13	1900	2000	13	12	173	
CPH37362	260 B-M10	253	235±1	61	18.5	29	M10	17	1900	2000	13	12	171	
CPH37371	320 B-M10	322	300±1	64	22	32	M10	17	2000	2000	18	11	205	
CPH37353	200 B-M8	196	179±1	45	15	27	M8	13	4000	3500	25	25	118	

Powder Coated Aluminium Bridge Handle



KEY FEATURES

- / Powder coated aluminum
- / Black matt finish
- / Machine bored holes



Part No.	A	B	C	D	E	Bore size (mm)
ABH130116	130	53	116	33	26	6.4
ABH146132	146	55	132	38	26	6.4
ABH178164	178	57	164	38	26	6.4
ABH210196	210	57	196	38	26	6.4

Positioning & Machine Elements



PINS

/ Eccentric Bushings / Side Thrust Pins / Plain Ball Lock Pin / Knurled Lock Pins / Lock Pin
/ Spring Loaded Ball Lock Pins / Ball Lock Pins

Pages 288-291

GRUB SCREWS

/ Grub Screws with Ball Terminal / Grub Screws

Pages 292-296

PLUNGERS

/ Indexing Plungers / Index Plunger / Threaded Plungers with Screwdriver Slotted Head / Threaded Bolt
Spring Plungers / Threaded Ball Spring Plungers / Smooth Ball Spring Plungers / Spring Plunger Double
Ended Ball Type / Threaded Ball Spring Plungers with Switch

Pages 297-315

ROLLER UNITS & WASHERS

/ Spring Rings for Ball/Roller Units / Pot Roller Unit (Ball Transfer) / Cup Roller Units (Ball Transfer)
/ Levelling Washers / Levelling Washers Stainless Steel

Pages 316-320

SPLIT CLAMPS & POSITION RINGS

/ Split Clamping Collar Stainless Steel / Semi-Split Clamping Collar / Positioning Rings Screw Assembly
/ Positioning Rings Screw Assembly Stainless Steel

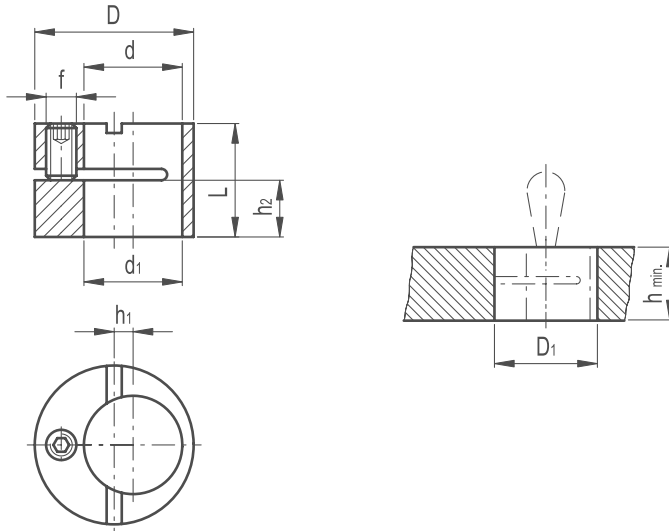
Pages 321-327

NUTS & SCREWS

/ Thumb Screw / Knurled Thumb Screw / Knurled Nut / Knurled Grip Nut / Flat Knurled Nut
/ Shoulder Screw / Stripper Bolts

Pages 328-334

Eccentric Bushings



MATERIAL

/ Black-oxide steel

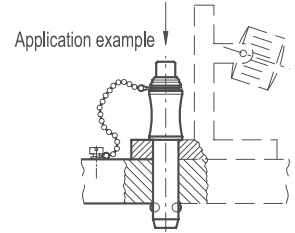
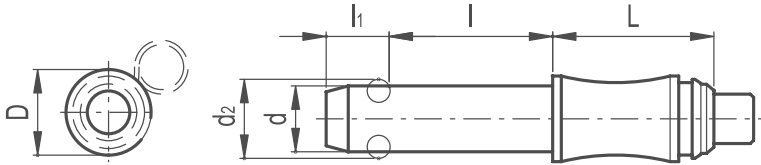
FEATURES AND APPLICATIONS

Eccentric bushings are used to position side thrust pins correctly. By using the eccentric bushings, the thrust pin can be positioned very precisely to adapt to the tolerance of the piece to be machined.



Part Reference	d	D1+0.1	D	D1 H7	f	h	h1	h2	L-0.2
ECB1	6	6.2	12	12	M4	10	2	4.4	9.9
ECB2	10	10.2	16	16	M4	12	2	5.4	11.9
ECB3	12	12.2	18	18	M4	14	2	6.6	13.9
ECB4	16	16.2	25	25	M6	18	3	7.9	17.9

Plain Ball Lock Pin



/ Pin and push button

AISI 303 stainless steel.

/ Balls and spring

Stainless steel.

/ Cylindrical body

For a safer grip, with groove for a metal ring.

/ Maximum working temperature

250°C

SPECIAL EXECUTIONS ON REQUEST

(For sufficient quantities) Other dimensions.

ACCESSORIES ON REQUEST

Metal ring to avoid loss or misplacement when the pin is in the rest position.

FEATURES AND APPLICATIONS

Ball lock pins are without knob therefore they have very compact shape and dimensions for use in very limited spaces. Ball lock pins are suitable for quick fixation or connection of parts to be machined, in particular for elements which need to be removed and reset continuously.

AISI 303 stainless steel, thanks to its high resistance to corrosion, allows the application of these lock pins on machines and equipment in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to corrosion resistant materials.

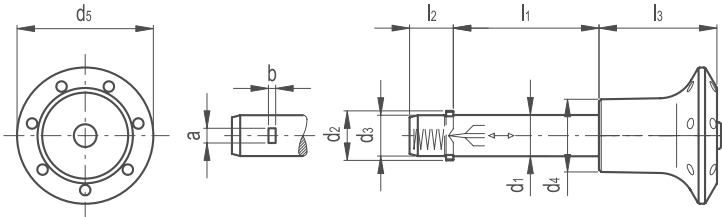
INSTRUCTIONS OF USE

By pressing the push button the two balls are freed and the pin can be pulled-out or inserted.

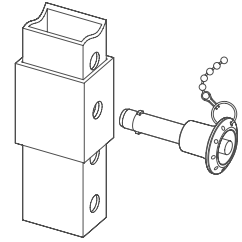


Part Reference	d $\frac{+0.04}{-0.08}$	d2	D	l	l1	L	Mounting Hole H11	Double sided Shearing Force (KN)
PBLP1	6	7	12	10	7	22	6	21
PBLP2	6	7	12	15	7	22	6	21
PBLP3	6	7	12	20	7	22	6	21
PBLP4	6	7	12	25	7	22	6	21
PBLP5	6	7	12	30	7	22	6	21
PBLP6	6	7	12	40	7	22	6	21
PBLP7	8	9.5	12	20	8.2	20	8	38
PBLP8	8	9.5	12	25	8.2	20	8	38
PBLP9	8	9.5	12	30	8.2	20	8	38
PBLP10	8	9.5	12	40	8.2	20	8	38
PBLP11	8	9.5	12	50	8.2	20	8	38
PBLP12	10	12	13	20	9.6	24.5	10	60
PBLP13	10	12	13	25	9.6	24.5	10	60
PBLP14	10	12	13	30	9.6	24.5	10	60
PBLP15	10	12	13	40	9.6	24.5	10	60
PBLP16	10	12	13	50	9.6	24.5	10	60
PBLP17	12	14.5	15	25	10.6	24.5	12	87
PBLP18	12	14.5	15	30	10.6	24.5	12	87
PBLP19	12	14.5	15	40	10.6	24.5	12	87
PBLP20	12	14.5	15	50	10.6	24.5	12	87
PBLP21	12	14.5	15	60	10.6	24.5	12	87

Lock Pin



Application example



/ Shank

Zinc-plated steel.

/ Pawls

AISI 304 stainless steel

/ Spring

AISI 301 stainless steel.

/ Knob

Glass-fibre reinforced polyamide based (PA) technopolymer, black colour, provided with holes for security ring. Resistant to solvents, oils, greases and other chemical agents.

/ Push button

Polyamide based (PA) technopolymer, red colour, glossy finish.

/ Working temperature

From -20°C to +80°C.

FEATURES AND APPLICATIONS

Lock pins are generally used for quick fixation or connection of parts to be machined, in particular for elements which need to be removed and reset continuously.

SPECIAL EXECUTIONS ON REQUEST

Other dimensions.

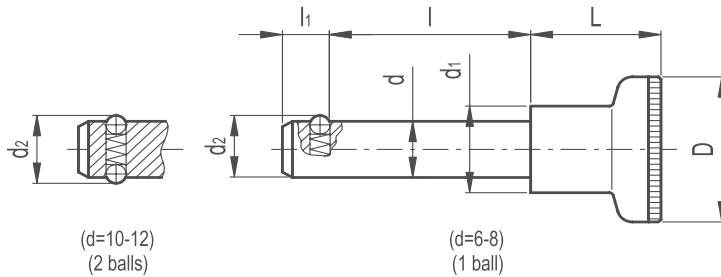
INSTRUCTIONS OF USE

By pressing the push button the two pawls are freed and the pin can be pulled-out or inserted.

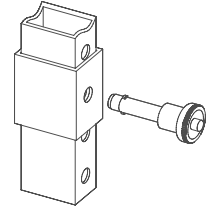


Part Ref.	d1-0.05	d2	d3	d4	d5	l1+0.4	l2	l3	a	b	Double Sided Shearing	
											Force (KN)	Weight (g)
LP1	6	7.5 +0.5	5.9	15	30	10	7	21	2.3	0.5	14	10
LP2	6	7.5 +0.5	5.9	15	30	16	7	21	2.3	0.5	14	12
LP3	6	7.5 +0.5	5.9	15	30	20	7	21	2.3	0.5	14	13
LP4	6	7.5 +0.5	5.9	15	30	25	7	21	2.3	0.5	14	15
LP5	6	7.5 +0.5	5.9	15	30	30	7	21	2.3	0.5	14	15
LP6	6	7.5 +0.5	5.9	15	30	40	7	21	2.3	0.5	14	16
LP7	8	10 +0.5	7.9	15	30	20	8.4	21	2.8	1	28	18
LP8	8	10 +0.5	7.9	15	30	25	8.4	21	2.8	1	28	19
LP9	8	10 +0.5	7.9	15	30	30	8.4	21	2.8	1	28	22
LP10	8	10 +0.5	7.9	15	30	40	8.4	21	2.8	1	28	24
LP11	8	10 +0.5	7.9	15	30	50	8.4	21	2.8	1	28	28
LP12	10	12 +1	9.9	18	34	20	9.8	26	3.3	1	38	27
LP13	10	12 +1	9.9	18	34	25	9.8	26	3.3	1	38	30
LP14	10	12 +1	9.9	18	34	30	9.8	26	3.3	1	38	31
LP15	10	12 +1	9.9	18	34	40	9.8	26	3.3	1	38	37
LP16	10	12 +1	9.9	18	34	50	9.8	26	3.3	1	38	42
LP17	12	14 +1	11.9	18	34	25	11.3	26	3.8	1	61	39
LP18	12	14 +1	11.9	18	34	30	11.3	26	3.8	1	61	43
LP19	12	14 +1	11.9	18	34	40	11.3	26	3.8	1	61	50
LP20	12	14 +1	11.9	18	34	50	11.3	26	3.8	1	61	60
LP21	12	14 +1	11.9	18	34	60	11.3	26	3.8	1	61	62

Spring Loaded Ball Lock Pins



Application example


/ Pin

AISI 303 stainless steel.

/ Balls and spring

Stainless steel.

 \emptyset d from 6 to 8: one ball.

 \emptyset d from 10 to 12: two balls.

/ Knurled knob

Polyamide based (PA) technopolymer, black colour, matte finish. Resistant to solvents, oils, greases and other chemical agents.

/ Working temperature

 From -30°C to $+80^{\circ}\text{C}$.

FEATURES AND APPLICATIONS

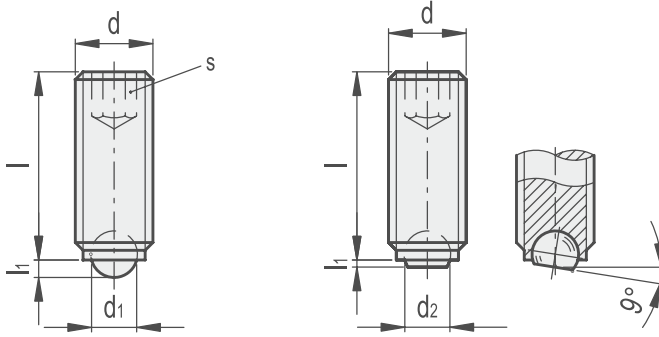
The two balls of SLBLP1 are not provided with a locking mechanism but they are kept in position by a spring. This is the reason why their tensile strength is limited compared to BLP. Ball lock pins are suitable for quick fixation or connection of parts to be machined, in particular for elements which need to be removed and inserted continuously.

AISI 303 stainless steel, thanks to its high resistance to corrosion, allows the application of these lock pins on machines and equipment in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to use corrosion resistant materials.



Part Ref.	d h9	d2	D	d1	l	l1	L	Mounting Hole D12	Axial Holding Force (N)	Double Sided Sharing Force (KN)
SLBLP1	6	6.5	25	14.5	10	5	22.5	6	8	22
SLBLP2	6	6.5	25	14.5	15	5	22.5	6	8	22
SLBLP3	6	6.5	25	14.5	20	5	22.5	6	8	22
SLBLP4	6	6.5	25	14.5	25	5	22.5	6	8	22
SLBLP5	6	6.5	25	14.5	30	5	22.5	6	8	22
SLBLP6	6	6.5	25	14.5	50	5	22.5	6	8	22
SLBLP7	8	8.7	25	14.5	15	6.3	22.5	8	15	40
SLBLP8	8	8.7	25	14.5	20	6.3	22.5	8	15	40
SLBLP9	8	8.7	25	14.5	25	6.3	22.5	8	15	40
SLBLP10	8	8.7	25	14.5	30	6.3	22.5	8	15	40
SLBLP11	8	8.7	25	14.5	50	6.3	22.5	8	15	40
SLBLP12	10	12	31	18.5	15	8.7	27	10	30	62
SLBLP13	10	12	31	18.5	20	8.7	27	10	30	62
SLBLP14	10	12	31	18.5	25	8.7	27	10	30	62
SLBLP15	10	12	31	18.5	30	8.7	27	10	30	62
SLBLP16	10	12	31	18.5	50	8.7	27	10	30	62
SLBLP17	12	14.5	31	18.5	20	9.5	27	12	32	90
SLBLP18	12	14.5	31	18.5	30	9.5	27	12	32	90
SLBLP19	12	14.5	31	18.5	40	9.5	27	12	32	90
SLBLP20	12	14.5	31	18.5	50	9.5	27	12	32	90

Grub Screw with Ball Terminal



MATERIAL

/ Black-oxide steel, hexagon socket head

STANDARD EXECUTIONS

Hardened steel ball.

/ TYPE-A: ball for applications requiring a single point contact

/ TYPE-B: reversible flat-faced ball for fitting non-parallel surfaces

Maximum ball plane inclination = 9°.

FEATURES AND APPLICATIONS

GSB grub screws with ball terminal are suitable for locking pieces to be machined.

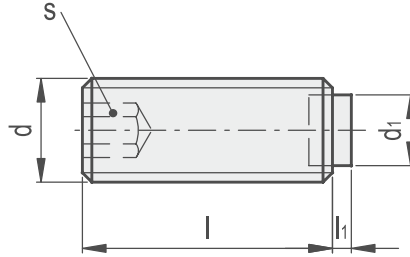


Part Ref.	Description	d	l	l1~	d1	d2	s	Weight (g)
GSB14001	M4-6-A	M4	6	0.8	2.5	-	2	1
GSB14003	M4-10-A	M4	10	0.8	2.5	-	2	1
GSB14006	M4-16-A	M4	16	0.8	2.5	-	2	1
GSB14011	M5-8-A	M5	8	0.9	3	-	2.5	1
GSB14013	M5-12-A	M5	12	0.9	3	-	2.5	1
GSB14016	M5-20-A	M5	20	0.9	3	-	2.5	2
GSB14021	M6-10-A	M6	10	1.4	4	-	3	2
GSB14023	M6-16-A	M6	16	1.4	4	-	3	3
GSB14026	M6-25-A	M6	25	1.4	4	-	3	4
GSB14031	M8-10-A	M8	10	1.7	5.5	-	4	3
GSB14033	M8-12-A	M8	12	1.7	5.5	-	4	3
GSB14036	M8-20-A	M8	20	1.7	5.5	-	4	6
GSB14038	M8-30-A	M8	30	1.7	5.5	-	4	9
GSB14041	M10-12-A	M10	12	2.3	7	-	5	5
GSB14043	M10-16-A	M10	16	2.3	7	-	5	7
GSB14046	M10-25-A	M10	25	2.3	7	-	5	11
GSB14048	M10-35-A	M10	35	2.3	7	-	5	16
GSB14051	M12-16-A	M12	16	2.8	8	-	6	10
GSB14053	M12-20-A	M12	20	2.8	8	-	6	13
GSB14056	M12-30-A	M12	30	2.8	8	-	6	20
GSB14058	M12-40-A	M12	40	2.8	8	-	6	28
GSB14061	M16-20-A	M16	20	4	12	-	8	22
GSB14063	M16-25-A	M16	25	4	12	-	8	28
GSB14066	M16-35-A	M16	35	4	12	-	8	41
GSB14068	M16-50-A	M16	50	4	12	-	8	48
GSB14321	M6-10-B	M6	10	0.6	4	3.2	3	2

Continued on next page

Part Ref.	Description	d	l	l1~	d1	d2	s	Weight (g)
GSB14323	M6-16-B	M6	16	0.6	4	3.2	3	3
GSB14326	M6-25-B	M6	25	0.6	4	3.2	3	4
GSB14331	M8-10-B	M8	10	0.7	5.5	4.2	4	3
GSB14333	M8-12-B	M8	12	0.7	5.5	4.2	4	3
GSB14336	M8-20-B	M8	20	0.7	5.5	4.2	4	6
GSB14338	M8-30-B	M8	30	0.7	5.5	4.2	4	9
GSB14341	M10-12-B	M10	12	0.8	7	5.7	5	5
GSB14343	M10-16-B	M10	16	0.8	7	5.7	5	7
GSB14346	M10-25-B	M10	25	0.8	7	5.7	5	11
GSB14348	M10-35-B	M10	35	0.8	7	5.7	5	16
GSB14351	M12-16-B	M12	16	0.9	8	7.1	6	10
GSB14353	M12-20-B	M12	20	0.9	8	7.1	6	13
GSB14356	M12-30-B	M12	30	0.9	8	7.1	6	20
GSB14358	M12-40-B	M12	40	0.9	8	7.1	6	28
GSB14361	M16-20-B	M16	20	1.5	12	9.7	8	22
GSB14363	M16-25-B	M16	25	1.5	12	9.7	8	28
GSB14366	M16-35-B	M16	35	1.5	12	9.7	8	41
GSB14368	M16-50-B	M16	50	1.5	12	9.7	8	48

Grub Screws



MATERIAL

/ Black-oxide steel, class 5.8 (tensile strength 500 N/mm²), hexagon socket head.

STANDARD EXECUTIONS

/ TYPE-KU: acetal resin based (POM) technopolymer bolt, natural colour.
/ TYPE-MS: brass bolt.

SPECIAL EXECUTIONS ON REQUEST

/ Different threadings and lengths.

FEATURES AND APPLICATIONS

GS grub screws, thanks to the brass or technopolymer bolt, prevent the contact surface from being damaged.



MS Type

Part Ref.	Description	d Gg	d1	l	l1	s	Weight (g)
GS13801	M4-6-MS	M4	2.5	6	0.5	2	1
GS13802	M4-8-MS	M4	2.5	8	0.5	2	1
GS13803	M4-10-MS	M4	2.5	10	0.5	2	1
GS13804	M4-12-MS	M4	2.5	12	0.5	2	1
GS13805	M4-16-MS	M4	2.5	16	0.5	2	1
GS13806	M4-20-MS	M4	2.5	20	0.5	2	1
GS13811	M5-8-MS	M5	3	8	0.5	2.5	1
GS13812	M5-10-MS	M5	3	10	0.5	2.5	1
GS13813	M5-12-MS	M5	3	12	0.5	2.5	1
GS13814	M5-16-MS	M5	3	16	0.5	2.5	2
GS13815	M5-20-MS	M5	3	20	0.5	2.5	2
GS13816	M5-25-MS	M5	3	25	0.5	2.5	3
GS13821	M6-10-MS	M6	4	10	1	3	1
GS13822	M6-12-MS	M6	4	12	1	3	2
GS13823	M6-16-MS	M6	4	16	1	3	2
GS13824	M6-20-MS	M6	4	20	1	3	3
GS13825	M6-25-MS	M6	4	25	1	3	4
GS13826	M6-32-MS	M6	4	32	1	3	5
GS13827	M6-40-MS	M6	4	40	1	3	6
GS13828	M6-50-MS	M6	4	50	1	3	8
GS13831	M8-12-MS	M8	6	12	1.5	4	3
GS13832	M8-16-MS	M8	6	16	1.5	4	5
GS13833	M8-20-MS	M8	6	20	1.5	4	6
GS13834	M8-25-MS	M8	6	25	1.5	4	7
GS13835	M8-32-MS	M8	6	32	1.5	4	10
GS13836	M8-40-MS	M8	6	40	1.5	4	12

Continued on next page

Part Ref.	Description	d 6g	d1	l	l1	s	Weight (g)
GS13837	M8-50-MS	M8	6	50	1.5	4	15
GS13838	M8-63-MS	M8	6	63	1.5	4	19
GS13841	M10-16-MS	M10	8	16	2	5	7
GS13842	M10-20-MS	M10	8	20	2	5	9
GS13843	M10-25-MS	M10	8	25	2	5	11
GS13844	M10-32-MS	M10	8	32	2	5	15
GS13845	M10-40-MS	M10	8	40	2	5	18
GS13846	M10-50-MS	M10	8	50	2	5	23
GS13847	M10-63-MS	M10	8	63	2	5	30
GS13848	M10-80-MS	M10	8	80	2	5	38
GS13851	M12-20-MS	M12	10	20	2	6	12
GS13852	M12-25-MS	M12	10	25	2	6	16
GS13853	M12-32-MS	M12	10	32	2	6	21
GS13854	M12-40-MS	M12	10	40	2	6	27
GS13855	M12-50-MS	M12	10	50	2	6	34
GS13856	M12-63-MS	M12	10	63	2	6	43
GS13857	M12-80-MS	M12	10	80	2	6	56
GS13858	M12-100-MS	M12	10	100	2	6	70

KU Type

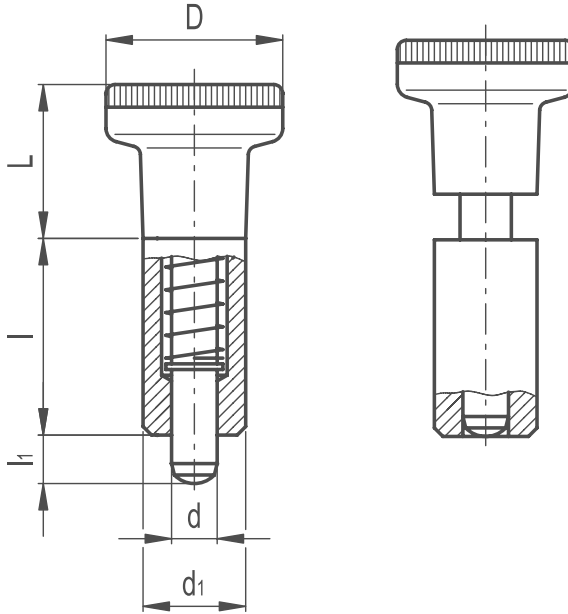
Part Ref.	Description	d 6g	d1	l	l1	s	Weight (g)
GS13701	M4-6-KU	M4	2	6	1	2	1
GS13702	M4-8-KU	M4	2	8	1	2	1
GS13703	M4-10-KU	M4	2	10	1	2	1
GS13704	M4-12-KU	M4	2	12	1	2	1
GS13705	M4-16-KU	M4	2	16	1	2	1
GS13706	M4-20-KU	M4	2	20	1	2	1
GS13711	M5-8-KU	M5	3	8	1	2.5	1
GS13712	M5-10-KU	M5	3	10	1	2.5	1
GS13713	M5-12-KU	M5	3	12	1	2.5	1
GS13714	M5-16-KU	M5	3	16	1	2.5	2
GS13715	M5-20-KU	M5	3	20	1	2.5	2
GS13716	M5-25-KU	M5	3	25	1	2.5	3
GS13720	M6-10-KU	M6	3.5	10	1.3	3	1
GS13721	M6-12-KU	M6	3.5	12	1.3	3	1
GS13722	M6-16-KU	M6	3.5	16	1.3	3	2
GS13723	M6-20-KU	M6	3.5	20	1.3	3	3
GS13724	M6-25-KU	M6	3.5	25	1.3	3	4
GS13725	M6-32-KU	M6	3.5	32	1.3	3	5
GS13726	M6-40-KU	M6	3.5	40	1.3	3	6
GS13728	M6-50-KU	M6	3.5	50	1.3	3	8
GS13729	M8-12-KU	M8	5	12	1.6	4	2
GS13730	M8-16-KU	M8	5	16	1.6	4	4
GS13731	M8-20-KU	M8	5	20	1.6	4	5
GS13732	M8-25-KU	M8	5	25	1.6	4	7
GS13733	M8-32-KU	M8	5	32	1.6	4	9
GS13734	M8-40-KU	M8	5	40	1.6	4	11
GS13736	M8-50-KU	M8	5	50	1.6	4	14
GS13738	M8-63-KU	M8	5	63	1.6	4	18

Continued on next page

Grub Screws

Part Ref.	Description	d 6g	d1	l	l1	s	Weight (g)
GS13739	M10-16-KU	M10	6.5	16	1.9	5	5
GS13740	M10-20-KU	M10	6.5	20	1.9	5	7
GS13741	M10-25-KU	M10	6.5	25	1.9	5	9
GS13742	M10-32-KU	M10	6.5	32	1.9	5	13
GS13743	M10-40-KU	M10	6.5	40	1.9	5	16
GS13744	M10-50-KU	M10	6.5	50	1.9	5	21
GS13746	M10-63-KU	M10	6.5	63	1.9	5	28
GS13748	M10-80-KU	M10	6.5	80	1.9	5	36
GS13749	M12-20-KU	M12	8	20	2.1	6	9
GS13750	M12-25-KU	M12	8	25	2.1	6	13
GS13751	M12-32-KU	M12	8	32	2.1	6	18
GS13752	M12-40-KU	M12	8	40	2.1	6	24
GS13753	M12-50-KU	M12	8	50	2.1	6	31
GS13754	M12-63-KU	M12	8	63	2.1	6	40
GS13756	M12-80-KU	M12	8	80	2.1	6	52
GS13758	M12-100-KU	M12	8	100	2.1	6	66

Indexing Plungers



/ Plain body

Black-oxide steel, welding quality.

/ Plunger

Black-oxide steel with hardened end.

Suggested matching hole in G7 tolerance.

/ "Push / Pull" knurled knob

High resilience polyamide based (PA) technopolymer, black colour, matte finish. Resistant to solvents, oils, greases and other chemical agents.

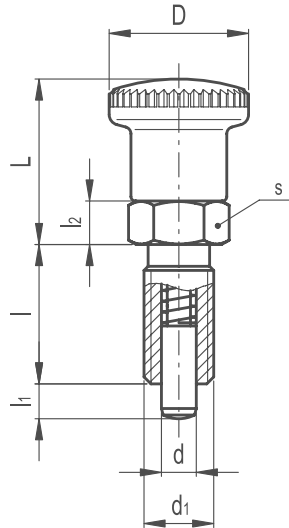
APPLICATIONS

Indexing plungers are especially designed for assembly by means of welding.



Part Reference	d -0.02	L	d1 h9	D	l	l1	Spring Pressure	
							Preload (N~)	Max. load (N~)
IPW1-3272	5	18	12	21	22	5	7	16
IPW2-3272	6	22.5	14	25	26	6	6.5	15
IPW3-3272	8	27	18	31	34	8	12	31

Index Plunger



/ Threaded body

Black-oxide steel.

/ Plunger

Black-oxide steel with hardened end.

Suggested matching hole in H7 tolerance.

/ Locking nut

Black-oxide steel.

/ "Push / Pull" knurled knob

High resilience polyamide based (PA) technopolymer, black colour, matte finish. Resistant to solvents, oils, greases and other chemical agents.

ACCESSORIES ON REQUEST

(For sufficient quantities)

Black-oxide steel distance bushings are available for making up for the length of the threading in case the plunger is assembled on thin sheets.

APPLICATIONS

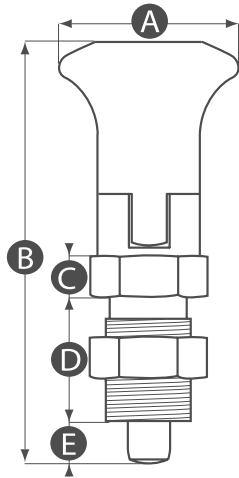
Indexing plungers with locking nut are used where positioning operations are required and in those applications where the plunger needs to be locked in the retracted position.



Part Reference	d	d1	D	L11	L1	l	L2	s
IP1-3270	5	m10 x 1	21	49-0	5	17	5	12
IP2-3270	6	m12 x 1.5	25	59-0	6	20	6	14
IP3-3270	8	m16 x 1.5	31	73.5	7	26	8	19

Index Plunger

Spring Loaded with Locking Rest Position



MATERIAL

/ High impact resistant thermoplastic

FINISH

/ Matt

BODY MATERIAL

/ Blackened steel or stainless steel

STANDARD COLOUR

/ Black knob

OPTIONS

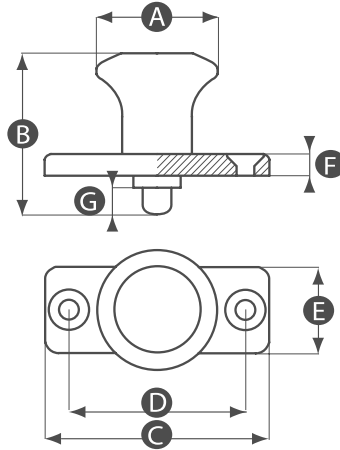
Comes as standard with 90° locking rest position in plunger body.



Part No.	A	B	C	D	E	Thread size	Plunger diameter (mm)	Body material
IP5-M10L	21	51	5	17	5	M10x1.0	5	Blackened steel
IP6-M12L	25	61	6	20	6	M12x1.5	6	Blackened steel
IP7-M16L	31	76	8	26	7	M16x1.5	8	Blackened steel
IP5-M10LSS	21	51	5	17	5	M10x1.0	5	Stainless steel
IP6-M12LSS	25	61	6	20	6	M12x1.5	6	Stainless steel
IP7-M16LSS	31	76	8	26	7	M16x1.5	8	Stainless steel

Index Plunger

Rest Position and Fixing Plate



MATERIAL

/ High impact resistant thermoplastic

FINISH

/ Matt

FIXING PLATE MATERIAL

/ Zinc plated diecast steel

STANDARD COLOUR

/ Black knob

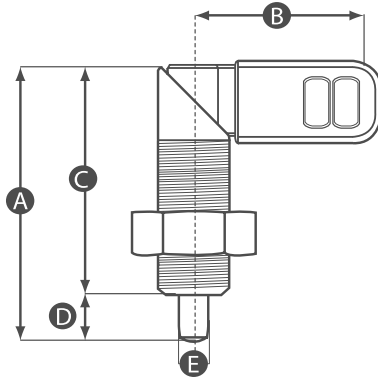
OPTIONS

Available with or without a 90° rest position.



Part No.	A	B	C	D	E	F	G	Plunger diameter (mm)	Rest position
IPR6-25	25	37	40	30	18	5	6	6	No
IPR8-31	31	44	46	34	20	6	8	8	No
IPR6-RP	25	37	40	30	18	5	6	6	Yes
IPR8-RP	31	44	46	34	20	6	8	8	Yes

Cam Plunger



MATERIAL

/ Blackened steel or stainless steel

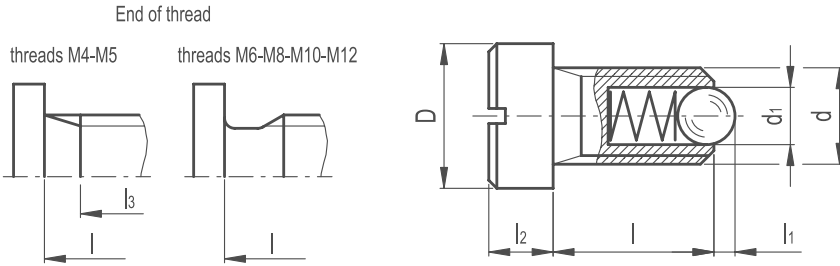
INCLUDES

Comes as standard with locking nut. Stainless steel body comes complete with black plastic cap.



Part No.	A	B	C	D	E	Thread size	Plunger diameter (mm)	Body material	Includes cap
CL8M12	47	32	39	8	8	M12x1.5	8	Blackened steel	No
CL8M20	69	37	36	12	8	M20x1.5	8	Blackened steel	No
CL10M20	69	37	36	12	10	M20x1.5	10	Blackened steel	No
CL12M20	69	37	36	12	12	M20x1.5	12	Blackened steel	No
CL8M2OSS	69	52	36	12	8	M20x1.5	8	Stainless steel	Yes
CL10M2OSS	69	52	36	12	10	M20x1.5	10	Stainless steel	Yes
CL12M2OSS	69	52	36	12	12	M20x1.5	12	Stainless steel	Yes

Threaded Plungers with Screwdriver Slotted Head



/ Body

AISI 303 stainless steel, screwdriver slotted head.

/ Ball and spring

Hardened stainless steel ball, stainless steel spring.

FEATURES AND APPLICATIONS

The screwdriver slot on the head of the plunger is also useful to provide an indication of the position of the blocked element. AISI 303 stainless steel, thanks to its high resistance to corrosion, allows the application of these threaded plungers on machines and equipment in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to use corrosion resistant materials.

/ Body

Black-oxide steel, screwdriver slotted head.

/ Ball and spring

Hardened steel ball, steel spring.

FEATURES

The screwdriver slot on the head of the plunger is also useful to provide an indication of the position of the blocked element.



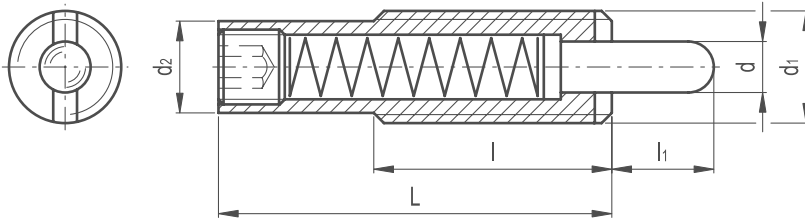
Spring Plunger Headed With Ball

Part Reference	d	d1	D	l	l1	l2	l3	Initial	Max
SPHB1	M4	2.5	6	6.5	0.8	3	5	8	14
SPHB2	M5	3	8	8.5	0.9	4	6.7	8	14
SPHB3	M6	3.5	10	9	1	5	-	11	18
SPHB4	M8	4.5	13	11	1.5	5.5	-	18	31
SPHB5	M10	6	16	14	2	6	-	24	45
SPHB6	M12	8	18	15	2.5	7	-	26	49

Spring Plunger Headed With Ball - Stainless Steel

Part Reference	d	d1	D	l	l1	l2	l3	Initial	Max
SPHB1SS	M4	2.5	6	6.5	0.8	3	5	8	14
SPHB2SS	M5	3	8	8.5	0.9	4	6.7	8	14
SPHB3SS	M6	3.5	10	9	1	5	-	11	18
SPHB4SS	M8	4.5	13	11	1.5	5.5	-	18	31
SPHB5SS	M10	6	16	14	2	6	-	24	45
SPHB6SS	M12	8	18	15	2.5	7	-	26	49

Threaded Bolt Spring Plungers Long Stroke



/ Threaded body

Black-oxide steel, partially coated with PFB polyamide blue coating for threads instant locking.

/ Bolt

Case-hardened ground black-oxide steel.

/ Spring

Steel.

/ Execution L: with normal end-force.

/ Execution LS: with heavy end-force with not burnished hexagon socket.

/ Working temperature

From -50°C to +90°C.

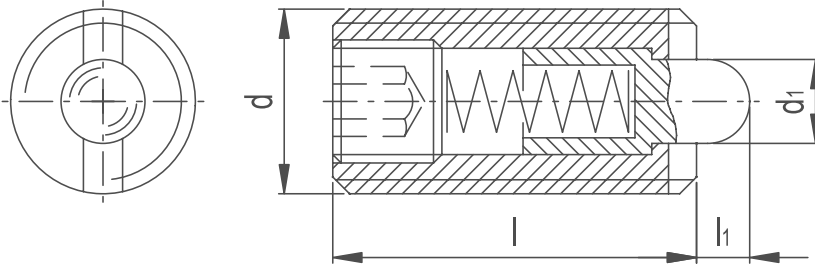
APPLICATIONS

Threaded bolt spring plungers are normally used for machining metal sheets, as ejectors for push-on or push-off operations or as cushion.



Part Reference	d1	d	d2	L	l	l1	Initial	Max
SPHL1	M10	4	7.8	35	25	8	6	16
SPHL2	M12	5.5	9.5	43	35	10	4	18
SPHL3	M16	8	13.4	58	35	15	9	33
SPHL4	M16	8	13.4	58	35	20	4	23
SPHL5	M16	8	13.4	98	35	30	13	47
SPHL6LS	M12	5.5	9.5	43	35	10	12	44
SPHL7LS	M16	8	13.4	58	35	15	10	57
SPHL8LS	M16	8	13.4	98	35	30	20	80

Threaded Bolt Spring Plungers



THREADED BODY

/ Black-oxide steel, hexagon socket head.

BOLT AND SPRING

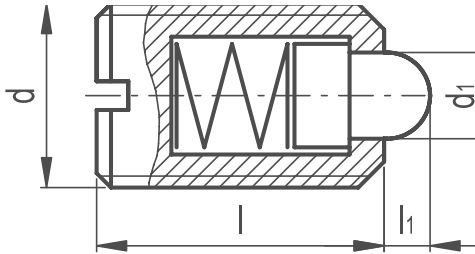
/ Hardened steel bolt, steel spring with normal end-force.

Special executions on request.



Part Reference	d	d1	l \pm 0.2	l1	Initial	Max
SPH1-3220	M3	1	12	1	2	4
SPH2-3220	M4	1.5	15	1.5	4.5	16
SPH3-3220	M5	2.4	18	2.3	6	19
SPH4-3220	M6	2.7	20	2.5	6	19
SPH5-3220	M8	3.5	22	3	10	39
SPH6-3220	M10	4	22	3	10	39
SPH7-3220	M12	6	28	4	12	53
SPH8-3220	M16	7.5	32	5	45	10
SPH9-3220	M20	10	40	7	52	125
SPH10-3220	M24	12	52	10	70	170

Threaded Bolt Spring Plungers



THREADED BODY

/ Black-oxide steel, screwdriver slotted head.

BOLT AND SPRING

/ Execution B: hardened steel bolt, black-oxide steel spring with normal end-force.

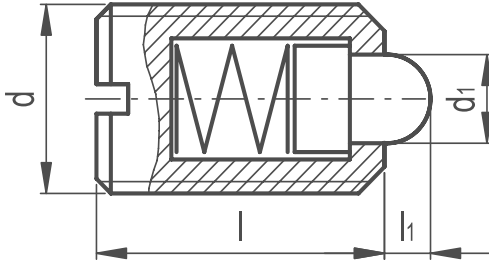
/ BS: zinc-plated steel bolt, black-oxide steel spring with heavy end-force.

Special executions on request.



Part Reference	d	d \pm 0.1	l \pm 0.1	l1	Initial	Max
SPP1-3215	M4	1.8	9	1.5	4.5	12.5
SPP2-3215	M5	2.4	12	2	5	13
SPP3-3215	M6	2.7	14	2	6	17
SPP4-3215	M8	3.8	16	2	16	33
SPP5-3215	M10	4.5	19	2.5	19	42
SPP6-3215	M12	6	22	3.5	22	57
SPP7-3215	M16	8.5	24	4.5	38	78
SPP8-3215	M20	10	30	6.5	39	81
SPP9-3215	M24	13	34	8	72	155

Threaded Bolt Spring Plungers



THREADED BODY

/ AISI 303 stainless steel, screwdriver slotted head.

BOLT AND SPRING

/ Nitrided AISI 303 stainless steel bolt, stainless steel spring with normal end-force.

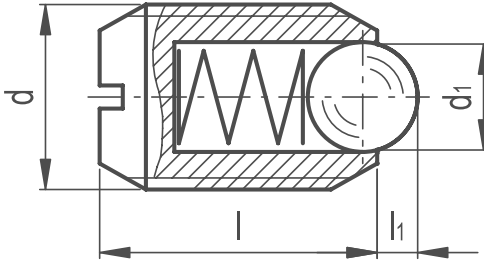
FEATURES AND APPLICATIONS

AISI 303 stainless steel, thanks to its high resistance to corrosion, allows the application of these plungers on machines and equipment in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to use corrosion resistant materials.



Part Reference	d	d \pm -0.1	l \pm -0.1	l1	Initial	Max
SPP1SS-3215	M4	1.8	9	1.5	4.5	12.5
SPP2SS-3215	M5	2.4	12	2	5	13
SPP3SS-3215	M6	2.7	14	2	6	17
SPP4SS-3215	M8	3.8	16	2	16	33
SPP5SS-3215	M10	4.5	19	2.5	19	42
SPP6SS-3215	M12	6	22	3.5	22	57
SPP7SS-3215	M16	8.5	24	4.5	38	78
SPP8SS-3215	M20	10	30	6.5	39	81
SPP9SS-3215	M24	13	34	8	72	155

Threaded Ball Spring Plungers



/ Threaded body

Black-oxide steel, screwdriver slotted head.

/ Ball and spring

SPB: hardened steel ball, steel spring with normal end-force.

/ Threaded body

AISI 303 stainless steel, screwdriver slotted head.

/ Ball and spring

SPBSS: hardened stainless steel ball, stainless steel spring with normal end-force.



FEATURES AND APPLICATIONS

AISI 303 stainless steel, thanks to its high resistance to corrosion, allows the application of these plungers on machines and equipment in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to use corrosion resistant materials.

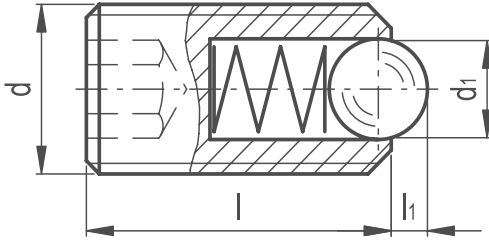
Spring Plunger with Ball and Slot

Part Reference	d	d1	l+/-0.1	l1	Initial	Max
SPB1-3210	M3	1.5	7	0.4	3	4.5
SPB2-3210	M4	2.5	9	0.8	6	14.5
SPB3-3210	M5	3	12	0.9	8	14
SPB4-3210	M6	3.5	14	1	11	18
SPB5-3210	M8	4.5	16	1.5	18	31
SPB6-3210	M10	6	19	2	24	45
SPB7-3210	M12	8	22	2.5	26	49
SPB8-3210	M16	10	24	3.5	41	86
SPB9-3210	M20	12	30	4.5	56	111
SPB10-3210	M24	15	34	5.5	81	151

Spring Plunger Stainless Steel with Ball and Slot

Part Reference	d	d1	l+/-0.1	l1	Initial	Max
SPB1SS	M3	1.5	7	0.4	3	4.5
SPB2SS	M4	2.5	9	0.8	6	14.5
SPB3SS	M5	3	12	0.9	8	14
SPB4SS	M6	3.5	14	1	11	18
SPB5SS	M8	4.5	16	1.5	18	31
SPB6SS	M10	6	19	2	24	45
SPB7SS	M12	8	22	2.5	26	49
SPB8SS	M16	10	24	3.5	41	86
SPB9SS	M20	12	30	4.5	56	111
SPB10SS	M24	15	34	5.5	81	151

Threaded Ball Spring Plungers



/ Threaded body

Black-oxide steel, hexagon socket head.

/ Ball and spring

Hardened steel ball, steel spring with normal end-force.

/ Threaded body

AISI 303 stainless steel, hexagon socket head.

/ Ball and spring

Hardened stainless steel ball, stainless steel spring with normal end-force.



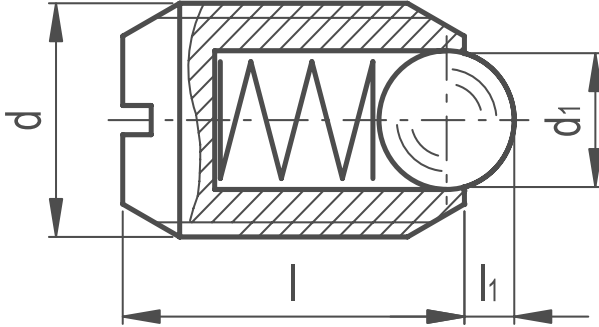
Spring Plunger with Ball and Hex

Part Reference	d	d1	l±0.1	l1	Initial	Max
SPBH1	M4	2.5	12	0.8	8.5	14
SPBH2	M5	3	14	0.9	8	14
SPBH3	M6	3.5	15	1	11	18
SPBH4	M8	4.5	18	1.5	18	31
SPBH5	M10	6	23	2	24	45
SPBH6	M12	8	26	2.5	26	49
SPBH7	M16	10	33	3.5	41	86
SPBH8	M20	12	43	4.5	66	111
SPBH9	M24	15	48	5.5	81	151

Spring Plunger Stainless Steel with Ball and Hex

Part Reference	d	d1	l±0.1	l1	Initial	Max
SPBH1SS	M4	2.5	12	0.8	8.5	14
SPBH2SS	M5	3	14	0.9	8	14
SPBH3SS	M6	3.5	15	1	11	18
SPBH4SS	M8	4.5	18	1.5	18	31
SPBH5SS	M10	6	23	2	24	45
SPBH6SS	M12	8	26	2.5	26	49
SPBH7SS	M16	10	33	3.5	41	86
SPBH8SS	M20	12	43	4.5	66	111
SPBH9SS	M24	15	48	5.5	81	15

Threaded Ball Spring Plungers



THREADED BODY

- / Acetal resin based (POM) technopolymer, screwdriver slotted head.
- / Resistant to solvents, oils, greases and other chemical agents.

BALL AND SPRING

- / Execution S: hardened stainless steel ball, stainless steel spring.
- / SPBP: technopolymer ball, stainless steel spring.

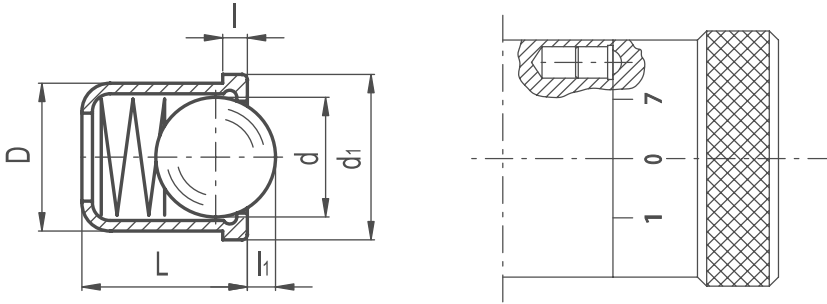
WORKING TEMPERATURE

- / From -30°C to +50°C.



Part Reference	d	d1	l	l1	Initial	Max
SPBPS1	M6	3.5	14	1	12	17
SPBPS2	M8	5	16	1.5	20	35
SPBPS3	M10	6	19	2	25	45
SPBP1	M6	3.5	14	1	12	17
SPBP2	M8	5	16	1.5	20	35
SPBP3	M10	6	19	2	25	45

Smooth Ball Spring Plungers



BODY

- / Acetal resin based (POM) technopolymer.
- / Resistant to solvents, oils, greases and other chemical agents.

BALL AND SPRING

- / SBSB: hardened stainless steel ball, stainless steel spring.
- / P: technopolymer ball, stainless steel spring.

WORKING TEMPERATURE

- / From -30°C to +50°C.

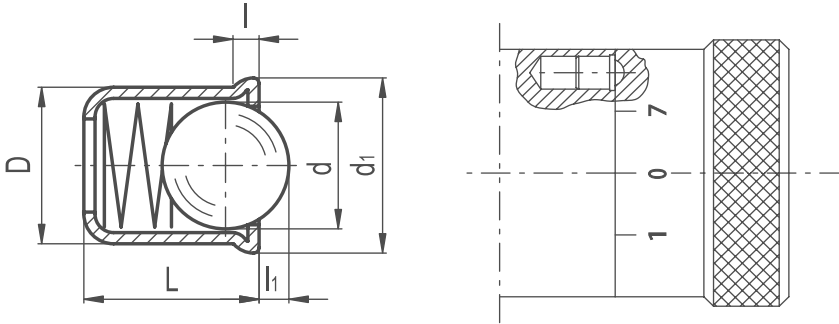
ACCESSORIES

- HOLDERS for spring plungers type HSBP to optimise the use of smooth ball spring plungers.



Part Reference	D+/-0.1	L	d	d1	l+/-0.1	l1	Initial	Max
SBSB1	4	5	3	4.6	1	0.8	2.5	6.5
SBSB2	5	6	4	5.6	1	1	4.5	9
SBSB3	6	7	5	6.5	1	1.6	6.5	13
SBSB4	8	9	6.5	8.5	1	1.9	8	18
SBSB5	10	13.5	8.5	11	1.5	2.4	12	23
SBSB6	12	16	10	13	1.5	3.3	13	25
SBSBP7	4	5	3	4.6	1	0.8	2.5	6.5
SBSBP8	5	6	4	5.6	1	1	4.5	9
SBSBP9	6	7	5	6.5	1	1.6	6.5	13
SBSBP10	8	9	6.5	8.5	1	1.9	8	18

Smooth Ball Spring Plungers



/ Body

Stainless steel.

/ Ball and spring

Hardened stainless steel ball, stainless steel spring.

FEATURES AND APPLICATIONS

Stainless steel, thanks to its high resistance to corrosion, allows the application of these smooth plungers on machines and equipment in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to use corrosion resistant materials.

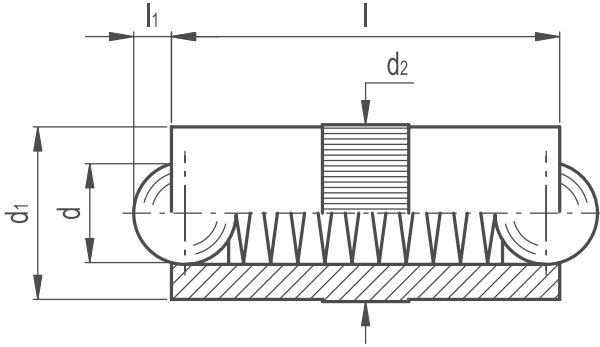


ACCESSORIES

Holders for spring plungers type HSBP to optimise the use of smooth ball spring plungers.

Part Reference	D \pm -0.1	L	d	d1	l	l1	Initial	Max
SP1-3230	4	5	3	4,6	0,9	1	2,5	6
SP2-3230	5	6	4	5,6	0,9	1,4	3	6,5
SP3-3230	6	7	5	6,5	1	1,8	5,5	11,5
SP4-3230	8	9	6,5	8,5	1,1	2,4	7	12,5
SP5-3230	10	13,5	8,5	11	1,7	3,3	8,5	18,5
SP6-3230	12	16	10	13	2,3	4	12	26,5

Spring Plunger Double Ended Ball Type



/ Body

Brass with central horizontal knurling.

/ Balls and spring

Hardened stainless steel balls, stainless steel spring.

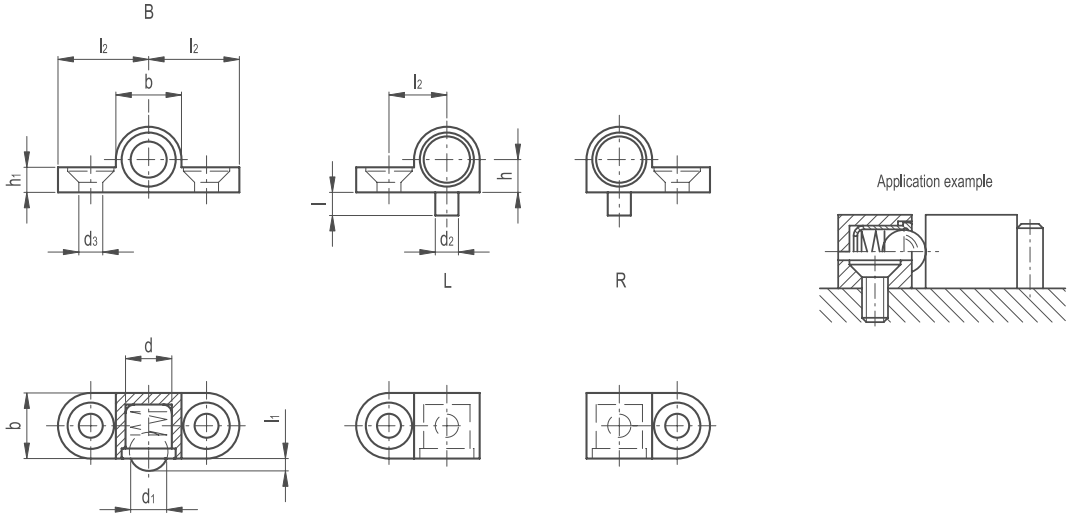
FEATURES AND APPLICATIONS

Double ended smooth balls spring plungers represent a further development of plungers type SBSB.



Part Reference	d1	2	d2+0.05	l	l1	Initial	Max
SPBDE1	2.5	2	2.52	5.3	0.65	1.3	2.5
SPBDE2	3	2.5	3.02	7.3	0.8	2	4.5
SPBDE3	4	3	4.03	9	0.9	2.5	7.5
SPBDE4	5	4	5.03	10.8	1.2	3.5	8
SPBDE5	7	6	7.03	14	2	4	12
SPBDE6	8	6.5	8.03	18	2.1	6	15

Holders for Smooth Ball Spring Plungers



MATERIAL

/ Nickel-plated die-cast zinc.

FIXING

- / Execution B: two-side fixing wings.
- / Execution L: left-side fixing wing with positioning pin.
- / Execution R: right-side fixing wing with positioning pin.

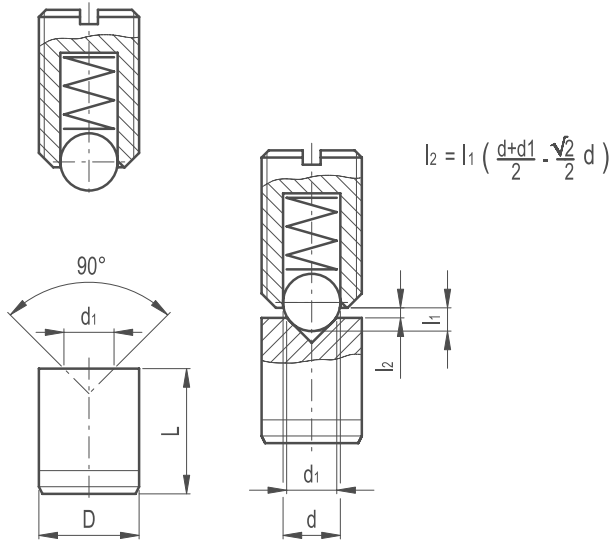
APPLICATIONS

Holders for spring plungers optimise the use of smooth ball spring plungers type.



Part Reference	D \pm 0.05	d1	d2 \pm 0.05	b	h \pm 0.05	h1	l	l1 \pm 0.1	l2 \pm 0.05	Hole d3	Screw
HSBP1B	6	5	3	8.5	4.25	3.2	3	1.5	7.5	3.2	M3
HSBP2B	8	6.5	4	10.5	5.25	4.2	4	1.8	9.5	4.3	M4
HSBP3L	6	5	3	8.5	4.25	3.2	3	1.5	7.5	3.2	M3
HSBP4L	8	6.5	4	10.5	5.25	4.2	4	1.8	9.5	4.3	M4
HSBP5R	6	5	3	8.5	4.25	3.2	3	1.5	7.5	3.2	M3
HSBP6R	8	6.5	4	10.5	5.25	4.2	4	1.8	9.5	4.3	M4

Striker Bushes



MATERIAL

/ Ground and hardened steel.

APPLICATIONS

Striker bushings are used together with ball or bolt spring plungers when a high wear resistance contact surface is required. In particular, they are recommended for use with plungers with high load springs and plungers with reinforced spring.

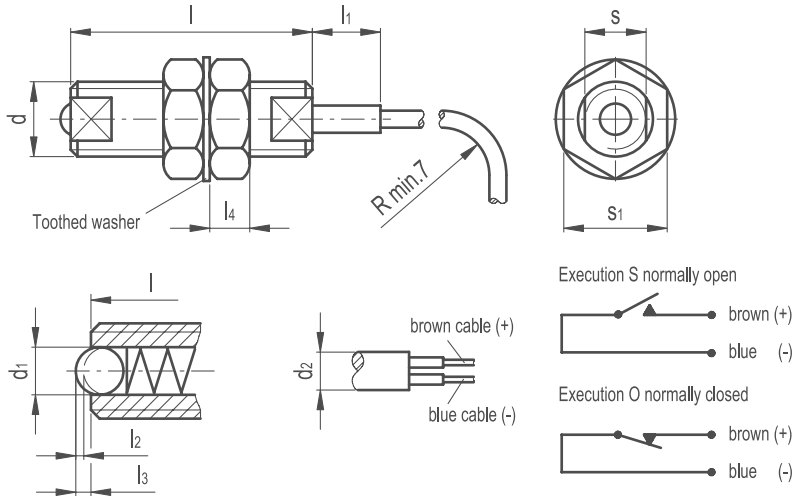


Part Reference	d+ -0.03	d#	d1	l+ -0.2	l1#	*	**
STBU1	4	#See Corresponding Plunger	1.5	5	#See Corresponding Plunger	M4	-
STBU2	5		2	6		M5	4
STBU3	6		2	8		M6	5
STBU4	8		3	10		M8	6
STBU5	10		4	12		M10	8
STBU6	12		6	14		M12	10
STBU7	16		8	18		M16	12

** Thread of the corresponding plunger SPH, SPB, SPP, SPBH, SPBP"

** Diameter of corresponding plunger SBSB

Threaded Ball Spring Plungers with Switch



- / **Threaded body**
Hardened nickel-plated steel.
- / **Ball**
Hardened steel.
- / **Hexagon nuts**
Nickel-plated steel.
- / **Toothed washer**
Hardened nickel-plated steel.
- / **Spring**
Stainless steel.
- / **Working temperature**
From -10°C to +80°C.

STANDARD EXECUTION AVAILABLE

- / Execution S: grey colour sheath for normally open contact.
- / Execution SB: black colour sheath for normally closed contact.

FEATURES AND APPLICATIONS

Threaded ball spring plungers are suitable for locking or releasing a device by using a built-in electrical switch.

ELECTRICAL CHARACTERISTICS OF THE SWITCH

Power supply: 20 mA DC
Voltage: from 12 to 24 V DC
Protection class: IP 40 according to table IEC 529
Supply cable: Ø 3 mm, two-phase, length 2 metres
Average switch life-span: 10 million switchings

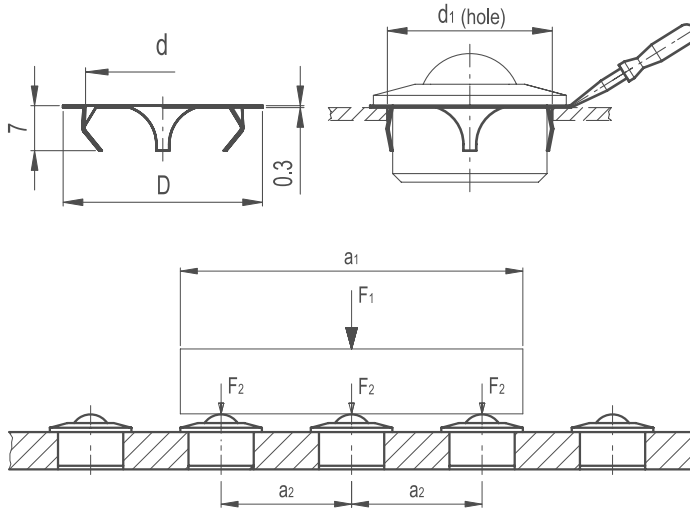
TECHNICAL DATA

Maximum tensile strength 20 N.



Part Reference	d	d1	d2	l	l1	l2+- 0.1	l3+- 0.1	l4	s	s1	Initial	Max
SPBS1	M6	3	3	27	10	0.3	0.8	3.5	5.5	10	6	13
SPBS2	M8	4	3	30	10	0.5	1	5	7	13	8	16
SPBS3	M10	5	3	33	10	0.7	1.2	6	8	17	10	20
SPBSB4	M6	3	3	27	10	0.3	1.8	3.5	5.5	10	6	13
SPBSB5	M8	4	3	30	10	0.5	1	5	7	13	8	16
SPBSB6	M10	5	3	33	10	0.7	1.2	6	8	17	10	20

Spring Rings for Ball/Roller Units



MATERIAL

/ Stainless steel.

FEATURES

Spring rings allow an easy and quick assembly and removal of ball transfer units type PRU and CRU.

TECHNICAL DATA FOR BALL TRANSFER UNITS PRU AND CRU

Ball transfer units consist of a metal body inside which a ball, supported by smaller balls, helps in conveying loads applied on a plane surface in every direction (for example conveyor belts).

CHOICE OF THE BALL TRANSFER UNIT

To choose the proper ball transfer unit for a conveyor track, both weight and dimension of the load to be carried must be taken into consideration. The max distance "a2" between the ball transfer units (on a plane surface) is obtained by dividing the smaller load dimension to be conveyed (a1) by 2.5. This calculation (based on an elementary geometry principle) guarantees that a load is always supported by at least 3 ball transfer units, thus preventing it from tipping over. As far as the weight is concerned, as the load is supported by at least three different ball transfer units, each of them would bear a third of the total weight (the total weight divided by three).

It may be equal or lower than the max load capacity values showed in the table for every unit.

a1 = smaller dimension of the load to be conveyed

a2 = max distance between ball transfer units

$a2 = \frac{a1}{2.5}$

F1 = load weight

F2 = load supported by each ball transfer unit

$F2 = \frac{F1}{3} < \text{max load capacity of each ball transfer unit}$

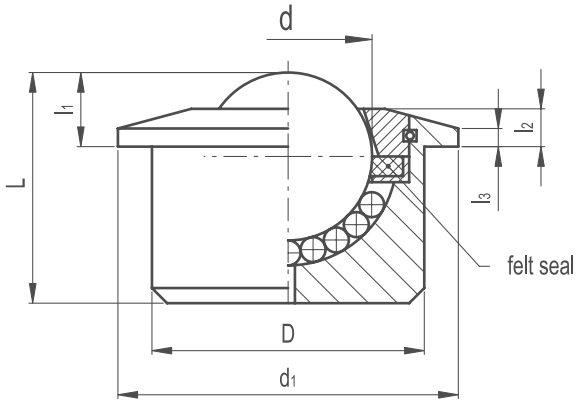
SPEED AND FRICTION

The permissible conveying speed is 2 m/sec. With speeds higher than 1 m/sec., according to the dimensions of the ball transfer units, a rise in temperature, in proportion to the dimensions of them, could occur owing to the increase of the rotation speed of the support balls. The friction value of the ball transfer units, at a speed of 1 m/sec., is 0.005 μ . This value depends, however, on the application and it could be subject to several variables. Ball transfer units in turned and black-oxide steel offer a higher rigidity in comparison with the zinc-plated drawn sheet steel ones. Lubrication of the balls is recommended to prevent corrosion, even though some applications may not require it.



Part Ref.	d	D	d1	For Ball Transfer Units PRU - CRU
PRU-CRU	24	31	25-0.2	15
PRU-CRU	36	44	37.3-0.3	22
PRU-CRU	45	55	46.7-0.3	30

Pot Roller Unit (Ball Transfer)


/ Material

Turned and zinc-plated steel.

/ Retaining components

Zinc-plated steel.

/ Balls

Zinc-plated steel - ZP

Stainless steel - SS

/ Retaining ring

Felt seat (only for dimensions 22 and 30)

SPECIAL EXECUTIONS ON REQUEST

(For sufficient quantities)

/ Stainless steel body and balls.

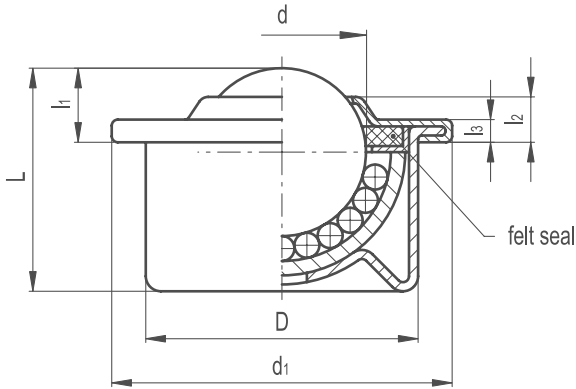
APPLICATIONS

Ball transfer units are particularly suitable on conveyor tracks. They make linear or rotary movements easier even with heavy loads.



Part Reference	d	L +0.3	D +0.8	d1	l1 +0.3	l2 +0.3	l3	Max. Load Carrying Capacity (N)
PRU1ZP	12.7	17	22	27	8	4	3.2	200
PRU2SS	12.7	17	22	27	8	4	3.2	150
PRU3ZP	15.8	21	24	31	9.5	5.5	4	500
PRU4SS	15.8	21	24	31	9.5	5.5	4	400
PRU5ZP	22.2	30.5	36	45	9.5	5	2.4	1300
PRU6SS	22.2	30.5	36	45	9.5	5	2.4	1000
PRU7ZP	30.1	37	45	55	13.5	7	4.5	2500
PRU8SS	30.1	37	45	55	13.5	7	4.5	2500

Cup Roller Units (Ball Transfer)



/ Material

Zinc-plated drawn sheet steel.

/ Retaining components

Zinc-plated steel.

/ Balls

Zinc-plated steel - ZP

Stainless steel - SS

/ Retaining ring

Felt seal (only for dimensions 22 and 30)

SPECIAL EXECUTIONS ON REQUEST

(For sufficient quantities)

/ Stainless steel body and balls.

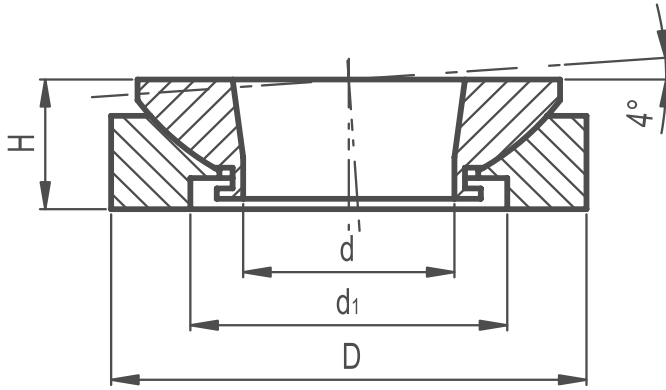
APPLICATIONS

Ball transfer units are particularly suitable on conveyer tracks. They make linear or rotary movements easier even with heavy loads.



Part Reference	d	L +0.3	D	d1	l1 +0.3	l2 +0.3	l3	Max. Load Carrying Capacity (N)
CRU1ZP	15.8	21	24	31	9.5	5	2.5	500
CRU2SS	15.8	21	24	31	9.5	5	2.5	300
CRU3ZP	22.2	29.5	36	45	10	6	3	1200
CRU4SS	22.2	29.5	36	45	10	6	3	900
CRU5ZP	30.1	38	45	55	13.5	7	3.5	2000
CRU6SS	30.1	38	45	55	13.5	7	3.5	1500

Levelling Washers



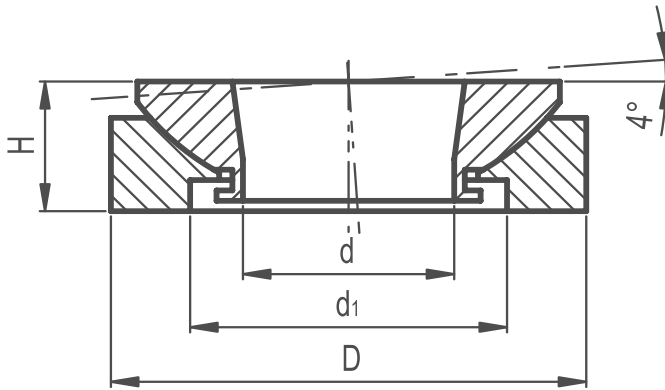
MATERIAL
/ Zinc-plated steel.

APPLICATIONS
Levelling washers are suitable for locking mechanical parts on non-parallel surfaces. The coupling of the spherical surfaces of the two "non-dismountable" washers allows a high load resistance.



Part Reference	D	H	d	d1	Max Screw Dimension	Static Load (N)
LW1	25	8	8.5	15	M6	40000
LW2	32	10	13	20	M10	65000
LW3	45	12.5	20	30	M16	12000
LW4	58	16	29	38	M24	210000
LW5	70	20	36	48	M30	330000
LW6	80	20	44	61	M36	495000

Levelling Washers Stainless Steel



MATERIAL

/ AISI 316 stainless steel.

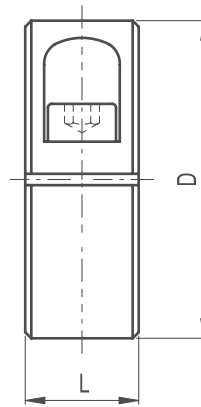
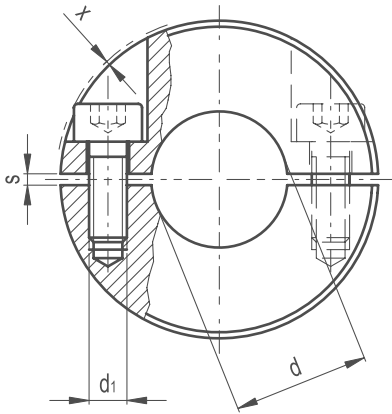
FEATURES AND APPLICATIONS

Levelling washers are suitable for locking mechanical parts on non-parallel surfaces. The coupling of the spherical surfaces of the two "non-dismountable" washers allows a high load resistance. AISI 316 stainless steel, thanks to its high resistance to corrosion, allows the application of these washers on machines and equipment in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to use corrosion resistant materials.



Part Reference	D	H	d	d1	Max Screw Dimension	Static Load (N)
LW1SS	25	8	8.5	15	M6	27100
LW2SS	32	10	13	20	M10	43400
LW3SS	45	12.5	20	30	M16	84000
LW4SS	58	16	29	38	M24	148000
LW5SS	70	20	36	48	M30	225000
LW6SS	80	20	44	61	M36	323000

Split Clamping Collar Stainless Steel



/ Material

AISI 303 stainless steel, sandblasted matte finish.

/ Clamping assembly system

AISI 303 stainless steel grub screws, cylindrical head with hexagon socket, supplied assembled.

For diameters D = from 20 to 36 threaded through holes; D > 42 threaded blind holes.

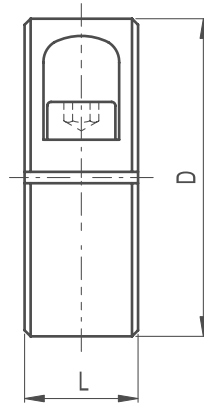
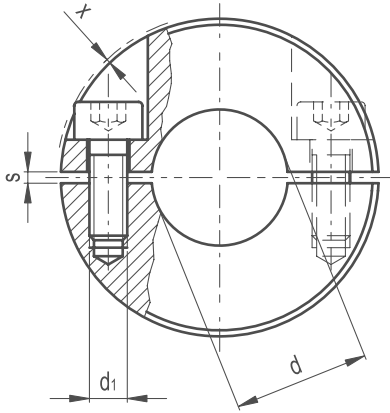
FEATURES AND APPLICATIONS

Split set collars can be used not only as end stops, but they can also be used for fixing other components, such as end limit switches. Split set collars can also be assembled on shafts whose shape may not allow their sliding. AISI 303 stainless steel, thanks to its high resistance to corrosion, allows the application of these split set collars on machines and equipment in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to use corrosion resistant materials.



Part Reference	D	dH8	L	d1	s	x
SCC1SS	20	6	9	M3	1.2	0.3
SCC2SS	22	8	9	M3	1.2	0.2
SCC3SS	26	10	11	M4	1.5	1
SCC4SS	30	12	11	M4	1.5	0.2
SCC5SS	32	14	11	M4	1.5	0.2
SCC6SS	36	15	13	M5	1.5	1
SCC7SS	36	16	13	M5	1.5	1
SCC8SS	42	18	15	M5	1.5	0.2
SCC9SS	42	20	15	M5	1.5	0.2
SCC10SS	48	22	15	M5	1.5	0
SCC11SS	48	25	15	M5	1.5	0
SCC12SS	55	28	15	M6	1.5	0
SCC13SS	55	30	15	M6	1.5	0
SCC14SS	60	32	15	M6	2	0
SCC15SS	60	35	15	M6	2	0
SCC16SS	65	40	15	M6	2	0.2

Split Clamping Collar



/ Material

Black-oxide steel.

/ Clamping assembly system

AISI 303 stainless steel grub screws, cylindrical head with hexagon socket, supplied assembled.
For diameters D = from 20 to 36 threaded through holes; D > 42 threaded blind holes.

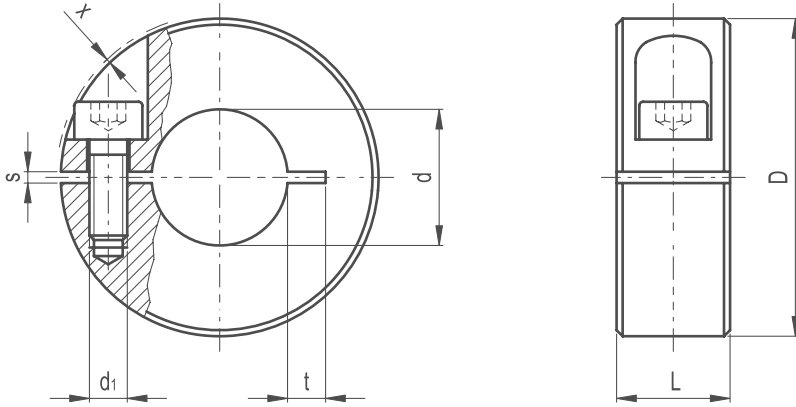
FEATURES AND APPLICATIONS

Split set collars can be used not only as end stops, but they can also be used for fixing other components, such as end limit switches. Split set collars can also be assembled on shafts whose shape may not allow their sliding.



Part Reference	D	dH8	L	d1	s	x
SCC1	20	6	9	M3	1.2	0.3
SCC2	22	8	9	M3	1.2	0.2
SCC3	26	10	11	M4	1.5	1
SCC4	30	12	11	M4	1.5	0.2
SCC5	32	14	11	M4	1.5	0.2
SCC6	36	15	13	M5	1.5	1
SCC7	36	16	13	M5	1.5	1
SCC8	42	18	15	M5	1.5	0.2
SCC9	42	20	15	M5	1.5	0.2
SCC10	48	22	15	M5	1.5	0
SCC11	48	25	15	M5	1.5	0
SCC12	55	28	15	M6	1.5	0
SCC13	55	30	15	M6	1.5	0
SCC14	60	32	15	M6	2	0
SCC15	60	35	15	M6	2	0
SCC16	65	40	15	M6	2	0.2

Semi-Split Clamping Collar



/ Material

Black-oxide steel.

/ Clamping assembly system

Black-oxide steel grub screw, cylindrical head with hexagon socket, supplied assembled.

For diameters D = from 20 to 36 threaded through hole; D > 42 threaded blind hole.

FEATURES AND APPLICATIONS

Split set collars can be used not only as end stops, but they can also be used for fixing other components, such as end limit switches. Semi-split set collars can be assembled without damaging the surfaces of the shaft when high clamping forces are necessary.

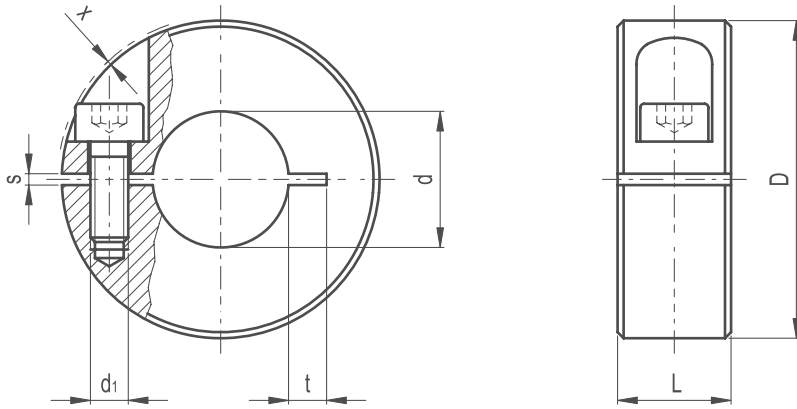


TECHNICAL DATA

Shaft tolerance = h11.

Part Reference	D	dH8	L	d1	s	x
SSCC1	20	6	9	M3	1.2	0.3
SSCC2	22	8	9	M3	1.2	0.2
SSCC3	26	10	11	M4	1.5	1
SSCC4	30	12	11	M4	1.5	0.2
SSCC5	32	14	11	M4	1.5	0.2
SSCC6	36	15	13	M5	1.5	1
SSCC7	36	16	13	M5	1.5	1
SSCC8	42	18	15	M5	1.5	0.2
SSCC9	42	20	15	M5	1.5	0.2
SSCC10	48	22	15	M5	1.5	0
SSCC11	48	25	15	M5	1.5	0
SSCC12	55	28	15	M6	1.5	0
SSCC13	55	30	15	M6	1.5	0
SSCC14	60	32	15	M6	2	0
SSCC15	60	35	15	M6	2	0
SSCC16	65	40	15	M6	2	0.2

Semi-Split Clamping Collar Stainless Steel



/ Material

AISI 303 stainless steel, sandblasted matte finish.

/ Clamping assembly system

AISI 303 stainless steel grub screws, cylindrical head with hexagon socket, supplied assembled.

For diameters D = from 20 to 36 threaded through holes; D > 42 threaded blind holes.

FEATURES AND APPLICATIONS

Split set collars can be used not only as end stops, but they can also be used for fixing other components, such as end limit switches. Split set collars can also be assembled on shafts whose shape may not allow their sliding.

AISI 303 stainless steel, thanks to its high resistance to corrosion, allows the application of these split set collars on machines and equipment in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to use corrosion resistant materials.



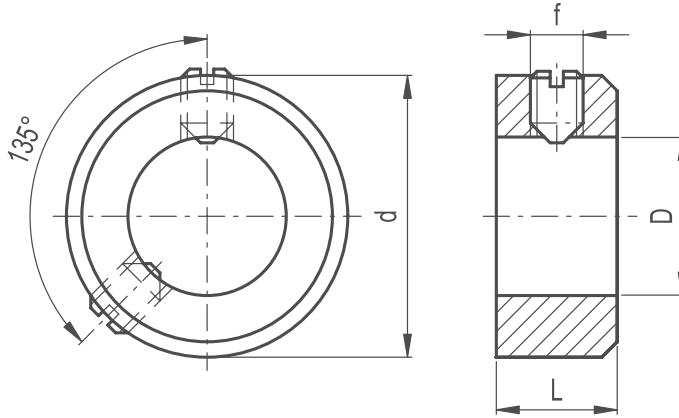
TECHNICAL DATA

Shaft tolerance = h11.

Part Reference	D	dH8	L	d1	s	x
SSCC1SS	20	6	9	M3	1.2	0.3
SSCC2SS	22	8	9	M3	1.2	0.2
SSCC3SS	26	10	11	M4	1.5	1
SSCC4SS	30	12	11	M4	1.5	0.2
SSCC5SS	32	14	11	M4	1.5	0.2
SSCC6SS	36	15	13	M5	1.5	1
SSCC7SS	36	16	13	M5	1.5	1
SSCC8SS	42	18	15	M5	1.5	0.2
SSCC9SS	42	20	15	M5	1.5	0.2
SSCC10SS	48	22	15	M5	1.5	0
SSCC11SS	48	25	15	M5	1.5	0
SSCC12SS	55	28	15	M6	1.5	0
SSCC13SS	55	30	15	M6	1.5	0
SSCC14SS	60	32	15	M6	2	0
SSCC15SS	60	35	15	M6	2	0
SSCC16SS	65	40	15	M6	2	0.2

Positioning Rings Screw Assembly

With screwdriver slotted head



MATERIAL

/ Black-oxide steel.

CLAMPING ASSEMBLY SYSTEM

/ Execution A: grub screw with screwdriver slotted head.
Rings with $d = 75$ and 80 mm are provided with two grub screws.

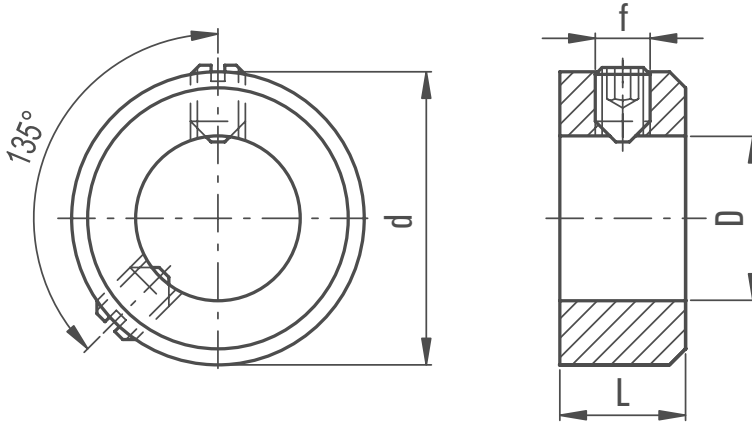


Part Reference	D	d1	d	f
PR1-A	5	6	10	M3x4
PR2-A	6	8	12	M4x5
PR3-A	7	8	12	M4x5
PR4-A	8	8	16	M4x6
PR5-A	9	10	18	M5x8
PR6-A	10	10	20	M5x8
PR7-A	11	10	20	M5x8
PR8-A	12	12	22	M6x8
PR9-A	13	12	22	M6x8
PR10-A	14	12	25	M6x8
PR11-A	15	12	25	M6x8
PR12-A	16	12	28	M6x8
PR13-A	18	14	32	M6x8
PR14-A	20	14	32	M6x8
PR15-A	22	14	36	M6x10
PR16-A	24	16	40	M8x10
PR17-A	25	16	40	M8x10
PR18-A	26	16	40	M8x10
PR19-A	28	16	45	M8x10
PR20-A	30	16	45	M8x10
PR21-A	32	16	50	M8x12

Part Reference	D	d1	d	f
PR22-A	34	16	50	M8x12
PR23-A	35	16	56	M8x12
PR24-A	36	16	56	M8x12
PR25-A	38	16	56	M8x12
PR26-A	40	18	63	M10x16
PR27-A	42	18	63	M10x16
PR28-A	45	18	70	M10x16
PR29-A	48	18	70	M10x16
PR30-A	50	18	80	M10x16
PR31-A	52	18	80	M10x16
PR32-A	55	18	80	M10x16
PR33-A	56	18	80	M10x16
PR34-A	58	20	90	M10x16
PR35-A	60	20	90	M10x16
PR36-A	63	20	90	M10x16
PR37-A	65	20	100	M10x20
PR38-A	68	20	100	M10x20
PR39-A	70	20	100	M10x20
PR40-A	72	22	110	M12x20
PR41-A	75	22	110	M12x20
PR42-A	80	22	110	M12x20

Positioning Rings Screw Assembly

With slotted head



MATERIAL

/ Black-oxide steel.

CLAMPING ASSEMBLY SYSTEM

/ Execution E: grub screw with hexagon socket.
Rings with $d = 75$ and 80 mm are provided with two grub screws.

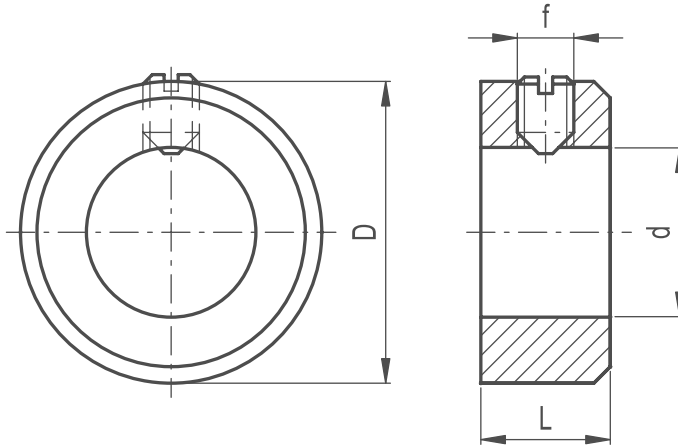


Part Reference	D	d1	d	f
PR1-E	5	6	10	M3x4
PR2-E	6	8	12	M4x5
PR3-E	7	8	12	M4x5
PR4-E	8	8	16	M4x6
PR5-E	9	10	18	M5x8
PR6-E	10	10	20	M5x8
PR7-E	11	10	20	M5x8
PR8-E	12	12	22	M6x8
PR9-E	13	12	22	M6x8
PR10-E	14	12	25	M6x8
PR11-E	15	12	25	M6x8
PR12-E	16	12	28	M6x8
PR13-E	18	14	32	M6x8
PR14-E	20	14	32	M6x8
PR15-E	22	14	36	M6x10
PR16-E	24	16	40	M8x10
PR17-E	25	16	40	M8x10
PR18-E	26	16	40	M8x10
PR19-E	28	16	45	M8x10
PR20-E	30	16	45	M8x10
PR21-E	32	16	50	M8x12

Part Reference	D	d1	d	f
PR22-E	34	16	50	M8x12
PR23-E	35	16	56	M8x12
PR24-E	36	16	56	M8x12
PR25-E	38	16	56	M8x12
PR26-E	40	18	63	M10x16
PR27-E	42	18	63	M10x16
PR28-E	45	18	70	M10x16
PR29-E	48	18	70	M10x16
PR30-E	50	18	80	M10x16
PR31-E	52	18	80	M10x16
PR32-E	55	18	80	M10x16
PR33-E	56	18	80	M10x16
PR34-E	58	20	90	M10x16
PR35-E	60	20	90	M10x16
PR36-E	63	20	90	M10x16
PR37-E	65	20	100	M10x20
PR38-E	68	20	100	M10x20
PR39-E	70	20	100	M10x20
PR40-E	72	22	110	M12x20
PR41-E	75	22	110	M12x20
PR42-E	80	22	110	M12x20

Positioning Rings Screw Assembly Stainless Steel

BONEHAM



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POSITIONING & MACHINE ELEMENTS

MATERIAL

/ Black-oxide steel.

CLAMPING ASSEMBLY SYSTEM

/ Execution A: grub screw with screwdriver slotted head.

/ Execution E: grub screw with hexagon socket.

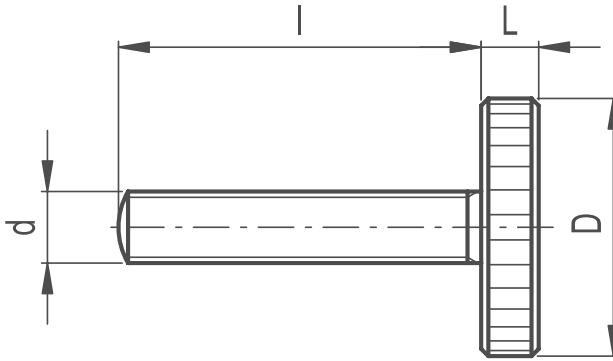
Rings with $d = 75$ and 80 mm are provided with two grub screws.



Part Reference	d H8	L js14	D	f
PR1-ASS	5	6	10	M3x4
PR2-ASS	6	8	12	M4x5
PR3-ASS	8	8	16	M4x6
PR4-ASS	9	10	18	M5x8
PR5-ASS	10	10	20	M5x8
PR6-ASS	11	10	20	M5x8
PR7-ASS	12	12	22	M6x8
PR8-ASS	13	12	22	M6x8
PR9-ASS	14	12	25	M6x8
PR10-ASS	15	12	25	M6x8
PR11-ASS	16	12	28	M6x8
PR12-ASS	18	14	32	M6x8
PR13-ASS	20	14	32	M6x8
PR14-ASS	22	14	36	M6x10
PR15-ASS	24	16	40	M8x10
PR16-ASS	25	16	40	M8x10
PR17-ASS	26	16	40	M8x10
PR18-ASS	28	16	45	M8x12
PR19-ASS	30	16	45	M8x10
PR20-ASS	32	16	50	M8x12
PR21-ASS	34	16	50	M8x12
PR22-ASS	35	16	56	M8x12
PR23-ASS	36	16	56	M8x12
PR24-ASS	38	16	56	M8x12
PR25-ASS	40	18	63	M10x16
PR26-ASS	45	18	70	M10x16
PR27-ASS	50	18	80	M10x16

Thumb Screw

DIN 653



/ Material

Turned black-oxide steel.

/ Assembly

Threaded pin.

SPECIAL EXECUTIONS ON REQUEST

(For sufficient quantities) Different lengths and threads.

/ Material

AISI 303 stainless steel, sandblasted matte finish.

/ Assembly

Threaded pin.

SPECIAL EXECUTIONS ON REQUEST

(For sufficient quantities) Different lengths and threads.

FEATURES AND APPLICATIONS

AISI 303 stainless steel, thanks to its high resistance to corrosion, allows the application of these knobs on machines and equipment in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to use corrosion resistant materials.



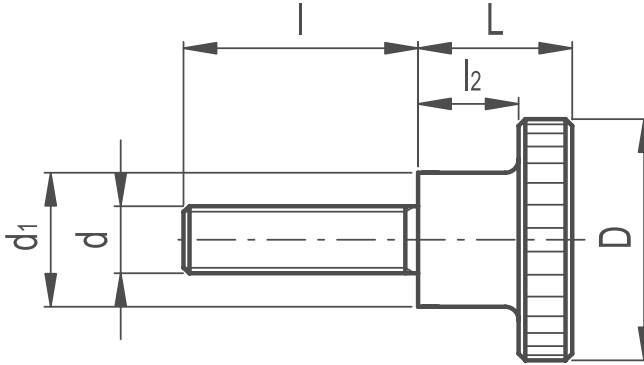
Part Reference	d	l	D	L
TS1-3702	M3	6	12	2.5
TS2-3702	M3	8	12	2.5
TS3-3702	M3	10	12	2.5
TS4-3702	M3	16	12	2.5
TS5-3702	M4	8	16	3.5
TS6-3702	M4	10	16	3.5
TS7-3702	M4	12	16	3.5
TS8-3702	M4	16	16	3.5
TS9-3702	M4	20	16	3.5
TS10-3702	M4	25	16	3.5
TS11-3702	M5	10	20	4
TS12-3702	M5	12	20	4
TS13-3702	M5	16	20	4
TS14-3702	M5	20	20	4
TS15-3702	M5	25	20	4
TS16-3702	M5	30	20	4
TS17-3702	M6	12	24	5
TS18-3702	M6	16	24	5
TS19-3702	M6	20	24	5

Part Reference	d	l	D	L
TS20-3702	M6	25	24	5
TS21-3702	M6	30	24	5
TS22-3702	M8	20	30	6
TS23-3702	M8	25	30	6
TS24-3702	M8	30	30	6
TS25-3702	M8	35	30	6
TS26-3702	M8	40	30	6
TS27-3702	M10	20	36	8
TS28-3702	M10	25	36	8
TS29-3702	M10	30	36	8
TS30-3702	M10	40	36	8

Part Reference	d	l	D	L
TS1SS	M5	10	20	4
TS2SS	M5	16	20	4
TS3SS	M6	16	24	5
TS4SS	M6	20	24	5
TS5SS	M8	20	30	6
TS6SS	M8	30	30	6

Knurled Thumb Screw

DIN 464



- / **Material**
Turned black-oxide steel.
- / **Assembly**
Threaded pin.

Special executions on request
(For sufficient quantities)
Different lengths and threadings.

- / **Material**
AISI 303 stainless steel, sandblasted matte finish.
- / **Assembly**
Threaded pin.

SPECIAL EXECUTIONS ON REQUEST
(For sufficient quantities)
Different lengths and threads.

- / **Material**
Brass-bright finish.
- / **Assembly**
Threaded pin.

SPECIAL EXECUTIONS ON REQUEST
(For sufficient quantities)
Different lengths and threads.

FEATURES AND APPLICATIONS
AISI 303 stainless steel, thanks to its high resistance to corrosion, allows the application of these knobs on machines and equipment in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to use corrosion resistant materials.



Knurled Thumb Screw DIN 464 Brass

Part Reference	d	l	D	L	d1	l2
KTS1BR	M5	10	20	11.5	10	7.5
KTS2BR	M5	16	20	11.5	10	7.5
KTS3BR	M6	16	24	15	12	10
KTS4BR	M6	20	24	15	12	10
KTS5BR	M8	16	30	18	16	12
KTS6BR	M8	20	30	18	16	12
KTS7BR	M8	30	30	18	16	12

Knurled Thumb Screw

Knurled Thumb Screw DIN 464

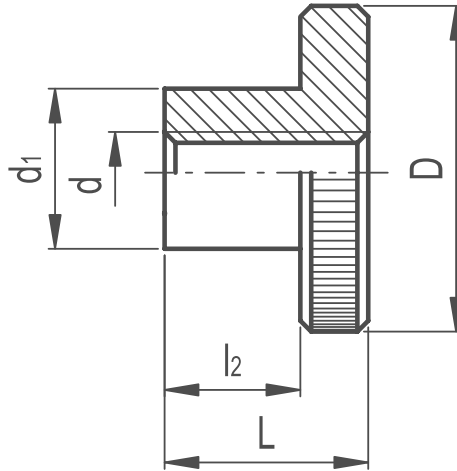
Part Reference	d	l	D	L	d1	l2
KTS1-3714	M3	6	12	7.5	6	5
KTS2-3714	M3	10	12	7.5	6	5
KTS3-3714	M3	12	12	7.5	6	5
KTS4-3714	M3	16	12	7.5	6	5
KTS5-3714	M4	8	16	9.5	8	6
KTS6-3714	M4	10	16	9.5	8	6
KTS7-3714	M4	12	16	9.5	8	6
KTS8-3714	M4	16	16	9.5	8	6
KTS9-3714	M4	20	16	9.5	8	6
KTS10-3714	M4	25	16	9.5	8	6
KTS11-3714	M5	6	20	11.5	10	7.5
KTS12-3714	M5	8	20	11.5	10	7.5
KTS13-3714	M5	10	20	11.5	10	7.5
KTS14-3714	M5	12	20	11.5	10	7.5
KTS15-3714	M5	16	20	11.5	10	7.5
KTS16-3714	M5	20	20	11.5	10	7.5
KTS17-3714	M5	25	20	11.5	10	7.5
KTS18-3714	M5	30	20	11.5	10	7.5
KTS19-3714	M6	8	24	15	12	10
KTS20-3714	M6	10	24	15	12	10
KTS21-3714	M6	12	24	15	12	10
KTS22-3714	M6	16	24	15	12	10
KTS23-3714	M6	20	24	15	12	10
KTS24-3714	M6	25	24	15	12	10
KTS25-3714	M6	30	24	15	12	10
KTS26-3714	M8	12	30	18	16	12
KTS27-3714	M8	16	30	18	16	12
KTS28-3714	M8	20	30	18	16	12
KTS29-3714	M8	25	30	18	16	12
KTS30-3714	M8	30	30	18	16	12
KTS31-3714	M8	35	30	18	16	12
KTS32-3714	M8	40	30	18	16	12
KTS33-3714	M10	20	36	23	20	15
KTS34-3714	M10	25	36	23	20	15
KTS35-3714	M10	30	36	23	20	15
KTS36-3714	M10	35	36	23	20	15
KTS37-3714	M10	40	36	23	20	15

Knurled Thumb Screw DIN 464-303 Stainless Steel

Part Reference	d	l	D	L	d1	l2
KTS1SS	M5	10	20	11.5	10	7.5
KTS2SS	M5	16	20	11.5	10	7.5
KTS3SS	M6	16	24	15	12	10
KTS4SS	M6	20	24	15	12	10
KTS5SS	M8	16	30	18	16	12
KTS6SS	M8	20	30	18	16	12
KTS7SS	M8	30	30	18	16	12

Knurled Nut

DIN 466



/ Material

Turned black-oxide steel.

/ Assembly

Hub, tapped through hole.

/ Threaded body

AISI 303 stainless steel, sandblasted matte finish.

/ Assembly

Hub, tapped through hole.

FEATURES AND APPLICATIONS

AISI 303 stainless steel, thanks to its high resistance to corrosion, allows the application of these knobs on machines and equipment in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to use corrosion resistant materials.



Knurled Nut DIN 466

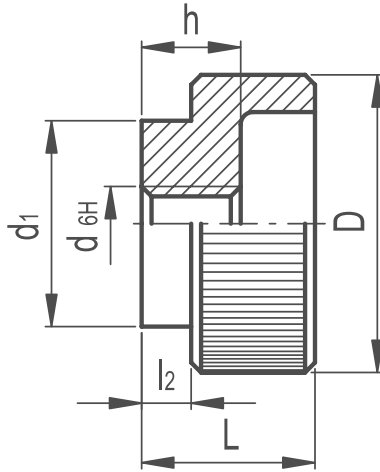
Part Reference	Hole d	D	L	d1	l2
KN1-3710	M3	12	7.5	6	5
KN2-3710	M4	16	9.5	8	6
KN3-3710	M5	20	11.5	10	7.5
KN4-3710	M6	24	15	12	10
KN5-3710	M8	30	18	16	12
KN6-3710	M10	36	23	20	15
KN7-3710	M12	40	25	22	15

Knurled Nut Stainless Steel DIN 466

Part Reference	Hole d	D	L	d1	l2
KN1SS	M4	16	9.5	8	6
KN2SS	M5	20	11.5	10	7.5
KN3SS	M6	24	15	12	10
KN4SS	M8	30	18	16	12

Knurled Grip Nut

DIN 6303


/ Material

Black-oxide steel.

/ Assembly

Tapped through hole.

/ Material

AISI 303 stainless steel, sandblasted matte finish.

/ Assembly

Tapped through hole.

FEATURES AND APPLICATIONS

AISI 303 stainless steel, thanks to its high resistance to corrosion, allows the application of these knobs on machines and equipment in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to use corrosion resistant materials.



Knurled Grip Nuts DIN 6303

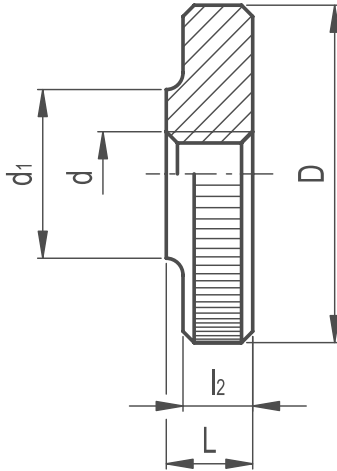
Part Reference	Hole d	h	D	L	d1	l2
KGN1	M5	7	20	12	14	4
KGN2	M6	8	24	14	16	4
KGN3	M8	10	30	17	20	5
KGN4	M10	12	36	20	28	6
KGN5	M12	16	40	24	32	8

Knurled Grip Nuts DIN 6303-303 Stainless Steel

Part Reference	Hole d	h	D	L	d1	l
KGN1SS	M5	7	20	12	14	4
KGN2SS	M6	8	24	14	16	4
KGN3SS	M8	10	30	17	20	5
KGN4SS	M10	12	36	20	28	6
KGN5SS	M12	16	40	24	32	8

Flat Knurled Nut

DIN 467



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POSITIONING & MACHINE ELEMENTS

- / **Material**
Turned black-oxide steel.
- / **Assembly**
Tapped through hole.

- / **Material**
AISI 303 stainless steel, sandblasted matte finish.
- / **Assembly**
Tapped through hole.



FEATURES AND APPLICATIONS
AISI 303 stainless steel, thanks to its high resistance to corrosion, allows the application of these knobs on machines and equipment in those sectors where laws or particular hygienic, climatic and environmental factors make it mandatory to use corrosion resistant materials.

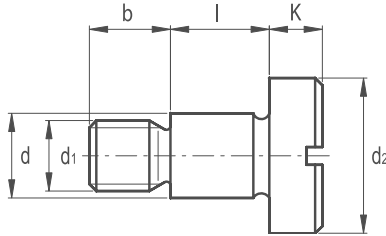
Flat Knurled Nut DIN 467

Part Reference	Hole d	D	L	d1	l2
FKN1	M3	12	3	6	2.5
FKN2	M4	16	4	8	3.5
FKN3	M5	20	5	10	4
FKN4	M6	24	6	12	5
FKN5	M8	30	8	16	6
FKN6	M10	36	10	20	8
FKN7	M12	40	12	22	10

Flat Knurled Nut DIN 467-303 Stainless Steel

Part Reference	Hole d	D	L	d1	l2
FKN1SS	M3	12	3	6	2.5
FKN2SS	M4	16	4	8	3.5
FKN3SS	M5	20	5	10	4
FKN4SS	M6	24	6	12	5
FKN5SS	M8	30	8	16	6

Shoulder Screw



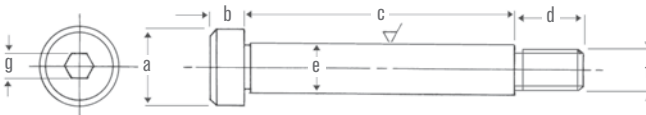
MATERIAL

/ Steel DIN 923



Part Reference	d1	d2	d hg	l	b	k
SS1-3670	M6	13	8	10	9.0	3.1
SS2-3670	M8	16	10	12	11.0	3.8
SS3-3670	M8	16	10	16	11.0	3.8

Stripper Bolts



ORDERING INSTRUCTIONS

Advise "e" dia and "c" length

Example: Stripper Bolt 12mm x 50mm



e	Length c										a dia	b	d	f Thread	g
	Sizes Available														
8	25	30	40	50							13	5.5	11	6x1	4
10		30	40	50	60	70	80				16	7	13	8x1.25	5
12		30	40	50	60	70	80	90	100		18	8	16	10x1.5	6
16		30	40	50	60	70	80	90	100	120	24	11	18	12x1.75	8
20				50	60	70	80	90	100	120	30	14	22	16x2	10
24					70	80	90				36	16	27	20x2.5	12

Advise e dia. and length

Press Tool Components



Boneham has been manufacturing press tool components for over 100 years and was heavily involved in creating the ISO standard. Our Press Tool Pins, Bushes and Die Sets are now made to order. Please contact technical sales with your requirements. The current standard off-the-shelf range within this chapter comprises of Die Springs, Elastomer Springs and Gas Springs from US manufacturer DADCO. DADCO Gas Springs are manufactured using the latest technology and processes, ensuring the very best in reliability, quality and safety. Together we pioneer pipeless technology SMS-I (Sectional Mounting System-Internal).

SPRINGS

/ Die Springs

Pages 337-338

ELASTOMERS

/ Elastomer Springs / Elastomer Solid Bars / Elastomer Plates

Pages 339-341

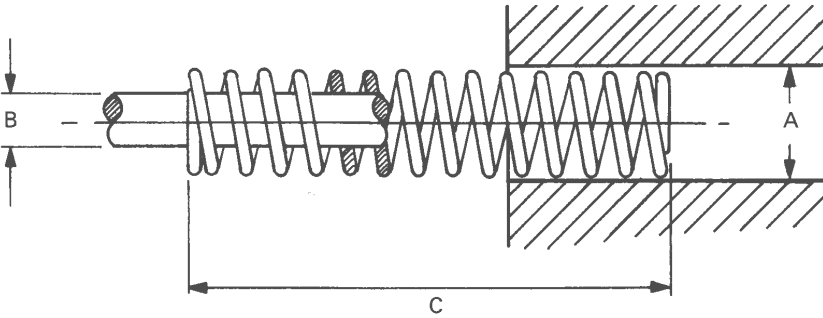
DADCO GAS SPRINGS

/ Dadco Micro – C Series / Dadco Ultra Force[®] – U Series / Dadco Mini – LJ / L Series
/ Dadco Ultra Force Extended[®] – UX Series / Dadco Super Compact – SC Series
/ Dadco ISO / 90.10 Series / Dadco Super Compact – SCR Series
/ Dadco Micro Nitrogen Gas Spring Lifters – SL Series / Dadco ISO Air Cylinders – HP Series
/ Dadco Guide Retainer Sets – GRS/GRS HD Series

Pages 342-351

Die Springs

BS 7568 PT 4 1992/Colour Coded I.S.O 10243



Die Springs are precision manufactured and have ends which are ground square to ensure even compression of spring.

Boneham & Turners Die Springs are available in four colour-coded load rated classifications. All springs are guaranteed to fit the hole and rod diameters and depicted in the reference table. Sizes and colour codes are in accordance with ISO 10243.

	ISO Colour Code	Load	Max Deflection	Code
	Green	Light Load	40%	LDS
	Blue	Medium	37.5%	MDS
	Red	Heavy	30%	HDS
	Yellow	Extra Heavy	25%	EHDS

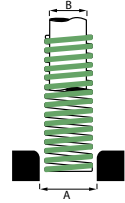
Die Springs

ORDER INSTRUCTIONS

State references only e.g. LDS 28.

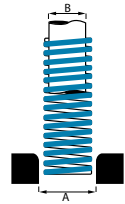
NOTES

Table shows rate of deflection kilograms per 1mm of deflection.



Green - Light Load

Hole	Rod	C Free Lengths														
Size A	Dia B	25	32	38	51	64	76	89	102	115	127	152	178	203	254	
12.5	6.3	LDS 1	LDS 2	LDS 3	LDS 4	LDS 5	LDS 6									
12.5	6.3	1.83	1.67	1.39	1.16	.95	.72									
16	8	LDS 7	LDS 8	LDS 9	LDS 10	LDS 11	LDS 12	LDS 13	LDS 14							
16	8	2.39	2.34	1.97	1.60	1.09	1.02	.88	.80							
20	10	LDS 15	LDS 16	LDS 17	LDS 18	LDS 19	LDS 20	LDS 21	LDS 22	LDS 23	LDS 24	LDS 25				
20	10	5.69	4.59	3.40	2.50	2.04	1.63	1.43	1.22	1.11	.97	.77				
25	12.5	LDS 26	LDS 27	LDS 28	LDS 29	LDS 30	LDS 31	LDS 32	LDS 33	LDS 34	LDS 35	LDS 36	LDS 37	LDS 38		
25	12.5	10.2	8.19	6.32	4.49	3.59	2.86	2.45	2.15	1.91	1.70	1.43	1.28	1.06		
32	16			LDS 39	LDS 40	LDS 41	LDS 42	LDS 43	LDS 44	LDS 45	LDS 46	LDS 47	LDS 48	LDS 49	LDS 50	
32	16			9.59	6.83	5.40	4.49	3.79	3.26	2.96	2.55	2.19	1.86	1.61	1.28	
40	20				LDS 51	LDS 52	LDS 53	LDS 54	LDS 55	LDS 56	LDS 57	LDS 58	LDS 59	LDS 60	LDS 61	
40	20				9.38	7.45	6.43	5.20	4.39	4.04	3.77	2.86	2.57	2.31	1.73	
50	25					LDS 62	LDS 63	LDS 64	LDS 65	LDS 66	LDS 67	LDS 68	LDS 69	LDS 70	LDS 71	
50	25					15.91	12.75	11.12	9.59	8.26	7.24	6.12	5.30	4.49	3.57	



Blue - Medium Load

Hole	Rod	C Free Lengths														
Size A	Dia B	25	32	38	51	64	76	89	102	115	127	152	178	203	254	
12.5	6.3	MDS 1	MDS 2	MDS 3	MDS 4	MDS 5	MDS 6									
12.5	6.3	3.06	2.53	2.18	1.58	1.23	1.04									
16	8	MDS 7	MDS 8	MDS 9	MDS 10	MDS 11	MDS 12	MDS 13	MDS 14							
16	8	5.04	3.78	3.46	2.69	2.09	1.82	1.55	1.38							
20	10	MDS 15	MDS 16	MDS 17	MDS 18	MDS 19	MDS 20	MDS 21	MDS 22	MDS 23	MDS 24	MDS 25				
20	10	10.00	7.41	5.71	4.25	3.29	2.56	2.24	2.02	1.85	1.69	1.35				
25	12.5	MDS 26	MDS 27	MDS 28	MDS 29	MDS 30	MDS 31	MDS 32	MDS 33	MDS 34	MDS 35	MDS 36	MDS 37	MDS 38		
25	12.5	14.99	12.04	9.49	7.00	5.41	4.41	3.90	3.37	2.86	2.64	2.12	1.82	1.61		
32	16			MDS 39	MDS 40	MDS 41	MDS 42	MDS 43	MDS 44	MDS 45	MDS 46	MDS 47	MDS 48	MDS 49	MDS 50	
32	16			18.87	13.67	10.10	8.21	7.05	6.00	5.25	4.57	3.86	3.32	2.95	2.18	
40	20				MDS 51	MDS 52	MDS 53	MDS 54	MDS 55	MDS 56	MDS 57	MDS 58	MDS 59	MDS 60	MDS 61	
40	20				18.52	14.28	11.02	9.25	8.26	7.32	6.40	5.26	4.50	3.74	3.07	
50	25					MDS 62	MDS 63	MDS 64	MDS 65	MDS 66	MDS 67	MDS 68	MDS 69	MDS 70	MDS 71	
50	25					21.32	17.14	14.28	12.14	10.81	9.89	8.16	7.09	6.10	4.48	

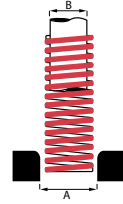
Die Springs

ORDER INSTRUCTIONS

State references only e.g. HDS 15.

NOTES

Table shows rate of deflection kilograms per 1mm of deflection.



Red – Heavy Load

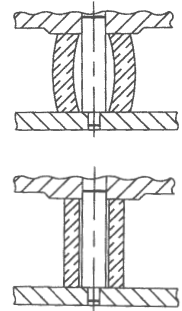
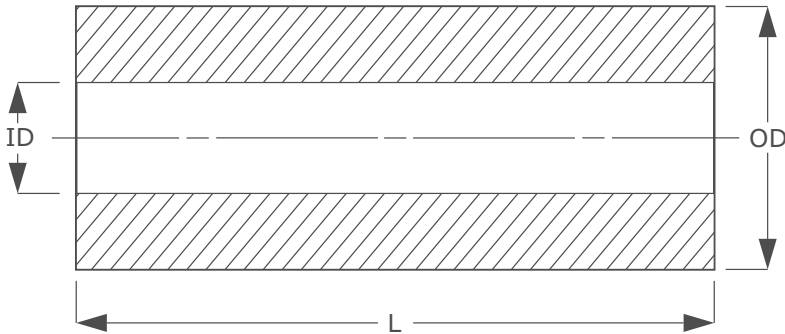
Hole	Rod	C Free Lengths													
Size A	Dia B	25	32	38	51	64	76	89	102	115	127	152	178	203	254
12.5	6.3	HDS 1	HDS 2	HDS 3	HDS 4	HDS 5	HDS 6								
12.5	6.3	4.29	3.39	2.99	2.00	1.53	1.35								
16	8	HDS 7	HDS 8	HDS 9	HDS 10	HDS 11	HDS 12	HDS 13	HDS 14						
16	8	7.72	5.39	4.95	3.78	3.09	2.62	2.21	2.00						
20	10	HDS 15	HDS 16	HDS 17	HDS 18	HDS 19	HDS 20	HDS 21	HDS 22	HDS 23	HDS 24	HDS 25			
20	10	22.03	17.14	13.16	9.59	7.35	6.09	5.15	4.51	3.92	3.48	2.88			
25	12.5		HDS 27	HDS 28	HDS 29	HDS 30	HDS 31	HDS 32	HDS 33	HDS 34	HDS 35	HDS 36	HDS 37	HDS 38	
25	12.5		30.29	22.34	15.91	12.55	10.10	8.57	7.45	6.63	5.89	4.88	4.18	3.65	
32	16			HDS 39	HDS 40	HDS 41	HDS 42	HDS 43	HDS 44	HDS 45	HDS 46	HDS 47	HDS 48	HDS 49	HDS 50
32	16			39.58	27.74	21.62	17.54	14.38	12.44	10.91	9.49	7.96	6.85	6.03	4.73
40	20				HDS 51	HDS 52	HDS 53	HDS 54	HDS 55	HDS 56	HDS 57	HDS 58	HDS 59	HDS 60	HDS 61
40	20				35.70	27.44	22.34	19.38	16.63	14.48	13.06	10.71	9.08	7.85	6.22
50	25					HDS 62	HDS 63	HDS 64	HDS 65	HDS 66	HDS 67	HDS 68	HDS 69	HDS 70	HDS 71
50	25					42.13	34.58	29.38	24.99	21.93	19.58	15.71	13.67	11.93	9.08



Yellow – Extra Heavy Load

Hole	Rod	C Free Lengths													
Size A	Dia B	25	32	38	51	64	76	89	102	115	127	152	178	203	254
12.5	6.3	EHDS 1	EHDS 2	EHDS 3	EHDS 4	EHDS 5	EHDS 6								
12.5	6.3	5.96	4.48	3.67	2.67	2.16	1.74								
16	8	EHDS 7	EHDS 8	EHDS 9	EHDS 10	EHDS 11	EHDS 12	EHDS 13	EHDS 14						
16	8	12.03	9.08	7.35	5.33	4.20	3.47	3.00	2.61						
20	10	EHDS 15	EHDS 16	EHDS 17	EHDS 18	EHDS 19	EHDS 20	EHDS 21	EHDS 22	EHDS 23	EHDS 24	EHDS 25			
20	10	29.88	22.84	18.05	13.05	10.09	8.33	7.09	6.18	5.40	4.85	3.98			
25	12.5		EHDS 27	EHDS 28	EHDS 29	EHDS 30	EHDS 31	EHDS 32	EHDS 33	EHDS 34	EHDS 35	EHDS 36	EHDS 37	EHDS 38	
25	12.5		38.18	35.29	21.16	16.42	13.34	11.27	9.82	8.74	7.78	6.48	5.50	4.79	
32	16			EHDS 39	EHDS 40	EHDS 41	EHDS 42	EHDS 43	EHDS 44	EHDS 45	EHDS 46	EHDS 47	EHDS 48	EHDS 49	EHDS 50
32	16			53.88	36.00	27.45	22.28	18.39	15.81	14.28	12.65	10.40	8.99	7.75	6.20
40	20				EHDS 51	EHDS 52	EHDS 53	EHDS 54	EHDS 55	EHDS 56	EHDS 57	EHDS 58		EHDS 60	EHDS 61
40	20				64.05	49.67	38.65	32.74	28.66	24.99	22.54	17.14		13.46	10.91
50	25					EHDS 62	EHDS 63	EHDS 64	EHDS 65	EHDS 66	EHDS 67	EHDS 68		EHDS 70	EHDS 71
50	25					72.32	58.34	48.45	41.31	35.90	32.23	24.37		19.07	15.60

Elastomer Springs



Boneham & Turners range of Polyurethane Elastomer Springs have a nominal Hardness of 90 Shore A, other hardness are available on request.

Lengths of the each bar are kept in stock to provide a quick turnaround on standard and non-standard lengths.



Standard Length

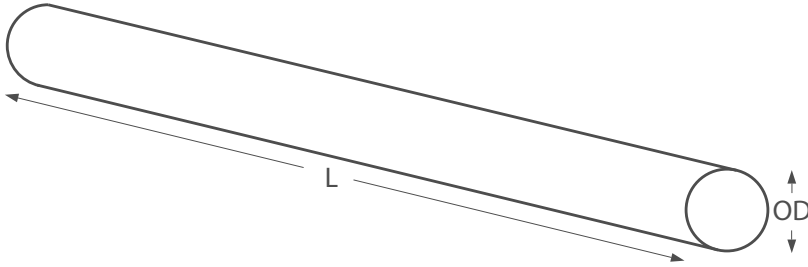
B & T Ref.	Outside Diameter	Length	Inside Diameter	Maximum Compression
ES 1	16	16	6.5	4
ES 2	16	20	6.5	5
ES 3	16	25	6.5	6.25
ES 4	20	16	8.5	4
ES 5	20	20	8.5	5
ES 6	20	25	8.5	6.25
ES 7	20	32	8.5	8
ES 8	25	20	10.5	5
ES 9	25	25	10.5	6.25
ES 10	25	32	10.5	8
ES 11	25	40	10.5	10
ES 12	32	32	13.5	8
ES 13	32	40	13.5	10
ES 14	32	50	13.5	12.5
ES 15	32	63	13.5	15.75
ES 16	40	32	13.5	8
ES 17	40	40	13.5	10
ES 18	40	50	13.5	12.5
ES 19	40	63	13.5	15.75
ES 20	40	80	13.5	20
ES 21	50	32	17	8
ES 22	50	40	17	10
ES 23	50	50	17	12.5
ES 24	50	63	17	15.75

B & T Ref.	Outside Diameter	Length	Inside Diameter	Maximum Compression
ES 25	50	80	17	20
ES 26	50	100	17	25
ES 27	63	32	17	8
ES 28	63	40	17	10
ES 29	63	50	17	12.5
ES 30	63	63	17	15.75
ES 31	63	80	17	20
ES 32	63	100	17	25
ES 33	63	125	17	31.25
ES 34	80	32	21	8
ES 35	80	40	21	10
ES 36	80	50	21	12.5
ES 37	80	63	21	15.75
ES 38	80	80	21	20
ES 39	80	100	21	25
ES 40	80	125	21	31.25
ES 41	100	32	21	8
ES 42	100	40	21	10
ES 43	100	50	21	12.5
ES 44	100	63	21	15.75
ES 45	100	80	21	20
ES 46	100	100	21	25
ES 47	100	125	21	31.25

Elastomer Solid Bars

340

PRESS TOOL PARTS



ORDER EXAMPLE

Diameter 32mm by 300 long.

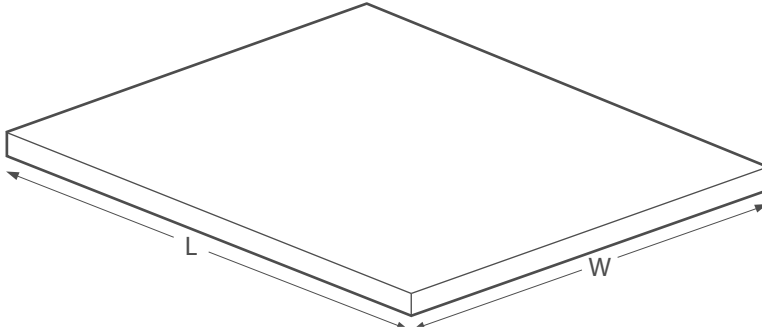
NOTES

Available in 80 shore and 90 shore.



OD	L
16	250
20	250
25	250
32	500
40	500
50	500
63	500
80	500
100	500
125	500

Elastomer Plates

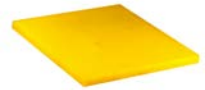


ORDER INSTRUCTIONS

State W, L, Thickness and quantity.

NOTES

Available in 80 shore and 90 shore.



W	L	T
500	500	10
500	500	12
500	500	16
500	500	20
500	500	25
500	500	30
500	500	35
500	500	40
500	500	45
500	500	50
500	500	60
500	500	70
500	500	90

Dadco Micro – C Series



KEY FEATURES

- / Pre-set and adjustable force models
- / Color-coded for easy identification
- / Threaded body styles available
- / Operate self-contained or linked using MINILink® system

Model	Can Diameter		Rod Diameter		Stroke Lengths		Overall Length		Max Force on Contact		Max Charging Pressure		Port Size
	mm	Inch	mm	Inch	mm		mm		daN	lbs	Bar	Psi	
C.045	12	.472	6	.24	7-50	63.5-80	(2 x S) + 42	(2 x S) + 45	50	112	177	2560	M6
C.070	15	.591	7	.28	7-50	63.5-125	(2 x S) + 42	(2 x S) + 45	68	154	177	2560	M6
C.090	19	.748	8	.31	7-50	63.5-125	(2 x S) + 42	(2 x S) + 45	89	200	177	2560	M6
					150-200		(2 x S) + 53						
C.180	25	.984	12	.47	7-50	63.5-125	(2 x S) + 42	(2 x S) + 45	200	450	177	2560	M6
					150-200		(2 x S) + 53						
C.250	32	1.260	15	.59	7-50	63.5-125	(2 x S) + 42	(2 x S) + 45	313	701	177	2560	M6

Dadco Ultra Force® – U Series



KEY FEATURES

- / High force and compact height
- / Operates self-contained or linked
- / UltraPak® cartridge used for long life

Model	Can Diameter		Rod Diameter		Stroke Lengths		Overall Length		Max Force on Contact		Max Charging Pressure		Port Size
	mm	Inch	mm	Inch	mm		mm		daN	lbs	Bar	Psi	
U.0175	19	.748	11	.43	7-63.5	75-125	(2 x S) + 30	(2 x S) + 35	171	383	180	2600	M6
U.0325	25	.984	15	.59	7-63.5	75-125	(2 x S) + 30	(2 x S) + 35	320	715	180	2600	M6
U.0400	32	1.260	16	.63	10-125		2 x Stroke + 30		362	810	180	2600	M6
U.0600	38	1.496	20	.79	10-125		2 x Stroke + 30		471	1059	150	2175	M6
U.0800	44.5	1.750	25	.98	10-125		2 x Stroke + 32		736	1655	150	2175	M6
U.1000	50	1.968	28	1.10	12.5-125		2 x Stroke + 38		924	2076	150	2175	M6
U.1200	50	1.968	30	1.18	10-125		2 x Stroke + 38		1060	2383	150	2175	M6
U.1600	63	2.480	36	1.42	10-125		2 x Stroke + 44		1527	3432	150	2175	M6
U.2600	75	2.953	45	1.77	16-125		2 x Stroke + 45		2386	5362	150	2175	M6
U.4600	95	3.740	60	2.36	16-125		2 x Stroke + 58		4241	9532	150	2175	G 1/8
U.6600	120	4.724	75	2.95	16-125		2 x Stroke + 68		6627	14894	150	2175	G 1/8
U.9600	150	5.906	90	3.54	25-125		2 x Stroke + 78		9543	21447	150	2175	G 1/8
U.20000	195	7.677	130	5.12	25-125		2 x Stroke + 110		19910	44747	150	2175	G 1/8

Dadco Mini – LJ / L Series



KEY FEATURES

- / Operate self-contained or linked using MINILink® system
- / Variety of bolt-on mounts available
- / L Series backed by DADCO's two year/two million stroke Select Guarantee

Model	Can Diameter		Rod Diameter		Stroke Lengths mm	Overall Length mm	Max Force on Contact		Max Charging Pressure		Port Size
	mm	Inch	mm	Inch			daN	lbs	Bar	Psi	
LJ.300	38	1.496	16	.63	12.5-125	2 x Stroke + 30	302	678	150	2175	M6
L.300	38	1.496	16	.63	6.3-125	2 x Stroke + 50.5	302	678	150	2175	M6
LJ.750	50	1.968	25	.98	12.5-125	2 x Stroke + 38	736	1655	150	2175	M6
L.750	50	1.968	25	.98	6.3-125	2 x Stroke + 50.5	736	1655	150	2175	M6

Dadco Ultra Force Extended® – UX Series



REQUEST
THE DEDICATED
DADCO
CATALOGUE

KEY FEATURES

- / High Force
- / Stroke Lengths up to 300 mm
- / Matches ISO standard diameter and height

Model	Can Diameter		Rod Diameter		Stroke Lengths mm	Overall Length mm	Max Force on Contact		Max Charging Pressure		Port Size
	mm	Inch	mm	Inch			daN	lbs	Bar	Psi	
UX.0800	44.5	1.750	25	.98	12.5-200	2 x Stroke + 42	736	1655	150	2175	G 1/8
UX.1000	50	1.968	28	1.10	12.5-300	2 x Stroke + 93	924	2076	150	2175	G 1/8
UX.1600	63	2.480	36	1.42	12.5-300	2 x Stroke + 95	1527	3432	150	2175	G 1/8
UX.2600	75	2.953	45	1.77	25-300	2 x Stroke + 108	2386	5362	150	2175	G 1/8
UX.4600	95	3.740	60	2.36	25-300	2 x Stroke + 120	4241	9532	150	2175	G 1/8
UX.6600	120	4.724	75	2.95	25-300	2 x Stroke +140	6627	14894	150	2175	G 1/8
UX.9600	150	5.906	90	3.54	25-300	2 x Stroke + 155	9543	21447	150	2175	G 1/8
UX.20000	195	7.677	130	5.12	25-300	2 x Stroke + 160	19910	44747	150	2175	G 1/8

Dadco Super Compact – SC Series



KEY FEATURES

- / High force, compact height
- / Bore seal design
- / Optional side port with addition of sub plate

Model	Can Diameter		Rod Diameter		Stroke Lengths mm	Overall Length mm	Max Force on Contact		Max Charging Pressure		Port Size
	mm	Inch	mm	Inch			daN	lbs	Bar	Psi	
SC.00420	25	.984	12	.47	10, 16, 25	70, 91,120	425	956	150	2175	M6
SC.00740	32	1.260	20	.79	6-50	63-195	736	1655	150	2175	M6
SC.01000	38	1.496	20	.79	6-50	61-230	1060	2383	150	2175	M6
SC.01800	50	1.968	30	1.18	6-50	66-220	1885	4236	150	2175	G 1/8
SC.03500	63	2.480	45	1.77	10-50	85-205	3185	7160	150	2175	G 1/8
SC.04700	75	2.953	50	1.97	10-50	80-240	4676	10509	150	2175	G 1/8
SC.07500	95	3.740	63	2.48	10-50	90-255	7540	16946	150	2175	G 1/8
SC.11800	120	4.724	80	3.15	10-50	100-260	11781	26478	150	2175	G 1/8
SC.18300	150	5.906	100	3.94	10-50	110-270	18408	41372	150	2175	G 1/8

Dadco ISO / 90.10 Series



REQUEST
THE DEDICATED
DADCO
CATALOGUE

KEY FEATURES

- / Matches ISO standards
- / Long strokes for deep drawing
- / Welded or bolt-on mounts available

Model	Can Diameter		Rod Diameter		Stroke Lengths mm	Overall Length mm	Max Force on Contact		Max Charging Pressure		Port Size
	mm	Inch	mm	Inch			daN	lbs	Bar	Psi	
90.10.00170	32	1.260	12	.47	10-125	2 x Stroke + 50	170	381	150	2175	M6
90.10.00500	44.5	1.750	20	.79	12.5-200	2 x Stroke + 85	471	1059	150	2175	G 1/8
90.10.00750	50	1.968	25	.98	12.5-300	2 x Stroke + 95	736	1655	150	2175	G 1/8
90.10.01500	75	2.953	36	1.42	12.5-300	2 x Stroke + 110	1527	3432	150	2175	G 1/8
90.10.03000	95	3.740	50	1.97	12.5-300	2 x Stroke + 120	2945	6619	150	2175	G 1/8
90.10.05000	120	4.724	65	2.56	25-300	2 x Stroke + 140	4977	11187	150	2175	G 1/8
90.10.07500	150	5.906	80	3.15	25-300	2 x Stroke + 155	7540	16946	150	2175	G 1/8
90.10.10000	195	7.677	95	3.74	50-250	2 x Stroke + 160	10632	23896	150	2175	G 1/8

Dadco Super Compact – SCR Series



KEY FEATURES

- / High force, compact height
- / M6 port for pressure adjustment
- / Linking capabilities

Model	Can Diameter		Rod Diameter		Stroke Lengths mm	Overall Length mm	Max Force on Contact		Max Charging Pressure		Port Size
	mm	Inch	mm	Inch			daN	lbs	Bar	Psi	
SCR.0500	32	1.260	18	.71	10-80	2 x Stroke + 55	458	1026	180	2600	M6
SCR.0800	38	1.496	25	.98	10-80	2 x Stroke + 55	884	1978	180	2600	M6
SCR.1900	50	1.968	35	1.38	10-80	2 x Stroke + 80	1732	3877	180	2600	M6
SCR.3200	63	2.480	45	1.77	16-80	2 x Stroke + 80	2863	6409	180	2600	M6

Dadco Micro Nitrogen Gas Spring Lifters – SL Series



REQUEST
THE DEDICATED
DADCO
CATALOGUE

KEY FEATURES

- / Non-rotating and internal cushion options
- / Built-in guidance
- / Force provided by Micro and Mini Series gas springs
- / Single, multi-point or rail lift applications
- / Ideal for progressive stamping dies, rail lifters and work holding applications

Model	Can Diameter		Stroke Lengths S mm	Overall Length mm	Max Force on Contact		Max Charging Pressure		Port Size
	mm	Inch			daN	lbs	Bar	Psi	
E.16	12	.472	15-80	74-207	42	95	150	2175	M6
E.24	21.5	.846	20-80	100-220	170	381	150	2175	M6
SL.16	14	.55	10-100	2 x Stroke + 60	51	114	180	2611	M6
SLN.090	38	1.496	25-125	112-330	89	200	177	2560	-
SLN.180*	50	1.968	25-125	145-369	200	450	177	2560	-
SLN.300	75	2.953	50-150	2 x Stroke + 96	302	678	150	2175	M6
SLC.500	50	1.96	50-200	2 x Stroke + 122.5	220	487	70	1000	G 1/8
SLC.800	75	2.95	50-200	2 x Stroke + 204	712	1578	70	1000	G 1/8
Model	Rail Width		Stroke Lengths	Overall Length	Max Force on Contact		Max Charging Pressure		Port Size
SL2.090	160	6.30	23-198	105-466	89	200	177	2560	M6
SL2.180	180	7.09	23-198	105-466	200	450	177	2560	M6
SL2.300	180	7.09	23-198	105-466	302	678	150	2175	M6

*Available in Flange Model (FA / FB) for stripper applications.

Dadco ISO Air Cylinders – HP Series



KEY FEATURES

- / Standard male (HP.Z), optional female (HP.W) and non-rotating (HP.N) rod ends
- / Two post lifters (TDL2C / TDL4)
- / Adjustable cushioning
- / Meets or exceeds most NAAMS, ISO and VDMA standards

Model	Bore Size mm	Stroke Lengths S (mm)	Cylinder Body Length (mm)	Push Force 6 Bar / 80 Psi		Max Charging Pressure		Port Style
				kN	lbs	Bar	Psi	
HP.Z / HP.W	32-250	25-500	Varies by bore size (see catalog)	.483-29.45	100-6087	10	140	NPT/BSPP
HP.N	32-100	25-500	Varies by bore size (see catalog)	.483-4.71	100-974	10	140	NPT/BSPP
HP.TDL2C	40-100	25-400	Varies by bore size (see catalog)	.754-4.71	156-974	10	140	NPT/BSPP
HP.TDL4	40	25-250	Stroke + 171	.754	156	10	140	NPT/BSPP
HP.STB	50	125-200	Stroke + 161	1.080	243	10	140	NPT/BSPP

Dadco Guide Retainer Sets – GRS/GRS HD Series



REQUEST
THE DEDICATED
DADCO
CATALOGUE

KEY FEATURES

- / Robust design with combined guidance and retention
- / Four rod diameters: 25 mm, 30 mm, 36 mm and 50 mm
- / Various stroke lengths to suit application requirements
- / Replaces common pins, bushings and spools

Model	Rod Diameter		Retainer Diameter		Pin Extension mm	Overall Length mm	Rod Attachment SHCS		Fastener Qty.
	mm	Inch	mm	Inch			Metric	Imperial	
GRS.25	25	.984	38	1.496	20-150	Stroke + 50	M12	1/2"-13	1
GRS.30*	30	1.181	43	1.693	20-150	Stroke + 50	M8	5/16"-18	4
GRS.36*	36	1.417	50	1.968	20-150	Stroke + 65	M10	3/8"-16	4
GRS.50	50	1.968	68	2.677	20-150	Stroke + 80	M12	1/2"-13	4
GRS.36.HD	36	1.417	50	1.969	45-145	Stroke + 100	4 x M10	-	4
GRS.50.HD	50	1.967	70	2.756	55-155	190-280	3 x M16	-	3
GRS.65.HD	65	2.557	90	3.543	55-155	225-315	4 x M16	-	4

*GRS.30 and GRS.36 are available with Alternative Toe Clamps.



PLUGS

/ Threaded Hexagon Socket Plug / Aluminium Threaded Plug / Threaded Plug O-Ring / Threaded Plug

Pages 353-356

KOENIG EXPANDER® SEALING PLUGS MB / CV SERIES

/ MB 600 Series Sealing Plugs / MB 600 Series Inch Version Sealing Plugs / MB 700 Series Sealing Plug
/ MB850 Series Sealing Plugs / CV 173 Series Sealing Plugs / CV 173 Series INCH Sealing Plugs
/ CV 173 Series INCH Short Sealing Plugs / CV 588 Series Sealing Plugs
/ CV 588 Series INCH Sealing Plugs / CV 588 Series INCH Short Sealing Plugs
/ MB Series Setting Tools / CV Series Setting Tools

Pages 363-378

KOENIG EXPANDER® SEALING PLUGS SK / LK / LP SERIES

/ SK 550 Series Sealing Plugs / SK 552 Series Long Mandrel Sealing Plugs
/ SK Series Spacer Setting Tools SK552 / LK 600 Series Sealing Plugs / LK 950 Series Sealing Plugs
/ LP 900 Series Sealing Plugs / LP Series Setting Tools

Pages 379-388

KOENIG CHECK VALVE® BF / BR SERIES

/ BF Series 5.5mm Forward and Reverse Check Valves / BF Series 8.0mm Forward and Reverse
Check Valves / BF and BR Series Setting Tools

Pages 389-394

KOENIG RESTRICTOR® RE SERIES

/ RE Series Orifice Restrictors / RE Series Setting Tools

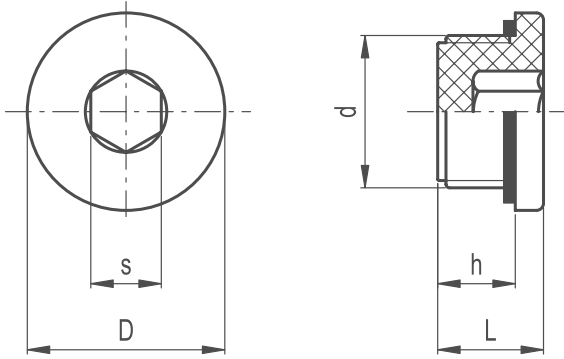
Pages 395-397

KOENIG SETTING TOOL EQUIPMENT

/ Express 3000 and 5000 Setting Tools / EXT00L Setting Tools Range / KW-008 Setting Tool

Pages 399-406

Threaded Hexagon Socket Plug



/ Material

Glass-fibre reinforced polyamide based (PA) technopolymer. Resistant to solvents, oils, greases and other chemical agents.

/ Colour

Black, matt finish.

/ Flat packing ring

NBR synthetic rubber.

/ Maximum continuous working temperature

130°C.

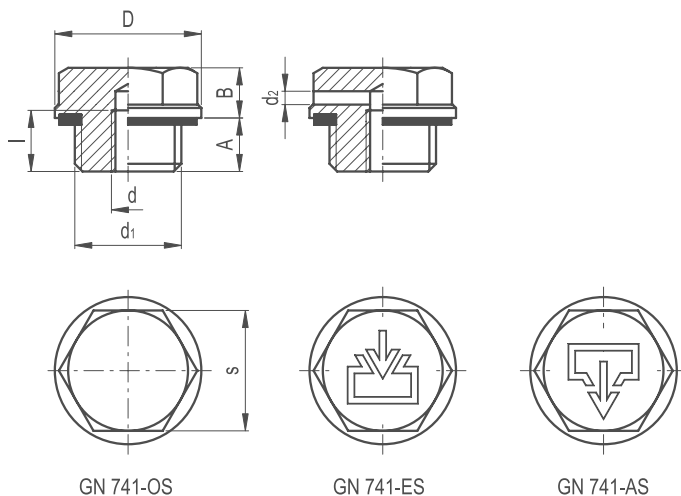


TECHNICAL DATA

An adequate tightening torque (see table below) is recommended when screwing the plug, so as to guarantee optimal tightness without any deformation of the packing ring. Suggested tightening torque is the result of laboratory tests carried out at ambient temperature (23°C) with plug, packing ring and reservoir walls perfectly cleaned.

Part Reference	D	h	s	L	D	Tightening Torque (Nm)
THSP1	G 1/4	9	6	12	20	3
THSP2	G 3/8	9	8	13	22	3-5
THSP3	G 1/2	11	10	15	28	3-4
THSP4	G 3/4	12	12	16.5	32	3-5

Aluminium Threaded Plug



GN 741-OS

GN 741-ES

GN 741-AS

/ Material

Aluminium, sandblasted matt finish.

/ Flat packing ring

NBR synthetic rubber.

/ Maximum continuous working temperature

120°C.

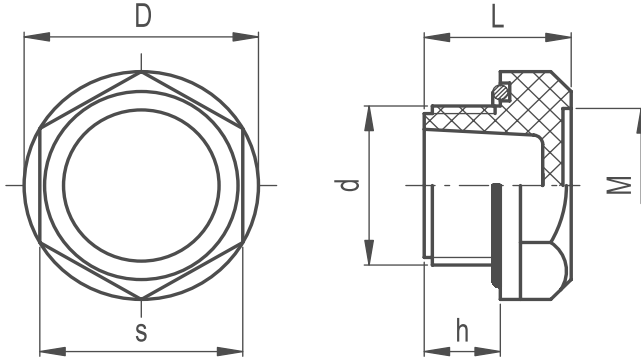
FEATURES

Plugs are provided with a threaded blind hole for assembling a dipstick. High temperature up to 200°C. Available on request.



Part Reference	d1	A	B	D	d	l	s
ATP1	M16x1.5	8	7.5	22	M5	8	18
ATP2	M20x1.5	8.5	7.5	26	M5	8	21
ATP3	M26x1.5	9	8	32	M5	8	27
ATP4	G 3/8	8	7.5	22	M5	8	18
ATP5	G 1/2	8.5	7.5	26	M5	8	21
ATP6	G 3/4	9	8	32	M5	8	27
ATP7	G 1	11	8.5	40	M5	8	32

Threaded Plug O-Ring



/ Material

Glass-fibre reinforced polyamide based (PA) technopolymer. Resistant to solvents, oils, greases and other chemical agents.

/ Colour

Black, matt finish.

/ Packing ring

NBR synthetic rubber O-Ring.

/ Maximum continuous working temperature
130°C.

ACCESSORIES ON REQUEST

Plugs are suitable for mounting MH. aluminium plates with graphic symbols here beside.

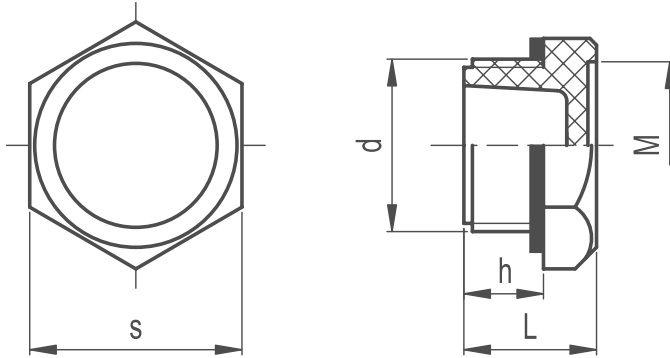
TECHNICAL DATA

An adequate tightening torque (see table below) is recommended when screwing the plug, so as to guarantee optimal tightness without any deformation of the packing ring. Suggested tightening torque is the result of laboratory tests carried out at ambient temperature (23°C) with plug, packing ring and reservoir walls perfectly cleaned.



Part Reference	d	h	D	s	L	M	Tightening Torque (Nm)
TPOR1	G 1/2	11	32	27	20	20.5	8-10
TPOR2	G 3/4	12	37	32	22	25	10-12
TPOR3	G 1	13	44	38	23	31	12-15

Threaded Plug



- / **Material**
Glass-fibre reinforced polyamide based (PA) technopolymer. Resistant to solvents, oils, greases and other chemical agents.
- / **Colour**
Black, matt finish.
- / **Flat packing ring**
NBR synthetic rubber.
- / **Maximum continuous working temperature**
130°C.

ACCESSORIES ON REQUEST
Plugs are suitable for mounting MH. aluminium plates with graphic symbols.

TECHNICAL DATA
An adequate tightening torque (see table below) is recommended when screwing the plug, so as to guarantee optimal tightness without any deformation of the packing ring. Suggested tightening torque is the result of laboratory tests carried out at ambient temperature (23°C) with plug, packing ring and reservoir walls perfectly cleaned.



Part Reference	D	h	s	L	M	Tightening Torque (Nm)
TP1	M10x1.5	9	19	16	15	4-5
TP2	M12x1.5	9	19	16	15	6-8
TP3	M14x1.5	9	19	16	15	6-8
TP4	M16x1.5	9	22	16	17	8-10
TP5	M18x1.5	11	26	18	20.5	8-10
TP6	M20x1.5	11	26	18	20.5	8-10
TP7	M22x1.5	12	32	20	25	10-12
TP8	M25x1.5	12	32	20	25	10-12
TP9	M26x1.5	12	32	20	25	10-12
TP10	M35x1.5	13	38	22	31	15-18
TP11	M40x1.5	14	46	24	38	15-18
TP12	G 1/8	9	19	16	15	4-6
TP13	G 1/4	9	19	16	15	4-6
TP14	G 3/8	9	22	16	17	8-10
TP15	G 1/2	11	26	18	20.5	8-10
TP16	G 3/4	12	32	20	25	10-12
TP17	G 1	13	38	22	31	12-15
TP18	G1 1/4	14	46	24	38	15-18
TP19	G1 1/2	15	55	26	46	15-18

The World's Leading Sealing & Flow Control Technology

With over 3 billion parts installed and failure rates less than 1 part per million, SFC KOENIG® is recognised around the world for reliable, safe and effective sealing and flow control. With our unique expanding seal technology our parts reduce contamination, withstand high pressures and provide leak-free performance for long life cycles.

SFC KOENIG is the original inventor of the one piece, metal-to-metal sealing solution, the KOENIG EXPANDER®, and all SFC KOENIG components are recognised for best-in-class performance in even the most critical applications.

With a combined 180 years of experience, BONEHAM and SFC KOENIG are ready to deliver a solution designed for your application and can integrate our products into your production and workflow processes. Our expert engineers are ready to design a custom part to meet your specific requirements, and we offer a wide variety of standard sizes, designs and configurations for our full line of easy-to-install components.

SFCKOENIG

Leader in
Sealing & Flow Control
Technology



Proven Precision & Reliability

SFC KOENIG components are proven effective in a diverse array of applications, and are the ideal solution wherever safe and secure sealing and flow control is needed. We maintain a variety of manufacturing and industry-specific certifications, and our engineers are ready to assist with a customised solution that meets your exact specifications and requirements. With over 3 billion parts installed, SFC KOENIG components are proven effective and are ready to meet your toughest sealing and flow control challenge.



FLUID POWER

SFC KOENIG parts are ideal for hydraulics, manifolds, mobile power units, valves, pumping and other fluid power systems. We deliver reliable, leak-free sealing and flow control, with tamper-proof designs that provide long life cycles and withstand the harshest environments.



TRANSPORTATION

Leading automotive and vehicle system manufacturers rely on SFC KOENIG solutions for optimised safety and reliability. We maintain IATF 16949 certification and our parts are proven reliable for the operational extremes and high-vibration levels found in engines, transmissions, turbo chargers, braking, fueling and transportation.



MEDICAL

Offering the highest levels of safety, security and dependability, SFC KOENIG components meet the strict requirements of medical, surgical, optical and dental applications. From life-saving equipment to environmental controls, our best-in-class performance is relied on in even the most mission-critical applications.



OFFSHORE & MARITIME

The corrosive, harsh conditions found in maritime and offshore applications are reliably handled by SFC KOENIG components. Our sealing and flow control solutions have been used a diverse array of applications, including shipping, natural gas compressors, pumps, fluid density probes and more.



AEROSPACE

The aviation and aerospace industries rely on SFC KOENIG components for lightweight, high-pressure performance. From flight controls to jet engines, our parts provide safe and effective sealing and flow control in extreme environmental conditions.

Unrivalled Sealing & Flow Control Solutions



KOENIG EXPANDER®

The KOENIG EXPANDER® is the original one-piece, metal-to-metal sealing solution. With over 3 billion parts installed and a failure rate less than 1 PPM (part per million), these no-leak sealing plugs permanently resist pressures up to 500 bar and are proven effective – even for the sealing of angled channels and deep holes. The KOENIG EXPANDER® offers easy installation for a variety of applications and configurations, and is the industry's leading technology for the sealing of drilled holes.



KOENIG CHECK VALVE®

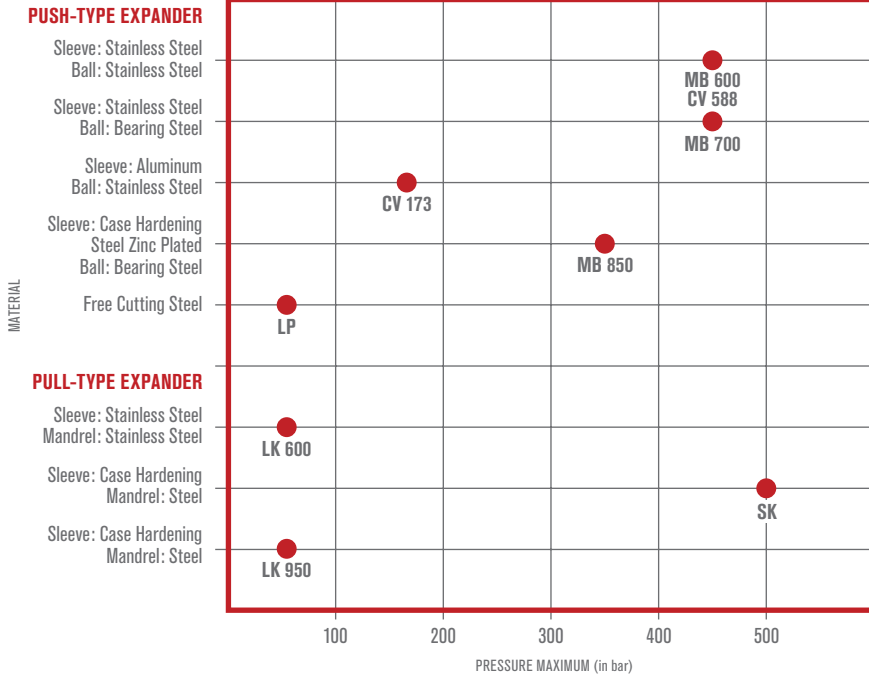
With its self-contained, ball-style design and stainless steel construction, the KOENIG CHECK VALVE® provides precise flow control and minimal leakage, leveraging proven SFC KOENIG expander sleeve technology and flow control expertise to provide a highly-accurate solution. Available in a variety of sizes, cracking pressures, and in forward-flow and reverse-flow designs, the KOENIG CHECK VALVE® is effective for fast and dependable flow control.



KOENIG RESTRICTOR®

Designed for accurate flow control in even the most precise applications, the KOENIG RESTRICTOR® is ideal for deep-hole installations and wherever dependable, no leak fluid restriction is needed. The KOENIG RESTRICTOR® is available in a variety of orifice sizes customised for your flow rate, and is offered with or without an integrated screen, providing a reliable, one-piece flow control solution.

Material / Pressure



Flow Rate / Pressure

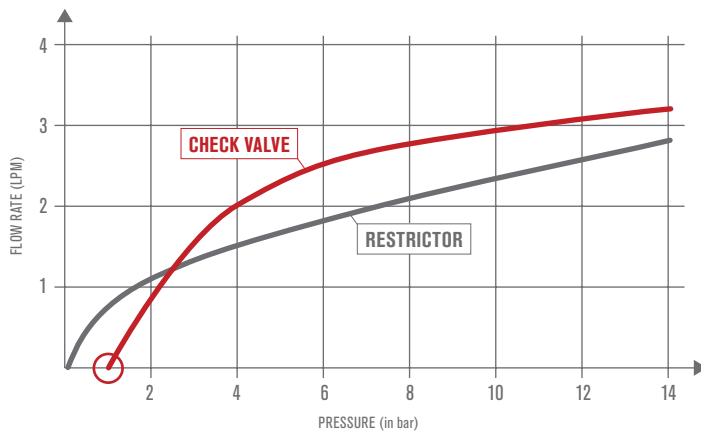
FUNCTIONS

CHECK VALVE

- / Opening Pressure: Allow the flow from e.g. 1 bar in flow direction
- / Control fluid pressure in circuits
- / Backflow prevention

RESTRICTOR

- / Flow Limiter: Control the amount of fluid being supplied
- / Orifice diameters customised to your flow requirements



Contents

Pages 363-378

PUSH-TYPE EXPANDERS

KOENIG EXPANDER® plugs effectively seal drilled holes. These parts feature a serrated sleeve which expands as the ball is inserted, enlarging the part to the needed size and sealing the hole. For installation, push-style expanders require a hole drilled with a counter bore.

SERIES MB / CV

- / Sealing plugs for operating pressures up to 450 bar / 6500 psi
- / Wide range of sizes from Ø 3 - 22mm
- / Corrosion-resistant versions available
- / Fast, easy installation



Pages 386-388

LOW-PRESSURE EXPANDERS

Based on a press fit and anchoring concept, low-pressure style expanders use a conical press-in sleeve. During installation, the press-in sleeve adapts to the bore and the outer serration bites into the bore wall.

SERIES LP

- / Sealing plugs for operating pressures up to 60 bar / 850 psi
- / Short installation dimensions
- / Mechanical sealing using press fit
- / Quick installation



Pages 379-385

PULL-TYPE EXPANDERS

Pull-style expanders use an integrated mandrel to insert the expander plug into a drilled hole. This type of KOENIG EXPANDER® does not require the hole to be counter-bored, and is often used for angled channels or installations with difficult orientations. They are ideal for installations with space or weight constraints.

SERIES SK

- / Sealing plugs for operating pressures up to 500 bar / 7200 psi
- / Short installation length
- / Liberal manufacturing tolerance 0 / + 0.12mm
- / Extended mandrel for deeper setting



SERIES LK

- / Sealing plugs for operating pressures up to 60 bar / 850 psi
- / Short installation dimensions
- / Liberal manufacturing tolerance 0 / + 0.12mm
- / Comprehensive product range for Ø 4 - 20 mm

Contents

Pages 389-397

FLOW CONTROL

The KOENIG RESTRICTOR® is designed to restrict flow in fluid systems and is available in a variety of orifice sizes. The KOENIG CHECK VALVE® controls the flow of fluids and is available in a variety of cracking pressures.

CHECK VALVES

- / Forward-flow and reverse-flow types available
- / Pressure rated up to 300 bar / 4350 psi
- / Standard units available in various cracking pressures
- / Stainless steel design is standard
- / Available in a range of standard size diameters and flow rates

SERIES RE - RESTRICTORS

- / Can be used with fluids or gases
- / Stainless steel design is standard
- / Orifices can be calculated to achieve desired flow rates
- / Expansion style easily installs into drilled holes and is tamper resistant



Page 398

SPECIAL ORDERS

Pages 399-406

SETTING TOOL EQUIPMENT

SFC KOENIG® offers a variety of setting tools and equipment to assist in the installation of our parts.

- / EXPRESS 3000 – Hydropneumatic Table Presses
- / EXPRESS 5000 – Hydropneumatic Table Presses
- / EXTOOLS 030, 040-1, 040-2 and 050
- / EXTOOLS B-010
- / KW-008 – Hand Lever Tool with Equipment Ø 4 - 6 mm

Page 407

SYSTEMS AND AUTOMATION SOLUTIONS

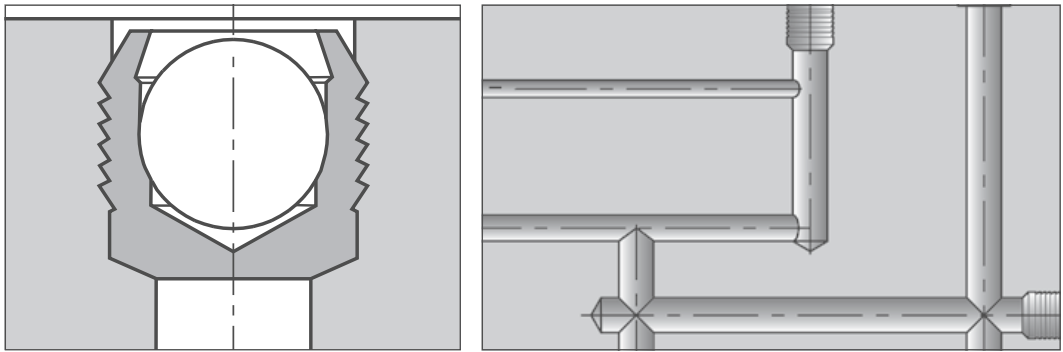
Pages 408-432

TECHNICAL INFORMATION

Koenig Expander[®] MB / CV Series

Sealing Plugs for Operating Pressures up to 450 bar / 6500 psi

- / Operating pressures up to 450 bar / 6500 psi
- / Comprehensive range of products for Ø 3 – 22 mm, also available in inch version
- / Corrosion-resistant version
- / Available in aluminum
- / Standard drilling manufacturing tolerance 0 / + 0.10 mm
- / Swift and easy installation
- / Purely mechanical sealing through anchorage system



For large volume special applications, please contact the BONEHAM technical sales team.

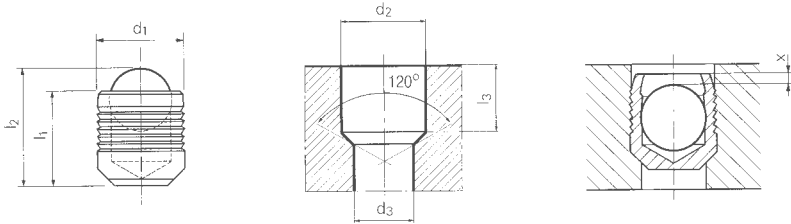
RECOMMENDED SETTING EQUIPMENT FOR SERIES MB AND CV

EXPRESS 3000 / Hydropneumatic Table Press / See page 400 for more information

EXPRESS 5000 / Hydropneumatic Table Press / See page 400 for more information

MB 600 Series Sealing Plugs

Sleeve Clear Passivated per MIL-S-5002, Aerospace Quality



MATERIAL

/ Sleeve: Stainless Steel 1.4305
/ Ball: Stainless Steel 1.4301

IMPORTANT

/ See installation instructions on pages 415-416
/ Installation requirements on page 410



Part Number	d ₁	l ₁	(l ₂) ~ Ref.	d ₂ +0.1 0	d ₃ max.	l ₃ min.	x ±0.2	Packaging Unit	Weight in gram/pcs.
MB600-030	3.0	3.6	4.6	3.0	2.2	3.4	0.4	100/1000	0.17
MB600-040	4.0	4.0	5.1	4.0	3.3	3.8	0.2	100/1000	0.34
MB600-050	5.0	5.5	7.1	5.0	4.3	5.3	0.4	100/1000	0.68
MB600-060	6.0	6.5	8.6	6.0	5.3	6.3	0.4	100/500	1.18
MB600-070	7.0	7.5	10.1	7.0	6.4	7.3	0.4	100/250	1.91
MB600-080	8.0	8.5	11.6	8.0	7.4	8.3	0.3	50/250	2.86
MB600-090	9.0	10.0	13.5	9.0	8.4	9.8	0.4	50/250	4.02
MB600-100	10.0	11.0	15.1	10.0	9.4	10.8	0.4	50/250	5.50
MB600-120	12.0	13.0	17.8	12.0	10.6	12.8	0.4	25/100	9.37
MB600-140	14.0	15.0	20.5	14.0	12.7	14.5	0.4	25/100	14.81

Dimensions in millimeters

PRESSURE PERFORMANCE

Series MB 600 mm	Base Material of the Installation						
	① ETG-100 / 44SMn28 AISI 1144	② C15Pb / 1.0403 ~ SAE 1015 (10L15)	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	④ EN 1561: GJL-250 ASTM A48: NO.35	⑤ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	⑥ AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	⑦ G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 3 – 10	1400 bar / 20300 psi 450 bar / 6500 psi			1200 bar / 17400 psi 380 bar / 5500 psi			
Ø 12 – 14	1000 bar / 14500 psi 350 bar / 5100 psi			900 bar / 13000 psi 280 bar / 4100 psi			

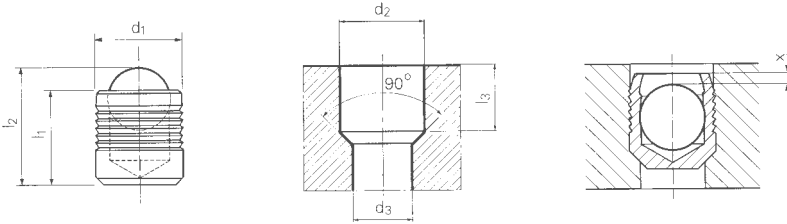
Proof Pressure Test – ⑧

Max. Allowable Working Pressure = Nominal Pressure

www.boneham.co.uk / Tel: +44 (0) 1623 445 450 / Fax: +44 (0) 1623 445 451 / sales@boneham.co.uk

MB 600 Series INCH Sealing Plugs

Sleeve Clear Passivated per MIL-S-5002, Aerospace Quality



MATERIAL

/ Sleeve: Stainless Steel 1.4305
 / Ball: Stainless Steel 1.4301 (1.4034 MB 600-093)

IMPORTANT

/ See installation instructions on pages 415-416
 / Installation requirements on page 410



Part Number	d ₁	l ₁	(l ₂) ~ Ref.	d ₂ +0.1 0	d ₃ max.	l ₃ min.	x 0 -0.012	Packaging Unit	Weight in gram/pcs.
MB600-093A	0.093	0.100	0.120	0.0937	0.062	0.095	0.012	100/1000	0.07
MB600-125A	0.124	0.138	0.172	0.1250	0.093	0.125	0.012	100/1000	0.17
MB600-156A	0.156	0.150	0.196	0.1562	0.125	0.130	0.012	100/1000	0.31
MB600-187A	0.187	0.193	0.259	0.1875	0.156	0.152	0.012	100/500	0.53
MB600-218A	0.218	0.225	0.301	0.2187	0.187	0.187	0.012	100/500	0.86
MB600-250A	0.249	0.260	0.352	0.2500	0.218	0.212	0.012	100/500	1.26
MB600-281A	0.281	0.285	0.380	0.2812	0.250	0.250	0.012	100/500	1.87

Dimensions in inches

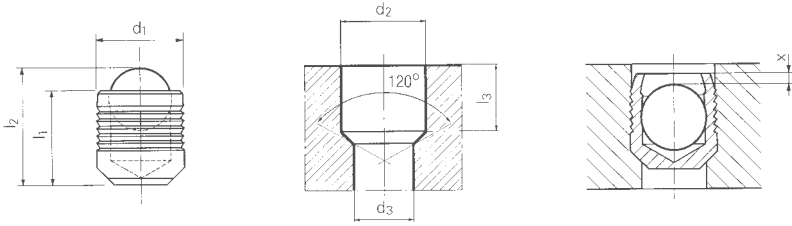
PRESSURE PERFORMANCE

Series MB 600 Inch	Base Material of the Installation						
	① ETG-100 / 44SMn28 AISI 1144	② C15Pb / 1.0403 ~ SAE 1015 (10L15)	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	④ EN 1561: GJL-250 ASTM A48: NO.35	⑤ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	⑥ AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	⑦ G-AlSi7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 0.093 – 0.281	1400 bar / 20300 psi 450 bar / 6500 psi					1200 bar / 17400 psi 380 bar / 5500 psi	

Proof Pressure Test – ⑧

Max. Allowable Working Pressure = Nominal Pressure

MB 700 Series Sealing Plugs



MATERIAL

/ Sleeve: Stainless Steel 1.4305
/ Ball: Bearing Steel, Heat Treated

IMPORTANT

/ See installation instructions on pages 415-416
/ Installation requirements on page 410



Part Number	d ₁	l ₁	(l ₂) ~ Ref.	d ₂ +0.1 0	d ₃ max.	l ₃ min.	x ±0.2	Packaging Unit	Weight in gram/pcs.
MB700-030	3.0	3.6	4.6	3.0	2.2	3.4	0.4	100/1000	0.17
MB700-040	4.0	4.0	5.2	4.0	3.3	3.8	0.2	100/2000	0.34
MB700-050	5.0	5.5	7.0	5.0	4.3	5.3	0.4	100/2000	0.68
MB700-060	6.0	6.5	8.6	6.0	5.3	6.3	0.4	100/2000	1.17
MB700-070	7.0	7.5	10.1	7.0	6.4	7.3	0.4	100/1000	1.90
MB700-080	8.0	8.5	11.6	8.0	7.4	8.3	0.3	50/1000	2.84
MB700-090	9.0	10.0	13.5	9.0	8.4	9.8	0.4	50/500	4.00
MB700-100	10.0	11.0	15.1	10.0	9.4	10.8	0.4	50/500	5.47
MB700-120	12.0	13.0	17.8	12.0	10.6	12.8	0.4	50/250	9.31
MB700-140	14.0	15.0	20.4	14.0	12.7	14.5	0.4	50/250	14.72
MB700-160	16.0	17.0	23.4	16.0	14.7	16.5	0.6	25/100	22.00
MB700-180	18.0	19.0	26.3	18.0	16.7	18.5	0.6	25/100	31.34
MB700-200	20.0	22.0	30.0	20.0	18.7	21.5	0.8	25/100	44.24
MB700-220	22.0	25.0	34.0	22.0	20.7	24.5	0.8	25/50	58.61

Dimensions in millimeters

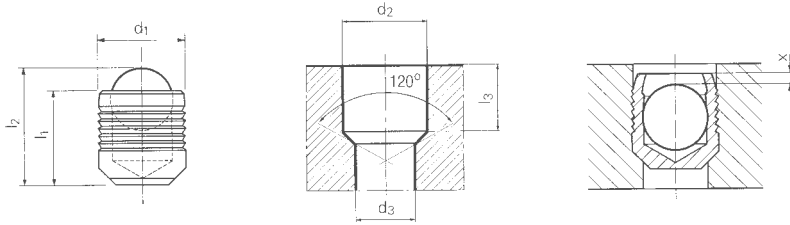
PRESSURE PERFORMANCE

Series MB 700 mm	Base Material of the Installation						
	① ETG-100 / 44SMn28 AISI 1144	② C15Pb / 1.0403 ~ SAE 1015 (10L15)	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	④ EN 1561: GJL-250 ASTM A48: NO.35	⑤ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	⑥ AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	⑦ G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 3 – 10	1400 bar / 20300 psi 450 bar / 6500 psi			1200 bar / 17400 psi 380 bar / 5500 psi			
Ø 12 – 22	1150 bar / 16700 psi 350 bar / 5100 psi			900 bar / 13000 psi 280 bar / 4100 psi			

Proof Pressure Test – ⑧

Max. Allowable Working Pressure = Nominal Pressure

MB 850 Series Sealing Plugs



MATERIAL

/ Sleeve: Case Hardening Steel Zinc Plated, Thick Coat Passivated, CR (VI) -Free
/ Ball: Bearing Steel, Heat Treated

IMPORTANT

/ See installation instructions on pages 415-416
/ Installation requirements on page 410



Part Number	d ₁	l ₁	(l ₂) ~ Ref.	d ₂ +0.1 0	d ₃ max.	l ₃ min.	x ±0.2	Packaging Unit	Weight in gram/pcs.
MB850-030	3.0	3.6	4.6	3.0	2.2	3.4	0.4	100/1000	0.17
MB850-040	4.0	4.0	5.2	4.0	3.3	3.8	0.2	100/2000	0.34
MB850-050	5.0	5.5	7.1	5.0	4.3	5.3	0.4	100/2000	0.68
MB850-060	6.0	6.5	8.6	6.0	5.3	6.3	0.4	100/2000	1.17
MB850-070	7.0	7.5	10.1	7.0	6.4	7.3	0.4	100/1000	1.91
MB850-080	8.0	8.5	11.6	8.0	7.4	8.3	0.3	50/1000	2.84
MB850-090	9.0	10.0	13.6	9.0	8.4	9.8	0.4	50/500	4.00
MB850-100	10.0	11.0	15.1	10.0	9.4	10.8	0.4	50/500	5.47
MB850-120	12.0	13.0	17.9	12.0	10.6	12.8	0.4	50/250	9.31
MB850-140	14.0	15.0	20.6	14.0	12.7	14.5	0.4	50/250	14.72
MB850-160	16.0	17.0	23.4	16.0	14.7	16.5	0.6	25/100	22.00
MB850-180	18.0	19.0	26.4	18.0	16.7	18.5	0.6	25/100	31.34
MB850-200	20.0	22.0	30.1	20.0	18.7	21.5	0.8	25/100	44.24
MB850-220	22.0	25.0	34.0	22.0	20.7	24.5	0.8	25/50	58.61

Dimensions in millimeters

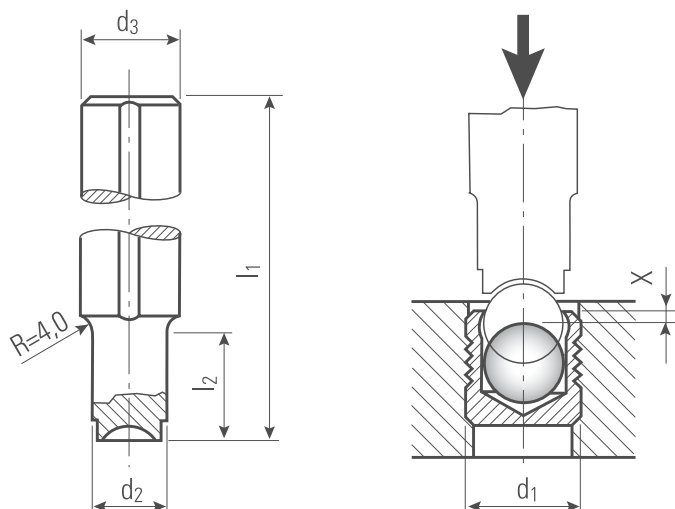
PRESSURE PERFORMANCE

Series MB 850 mm	Base Material of the Installation						
	① ETG-100 / 44SMn28 AISI 1144	② C15Pb / 1.0403 ~ SAE 1015 (10L15)	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	④ EN 1561: GJL-250 ASTM A48: NO.35	⑤ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	⑥ AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	⑦ G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 3 - 10	1100 bar / 16000 psi 350 bar / 5100 psi			1000 bar / 14500 psi 320 bar / 4600 psi			
Ø 12 - 22	900 bar / 13000 psi 280 bar / 4100 psi			800 bar / 11600 psi 250 bar / 3600 psi			

Proof Pressure Test - ⑧

Max. Allowable Working Pressure = Nominal Pressure

MB Series Setting Tools



MATERIAL

/ Tool Steel, Heat Treated, Hardness Approx. HRC 50

RECOMMENDED SETTING EQUIPMENT FOR SERIES MB

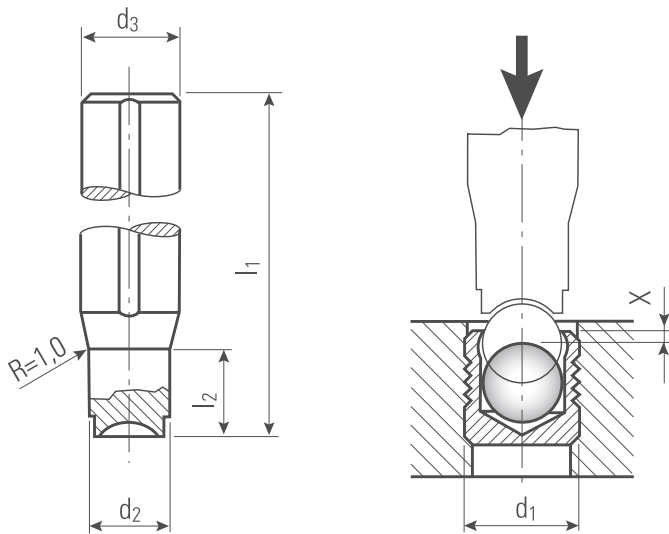
/ EXPRESS 3000 Hydropneumatic Table Press, see page 400 for more information

/ EXPRESS 5000 Hydropneumatic Table Press, see page 400 for more information

Part Number	d ₁ Expander	d ₃ -h9	l ₁	d ₂	l ₂	x ±0.2	Weight in gram/pcs.
MB030	3.0	10	100	2.8	10	0.4	55
MB040	4.0	10	100	3.8	10	0.2	55
MB050	5.0	10	100	4.8	12	0.4	55
MB060	6.0	10	100	5.8	15	0.4	55
MB070	7.0	10	100	6.8	18	0.4	55
MB080	8.0	10	100	7.8	20	0.3	55
MB090	9.0	14	100	8.8	22	0.4	120
MB100	10.0	14	100	9.8	25	0.4	120
MB120	12.0	14	150	11.7	30	0.4	180
MB140	14.0	20	150	13.7	35	0.4	350
MB160	16.0	20	150	15.7	40	0.6	350
MB180	18.0	20	150	17.7	45	0.6	350
MB200	20.0	25	150	19.7	50	0.8	550
MB220	22.0	25	150	21.7	55	0.8	550

Dimensions in millimeters

MB Series INCH Setting Tools



MATERIAL

/ Tool Steel, Heat Treated, Hardness Approx. HRC 50

RECOMMENDED SETTING EQUIPMENT FOR SERIES MB

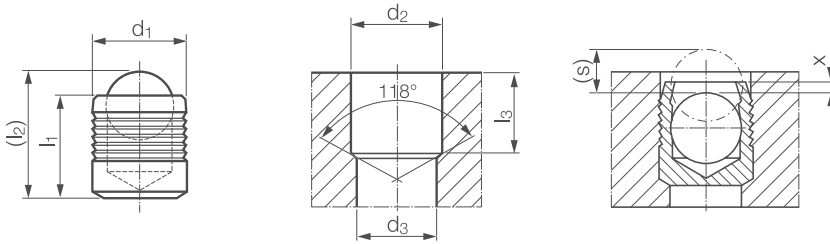
/ EXPRESS 3000 Hydropneumatic Table Press, see page 400 for more information

/ EXPRESS 5000 Hydropneumatic Table Press, see page 400 for more information

Part Number	d ₁ Expander	d ₃ -h9	l ₁	d ₂	l ₂	X 0 -0.012	Weight in gram/pcs.
MB093A	0.093	0.394	3.94	0.082	0.137	0.012	55
MB125A	0.125	0.394	3.94	0.117	0.137	0.012	55
MB156A	0.156	0.394	3.94	0.148	0.137	0.012	55
MB187A	0.187	0.394	3.94	0.180	0.137	0.012	55
MB218A	0.218	0.394	3.94	0.211	0.400	0.012	55
MB250A	0.250	0.394	3.94	0.242	0.400	0.012	55
MB281A	0.281	0.394	3.94	0.273	0.400	0.012	55

Dimensions in inches

CV 173 Series Sealing Plugs



MATERIAL

/ Sleeve: Aluminum 2024-T4, QQ-A 225/6

/ Ball: Stainless Steel, AISI 302/304, Wax Film Lubrication (Diameter Dependent)



Part Number	d_1	l_1	(l_2) ~ Ref.	d_2 +0.1 0	d_3 max.	l_3 min.	x ± 0.2	(s) ~ Ref.	Packaging Unit	Weight in gram/pcs.
CV173-030	3.0	3.18	4.1	3.0	2.3	2.9	0.2	1.0	100/1000	0.09
CV173-040	4.0	4.00	5.2	4.0	3.3	3.8	0.2	1.4	100/1000	0.20
CV173-050	5.0	5.50	7.0	5.0	4.3	5.3	0.2	1.9	100/1000	0.44
CV173-060	6.0	6.50	8.6	6.0	5.3	6.3	0.2	2.3	100/1000	0.78
CV173-070	7.0	7.50	10.1	7.0	6.2	7.3	0.2	2.8	100/1000	1.28
CV173-080	8.0	8.50	11.7	8.0	7.2	8.3	0.2	3.4	100/1000	1.96
CV173-090	9.0	10.00	13.7	9.0	8.2	9.8	0.2	3.7	100/1000	2.88
CV173-100	10.0	11.00	15.2	10.0	9.2	10.8	0.2	4.2	100/500	4.01
CV173-120	12.0	13.00	18.0	12.0	11.0	12.8	0.2	5.1	50/250	7.06

Dimensions in millimeters

Not all items in stock – MOQ and production lead times may apply

PRESSURE PERFORMANCE

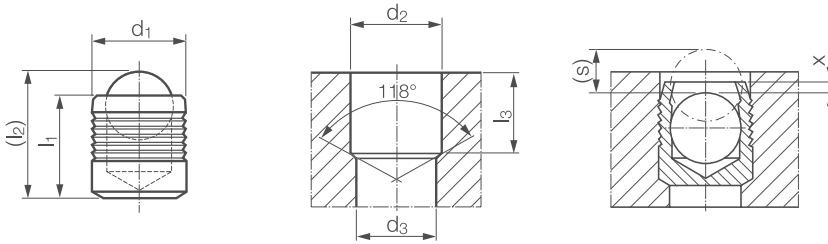
Series CV 173 mm	Base Material of the Installation				
	① ETG-100 / 44SMn28 AISI 1144	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	④ EN 1563: GJS-450-10 ASTM A536: 65-45-12	⑥ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	⑧ G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 3 – 10				650 bar / 9400 psi 210 bar / 3000 psi	
Ø 12				300 bar / 4300 psi 100 bar / 1500 psi	

Proof Pressure Test – ⑧

Max. Allowable Working Pressure = Nominal Pressure

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CV 173 Series INCH Sealing Plugs



MATERIAL

/ Sleeve: Aluminum 2024-T4, QQ-A 225/6
 / Ball: Stainless Steel, AISI 302/304, Wax Film Lubrication (Diameter Dependent)



Part Number	d ₁	l ₁	(l ₂) ~ Ref.	d ₂ +0.004 0	d ₃ max.	l ₃ min.	x ±0.004	(s) ~ Ref.	Packaging Unit	Weight in gram/pcs.
CV173-156	0.156	0.158	0.21	0.1562	0.130	0.149	0.008	0.053	100/1000	0.19
CV173-187	0.187	0.217	0.27	0.1875	0.160	0.208	0.010	0.066	100/1000	0.37
CV173-218	0.218	0.217	0.28	0.2187	0.190	0.208	0.010	0.078	100/1000	0.55
CV173-250	0.250	0.256	0.34	0.2500	0.220	0.247	0.010	0.094	100/1000	0.87
CV173-281	0.281	0.296	0.40	0.2812	0.250	0.287	0.010	0.110	100/1000	1.60
CV173-312	0.312	0.335	0.46	0.3125	0.281	0.326	0.010	0.129	100/1000	1.93
CV173-343	0.343	0.394	0.52	0.3437	0.312	0.385	0.010	0.140	100/500	2.58
CV173-375	0.375	0.394	0.54	0.3750	0.343	0.385	0.010	0.153	100/500	3.25
CV173-406	0.406	0.434	0.59	0.4062	0.375	0.425	0.010	0.162	100/500	4.20
CV173-437	0.437	0.512	0.68	0.4375	0.406	0.503	0.010	0.166	50/250	5.70

Dimensions in inches

Not all items in stock – MOQ and production lead times may apply

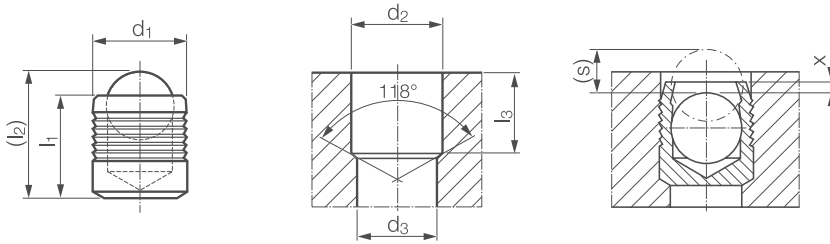
PRESSURE PERFORMANCE

Series CV 173 Inch	Base Material of the Installation				
	① ETG-100 / 44SMn28 AISI 1144	② EN 1563: GJS-600-3 ASTM A536: 80-60-03	④ EN 1563: GJS-450-10 ASTM A536: 65-45-12	③ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	⑤ G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 0.156 – 0.437				650 bar / 9400 psi 210 bar / 3000 psi	

Proof Pressure Test – ②

Max. Allowable Working Pressure = Nominal Pressure

CV 173 Series INCH Short Sealing Plugs



MATERIAL

/ Sleeve: Aluminum 2024-T4, QQ-A 225/6

/ Ball: Stainless Steel, AISI 302/304, Wax Film Lubrication (Diameter Dependent)



Part Number	d_1	l_1	(l_2) ~ Ref.	d_2 +0.004 0	d_3 max.	l_3 min.	x ± 0.004	(s) ~ Ref.	Packaging Unit	Weight in gram/pcs.
CV173-125S	0.125	0.125	0.16	0.1250	0.100	0.113	0.007	0.042	100/1000	0.10
CV173-156S	0.156	0.125	0.17	0.1562	0.130	0.113	0.000	0.040	100/1000	0.15
CV173-187S	0.187	0.187	0.24	0.1875	0.160	0.170	0.010	0.066	100/1000	0.33
CV173-218S	0.218	0.187	0.25	0.2187	0.190	0.170	0.000	0.063	100/1000	0.46
CV173-250S	0.250	0.225	0.30	0.2500	0.220	0.196	0.000	0.083	100/1000	0.76
CV173-281S	0.281	0.255	0.35	0.2812	0.250	0.233	0.000	0.091	100/1000	1.08
CV173-312S	0.312	0.280	0.39	0.3125	0.281	0.255	0.000	0.107	100/1000	1.52
CV173-343S	0.343	0.307	0.43	0.3437	0.312	0.275	0.000	0.118	100/500	2.01
CV173-406S	0.406	0.365	0.52	0.4062	0.375	0.308	-0.010	0.143	100/500	3.59

Dimensions in inches

Not all items in stock – MOQ and production lead times may apply

PRESSURE PERFORMANCE

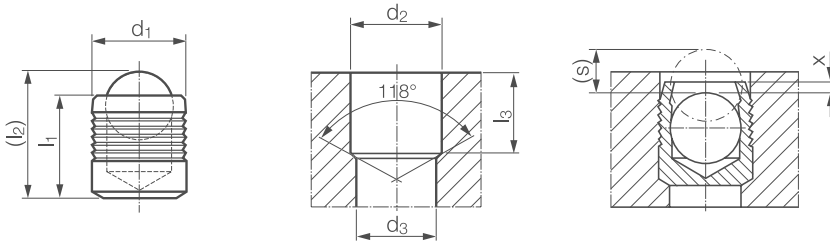
Series CV 173 Inch Short	Base Material of the Installation				
	① ETG-100 / 44SMn28 AISI 1144	② EN 1563: GJS-600-3 ASTM A536: 80-60-03	④ EN 1563: GJS-450-10 ASTM A536: 65-45-12	③ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	⑤ G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 0.125 – 0.406				400 bar / 5800 psi 150 bar / 2100 psi	

Proof Pressure Test – ②

Max. Allowable Working Pressure = Nominal Pressure

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CV 588 Series Sealing Plugs



MATERIAL

/ Sleeve: Stainless Steel (316) ASTM A580, Passivate, QQ-P-35C
 / Ball: Stainless Steel, AISI 316, Wax Film Lubrication (Diameter Dependent)



Part Number	d ₁	l ₁	(l ₂) ~ Ref.	d ₂ +0.1 0	d ₃ max.	l ₃ min.	x ±0.1	(s) ~ Ref.	Packaging Unit	Weight in gram/pcs.
CV588-040	4.0	4.00	5.2	4.0	3.3	3.8	0.2	1.4	100/1000	0.36
CV588-050	5.0	5.50	7.0	5.0	4.3	5.3	0.2	1.9	100/1000	0.76
CV588-060	6.0	6.50	8.6	6.0	5.3	6.3	0.2	2.3	100/1000	1.28
CV588-070	7.0	7.50	10.1	7.0	6.2	7.3	0.2	2.8	100/1000	2.00
CV588-080	8.0	8.50	11.7	8.0	7.2	8.3	0.2	3.4	100/1000	2.96
CV588-090	9.0	10.00	13.7	9.0	8.2	9.8	0.2	3.7	100/1000	4.31
CV588-100	10.0	11.00	15.2	10.0	9.2	10.8	0.2	4.2	100/500	5.88

Dimensions in millimeters

Not all items in stock – MOQ and production lead times may apply

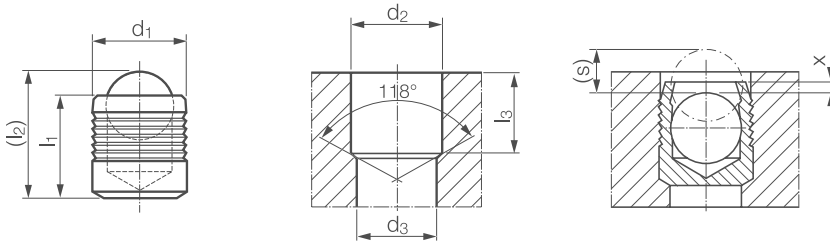
PRESSURE PERFORMANCE

Series CV 588 mm	Base Material of the Installation				
	① ETG-100 / 44SMn28 AISI 1144	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	④ EN 1563: GJS-450-10 ASTM A536: 65-45-12	⑥ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	⑧ G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 4 – 9	1000 bar / 14500 psi 350 bar / 5000 psi				
Ø 10	860 bar / 12500 psi 280 bar / 4000 psi				

Proof Pressure Test – ⑧

Max. Allowable Working Pressure = Nominal Pressure

CV 588 Series INCH Sealing Plugs



MATERIAL

/ Sleeve: Stainless Steel (316) ASTM A580, Passivate, QQ-P-35C
/ Ball: Stainless Steel, AISI 316, Wax Film Lubrication (Diameter Dependent)



Part Number	d ₁	l ₁	(l ₂) ~ Ref.	d ₂ +0.004 0	d ₃ max.	l ₃ min.	x ±0.004	(s) ~ Ref.	Packaging Unit	Weight in gram/pcs.
CV588-156	0.156	0.158	0.21	0.1562	0.130	0.149	0.008	0.053	500/1000	0.35
CV588-187	0.187	0.217	0.27	0.1875	0.160	0.208	0.010	0.066	100/1000	0.71
CV588-218	0.218	0.217	0.28	0.2187	0.190	0.208	0.010	0.078	100/1000	0.94
CV588-250	0.250	0.256	0.34	0.2500	0.220	0.247	0.010	0.094	100/1000	1.42
CV588-281	0.281	0.296	0.40	0.2812	0.250	0.287	0.010	0.110	100/1000	2.92
CV588-312	0.312	0.335	0.46	0.3125	0.281	0.326	0.010	0.129	100/1000	3.88
CV588-343	0.343	0.394	0.52	0.3437	0.312	0.385	0.010	0.140	100/500	4.11
CV588-375	0.375	0.394	0.54	0.3750	0.343	0.385	0.010	0.153	100/500	4.86

Dimensions in inches

Not all items in stock – MOQ and production lead times may apply

PRESSURE PERFORMANCE

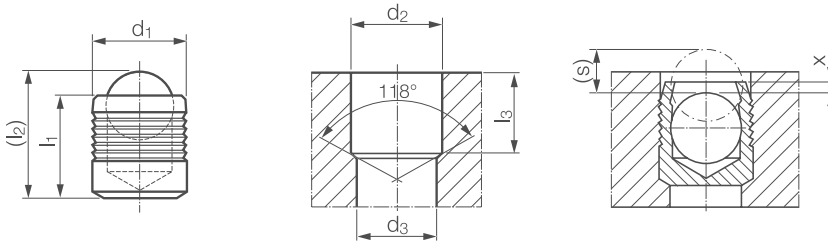
Series CV 588 Inch	Base Material of the Installation				
	① ETG-100 / 44SMn28 AISI 1144	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	④ EN 1563: GJS-450-10 ASTM A536: 65-45-12	⑥ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	⑧ G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 0.156 – 0.375	1000 bar / 14500 psi 350 bar / 5000 psi				

Proof Pressure Test – ⑧

Max. Allowable Working Pressure = Nominal Pressure

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CV 588 Series INCH Short Sealing Plugs



MATERIAL

/ Sleeve: Stainless Steel (316) ASTM A580, Passivate, QQ-P-35C
 / Ball: Stainless Steel, AISI 316, Wax Film Lubrication (Diameter Dependent)



Part Number	d ₁	l ₁	(l ₂) ~ Ref.	d ₂ +0.004 0	d ₃ max.	l ₃ min.	x ±0.004	(s) ~ Ref.	Packaging Unit	Weight in gram/pcs.
CV588-125S	0.125	0.125	0.16	0.1250	0.100	0.113	0.007	0.042	100/1000	0.18
CV588-156S	0.156	0.125	0.17	0.1562	0.130	0.113	0.000	0.040	100/1000	0.29
CV588-187S	0.187	0.187	0.24	0.1875	0.160	0.170	0.010	0.066	100/1000	0.60
CV588-218S	0.218	0.187	0.25	0.2187	0.190	0.170	0.000	0.063	100/1000	0.81
CV588-250S	0.250	0.225	0.30	0.2500	0.220	0.196	0.000	0.083	100/1000	1.20
CV588-281S	0.281	0.255	0.35	0.2812	0.250	0.233	0.000	0.091	100/1000	1.77

Dimensions in inches

Not all items in stock – MOQ and production lead times may apply

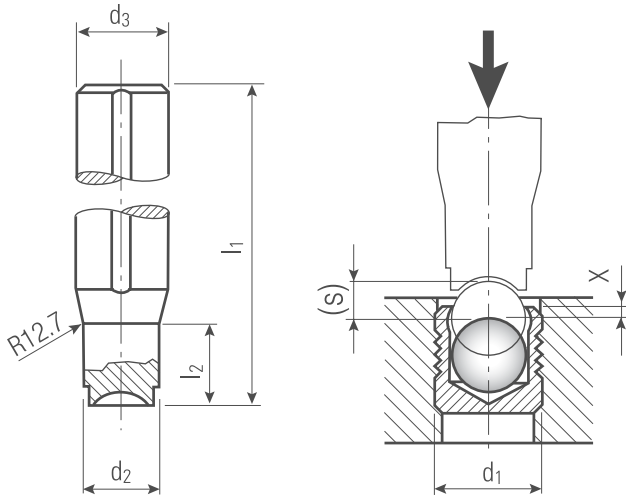
PRESSURE PERFORMANCE

Series CV 588 Inch Short	Base Material of the Installation				
	① ETG-100 / 44SMn28 AISI 1144	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	④ EN 1563: GJS-450-10 ASTM A536: 65-45-12	⑤ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	⑥ G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
∅ 0.125 – 0.281	560 bar / 8100 psi 250 bar / 3600 psi				

Proof Pressure Test – ⑥

Max. Allowable Working Pressure = Nominal Pressure

MB / CV Series Setting Tools



MATERIAL

/ Tool Steel, Heat Treated, Hardness Approx. HRC 50

RECOMMENDED SETTING EQUIPMENT FOR SERIES MB/CV

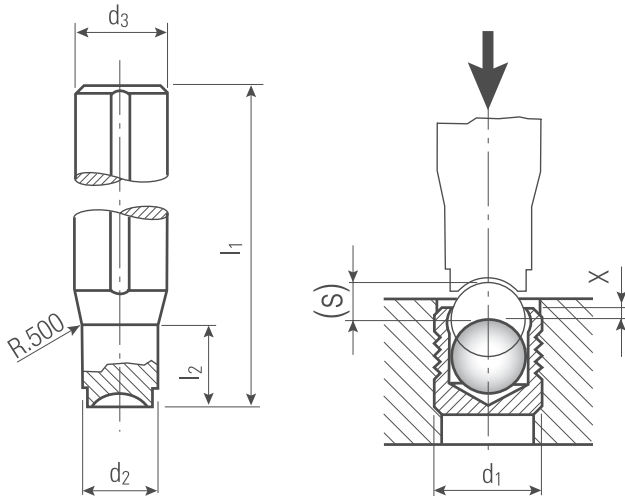
/ EXPRESS 3000 Hydropneumatic Table Press, see page 400 for more information

/ EXPRESS 5000 Hydropneumatic Table Press, see page 400 for more information

Part Number	d ₁ Expander	d ₃ ±0.004	l ₁	d ₂	l ₂	x ±0.10	(s) ~ Ref.	Weight in gram/pcs.
HT-MBM-030	MB/CV XXX-030	9.53	127	2.8	7.6	0.2	1.0	62
HT-MBM-040	MB/CV XXX-040	9.53	127	3.8	7.6	0.2	1.4	63
HT-MBM-050	MB/CV XXX-050	9.53	127	4.8	12.7	0.2	1.9	62
HT-MBM-060	MB/CV XXX-060	9.53	127	5.8	15.2	0.2	2.3	63
HT-MBM-070	MB/CV XXX-070	9.53	127	6.8	20.3	0.2	2.8	63
HT-MBM-080	MB/CV XXX-080	9.53	127	7.8	33.0	0.2	3.4	63
HT-MBM-090	MB/CV XXX-090	12.70	127	8.8	38.1	0.2	3.7	102
HT-MBM-100	MB/CV XXX-100	12.70	127	9.8	38.1	0.2	4.2	107
HT-MBM-120	MB/CV XXX-120	12.70	127	11.7	38.1	0.2	5.1	118
HT-MBM-140	MB/CV XXX-140	15.88	127	13.7	45.7	0.2	5.9	174
HT-MBM-160	MB/CV XXX-160	15.88	127	15.7	45.7	0.2	6.4	192
HT-MBM-180	MB/CV XXX-180	19.05	127	17.7	45.7	0.2	7.2	264
HT-MBM-200	MB/CV XXX-200	22.23	127	19.7	45.7	0.2	8.4	347
HT-MBM-220	MB/CV XXX-220	25.40	127	21.7	45.7	0.2	9.5	442

Dimensions in millimeters

MB / CV Series Setting Tools



MATERIAL

/ Tool Steel, Heat Treated, Hardness Approx. HRC 50

RECOMMENDED SETTING EQUIPMENT FOR SERIES MB/CV

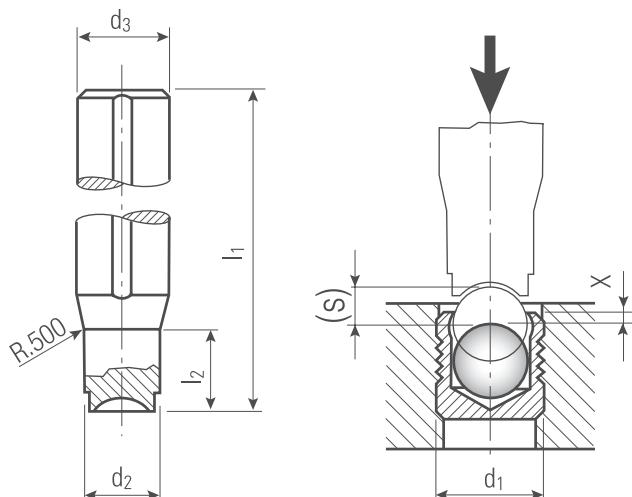
/ EXPRESS 3000 Hydropneumatic Table Press, see page 400 for more information

/ EXPRESS 5000 Hydropneumatic Table Press, see page 400 for more information

Part Number	d ₁ Expander	d ₃ ±0.005	l ₁	d ₂	l ₂	x ±0.004	(s) ~ Ref.	Weight in gram/pcs.
HT-CVI-156	CV XXX-156	0.375	5.0	0.142	0.3	0.008	0.053	63
HT-CVI-187	CV XXX-187	0.375	5.0	0.173	0.4	0.010	0.066	63
HT-CVI-218	CV XXX-218	0.375	5.0	0.204	0.5	0.010	0.063	63
HT-CVI-250	CV XXX-250	0.375	5.0	0.236	0.6	0.010	0.083	63
HT-CVI-281	CV XXX-281	0.375	5.0	0.267	0.8	0.010	0.110	63
HT-CVI-312	CV XXX-312	0.375	5.0	0.298	1.3	0.010	0.107	62
HT-CVI-343	CV XXX-343	0.500	5.0	0.329	1.5	0.010	0.140	100
HT-CVI-375	CV XXX-375	0.500	5.0	0.361	1.5	0.010	0.153	104
HT-CVI-406	CV XXX-406	0.500	5.0	0.392	1.5	0.010	0.162	108
HT-CVI-437	CV XXX-437	0.500	5.0	0.423	1.5	0.010	0.166	112

Dimensions in inches

MB / CV Series Short Setting Tools



MATERIAL

/ Tool Steel, Heat Treated, Hardness Approx. HRC 50

RECOMMENDED SETTING EQUIPMENT FOR SERIES MB/CV

/ EXPRESS 3000 Hydropneumatic Table Press, see page 400 for more information

/ EXPRESS 5000 Hydropneumatic Table Press, see page 400 for more information

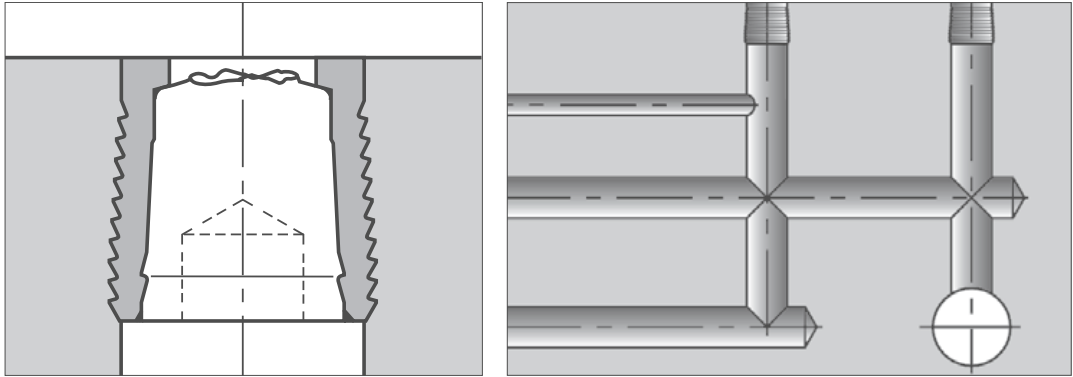
Part Number	d ₁ Expander	d ₃ ±0.005	l ₁	d ₂	l ₂	x ±0.004	(s) ~ Ref.	Weight in gram/pcs.
HT-CVI-125	CV XXX-125S	0.375	5.0	0.111	0.3	0.007	0.042	62
HT-CVI-156-S	CV XXX-156S	0.375	5.0	0.142	0.3	0.000	0.040	63
HT-CVI-187	CV XXX-187S	0.375	5.0	0.173	0.4	0.010	0.066	63
HT-CVI-218	CV XXX-218S	0.375	5.0	0.204	0.5	0.010	0.063	63
HT-CVI-250	CV XXX-250S	0.375	5.0	0.236	0.6	0.010	0.083	63
HT-CVI-281-S	CV XXX-281S	0.375	5.0	0.267	0.8	0.000	0.091	63
HT-CVI-312	CV XXX-312S	0.375	5.0	0.298	1.3	0.010	0.107	62
HT-CVI-343	CV XXX-343S	0.500	5.0	0.329	1.5	0.010	0.118	100
HT-CVI-406	CV XXX-406S	0.500	5.0	0.392	1.5	0.010	0.143	108

Dimensions in inches

Koenig Expander® SK Series

Sealing Plugs for Operating Pressures up to 500 bar / 7200 psi

- / Operating pressures up to 500 bar / 7200 psi
- / Short installation length
- / Liberal manufacturing tolerance 0 / + 0.12 mm
- / Direct installation into hydraulic bores
- / Purely mechanical sealing through anchorage system
- / Swift installation using convenient processing tools



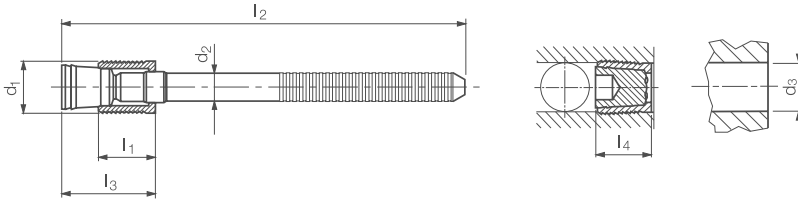
For large volume special applications, please contact the BONEHAM technical sales team.

RECOMMENDED SETTING EQUIPMENT FOR SERIES SK

- KW-008 / Hand Lever Tool with Equipment \varnothing 4 – 6 mm / See page 406 for more information
- EXTOOL-030 / Hydraulic/Pneumatic Tool / See page 401 for more information
- EXTOOL-040-1 / Hydraulic/Pneumatic Tool / See page 402 for more information
- EXTOOL-040-2 / Hydraulic/Pneumatic Tool / See page 403 for more information
- EXTOOL-B-010 / Hydraulic/Pneumatic Tool / See page 405 for more information

SK 550 Series Sealing Plugs

One Piece Construction, Ideal for Automated High Production Requirements



MATERIAL

/ Sleeve: Case Hardening Steel, Gun Metal-Finish
/ Mandrel: Heat Treatable Steel, Special Oil Film Lubrication

IMPORTANT

/ See installation instructions on pages 417
/ Installation requirements on page 410



Part Number	d_1	l_1	d_2	l_2	l_3 max.	l_4 max.	d_3 +0.12 0	Packaging Unit	Weight in gram/pcs.
SK550-040	4.0	4.5	2.50	39	9.0	6.5	4.0	100/1000	1.71
SK550-050	5.0	5.5	3.00	41	10.0	7.5	5.0	100/1000	2.68
SK550-060	6.0	6.5	3.40	43	12.0	8.0	6.0	100/500	3.61
SK550-070	7.0	7.5	4.10	38	14.0	9.0	7.0	100/500	4.98
SK550-080	8.0	8.5	4.20	40	15.0	10.5	8.0	100/500	6.33
SK550-090	9.0	9.5	4.50	43	17.0	11.0	9.0	100/250	8.23
SK550-100	10.0	10.5	4.75	45	19.0	12.5	10.0	100/250	10.57
SK550-120	12.0	12.5	5.70	50	24.0	16.5	12.0	50/250	16.77

Dimensions in millimeters

PRESSURE PERFORMANCE

Series SK 552 mm	Base Material of the Installation						
	① ETG-100 / 44SMn28 AISI 1144	② C15Pb / 1.0403 ~ SAE 1015 (10L15)	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	④ EN 1561: GJL-250 ASTM A48: NO.35	⑤ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	⑥ AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	⑦ G-AISi7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 4 – 10	1600 bar / 23200 psi 500 bar / 7200 psi				1400 bar / 20300 psi 450 bar / 6500 psi		
Ø 12	1600 bar / 23200 psi 400 bar / 5800 psi						

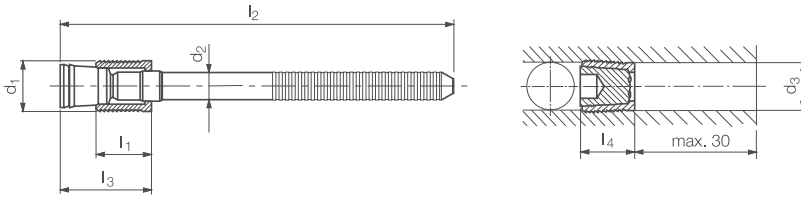
Proof Pressure Test – ⑧

Max. Allowable Working Pressure = Nominal Pressure

www.boneham.co.uk / Tel: +44 (0) 1623 445 450 / Fax: +44 (0) 1623 445 451 / sales@boneham.co.uk

SK 552 Series Long Mandrel Sealing Plugs

One Piece Construction, Ideal for Automated High Production Requirements
 Special Type: With Mandrel 30mm Longer than Standard



MATERIAL

/ Sleeve: Case Hardening Steel, Gun Metal-Finish
 / Mandrel: Heat Treatable Steel, Special Oil Film Lubrication



IMPORTANT

/ See installation instructions on pages 417
 / Installation requirements on page 410

Part Number	d ₁	l ₁	d ₂	l ₂	l ₃ max.	l ₄ min.	d ₃ +0.12 0	Packaging Unit	Weight in gram/pcs.
SK552-040	4.0	4.5	2.5	69	9.0	6.5	4.0	100/1000	2.87
SK552-050	5.0	5.5	3.0	71	10.0	7.5	5.0	100/500	4.32
SK552-060	6.0	6.5	3.4	73	12.0	8.0	6.0	100/500	5.65
SK552-070	7.0	7.5	4.1	68	14.0	9.0	7.0	100/250	8.01
SK552-080	8.0	8.5	4.2	70	15.0	10.5	8.0	100/250	9.60
SK552-090	9.0	9.5	4.5	73	17.0	11.0	9.0	50/100	11.97
SK552-100	10.0	10.5	4.8	75	19.0	12.5	10.0	50/100	14.73

Dimensions in millimeters

PRESSURE PERFORMANCE

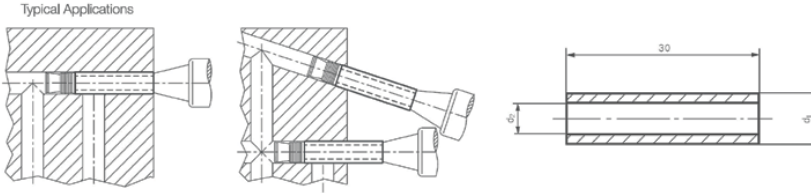
Series SK 552 mm	Base Material of the Installation						
	① ETG-100 / 44SMn28 AISI 1144	② C15Pb / 1.0403 ~ SAE 1015 (10L15)	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	④ EN 1561: GJL-250 ASTM A48: NO.35	⑤ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	⑦ AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	⑧ G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 4 - 10	1600 bar / 23200 psi 500 bar / 7200 psi					1400 bar / 20300 psi 450 bar / 6500 psi	

Proof Pressure Test – ⑧

Max. Allowable Working Pressure = Nominal Pressure

SK Series Spacer Setting Tools SK552

For Setting KOENIG EXPANDER® SK with Mandrel 30mm Longer than Standard



MATERIAL

/ Case Hardening Steel, Case Hardened

RECOMMENDED SETTING EQUIPMENT FOR SERIES MB/CV

- / KW-008 Hand Lever Tool with Equipment Ø 4 – 6 mm, see page xx for more information
- / EXT00L-030 Hydraulic/Pneumatic Tool, see page xx for more information
- / EXT00L-040-1 Hydraulic/Pneumatic Tool, see page xx for more information
- / EXT00L-040-2 Hydraulic/Pneumatic Tool, see page xx for more information
- / EXT00L-B-010 Hydraulic/Pneumatic Tool, see page xx for more information



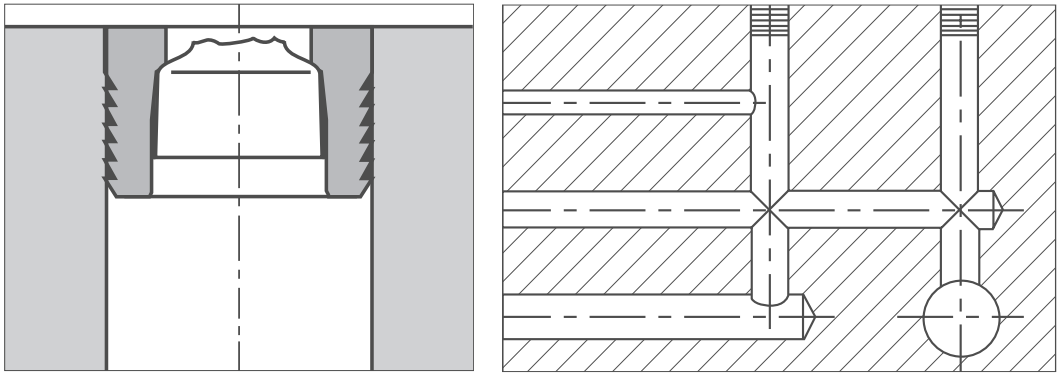
Part Number	d ₁	d ₂	Series SK	Weight in gram/pcs.
4X30-SK	4.0	2.7	SK552-040	2
5X30-SK	5.0	3.2	SK552-050	3
6X30-SK	6.0	3.7	SK552-060	5
7X30-SK	7.0	4.6	SK552-070	6
8X30-SK	8.0	4.8	SK552-080	8
9X30-SK	9.0	5.2	SK552-090	11
10X30-SK	10.0	5.6	SK552-100	13

Dimensions in millimeters

Koenig Expander® LK Series

Sealing Plugs for Operating Pressures up to 60 bar / 850 psi

- / Operating pressures up to 60 bar / 850 psi
- / Short installation dimensions
- / Liberal manufacturing tolerance 0 / + 0.12 mm
- / Direct installation into hydraulic bore
- / Purely mechanical sealing through anchorage system
- / Installation using convenient processing tools
- / Comprehensive product range for Ø 4 – 20mm

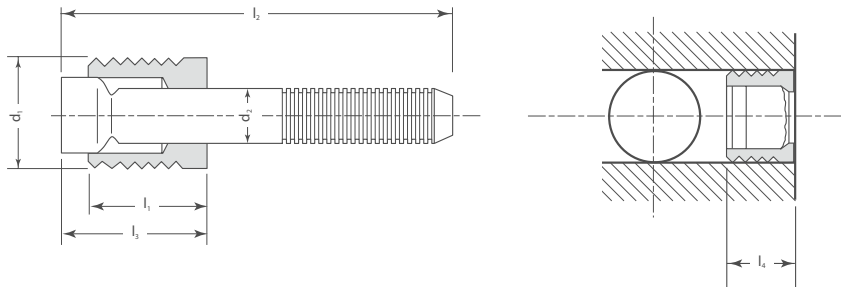


For large volume special applications, please contact the BONEHAM technical sales team.

RECOMMENDED SETTING EQUIPMENT FOR SERIES LK

- KW-008 / Hand Lever Tool with Equipment Ø 4 – 6 mm / See page 406 for more information
- EXTOOL-030 / Hydraulic/Pneumatic Tool / See page 401 for more information
- EXTOOL-040-1 / Hydraulic/Pneumatic Tool / See page 402 for more information
- EXTOOL-040-2 / Hydraulic/Pneumatic Tool / See page 403 for more information
- EXTOOL-050 Hydraulic/Pneumatic Tool / See page 404 for more information
- EXTOOL-B-010 / Hydraulic/Pneumatic Tool / See page 405 for more information

LK 600 Series Sealing Plugs



MATERIAL

/ Sleeve: Stainless Steel, Special Oil Film Lubrication
/ Mandrel: Stainless Steel, Special Oil Film Lubrication



IMPORTANT

/ See installation instructions on pages 418
/ Installation requirements on page 410

Part Number	d ₁	l ₁	d ₂	l ₂	d ₃ *	l ₃ max.	l ₄ max.	Packaging Unit	Weight in gram/pcs.
LK600-040	4.0	3.7	2.2	33	4.0	5.8	4.0	100/1000	1.19
LK600-050	5.0	4.5	2.5	36	5.0	7.1	4.8	100/1000	1.81
LK600-060	6.0	5.0	3.2	36	6.0	7.9	5.5	100/1000	2.95
LK600-070	7.0	5.5	3.8	32	7.0	8.8	5.8	100/500	3.70
LK600-080	8.0	6.5	4.3	34	8.0	10.5	7.0	100/500	5.26
LK600-100	10.0	7.0	4.9	34	10.0	11.0	7.5	100/500	7.65

Dimensions in millimeters

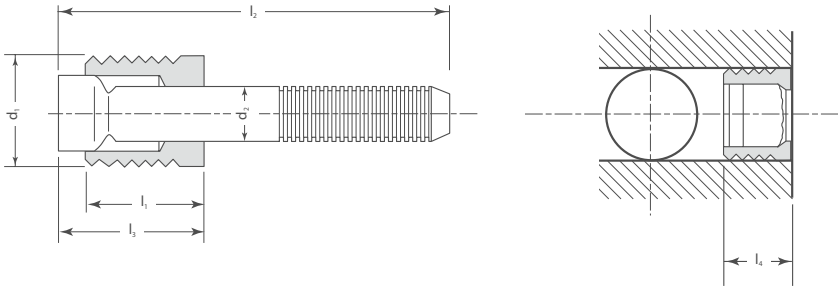
PRESSURE PERFORMANCE

Series LK 600 mm	Base Material of the Installation							
	①	②	③	④	⑤	⑥	⑦	⑧
	ETG-100 / 44SMn28 AISI 1144	C15Pb / 1.0403 ~ SAE 1015 (10L15)	EN 1563: GJS-600-3 ASTM A536: 80-60-03	EN 1561: GJL-250 ASTM A48: NO.35	AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356	
Ø 4 - 10	180 bar / 2600 psi 60 bar / 850 psi							

Proof Pressure Test – ⑧

Max. Allowable Working Pressure = Nominal Pressure

LK 950 Series Sealing Plugs



MATERIAL

/ Sleeve: Case Hardening Steel, Soft Annealed Gun Finish
 / Mandrel: Steel, Special Oil Film Lubrication

IMPORTANT

/ See installation instructions on pages 418
 / Installation requirements on page 410



Part Number	d ₁	l ₁	d ₂	l ₂	d ₃ +0.12 0	l ₃ max.	l ₄ max.	Packaging Unit	Weight in gram/pcs.
LK950-040	4.0	3.7	2.2	36	4.0	5.5	4.0	100/1000	1.26
LK950-050	5.0	4.5	3.0	36	5.0	6.9	4.8	100/1000	2.28
LK950-060	6.0	5.0	3.4	36	6.0	7.4	5.3	100/1000	3.12
LK950-070	7.0	5.5	4.2	34	7.0	8.0	5.8	100/500	4.70
LK950-080	8.0	6.5	4.3	34	8.0	9.8	6.8	100/500	5.32
LK950-090	9.0	6.5	4.7	34	9.0	9.8	6.8	100/500	6.53
LK950-100	10.0	6.5	5.1	36	10.0	9.8	6.8	100/500	8.23
LK950-120	12.0	7.5	5.9	36	12.0	11.7	7.8	100/500	12.21
LK950-140	14.0	8.0	5.9	36	14.0	12.2	9.0	100/250	13.98
LK950-160	16.0	10.5	5.9	42	16.0	16.0	11.5	100/250	21.17
LK950-180	18.0	11.0	6.60	50.0	18.0	17.7	13.0	100/200	29.99
LK950-200	20.0	11.0	6.60	50.0	20.0	17.7	13.0	50/125	34.55

Dimensions in millimeters

*In base materials with high hardness or hardened materials:

< 280HB the bore tolerance should be 0 / +0.12

≥ 280HB the bore tolerance should be +0.05 / +0.15

PRESSURE PERFORMANCE

Series LK 950 mm	Base Material of the Installation						
	① ETG-100 / 44SMn28 AISI 1144	② C15Pb / 1.0403 ~ SAE 1015 (10L15)	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	④ EN 1561: GJL-250 ASTM A48: NO.35	⑤ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	⑦ AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	⑧ G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 4 – 20	180 bar / 2600 psi 60 bar / 850 psi						

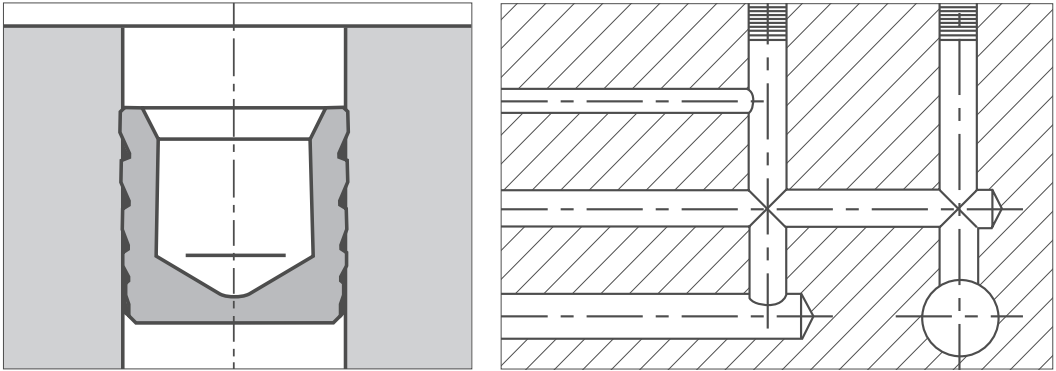
Proof Pressure Test – ⑥

Max. Allowable Working Pressure = Nominal Pressure

Koenig Expander[®] LP Series

Sealing Plugs for Operating Pressures up to 60 bar / 850 psi

- / Operating pressures up to 60 bar / 850 psi
- / Short installation dimensions
- / Mechanical sealing using press fit
- / Quick installation



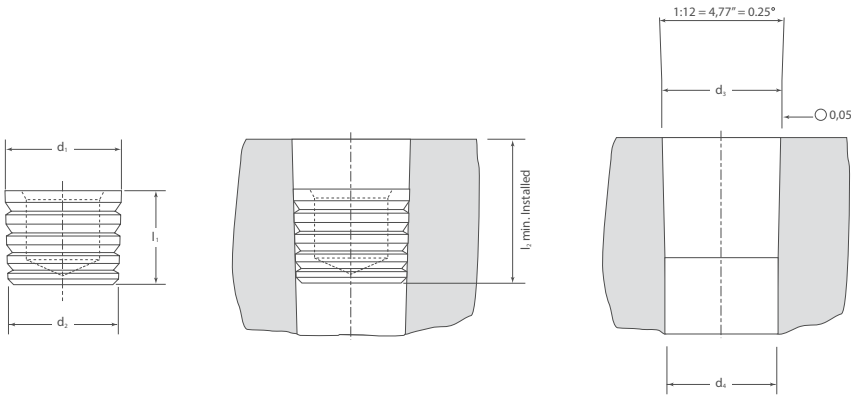
For large volume special applications, please contact the BONEHAM technical sales team.

RECOMMENDED SETTING EQUIPMENT FOR SERIES LP

EXPRESS 3000 / Hydropneumatic Table Press / See page 400 for more information

EXPRESS 5000 / Hydropneumatic Table Press / See page 400 for more information

LP 900 Series Sealing Plugs



MATERIAL

/ Free Cutting Steel
/ Nitrocarburized, Lubricated

IMPORTANT

/ See installation instructions on pages 419
/ Installation requirements on page 410



Part Number	d ₁ Expander	d ₂	l ₁	d ₃ min.	d ₄ +0.1 -0.3	l ₂ min.	Packaging Unit	Weight in gram/pcs.
LP900-040	4.40	3.7	5.0	4.55	4.0	7.0	1000/10000	0.35
LP900-050	5.40	4.7	6.0	5.55	5.0	8.0	1000/5000	0.63
LP900-060	6.40	5.7	6.0	6.55	6.0	8.5	500/2500	0.89
LP900-070	7.40	6.7	6.0	7.55	7.0	8.5	500/2500	1.20
LP900-080	8.45	7.7	7.0	8.60	8.0	9.5	250/2000	1.76
LP900-090	9.60	9.0	7.5	9.75	9.0	10.0	100/1000	2.30
LP900-100	10.65	10.0	8.5	10.80	10.0	11.0	100/1000	3.20
LP900-120	12.75	12.0	9.5	12.90	12.0	12.0	50/500	5.03

Dimensions in millimeters

Not all items in stock – MOQ and production lead times may apply

Please inquire with our sales team for larger LP 900 models

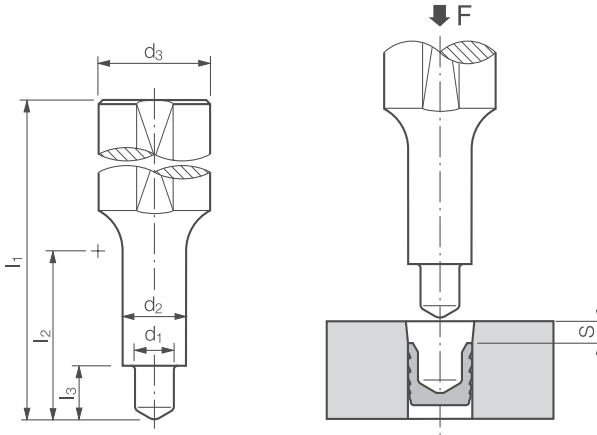
PRESSURE PERFORMANCE

Series LP 900 mm	Base Material of the Installation						
	① ETG-100 / 44SMn28 AISI 1144	② C15Pb / 1.0403 ~ SAE 1015 (10L15)	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	④ EN 1561: GJL-250 ASTM A48: NO.35	⑤ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	⑦ AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	⑧ G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 4 – 12	180 bar / 2600 psi 60 bar / 850 psi						

Proof Pressure Test – ⑧

Max. Allowable Working Pressure = Nominal Pressure

LP Series Setting Tools



MATERIAL

/ Tool Steel, Heat Treated, Hardness Approx. HRC 50

RECOMMENDED SETTING EQUIPMENT FOR SERIES LP

/ EXPRESS 3000 Hydropneumatic Table Press, see page 400 for more information

/ EXPRESS 5000 Hydropneumatic Table Press, see page 400 for more information

Part Number	d_1 Expander	d_1	d_2	d_3 -h9	l_1	l_2	l_3	(s) ~ Ref.	Weight in gram/pcs.
LP040	4.40	2.5	3.7	10.0	100	10	3.80	1.0	0.33
LP050	5.40	3.1	4.7	10.0	100	15	4.76	1.3	0.61
LP060	6.40	3.8	5.7	10.0	100	15	4.79	1.3	0.86
LP070	7.40	4.6	6.7	10.0	100	15	4.74	1.5	1.17
LP080	8.45	5.3	7.7	10.0	100	20	5.77	1.8	1.71
LP090	9.60	6.5	8.7	14.0	100	20	6.23	1.8	2.24
LP100	10.65	7.4	9.7	14.0	100	25	6.96	2.0	3.13
LP120	12.75	9.1	11.7	14.0	100	25	7.94	2.0	4.93

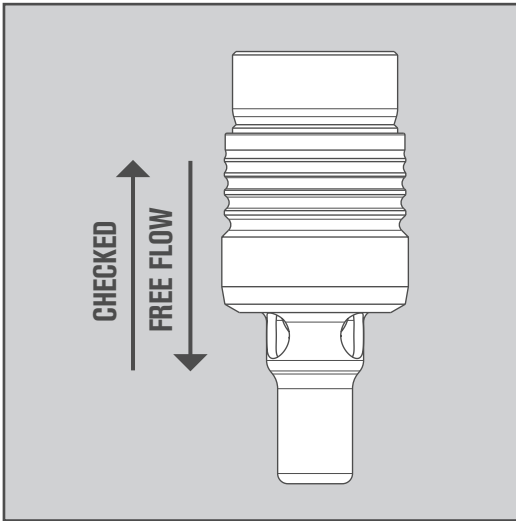
Dimensions in millimeters

Koenig Check Valve® BF / BR Series

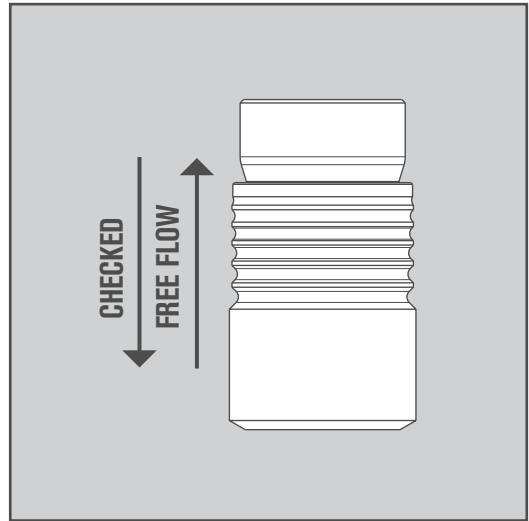
Max. Working Pressure Differential: 280 bar / 4060 psi in Checked Direction

- / Design based on the expansion principal
- / Modular concept: Forward Flow (BF) / Reverse Flow (BR)
- / Maximum working pressure differential: 280 bar / 4060 psi in checked direction
- / Available in standard sizes, with different opening pressures and screens
- / Specific customer solutions on request

CHECK VALVE FORWARD FLOW (BF)



CHECK VALVE REVERSE FLOW (BR)



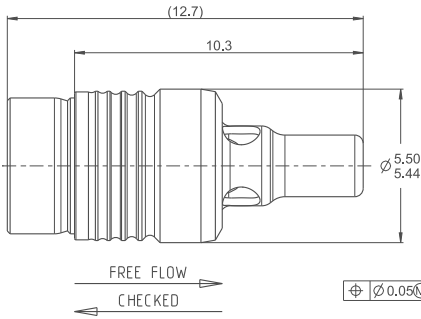
For large volume special applications, please contact the BONEHAM technical sales team.

RECOMMENDED SETTING EQUIPMENT FOR SERIES BF / BR

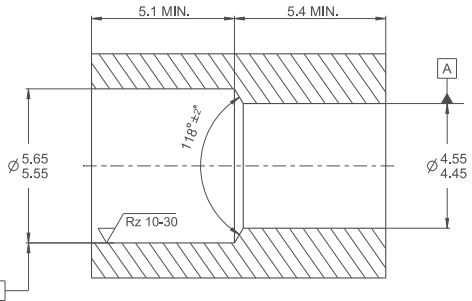
EXPRESS 3000 / Hydropneumatic Table Press / See page 400 for more information

BF Series 5.5mm Forward Check Valves

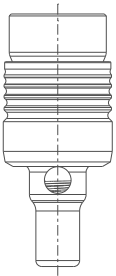
FORWARD FLOW CHECK VALVE



INSTALLATION HOLE

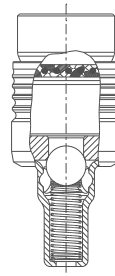


Dimensions in millimeters



CHECK VALVE FORWARD FLOW - UNSCREENED

Part Number	Cracking Pressure (bar)
BFAA055U000	0.00 (no spring)
BFAA055U014	0.14 (± 0.05)
BFAA055U025	0.25 (± 0.10)
BFAA055U040	0.40 (± 0.30)
BFAA055U050	0.50 (± 0.30)
BFAA055U100	1.00 (± 0.30)
BFAA055U200	2.00 (± 0.30)

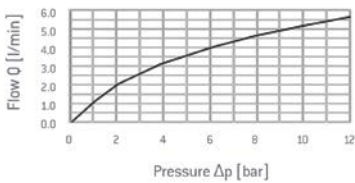


CHECK VALVE FORWARD FLOW - SCREENED

Part Number	Cracking Pressure (bar)
BFAA055S000	0.00 (no spring)
BFAA055S014	0.14 (± 0.05)
BFAA055S025	0.25 (± 0.10)
BFAA055S040	0.40 (± 0.30)
BFAA055S050	0.50 (± 0.30)
BFAA055S100	1.00 (± 0.30)
BFAA055S200	2.00 (± 0.30)

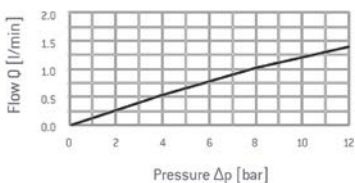
CHECK VALVE FLOW CURVE - UNSCREENED

BFAA055U014; T=50°C; Hydraulic Oil HLP46



CHECK VALVE FLOW CURVE - SCREENED

BFAA055S014; T=50°C; Hydraulic Oil HLP46



PERFORMANCE

Max. Installation Force	6200 N
Max. Working Pressure in Check Direction	280 bar
Max. Working Pressure in Flow Direction	40 bar
Max. Leakage on Air	20 sccm/min. @ 1.72 bar
Max. Leakage on Hydraulic Fluid (HLP46)	1 drop / min.
Cycle Test on Hydraulic Fluid (HLP46)	1 Mio. Cycles, 5 Hz, 6 bar, 50°C
Screen Size	125 Microns Absolute
Material of Test Body	EN-GJS-600-3

MATERIALS

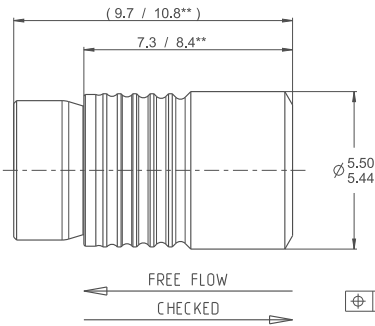
Sleeve	1.4305 / AISI 303
Pin	1.4021 / AISI 420A
Cage	1.4305 / AISI 303
Spring	1.4310 / AISI 301
Ball	1.3541 / AISI 420C
Screen	1.4401 / AISI 316L

SETTING TOOL

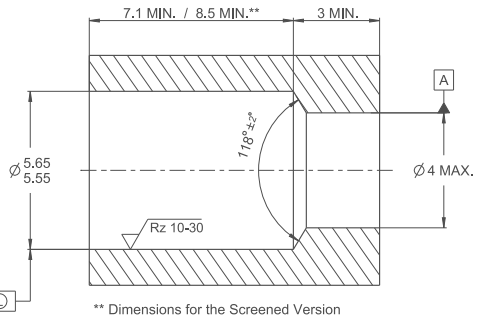
Check Valve Forward Flow - Unscreened	ST - 055 - 0335
Check Valve Forward Flow - Screened	ST - 055 - 0280

BR Series 5.5mm Reverse Check Valves

REVERSE FLOW CHECK VALVE

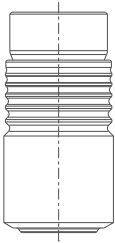


INSTALLATION HOLE



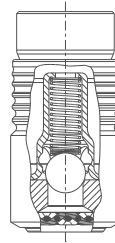
Dimensions in millimeters

CHECK VALVE REVERSE FLOW - UNSCREENED



Part Number	Cracking Pressure (bar)
BRAA055U000	0.00 (no spring)
BRAA055U014	0.14 (± 0.05)
BRAA055U025	0.25 (± 0.10)
BRAA055U040	0.40 (± 0.30)
BRAA055U050	0.50 (± 0.30)
BRAA055U100	1.00 (± 0.30)
BRAA055U200	2.00 (± 0.30)

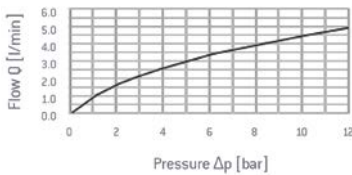
CHECK VALVE REVERSE FLOW - SCREENED



Part Number	Cracking Pressure (bar)
BRAA055S000	0.00 (no spring)
BRAA055S014	0.14 (± 0.05)
BRAA055S025	0.25 (± 0.10)
BRAA055S040	0.40 (± 0.30)
BRAA055S050	0.50 (± 0.30)
BRAA055S100	1.00 (± 0.30)
BRAA055S200	2.00 (± 0.30)

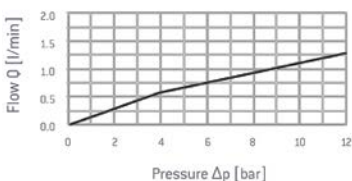
CHECK VALVE FLOW CURVE - UNSCREENED

BRAA055U014; T=50°C; Hydraulic Oil HLP46



CHECK VALVE FLOW CURVE - SCREENED

BRAA055S014; T=50°C; Hydraulic Oil HLP46



PERFORMANCE

Max. Installation Force	6200 N
Max. Working Pressure in Check Direction	280 bar
Max. Working Pressure in Flow Direction	40 bar
Max. Leakage on Air	20 sccm/min. @ 1.72 bar
Max. Leakage on Hydraulic Fluid (HLP46)	1 drop / min.
Cycle Test on Hydraulic Fluid (HLP46)	1 Mio. Cycles, 5 Hz, 6 bar, 50°C
Screen Size	125 Microns Absolute
Material of Test Body	EN-GJS-600-3

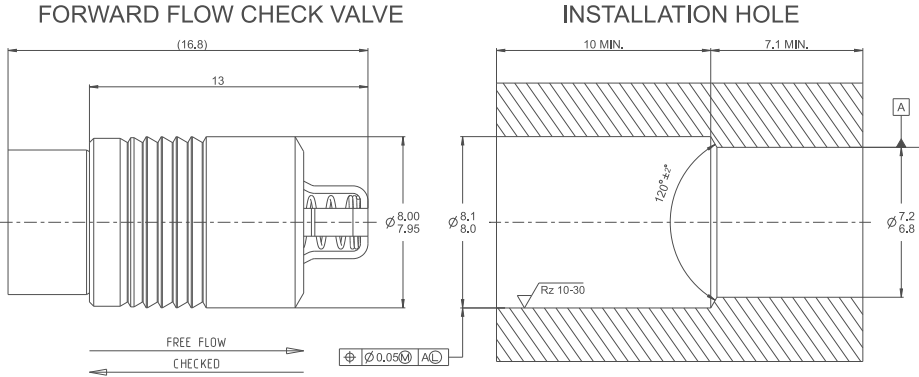
MATERIALS

Sleeve	1.4305 / AISI 303
Pin	1.4021 / AISI 420A
Cage	1.4305 / AISI 303
Spring	1.4310 / AISI 301
Ball	1.3541 / AISI 420C
Screen	1.4401 / AISI 316L

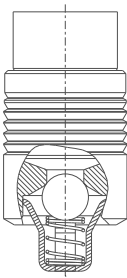
SETTING TOOL

Check Valve Forward Flow - Unscreened	ST - 055 - 0335
Check Valve Forward Flow - Screened	ST - 055 - 0335

BF Series 8.0mm Forward Check Valves



Dimensions in millimeters



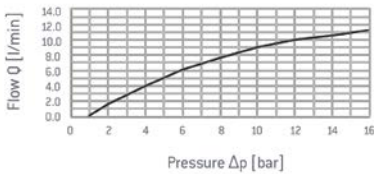
CHECK VALVE FORWARD FLOW - UNSCREENED

Part Number	Cracking Pressure (bar)
BF660080024000	0.00 (no spring)
BF660080024014	0.14 (± 0.05)
BF660080024040	0.40 (± 0.30)
BF660080024100	1.00 (± 0.30)



CHECK VALVE FLOW CURVE - UNSCREENED

BF660080024100; T=50°C; Hydraulic Oil HLP46



PERFORMANCE

Max. Installation Force	8000 N
Max. Working Pressure in Check Direction	280 bar
Max. Working Pressure in Flow Direction	40 bar
Max. Leakage on Air	20 sccm/min. @ 1.72 bar
Max. Leakage on Hydraulic Fluid (HLP46)	1 drop / min.
Cycle Test on Hydraulic Fluid (HLP46)	1 Mio. Cycles, 5 Hz, 6 bar, 50°C
Material of Test Body	EN-GJS-600-3

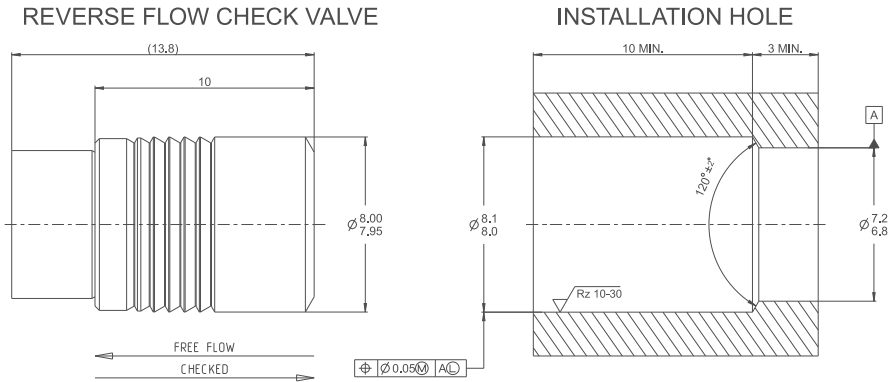
MATERIALS

Sleeve	1.4305 / AISI 303
Pin	1.4542 / AISI 630
Cage	1.4310 / AISI 301
Spring	1.4310 / AISI 301
Ball	1.3541 / AISI 420C

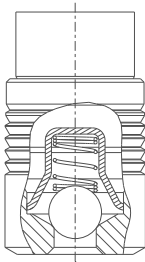
SETTING TOOL

Check Valve Forward Flow - Unscreened	ST - 080 - 0380
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BR Series 8.0mm Reverse Check Valves



Dimensions in millimeters



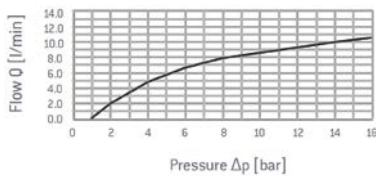
CHECK VALVE FORWARD FLOW - UNSCREENED

Part Number	Cracking Pressure (bar)
BR660080024000	0.00 (no spring)
BR660080024014	0.14 (± 0.05)
BR660080024040	0.40 (± 0.30)
BR660080024100	1.00 (± 0.30)



CHECK VALVE FLOW CURVE - UNSCREENED

BR660080024100; T=50°C; Hydraulic Oil HLP46



PERFORMANCE

Max. Installation Force	8000 N
Max. Working Pressure in Check Direction	280 bar
Max. Working Pressure in Flow Direction	40 bar
Max. Leakage on Air	20 sccm/min. @ 1.72 bar
Max. Leakage on Hydraulic Fluid (HLP46)	1 drop / min.
Cycle Test on Hydraulic Fluid (HLP46)	1 Mio. Cycles, 5 Hz, 6 bar, 50°C
Material of Test Body	EN-GJS-600-3

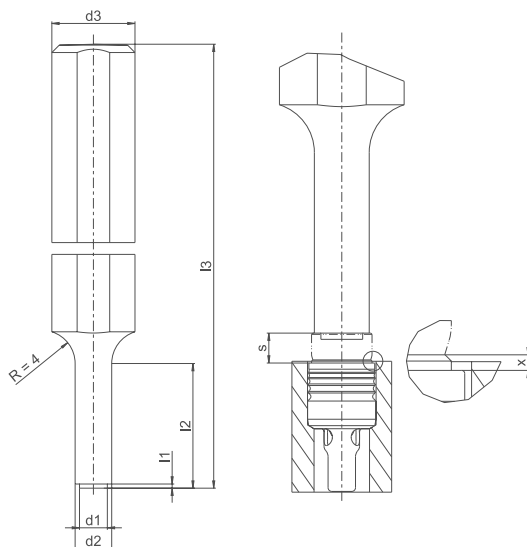
MATERIALS

Sleeve	1.4305 / AISI 303
Pin	1.4542 / AISI 630
Cage	1.4310 / AISI 301
Spring	1.4310 / AISI 301
Ball	1.3541 / AISI 420C

SETTING TOOL

Check Valve Forward Flow - Unscreened	ST - 080 - 0380
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BF / BR Series Setting Tools



RECOMMENDED SETTING EQUIPMENT FOR SERIES BF AND BR

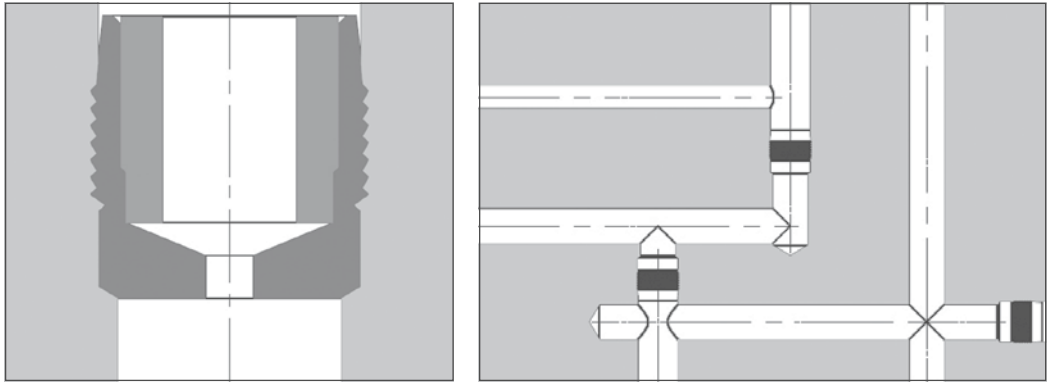
/ EXPRESS 3000 Hydropneumatic Table Press, see page 400 for more information

Part Number	Part Name	$d_1^{+0.05}$	$d_2^{+0.05}$	$d_3 \text{ h9}$	l_1	l_2	l_3	x	(s)
ST-055-0280	Setting Tool 5.5	2.80	4.40	10.0	$0.5^{+0.05}$	15	100	$0^{+0.25}$	2.4
ST-055-0335	Setting Tool 5.5	3.35	4.40	10.0	$0.5^{+0.05}$	15	100	$0^{+0.25}$	2.4
ST-080-0380	Setting Tool 8.0	3.80	6.20	10.0	2.4 ± 0.10	20	100	0 ± 0.15	4.0

Dimensions in millimeters

Koenig Restrictor® RE Series

- / Expansion style restrictors
- / Can be used with fluids or gases
- / Standard restrictors in 300 series stainless steel
- / Orifices can be calculated to achieve desired flow rates
- / Expansion style easily installs into drilled holes and is tamper resistant



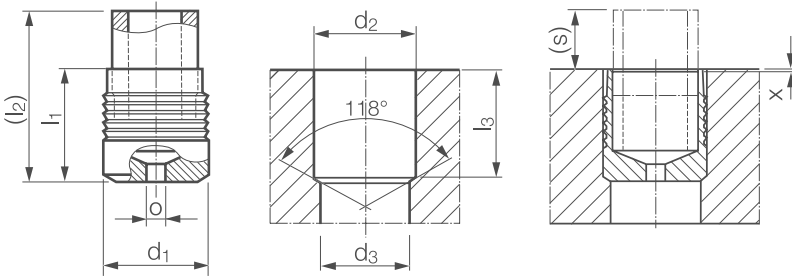
For large volume special applications, please contact the BONEHAM technical sales team.

RECOMMENDED SETTING EQUIPMENT FOR SERIES RE

EXPRESS 3000 / Hydropneumatic Table Press / See page 400 for more information

EXPRESS 5000 / Hydropneumatic Table Press / See page 400 for more information

RE Series Orifice Restrictors



MATERIAL

/ Stainless Steel AISI 303/304

PART NUMBER KEY

XXX is orifice diameter in hundredths of a millimeter, for example 127 for 1.27mm, with the decimal always in the same location.



Part Number	d_1	l_1	(l_2) ~ Ref.	\varnothing ± 0.025 Orifice Diameter	d_2 $+0.10$ 0	l_3 min.	d_3 max.	(s) ~ Ref.	x ± 0.3	Packaging Unit
RE-040-XXX	4.0	4.0	6.0	0.40-1.27	4.0	3.9	3.3	2.0	0.0	100/1000
RE-050-XXX	5.0	5.5	8.2	0.40-1.91	5.0	5.4	4.3	2.7	0.0	100/1000
RE-060-XXX	6.0	6.5	9.9	0.40-2.54	6.0	6.4	5.3	3.4	0.0	100/1000
RE-070-XXX	7.0	7.5	11.6	0.40-3.30	7.0	7.4	6.2	4.1	0.0	100/1000
RE-080-XXX	8.0	8.5	13.3	0.40-3.81	8.0	8.4	7.2	4.8	0.0	100/1000
RE-090-XXX	9.0	10.0	15.5	0.40-4.32	9.0	9.9	8.2	5.5	0.0	100/1000
RE-100-XXX	10.0	11.0	17.1	0.40-4.95	10.0	10.9	9.2	6.1	0.0	50/250

Dimensions in millimeters

The weight depending on the orifice diameter

To calculate orifice diameter/length please refer to page 429

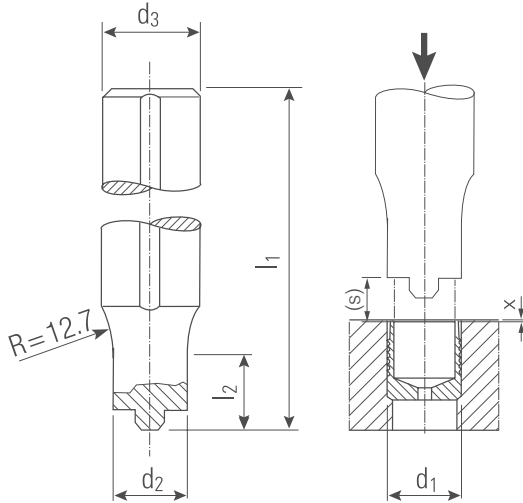
Not all items in stock – MOQ and production lead times may apply

PRESSURE PERFORMANCE

Series RE mm	Base Material of the Installation			
	① ETG-100 / 44SMn28 AISI 1144	② EN 1563: GJS-450-10 ASTM A536: 65-45-12	③ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	④ G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
$\varnothing 4$	120 bar / 1740 psi			100 bar / 1450 psi
$\varnothing 5$	180 bar / 2610 psi			150 bar / 2175 psi
$\varnothing 6$	210 bar / 3045 psi			150 bar / 2175 psi
$\varnothing 7-8$	210 bar / 3045 psi			180 bar / 2610 psi
$\varnothing 9-10$	Please Contact Us for Details			

Max. Allowable Working Pressure = Nominal Pressure

RE Series Setting Tools



MATERIAL

/ Tool Steel, Heat Treated, Hardness Approx. HRC 50

RECOMMENDED SETTING EQUIPMENT FOR SERIES RE

/ EXPRESS 3000 Hydropneumatic Table Press, see page 400 for more information
 / EXPRESS 5000 Hydropneumatic Table Press, see page 400 for more information

Part Number	d ₁ Series RE	d ₃ ±0.20	l ₁	d ₂	l ₂	(s) ~ Ref.	x ±0.30	Weight in gram/pcs.
HT-REM-040	RE-040-XXX	9.53	127	3.61	7.62	2.0	0.0	70
HT-REM-050	RE-050-XXX	9.53	127	4.78	12.70	2.7	0.0	70
HT-REM-060	RE-060-XXX	9.53	127	5.79	15.24	3.4	0.0	70
HT-REM-070	RE-070-XXX	9.53	127	6.78	20.32	4.1	0.0	70
HT-REM-080	RE-080-XXX	9.53	127	7.57	33.02	4.8	0.0	70
HT-REM-090	RE-090-XXX	12.70	127	8.36	38.10	5.5	0.0	70
HT-REM-100	RE-100-XXX	12.70	127	9.78	38.10	6.1	0.0	70

Dimensions in millimeters

Special Orders

In addition to our standard product line, BONEHAM and SFC KOENIG can provide customised parts and unique solutions specially designed for your installation.

Our in-house engineering staff is available to assist you with your needs. With decades of expertise in sealing we meet even the most unique requirements, producing parts that are tailored to your exact application. Our team includes some of the industry's most experienced engineers and manufacturing personnel, and we deliver the solutions others cannot.

From material to size to operation, we are able to customise our components to meet unique installations. With over 3 billion parts delivered to customers around the world, we are experts in sealing and flow control, and are ready to apply that knowledge to your order.

SFC KOENIG maintains failure rates less than 1 part per million, delivering reliable solutions with unmatched consistency. Our engineering expertise, quality controls and efficient manufacturing operations are designed to produce the highest quality parts for each customer's requirements.

SFC KOENIG brings more than 80 years of success to the design processes. From the initial design consultation to testing, production and process integration, we are ready to work with you to solve your unique sealing and flow control challenge.



Setting Tool Equipment

Setting Equipment for All Series

- / Express 3000 / Hydropneumatic Table Press
- / Express 5000 / Hydropneumatic Table Press
- / EXT00L 030, 040-1, 040-2 and 050 / Hydraulic / Pneumatic Tool with Mandrel Collection Device
- / EXT00L B-010 / Battery Tool with Mandrel Collection Device
- / KW-008 - Hand Lever Tool with Equipment \varnothing 4 – 6 mm



Express 3000 / 5000 Setting Tools

Hydropneumatic Table Press for Series MB / CV / LP / BF / BR / RE with Force and Distance Control

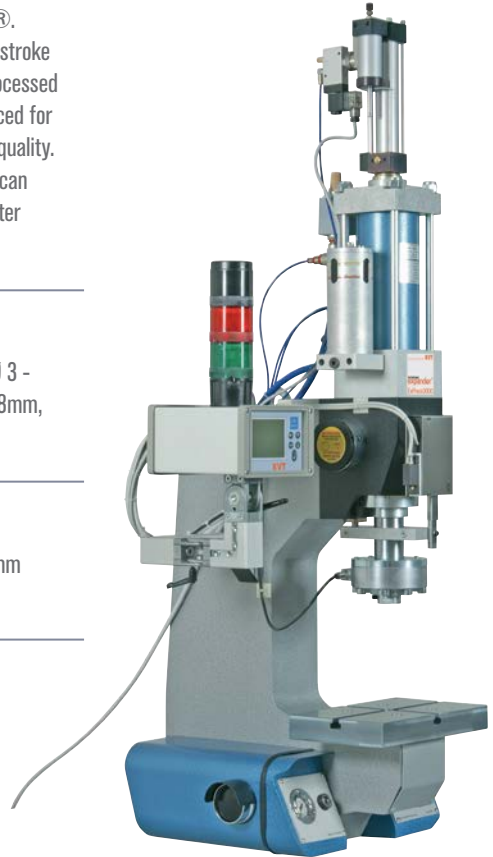
Hydropneumatic setting tool for the installation of KOENIG EXPANDER®. Quick tool change avoids long changeover times. The required working stroke is preprogrammed and can be retrieved by the Expander type to be processed (max. 64 memory locations). In addition, the working stroke is referenced for each individual Expander, which guarantees high process stability and quality. The press is force and distance controlled; an RS232 or USB interface can be used to trace corresponding data on the customer's computer for later processing. The required software is included in the scope of delivery.

EXPRESS 3000

For the installation of KOENIG EXPANDER Series MB, CV and LP from Ø 3 - 10mm (.093" - .375" inch), KOENIG CHECK VALVE BF and BR 5.5 and 8mm, and KOENIG RESTRICTOR Series RE from Ø 4 - 10mm.

EXPRESS 5000

For the installation of KOENIG EXPANDER Series MB and CV Ø 12 - 22mm (.406" - .437" inch) and Series LP for Ø 12mm.

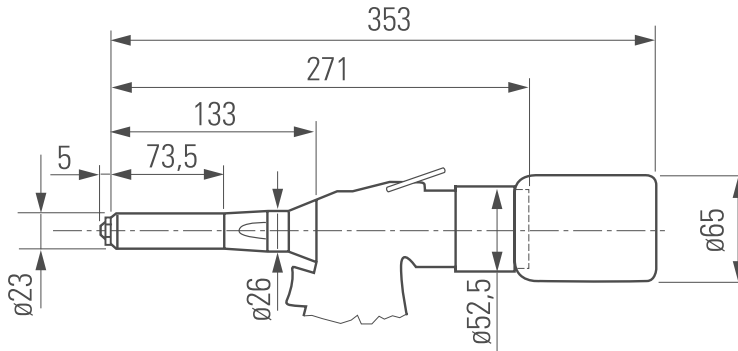


SETTING TOOL DATA

	Express 3000	Express 5000
Height	Approx 1360 mm	Approx. 1470 mm
Width	Approx. 340 mm (max. 530 mm)	Approx. 400 mm (max. 580 mm)
Depth	Approx. 495 mm	Approx. 535 mm
Table (width x depth)	220 x 160 mm	300 x 190 mm
Weight	approx. 140 kg	190 kg
Compressive force	30 kN (max force 29.5 kN at 6 bar)	50 kN (max force 52.5 kN at 6 bar)
Working stroke	10 mm (within the cylinder ram)	15 mm (within the cylinder ram)
Working speed	40 mm/sec (max. possible at 6 bar)	30 mm/sec (max. possible at 6 bar)
Working area (height)	250 mm (working height between table top and cylinder, without setting tool)	
Working area (depth)	200 mm (center-line spacing between cylinder and C frame)	
Cylinder ram	60 mm	
Operating voltage	230 V/110 V, automatic switchover to corresponding power supply	
Operation	VISUAL POINT terminal with QVGA graphic display	
Force / distance control	Sensor adjusted with SIT reference sensor	
Software	WINSCOPE Software for connecting to a PC	

EXTOOL-030 Setting Tool

Hydropneumatic Tool for Series LK / SK with Mandrel Collection Device



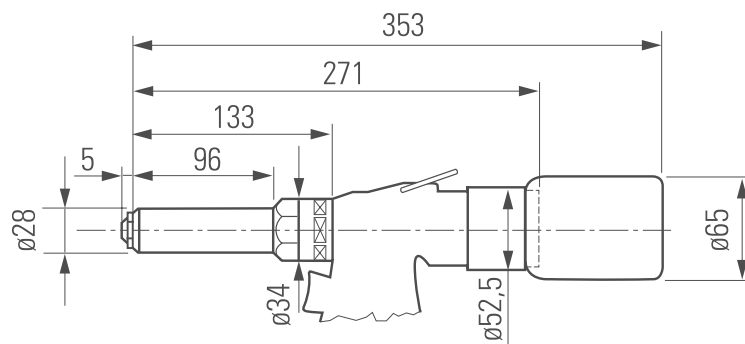
TECHNICAL DATA

Type	EXTOOL-030
Series	LK / SK
Order number	300160392
Weight	2.5 kg
Pull force at 7 bar	19 kN
Working stroke	25 mm
Air supply pressure (min. - max.)	5-7 bar
Air consumption at 5-6 bar	3.5 l
Noise level	< 75 dB(A)
Cycle time	2.0 s
Nosepiece (not included) LK600-040	300161993
Nosepiece (not included) Expander LK and SK Ø 4.0	300161899
Nosepiece (not included) Expander LK and SK Ø 5.0	300161901
Nosepiece (not included) Expander LK and SK Ø 6.0	300161902
Jaws Expander LK and SK Ø 4.0 - 6.0	300161883
Jaws case Expander LK and SK Ø 4.0 - 6.0	300161882
Jaws pusher Expander LK and SK Ø 4.0 - 6.0	300161884

Without nosepiece

EXTOOL-040-1 Setting Tool

Hydropneumatic Tool for Series LK / SK with Mandrel Collection Device



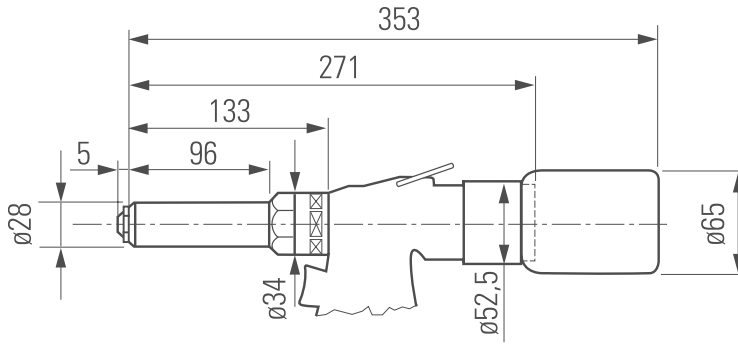
TECHNICAL DATA

Type	EXTOOL-040-1
Series	LK / SK
Order number	300160393
Weight	2.7 kg
Pull force at 7 bar	24 kN
Working stroke	18 mm
Air supply pressure (min. - max.)	5-7 bar
Air consumption at 5-6 bar	3.5 l
Noise level	< 75 dB(A)
Cycle time	2.0 s
Nosepiece (not included) Expander LK and SK Ø 7.0	300161911
Nosepiece (not included) Expander LK and SK Ø 8.0	300161912
Nosepiece (not included) Expander LK and SK Ø 9.0	300161913
Nosepiece (not included) Expander LK and SK Ø 10.0	300161914
Jaws Expander LK and SK Ø 7.0 - 10.0	300161903
Jaws case Expander LK and SK Ø 7.0 - 10.0	300161900
Jaws pusher Expander LK and SK Ø 7.0 - 10.0	300161905

Without nosepiece

EXTOOL-040-2 Setting Tool

Hydropneumatic Tool for Series LK / SK with Mandrel Collection Device



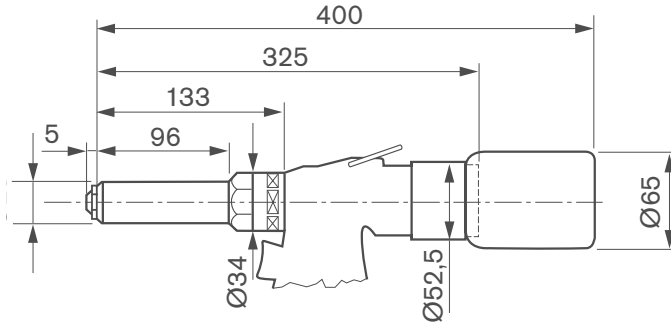
TECHNICAL DATA

Type	EXTOOL-040-2
Series	LK / SK
Order number	300160394
Weight	2.7 kg
Pull force at 7 bar	24 kN
Working stroke	18 mm
Air supply pressure (min. - max.)	5-7 bar
Air consumption at 5-6 bar	3.5 l
Noise level	< 75 dB(A)
Cycle time	2.0 s
Nosepiece (not included) Expander LK and SK Ø 12.0	300161931
Nosepiece (not included) Expander LK and SK Ø 14.0	300161932
Nosepiece (not included) Expander LK and SK Ø 16.0	300161933
Jaws Expander LK and SK Ø 12.0 - 16.0	300161930
Jaws case Expander LK and SK Ø 12.0 - 16.0	300161900
Jaws pusher Expander LK and SK Ø 12.0 - 16.0	300161905

Without nosepiece

EXTOOL-050 Setting Tool

Hydropneumatic Tool for Series LK / SK with Mandrel Collection Device



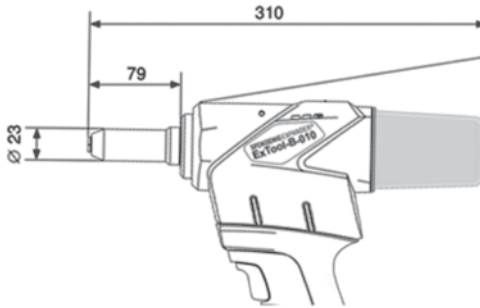
TECHNICAL DATA

Type	EXTOOL-050
Series	LK
Order number	300179728
Weight	3.4 kg
Pull force at 7 bar	34 kN
Working stroke	13 mm
Air supply pressure (min. - max.)	5-7 bar
Air consumption at 5-6 bar	3.5 l
Noise level	< 75 dB(A)
Cycle time	2.0 s
Nosepiece (not included) Expander LK \varnothing 18.0	300179935
Nosepiece (not included) Expander LK \varnothing 20.0	300179938
Jaws Expander LK \varnothing 18.0 - 20.0	300179934
Jaws case Expander LK \varnothing 18.0 - 20.0	300179921
Jaws pusher Expander LK \varnothing 18.0 - 20.0	300179922

Without nosepiece

EXTOOL-B-010 Setting Tool

Battery Tool for Series LK / SK with Mandrel Collection Device



TECHNICAL DATA

Type	EXTOOL-B-010
Series	LK / SK
Order number	300179894
Weight	1.65 kg (without battery)
Pull force	24 kN
Working stroke	30 mm
Weight battery	0.35 kg
Noise level	78.8 dB
Nominal voltage	20 V
Capacity	Li-Ion 2.0 Ah

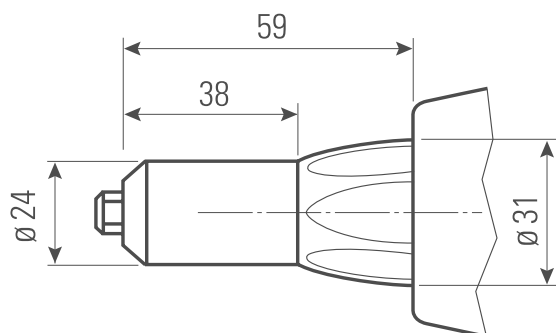
Without nosepieces and equipment kit

Type	Equipment Kit	Nosepieces
Series	LK / SK	LK / SK
Equipment Ø 4.0 – 6.0 (nosepiece not included)	300179925	
Nosepiece Expander LK and SK Ø 4.0		300161899
Nosepiece Expander LK and SK Ø 5.0		300161901
Nosepiece Expander LK and SK Ø 6.0		300161902
Equipment Ø 7.0 – 10.0 (nosepiece not included)	300179926	0.35 kg
Nosepiece Expander LK and SK Ø 7.0		300161911
Nosepiece Expander LK and SK Ø 8.0		300161912
Nosepiece Expander LK and SK Ø 9.0		300161913
Nosepiece Expander LK and SK Ø 10.0		300161914
Equipment Ø 12.0 – 16.0 (nosepiece not included)	300179927 (LK only)	
Nosepiece Expander LK Ø 12.0		300161931 (LK only)
Nosepiece Expander LK Ø 14.0		300161932 (LK only)
Nosepiece Expander LK Ø 16.0		300161933 (LK only)

Nosepieces and Equipment Kit are required and must be purchased separately.

KW-008 Setting Tool

Mechanical Hand Lever Tool for Series LK / SK



TECHNICAL DATA

Type	KW-008	KW-008
Series	LK	SK
Order number	300159301	300159301
Weight	1.95 kg	1.95 kg
Length	515 mm	515 mm
Nosepiece Expander \varnothing 4.0	DPM400-B10	DPM400-C10
Nosepiece Expander \varnothing 5.0	DPM400-D10	DPM400-D10
Nosepiece Expander \varnothing 6.0	DPM400-E10	DPM400-E10
Jaws \varnothing 4.0 - 6.0	PRG 540-46E	PRG 540-46E

Hand lever tool with equipment for LK and SK \varnothing 4 - 6mm

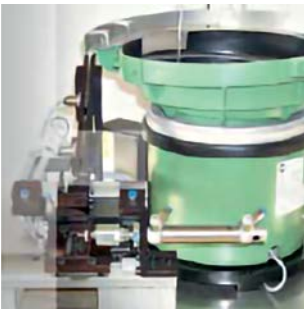
www.boneham.co.uk / Tel: +44 (0) 1623 445 450 / Fax: +44 (0) 1623 445 451 / sales@boneham.co.uk

Systems and Automation Solutions

At SFC KOENIG, a complete sealing and flow control solution means the right products are combined with the right assembly and installation processes. By helping customers integrate our parts into their operations we are able to improve efficiency, improve consistency and lower total costs. Our team is ready to work with you to develop a complete automation solution designed for your needs.



We support customers throughout the entire process – from planning, design and product selection, through to development and implementation. SFC KOENIG automation equipment, such as presses and hydraulic tools, combined with our process integration services, allows us to deliver a customised total solution for your operation.



In conjunction with our automation partners, SFC KOENIG offers single-head workstations as well as fully-automated assembly equipment. The direction, type and number of assembly heads can all be customised and integrated into your production line. Built-in processing diagnostics control the assembly process for improved product quality.

SFC KOENIG automation solutions help to ensure that products are placed accurately and consistently, eliminating errors and potential risks. Our customised solutions are developed for efficiency and help you reduce assembly time and lower costs. Our high quality assembly systems:

- / are efficient and reliable
- / automatically feed sealing and flow control products
- / easily integrate into assembly lines
- / strictly control the installation process
- / offer process flexibility
- / improve product quality
- / feature a modular design of the placing head
- / are capable of high process speeds
- / feature PLC control and monitoring
- / increase throughput
- / utilise a robust design

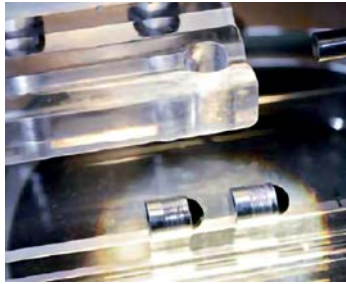


Koenig Technical Information

Information About CV Series Available Upon Request

KOENIG EXPANDER® **KOENIG CHECK VALVE®** **KOENIG RESTRICTOR®**

Our technical information section contains reference details related to performance, installation and materials. SFC KOENIG engineers are available to assist you at any time, and can advise on questions and concerns about your individual application. We also offer special orders for customised solutions to meet your individual needs.



TEST PRESSURE

Page 409

BASE MATERIALS / INSTALLATION REQUIREMENTS

Page 410

PRESSURE PERFORMANCE

Pages 411-412

ANCHORING PRINCIPLE

Pages 413-414

INSTALLATION INSTRUCTIONS

Pages 415-419

DESIGN GUIDELINES

Pages 420-422

GALVANIC CORROSION

Pages 423-424

KOENIG CHECK VALVE®

Pages 425-428

KOENIG RESTRICTOR®

Page 429

HARDNESS CONVERSION TABLE

For Hardenable Carbon and Low Alloy Steel

Page 430

KOENIG EXPANDER®

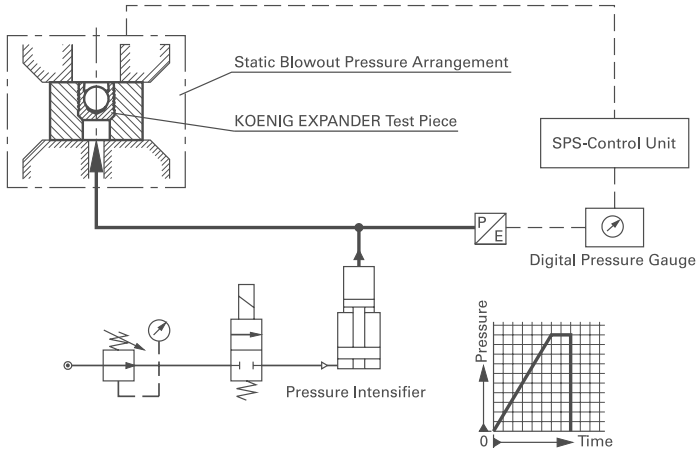
Systems / Product Comparison

Pages 431-432

Koenig Expander[®] Test Pressure

TEST PRESSURE ^(A)

The KOENIG EXPANDER[®] is statically loaded up to burst pressure. This test is performed at SFC KOENIG for functional testing during the production process. Samples from each production batch are subjected to this functional test.

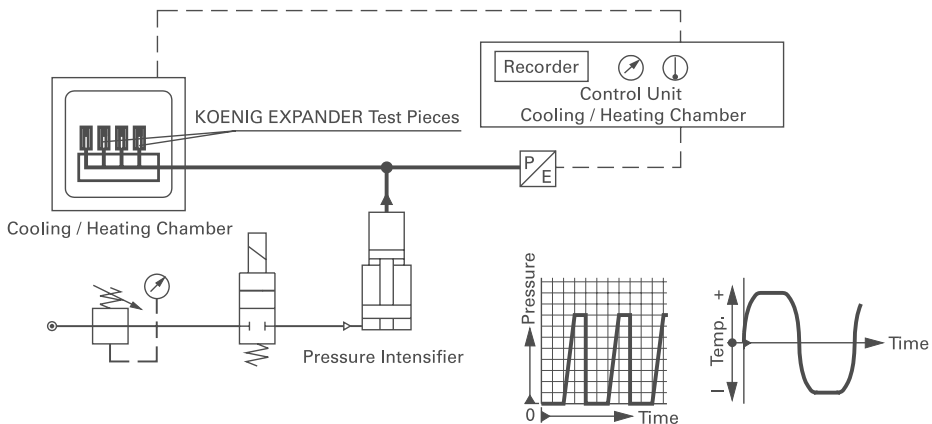


TEST PRESSURE, TEST ^(B)

The KOENIG EXPANDER[®] is subjected to a pressure cycling test under varying environmental conditions. The test determines the levels of pressure that can be absorbed by the part by applying intermittent pressure loads and temperature fluctuations to confirm the sealing plug is not squeezed out.

CONDITIONS

- / **Temperature:** 2 hrs at +100° C (Series LK/LP at 150° C) / 2 hrs at - 40° C temperature cycle 30 – 45 min.
- / **Pressure:** Intermittent, 2 min 0 bar, 3 min test pressure
- / **Duration:** 168 hrs (long-term test)
- / **Bore:** Tolerance, roundness and roughness in accordance with standard sheets, plain surface, edge and wall distance according to standard sheet.



Base Materials / Installation Requirements

Operating pressures listed can be achieved for the following base materials:

Base Material of the Installation	Tensile Strength Rm [N/mm ²]	Elongation A5 [%]	Yield Strength Rp0.2 [N/mm ²]	Hardness HB
① High Strength Steel ETG-100 / 44SMn28 AISI 1144	960 - 1000	6	min. 865	320 avg.
② Case Hardened Steel C15Pb / 1.0403 AISI 10L15	430 - 730	10	min. 280	200 avg.
③ Ductile Cast Iron EN 1563: GJS-600-3 ASTM A536: 80-60-03	min. 600	3	min. 370	200 - 290
④ Ductile Cast Iron (Dura-Bar®) EN 1563: GJS-450-10 ASTM A536: 65-45-12	450 avg.	12	310 avg.	131 - 217
⑤ Gray Cast Iron EN 1561: GJL-250 ASTM A48: NO.35	350 avg.	0.3	165 - 228	160 - 250
⑥ Aluminum-Alloy AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6*	min. 450	8	min. 310	120 avg.
⑦ Aluminum-Alloy AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	min. 310	8	min. 260	105 avg.
⑧ Cast Aluminum-Alloy G-AlSi7Mg / EN-AC-42100 ASTM/UNS: A356	min. 230	2	min. 190	min. 75

*SFC KOENIG's North American Engineering Department utilises 2024-T4/T6 as a test base material.

- / Equally high working pressures can also be achieved with base materials with similar mechanical properties. However, compliance must be met for the appropriate installation conditions.
- / Applications in cast aluminum, magnesium alloys, nonferrous metals and plastics require special consideration and can be developed upon request.
- / Applications in base materials with high hardness and hardened materials, require special consideration and can be developed upon request.
- / **Applications in surface coated materials (zinc plated, anodised ...) require special consideration and can be developed upon request.**
- / For factors affecting pressure performance please see:
 - Anchoring Principle
 - Surface Finish: Requirements
 - Design Guidelines

SAFETY MARGIN

The safety margin includes uncontrollable factors. Dynamic loads at nominal pressure, with 106 load cycles and a frequency of 3 - 4 Hz have shown that the subsequently measured bursting pressures, are reduced according to Test ① by 20 % as well as Test ②.

Pressure Performance

Series MB / CV

Series MB 600 mm	Base Material of the Installation						
	① ETG-100 / 44SMn28 AISI 1144	② C15Pb / 1.0403 ~ SAE 1015 (10L15)	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	④ EN 1561: GJL-250 ASTM A48: ND.35	⑤ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6	⑥ AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	⑦ G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 3 - 10	1400 bar / 20300 psi			450 bar / 6500 psi		1200 bar / 17400 psi	
Ø 12 - 14	1000 bar / 14500 psi			350 bar / 5100 psi		900 bar / 13000 psi	
Hole Tolerance	0 / +0.1 mm						
Hole Roughness	R _z 10 - 30 µm				Anchorage in Base Metal		

Series MB 600 Inch	Base Material of the Installation						
	① ETG-100 / 44SMn28 AISI 1144	② C15Pb / 1.0403 ~ SAE 1015 (10L15)	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	④ EN 1561: GJL-250 ASTM A48: ND.35	⑤ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6	⑥ AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	⑦ G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 0.093 - 0.281	1400 bar / 20300 psi			450 bar / 6500 psi		1200 bar / 17400 psi	
Hole Tolerance	Ø 0.093 0 / +0.002 Inch from Ø 0.125 0 / +0.004 Inch						
Hole Roughness	R _z 10 - 30 µm				Anchorage in Base Metal		

Series MB 700 mm	Base Material of the Installation						
	① ETG-100 / 44SMn28 AISI 1144	② C15Pb / 1.0403 ~ SAE 1015 (10L15)	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	④ EN 1561: GJL-250 ASTM A48: ND.35	⑤ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6	⑥ AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	⑦ G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 3 - 10	1400 bar / 20300 psi			450 bar / 6500 psi		1200 bar / 17400 psi	
Ø 12 - 22	1150 bar / 16700 psi			350 bar / 5100 psi		900 bar / 13000 psi	
Hole Tolerance	0 / +0.1 mm						
Hole Roughness	R _z 10 - 30 µm				Anchorage in Base Metal		

Series MB 850 mm	Base Material of the Installation						
	① ETG-100 / 44SMn28 AISI 1144	② C15Pb / 1.0403 ~ SAE 1015 (10L15)	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	④ EN 1561: GJL-250 ASTM A48: ND.35	⑤ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6	⑥ AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	⑦ G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 3 - 10	1100 bar / 16000 psi		350 bar / 5100 psi		1000 bar / 14500 psi		
Ø 12 - 22	900 bar / 13000 psi		280 bar / 4100 psi		800 bar / 11600 psi		
Hole Tolerance	0 / +0.1 mm						
Hole Roughness	R _z 10 - 30 µm			R _z 10 - 30 µm		Anchorage in Base Metal	

Series CV 173 mm	Base Material of the Installation				
	① ETG-100 / 44SMn28 AISI 1144	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	④ EN 1563: GJS-450-10 ASTM A536: 65-45-12	⑤ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6	⑦ G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 3 - 10			650 bar / 9400 psi		210 bar / 3000 psi
Ø 12			300 bar / 4300 psi		100 bar / 1500 psi
Hole Tolerance	0 / +0.1 mm				
Hole Roughness	R _z 10 - 30 µm			Anchorage in Base Metal	

Series CV 588 mm	Base Material of the Installation				
	① ETG-100 / 44SMn28 AISI 1144	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	④ EN 1563: GJS-450-10 ASTM A536: 65-45-12	⑤ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6	⑦ G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 4 - 9	1000 bar / 14500 psi		350 bar / 5000 psi		
Ø 10	860 bar / 12500 psi		280 bar / 4000 psi		
Hole Tolerance	0 / +0.1 mm				
Hole Roughness	R _z 10 - 30 µm			Anchorage in Base Metal	

Proof Pressure Test (B) **Max. Allowable Working Pressure = Nominal Pressure**

See Anchorage Principles related to the base materials on page 413.

Pressure Performance

Series SK / LP / LK / RE

Series SK mm	Base Material of the Installation							
	① ETG-100 / 44SMn28 AISI 1144	② C15Pb / 1.0403 ~ SAE 1015 (10L15)	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	⑤ EN 1561: GJL-250 ASTM A48: ND.35	⑥ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6	⑦ AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	⑧ G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356	
Ø 4 – 10	1400 bar / 20300 psi				500 bar / 7200 psi		1400 bar / 20300 psi	450 bar / 6500 psi
Ø 12				1600 bar / 23200 psi		400 bar / 5800 psi		
Hole Tolerance	0 / +0.12 mm							
Hole Roughness	R _z 10 – 30 µm				Anchorage in Base Metal			

If SK plugs are used to keep channels separated, allowable working pressure on the insertion side is reduced by 50%.

Series LP mm	Base Material of the Installation							
	① ETG-100 / 44SMn28 AISI 1144	② C15Pb / 1.0403 ~ SAE 1015 (10L15)	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	⑤ EN 1561: GJL-250 ASTM A48: ND.35	⑥ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6	⑦ AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	⑧ G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356	
Ø 4 – 12				180 bar / 2600 psi		60 bar / 850 psi		
Hole Tolerance	According to Data Sheet							
Hole Roughness	R _z 10 – 30 µm				Anchorage in Base Metal			

①②③⑤⑥ Temperature range for proof pressure test (B): - 40 °C to + 150 °C ⑦⑧ Temperature range for proof pressure test (B): - 40 °C to + 100 °C

Series LK 600 mm	Base Material of the Installation							
	① ETG-100 / 44SMn28 AISI 1144	② C15Pb / 1.0403 ~ SAE 1015 (10L15)	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	⑤ EN 1561: GJL-250 ASTM A48: ND.35	⑥ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6	⑦ AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	⑧ G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356	
Ø 4 – 10				180 bar / 2600 psi		60 bar / 850 psi		
Hole Tolerance	0 / +0.12 mm							
Hole Roughness	R _z 10 – 30 µm				Anchorage in Base Metal			

①②③⑤ Temperature range for proof pressure test (B): - 40 °C to + 150 °C ⑥⑦⑧ Temperature range for proof pressure test (B): - 40 °C to + 100 °C

Series LK 950 mm	Base Material of the Installation						
	① ETG-100 / 44SMn28 AISI 1144	② C15Pb / 1.0403 ~ SAE 1015 (10L15)	③ EN 1563: GJS-600-3 ASTM A536: 80-60-03	⑤ EN 1561: GJL-250 ASTM A48: ND.35	⑥ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6	⑦ AlMgSiPb / EN AW-6012-T6 AA: 6012-T6	⑧ G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 4 – 20				180 bar / 2600 psi		60 bar / 850 psi	
Hole Tolerance	+0.05 / +0.15		0 / +0.12 mm				
Hole Roughness	R _z 10 – 30 µm				R _z 10 – 30 µm		Anchorage in Base Metal

①②③⑤ Temperature range for proof pressure test (B): - 40 °C to + 150 °C ⑥⑦⑧ Temperature range for proof pressure test (B): - 40 °C to + 100 °C

KOENIG EXPANDER® sealing plugs series LK are not suitable for pressure load applied on the insertion side of the plug. For special release contact SFC KOENIG.

Series RE mm	Base Material of the Installation			
	① ETG-100 / 44SMn28 AISI 1144	④ EN 1563: GJS-450-10 ASTM A536: 65-45-12	⑥ AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6	⑧ G-AISI7Mg / EN-AC-42100 ASTM/UNS: A356
Ø 4	120 bar / 1740 psi		100 bar / 1450 psi	
Ø 5	180 bar / 2610 psi		150 bar / 2175 psi	
Ø 6	210 bar / 3045 psi		150 bar / 2175 psi	
Ø 7 – 8	210 bar / 3045 psi		180 bar / 2610 psi	
Ø 9 – 10	Please Contact Us for Details			

Proof Pressure Test (B) Max. Allowable Working Pressure = Nominal Pressure

Base Material Harder than Expander: To achieve the allowable working pressure, anchorage to the bore roughness of the base material is required. Roughness R_z = 10 – 30 µm.

Base Material Softer than Expander: Anchorage to the bore of the base material occurs automatically due to the serrations on the sleeve of the KOENIG EXPANDER®.

Transition Zone: To achieve the allowable working pressure, anchorage to the bore roughness of the base material is required. Roughness R_z = 10 to 30 µm.

See Anchorage Principles related to the base materials on opposite page.

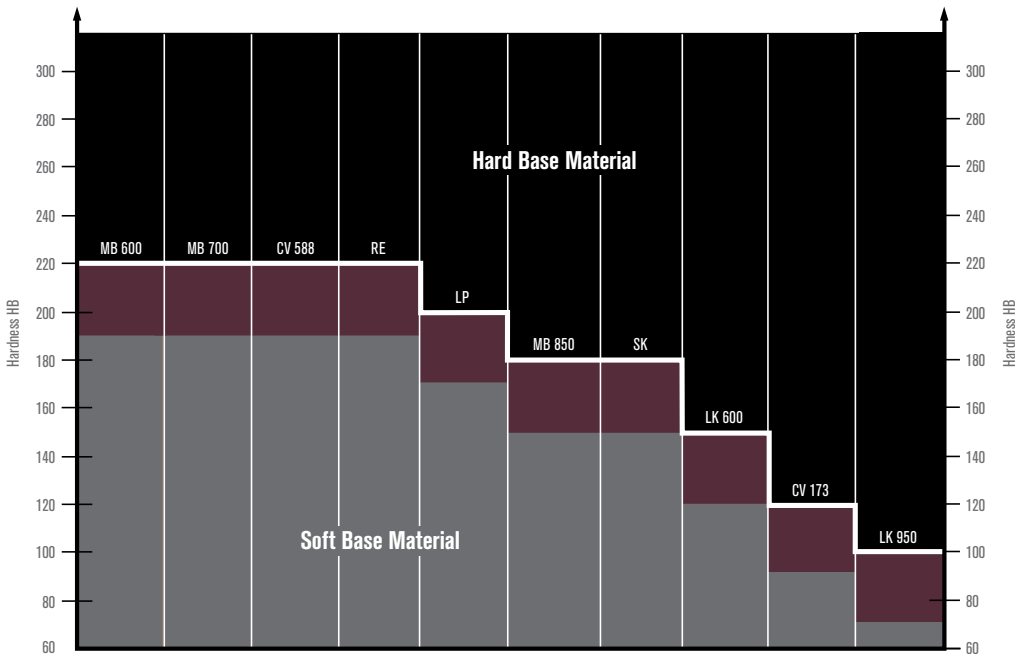
Anchorage Principle

The required bore roughness is directly related to the hardness and the mechanical characteristics of the base material. Depending on the combination of sealing plug and base material, anchorage takes place either by the groove profile of the expander sleeve biting into the base material or on anchorage to the surface roughness of the bore.

Note: When selecting a KOENIG EXPANDER® the bore roughness must always be adjusted according to the hardness of the base material.

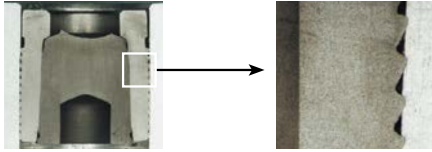
Anchorage between sleeve and base material is achieved when the sleeve is a minimum of HB = 30 greater than the base material. If the hardness difference is less, hole roughness of 10 to 30 µm is needed to achieve indicated working pressures.

ANCHORAGE PRINCIPLE RELATED TO THE BASE MATERIAL

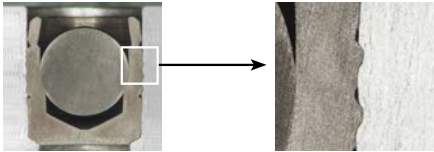


- Base Material Harder than Expander:** To achieve the allowable working pressure, anchorage to the bore roughness of the base material is required. **Roughness $R_z = 10 - 30 \mu\text{m}$.**
- Base Material Softer than Expander:** Anchorage to the bore of the base material occurs automatically due to the serrations on the sleeve of the KOENIG EXPANDER®.
- Transition Zone:** To achieve the allowable working pressure, anchorage to the bore roughness of the base material is required. **Roughness $R_z = 10 \text{ to } 30 \mu\text{m}$.**

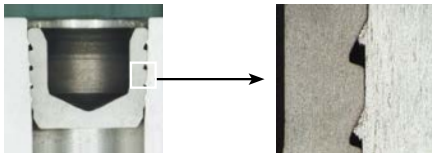
Anchorage Principle



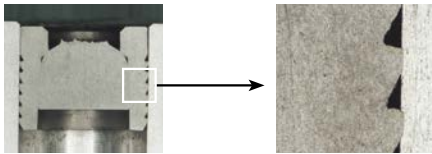
Anchorage due to plug sleeve serrations
KOENIG EXPANDER® Series SK
 In aluminum-alloy HB = 90



Anchorage due to plug sleeve serrations
KOENIG EXPANDER® Series MB 850
 In aluminum-alloy HB = 90

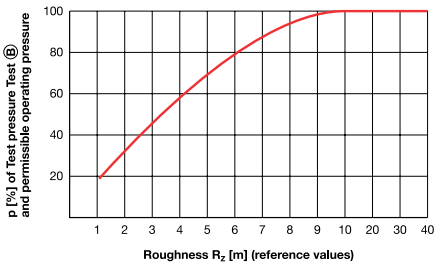


Anchorage due to plug sleeve serrations
KOENIG EXPANDER® Series LP
 In aluminum-alloy HB = 90



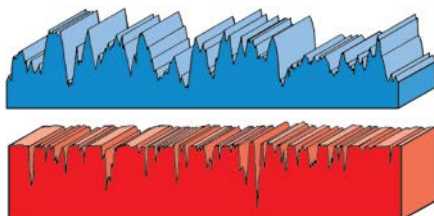
Sufficient anchorage due to plug sleeve serrations
KOENIG EXPANDER® Series LK 950
 In aluminum-alloy HB = 90

Pressure depending on the bore roughness



BORE ROUGHNESS REQUIREMENTS

When installing KOENIG EXPANDER® plugs in hard base material positive anchoring is not possible. To attain suitable working pressures and anchorage, it is necessary to have a bore roughness of $R_z = 10\text{--}30 \mu\text{m}$. At a roughness greater than $R_z = 30 \mu\text{m}$ leakage might occur.



ROUGHNESS PROFILE

Required Roughness Profile

The ideal bore roughness for anchorage is attained by drilling with a twist drill or a core drill.

Undesirable Roughness Profile

By reaming, a one-sided, smooth roughness profile is created. This is not desirable.

Installation Instructions for MB Series

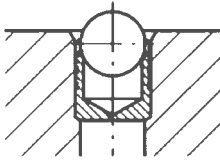


Fig. 1

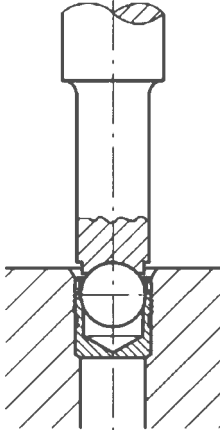


Fig. 2

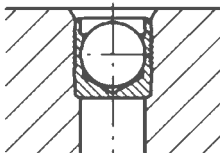


Fig. 3

DRILLED HOLE

- / The drilled hole must be within the tolerances shown on the preceding dimensional sheets.
- / The counterbored hole (d2) must be properly sized for the through hole (d3) according to the dimensional sheets.
- / Holes must be round within 0.05 mm.
- / With hard materials the bore roughness should be from $R_z = 10-30 \mu\text{m}$ for best results.
- / Longitudinal rifles and spiral grooves should be avoided. These influence the sealing effectiveness.
- / The bore must be free of oil, grease and chips.

SETTING PROCEDURE

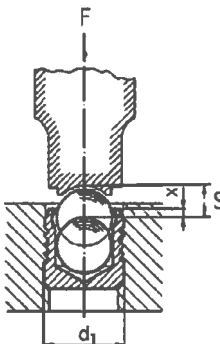
- / With the ball facing out the KOENIG EXPANDER[®] is inserted in the counterbored hole. The top sleeve should not be above the surface of the base material (Fig. 1).
- / With only a slight or no counterbore, the base of the sleeve must be adequately supported during installation.
- / The ball can now be pressed in until the top of the ball is below the edge of the sleeve (Fig. 2 and 3). Corresponding approximate values for stroke S as well as the dimensions X are from the table below.

Note:

- / Use the proper size setting tool for the KOENIG EXPANDER[®] according to the data sheet.
- / Spray cleaning with air drying is the only way to clean/degrease plugs before installation. Do not dip and vacuum dry the plugs.

PRESS

Small quantities or single parts can be installed with a hammer and a setting tool. Installation can also be done with an arbor press. It is preferred to limit stroke travel when using a press because insertion force is difficult to control. KOENIG EXPANDER[®] plugs are also ideal for automated installation because they are problem free.



INSTALLATION CHART

		Series MB 600 / MB 700 / MB 850													
d1 (mm)		3	4	5	6	7	8	9	10	12	14	16	18	20	22
s (mm)	Stroke (approx. values)	1.2	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.5	6.35	7.0	8.0	9.0	10.0
x (mm)	Position of Top of Ball Relative to Top of Sleeve ±0.2	0.4	0.2	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.6	0.6	0.8	0.8

		Series MB 600 Inch-Version					
d1 (inch)		.093	.125	.156	.187	.218	.281
s (in)	Stroke (approx. values)	.031	.047	.059	.079	.094	.118
x (in)	Position of Top of Ball Relative to Top of Sleeve 0/-0.012	Flush to .012 Below the Sleeve					

Installation Instructions for MB Series

PLUG REMOVAL

With KOENIG EXPANDER® MB Series removal of the plug is possible. The plug can be drilled out with a carbide tipped drill or with a high speed steel drill.

Plug Removal Drill Bit Recommendation		
MB 600-030 to 140	Ball HB ~250	High Speed Steel Drill
MB 600-093 A	Ball HRC ~55	Carbide Tipped Drill
MB 600-125 A to 281 A	Ball HB ~250	High Speed Steel Drill
MB 700-030 to 220	Ball HRC ~45	Carbide Tipped Drill
MB 850-030 to 220	Ball HRC ~45	Carbide Tipped Drill

PROCEDURE:

- / For KOENIG EXPANDER® smaller than 6mm or .250 inches in diameter: Drill out, in one process, to the **next larger diameter** according to the data sheet.
- / For KOENIG EXPANDER® models larger than 6mm or .250 inches in diameter: Drill out in several steps with last step to the **next larger diameter** according to the data sheet.
- / Clear chips, remnants of the sleeve, and oil and grease from the bore.
- / Inspect bore to confirm that it meets all requirements.
- / Install a new KOENIG EXPANDER®.

Note:

After plug removal always use the next larger size plug.

Installation Instructions for SK Series

DRILLED HOLE

- / The drilled hole must be within the tolerances shown on the preceding data sheets.
- / Holes must be round within 0.05 mm.
- / With hard materials the bore roughness should be from $R_z = 10\text{--}30\ \mu\text{m}$ for best results.
- / Longitudinal rifles and spiral grooves should be avoided. These influence the sealing effectiveness.
- / The bore must be free of oil, grease and chips.

SETTING PROCEDURE

- / Insert the plug in the tool, making sure that the sleeve is against the nosepiece (Fig. 1).
- / After inserting the plug into the hole (ensuring the tool is flush to the work surface) activate the tool to expand the plug.
- / The mandrel will break apart when the proper tension has been reached (Fig. 2 and 3).

Note:

- / The assembly of KOENIG EXPANDER® plugs should only be done in a **clean working area**.
- / The sleeve and mandrel of the **plug should not be cleaned, lubricated or have sealant (compound) applied**.

TOOLS

For trouble free installation of KOENIG EXPANDER® plugs use the tools and appropriate components according to the data sheet.

PLUG REMOVAL

With KOENIG EXPANDER® SK Series plug removal is possible.

PROCEDURE

- / Drive the mandrel from the sleeve with a punch.
- / Drill out the sleeve and remove the mandrel.
- / Bore the hole to the **next larger Expander diameter** per the data sheet.
- / Clear chips, remnants of the sleeve, and oil and grease from the bore.
- / Inspect bore to confirm that it meets all requirements.
- / Install a new KOENIG EXPANDER®.

Note: After plug removal always install the next larger size plug.

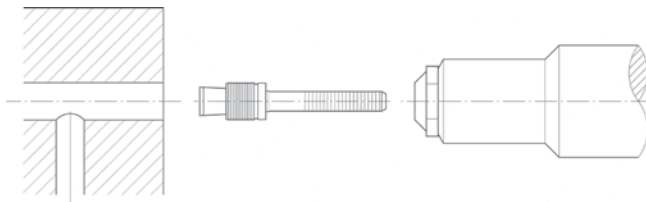


Fig.1

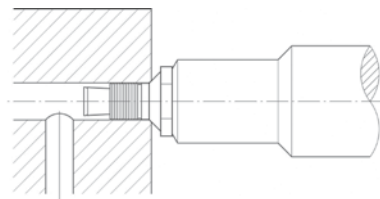


Fig.2

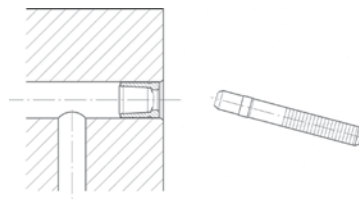


Fig.3

Installation Instructions for LK Series

DRILLED HOLE

1. The drilled hole must be within the tolerance shown on the dimensional sheets. In base materials with high hardness or hardened materials:
 - < 280HB the bore tolerance should be 0 / + 0.12
 - ≥ 280HB the bore tolerance should be +0.05 / + 0.15
2. Holes must be round within 0.05 mm.
3. With hard materials the bore roughness should be from $R_z = 10\text{--}30 \mu\text{m}$ for best results.
4. Longitudinal rifles and spiral grooves should be avoided. These influence the sealing effectiveness.
5. The bore must be free of oil, grease and chips.

SETTING PROCEDURE

- / Insert the plug in the tool, ensuring that the sleeve is against the nosepiece (Fig. 1).
- / After inserting the plug into the hole activate the tool to expand the plug.
- / The mandrel will break apart when the proper tension has been reached (Fig. 2 and 3).

Note:

- / The assembly of KOENIG EXPANDER® plugs should only be done in a **clean working area**.
- / The sleeve and mandrel of the **plug should not be cleaned, lubricated or have sealant (compound) applied**.

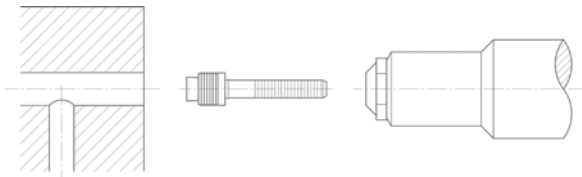


Fig.1

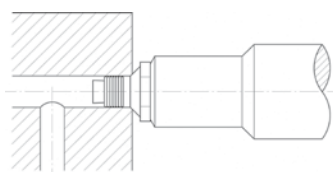


Fig.2

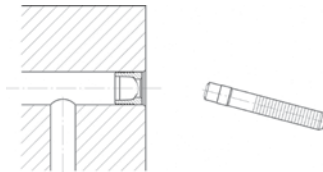


Fig.3

TOOLS

For trouble free installation of KOENIG EXPANDER® plugs use the tools and appropriate components according to the data sheet.

PLUG REMOVAL

With KOENIG EXPANDER® plugs LK Series plug removal is possible.

PROCEDURE

- / Drive the mandrel from the sleeve with a punch.
- / Drill out the sleeve and remove the mandrel.
- / Bore the hole to the **next larger Expander diameter** per the data sheet.
- / Clear chips, remnants of the sleeve and oil and grease from the bore.
- / Inspect bore to confirm that it meets all requirements.
- / Install a new KOENIG EXPANDER®.

Note: After plug removal always install the next larger size plug.

Installation Instructions for LP Series

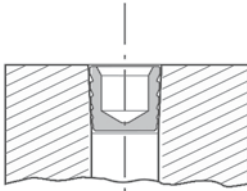


Fig. 1

DRILLED HOLE

- / The drilled hole must be within the tolerances shown on the dimensional sheets.
- / A 1:12 cone rate must be maintained as per the specification sheet.
- / Holes must be round within 0.05 mm.
- / With hard materials the bore roughness should be from $R_z = 10-30 \mu\text{m}$ for best results.
- / Longitudinal rifles and spiral grooves should be avoided. These influence the sealing effectiveness.
- / The bore must be free of oil, grease and chips.

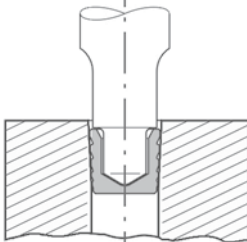


Fig. 2

SETTING PROCEDURE

- / With the setting hole facing out, the LP-plug is inserted in the cone bore. The top sleeve should not be above the surface of the base material (Fig. 1).
- / The LP-plug can now be pressed in with the setting tool. Corresponding approximate values for stroke S are from the table below (Fig. 2).
- / Installed LP-plug (Fig. 3).

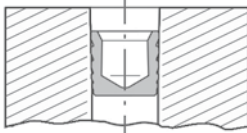


Fig. 3

Note:

- / Use the proper size setting tool for the KOENIG EXPANDER[®] according to the data sheet.
- / A higher setting force might occur if the LP plugs are washed before installation.

PRESS

- / It is preferred to limit travel when using a press because insertion force is difficult to control.
- / Recommended setting speed is 5 mm/sec.
- / The KOENIG EXPANDER[®] ensures an optimum orientation, it works perfectly with automatic processing.

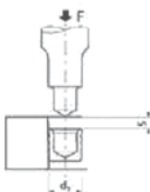
PLUG REMOVAL

With KOENIG EXPANDER[®] LP Series plug removal is possible. The plug can be drilled out with a high speed steel drill.

PROCEDURE

- / Drill out, in one process, to the next larger diameter, nominal diameter d_4 according to the data sheet.
- / Drill the taper hole with a reamer up to diameter d_3 according to the data sheet.
- / Clear chips, remnants of the sleeve, and oil and grease from the bore.
- / Install a new KOENIG EXPANDER[®].

Note: After plug removal always install the next larger size plug.



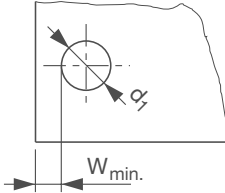
INSTALLATION CHART

Series LP 900								
Diameter	4	5	6	7	8	9	10	12
Stroke S (mm) +/- 0.25	1.0	1.3	1.3	1.5	1.8	1.8	2.0	2.0

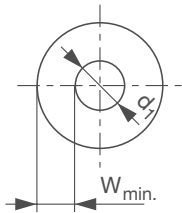
In steel, gray cast nodulized cast iron, aluminum wrought alloy, aluminum-cast material.

Design Guidelines

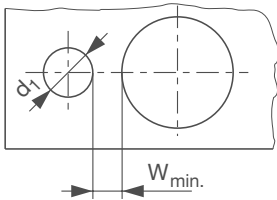
Distance to External Wall



Distance to Exterior Wall



Wall Thickness Between Bores



WALL THICKNESS / DISTANCE FROM EDGE

As the radial expansion of the KOENIG EXPANDER® sleeve occurs, the base material in which it will be anchored plastically deforms. The resultant strength, as well as the hydraulic pressure and temperature service conditions depending on the expander type and characteristics of the base material, require minimum wall thickness, or distance from edge.

The guideline values for minimum wall thickness and distance from edge ($W_{min.}$) express these influencing factors. At these minimum values, only slight deformation on the exterior profile of the base material of less than 20 μm is likely. This does not affect the function of the KOENIG EXPANDER®. Below the guideline values ($W_{min.}$) the possibility of overloading the base material exists, which can adversely influence the function of the KOENIG EXPANDER®. In such cases tests must be conducted.

Guideline values $W_{min.}$ for wall thickness and distance from edge

KOENIG EXPANDER® diameters Series MB / SK and LP

$$d1 \geq 4 \text{ mm: } W_{min.} = f_{min.} \times d1$$

$$d1 < 4 \text{ mm: } W_{min.} = f_{min.} \times d1 + 0.5 \text{ mm}$$

KOENIG EXPANDER® diameters Series LK / RE

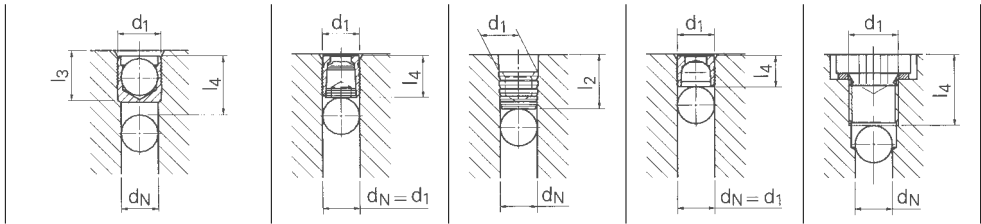
$$d1 \geq 5 \text{ mm: } W_{min.} = f_{min.} \times d1$$

$$d1 = 4 \text{ mm: } W_{min.} = f_{min.} \times d1 + 0.5 \text{ mm}$$

Base Material	Description	1	2	3	5	6	7	8
	Avg. Tensile Strength RM [N/mm ²]	ETG100	C15Pb	EN-GJS-600-3	EN-GJL-250	AlCu4Mg1	AlMgSiPb	G-AISI7Mg
	Minimum Elongation A5 [%]	1000	560	650	300	480	340	260
	Avg. Ultimate Strength Rp 0.2 [N/mm ²]	6	10	3	0.3	8	8	2
	900	300	425	200	380	290	220	
KOENIG EXPANDER® Series		Factor $f_{min.}$						
MB 600		0.6	0.8	0.8	1.0	0.8	1.0	1.0
MB 600, Inch-Version		0.6	0.8	0.8	1.0	0.8	1.0	1.0
MB 700		0.6	0.8	0.8	1.0	0.8	1.0	1.0
MB 850		0.5	0.6	0.6	1.0	0.6	1.0	1.0
CV 173		0.5	0.6	0.7	0.8	0.7	0.8	0.8
CV 588		0.6	0.8	0.8	1.0	0.8	1.0	1.0
SK		0.5	0.6	0.6	1.0	0.8	1.0	1.0
LP		0.3	0.3	0.3	0.5	0.4	0.5	0.5
LK 600		0.4	0.5	0.5	0.8	0.7	0.7	0.7
LK 950		0.3	0.3	0.4	0.6	0.5	0.5	0.5
RE		0.3	0.3	0.5	0.6	0.5	0.5	0.5

Design Guidelines

Required Installation Lengths



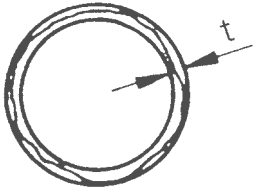
d _N	Series MB			Series SK		Series LP		Series LK		Threaded Plugs DIN 908	
	d ₁	l ₃ min.	l ₄ min.	d ₁	l ₄ max.	d ₁	l ₂ min.	d ₁	l ₄ max.	d ₁	l ₄ max.
2.0	3.0	3.4	5.0								
3.0	4.0	3.8	5.5								
4.0	5.0	5.3	7.0	4.0	6.5	4.40	7.0	4.0	4.0		
5.0	6.0	6.3	8.5	5.0	7.5	5.40	8.0	5.0	4.8	M8x1.5	11.5
6.0	7.0	7.3	9.5	6.0	8.0	6.40	8.5	6.0	5.3	M8x1.5	11.5
7.0	8.0	8.3	11.0	7.0	9.0	7.40	8.5	7.0	5.8	M10x1.5	12.0
8.0	9.0	9.8	12.5	8.0	10.5	8.45	9.5	8.0	6.8	M10x1.5	12.0
9.0	10.0	10.8	13.5	9.0	11.0	9.60	10.0	9.0	6.8	M12x1.5	16.0
10.0	12.0	12.8	16.0	10.0	12.5	10.65	11.0	10.0	6.8	M12x1.5	16.0
12.0	14.0	14.5	18.0	12.0	16.5	12.75	12.0	12.0	7.8	M14x1.5	16.0
14.0	16.0	16.5	20.0					14.0	8.7	M16x1.5	16.5
16.0	18.0	18.5	22.5					16.0	11.5	M18x1.5	17.5
18.0	20.0	21.5	25.5					18.0	13.0	M20x1.5	19.5
20.0	22.0	24.5	28.5					20.0	13.0	M22x1.5	19.5

d_N = Given nominal bore / system bore size

*Installation Lengths Series MB

The required installation length (l₄) min. for MB plugs is for base materials with hardness greater than HB = 90. For softer materials, deeper installation is required.

Design Guidelines



ROUNDNESS TOLERANCE

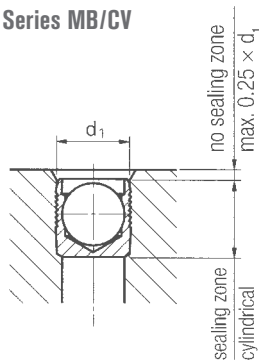
To ensure reliable functioning of the KOENIG EXPANDER® with regard to pressure performance and to ensure leak tight sealing, a **roundness tolerance of $t = 0.05 \text{ mm}$** must be held.

By using a double lipped twist drill, the called out hole and roundness tolerances are reached. Better tolerances, particularly for larger diameter holes, can be held by using a **triple lipped twist drill**.

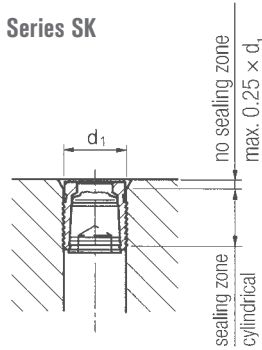
CONICITY OF THE BORE

Within the effective sealing area of the KOENIG EXPANDER®, the bore must be according to the dimensional sheets. The bore lead in can be chamfered up to a depth of **$0.25 \times d_1$** (LK: **$0.15 \times d_1$**) because this area has no significant effect on the sealing function.

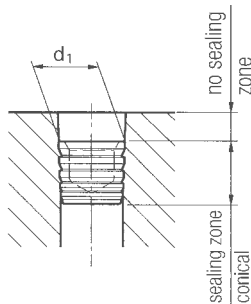
Series MB/CV



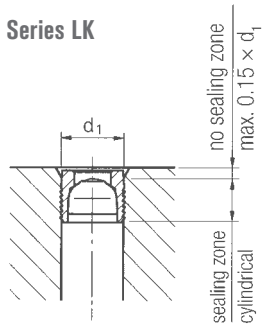
Series SK



Series LP



Series LK

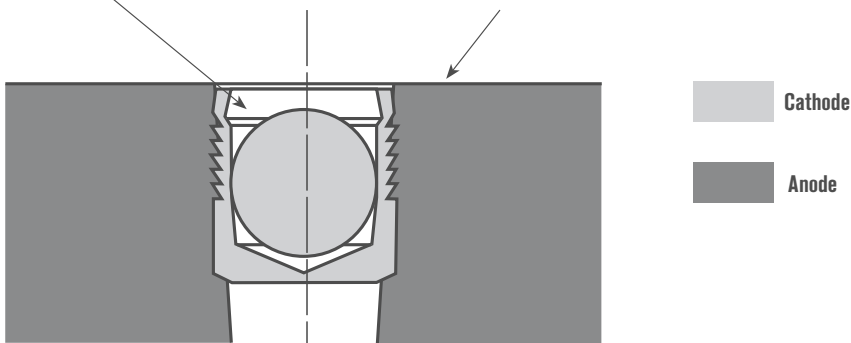


Galvanic Corrosion

In choosing a KOENIG EXPANDER[®] you must consider that the material of the sealing plug and the material of the production piece can show different electrical potentials. In the presence of an electrolyte (e.g. 5% water-NaCl solution), this potential difference causes electrochemical attack on the least noble of the metals in contact – galvanic corrosion. In this case, either the base material or its surface protection will become the anode and will be transferred to the pure metal of the cathode. The corrosion speed or the current density will be determined by the relative surface area or volume of the anode and cathode as illustrated below.

KOENIG EXPANDER[®] = Cathode

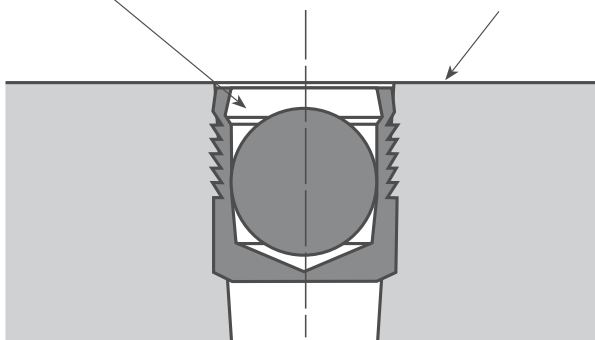
Base Material = Anode



Large Anode Area → Low Current Density at the Anode → Slow Corrosion

KOENIG EXPANDER[®] = Anode

Base Material = Cathode



Small Anode Area → High Current Density at the Anode → Fast Corrosion

Galvanic Corrosion

EFFECT OF GALVANIC CORROSION

The following table shows the expected galvanic corrosion behavior of KOENIG EXPANDER® plugs in common base materials allowing for the relative surface areas of both metals, which influences the speed of corrosion.

Installation Material	Series										
	MB 600	MB 700	MB 850	CV 173	CV 588	SK	LP	LK 600	LK 950	BF/BR	RE
Steel, Carbon/Low Alloy, Plain											
Steel, Carbon/Low, Zn Plated, Chromate			■	■							
Steel, Carbon/Low Alloy, Phosphatized											
Nitrided or Case Hardening Steel	Behavior Depends on the Method Used										
Stainless Steel, X8CrNiS18-9, 1.4305, ANSI 303	■	■	■	■	■	■		■	■	■	■
Stainless Steel, X12CrS13, 1.4005, ANSI 416	■	■	■	■	■	■		■	■	■	■
Cast Iron, EN 1561, Plain				■	■						
Cast Iron, EN 1561, Zn Plated, Chromate			■	■	■						
Cast Iron, EN 1561, Phosphatized				■	■						
Ductile Cast Iron, EN 1563, Plain				■	■						
Ductile Cast Iron, EN 1563, Zn Plated, Chromate			■	■	■						
Ductile Cast Iron, EN 1563, Phosphatized				■	■						
AlMg1SiCu EN AW-6061											
AlMgSiPb EN AW-6062											
AlCu4Mg1 EN AW-2024				■							
AlZnMgCu1,5 EN AW-7075											
G-AlSi7Mg A-Norm 356											
G-AlSi9Mg											
G-AlSi10Mg											

■ = Accelerated ■ = Not Accelerated ■ = Slightly Accelerated

Key to the galvanic corrosion behavior of KOENIG EXPANDER® plugs in the presence of an electrolytic medium installed in base materials per the above table.

Suggestions to Prevent Galvanic Corrosion:

- / Choose materials with no or low potential difference.
- / Use corrosion reducing designs, i.e. if possible prevent the accumulation of fluids on the outer surface of the workpiece.
- / By using suitable surface coatings, corrosion attack can be considerably reduced.

Salt spray testing per DIN EN ISO 9227 is available upon request.

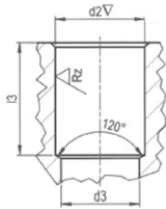


Fig. 1

Before Installation



Fig. 2

After Installation

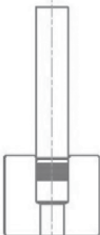


Fig. 3

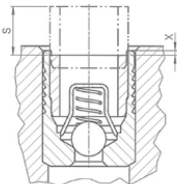


Fig. 4 (Reverse Flow)

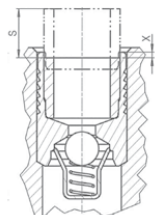


Fig. 5 (Forward Flow)

DRILLED HOLE

- / The drilled hole (Fig. 1) must be within the tolerances shown on the preceding dimensional sheets.
- / The counter-bored hole (d2) must be properly sized for the through hole (d3) according to the dimensional sheets.
- / Hole must be round within 0.05 mm.
- / With hard materials (HB > 190) the bore roughness should be from $R_z = 10 - 30 \mu\text{m}$ for best results.
- / Longitudinal rifles and spiral grooves should be avoided.
- / The bore must be free of oil, grease and chips.
- / Additional reaming operation on the hole is not required.

SETTING PROCEDURE

- / With the pin facing out, the KOENIG CHECK VALVE® is inserted in the counterbored hole (Fig. 2). The top surface of the sleeve should not be above the top surface of the base material.
- / With only a slight or no counter-bore, the base of the sleeve must be adequately supported during installation.
- / The pin can now be pressed in until the top of the pin is flush with the top surface of the sleeve. Corresponding approximate values for stroke S, as well as the dimension X can be referred from the dimensional sheets (Fig. 3, 4 and 5).

Note:

- / Use the proper size setting tool for the KOENIG CHECK VALVE® according to the data sheet.
- / Clean/degrease the KOENIG CHECK VALVE® before installation; only spray cleaning with air drying is allowed (no dipping or vacuum drying).
- / Sealants or locking compounds should not be applied on the KOENIG CHECK VALVE®.

PRESS

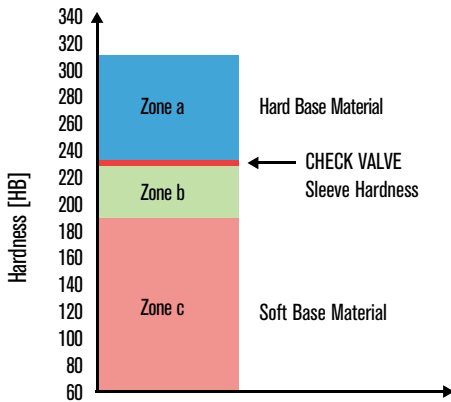
Small quantities or single parts can be installed with a hammer and setting tool. Installation can also be done with an arbor press. It is preferred to limit stroke travel when using a press because insertion force is difficult to control. The KOENIG CHECK VALVE® is also ideal for automated installation.

Anchorage Principles for Koenig Check Valve®

The required bore roughness is directly related to the hardness and the mechanical characteristics of the base material. Depending on the combination of the KOENIG CHECK VALVE® and the base material, anchorage takes place either by the groove profile of the KOENIG CHECK VALVE® sleeve biting into the base material or on anchorage to the surface roughness of the bore.

Note:

When selecting a KOENIG CHECK VALVE®, the bore roughness must always be adjusted according to the hardness of the base material. Anchorage between sleeve and base material is achieved when the sleeve is a minimum of HB = 30 greater than the base material. If the hardness difference is less, hole roughness of 10 to 30 µm is needed to achieve good anchorage for the rated working pressure differential values.



Zone a - Hard Base Material (HB > 220)

To achieve the allowable working pressure, anchorage to the bore roughness of the base material is required. Roughness $R_z = 10 - 30 \mu\text{m}$.

Zone b - Transition Zone (HB 190 - 220)

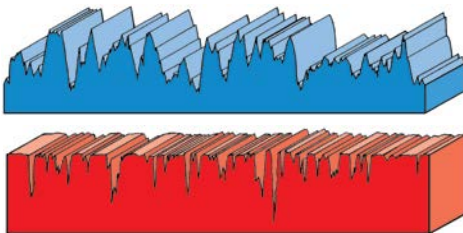
To achieve the allowable working pressure, anchorage to the bore roughness of the base material is required. Roughness $R_z = 10 - 30 \mu\text{m}$.

Zone c - Soft Base Material (HB < 190)

Anchorage to the bore of the base material occurs automatically due to the serrations on the sleeve.

REFERENCE

Base Material of the Installation		
Steel	Cast Iron	Aluminum Alloy
$R_z = 10 - 30 \mu\text{m}$		$R_z = 4 - 30 \mu\text{m}$



ROUGHNESS PROFILE

Required Roughness Profile

The ideal bore roughness for anchorage is attained by drilling with a twist drill or a core drill.

Undesirable Roughness Profile

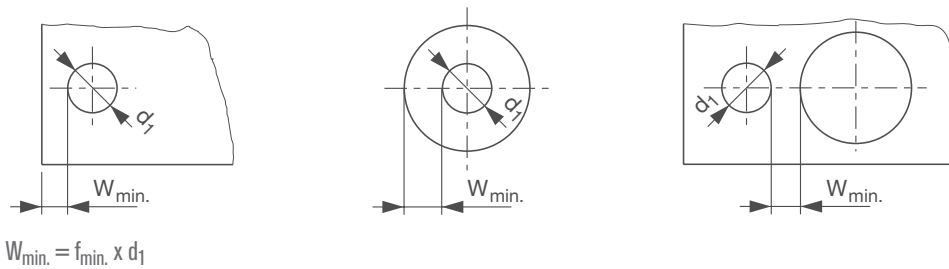
By reaming, a one-sided, smooth roughness profile is created. This is not desirable.

Design Guidelines for Koenig Check Valve®

WALL THICKNESS / DISTANCE FROM EDGE

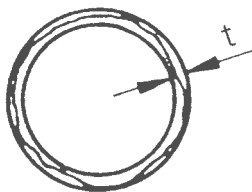
As the radial expansion of the KOENIG CHECK VALVE® sleeve occurs, the base material in which it anchors plastically deforms. The resultant strength, as well as the hydraulic pressure and temperature service conditions depending on the characteristics of the base material, require a minimum wall thickness or distance from edge.

The guideline values for minimum wall thickness and distance from edge ($W_{min.}$) express these influencing factors. At these minimum values, only slight deformation on the exterior profile of the base material of less than 20 µm is likely. This does not affect the function of the KOENIG CHECK VALVE®. Below the guideline values ($W_{min.}$) the possibility of overloading the base material exists, which can adversely influence the function of the KOENIG CHECK VALVE®. In such cases, tests must be conducted.



Base Material of the Installation				
ETG-100 / 44SMn28 AISI 1144	EN 1563: GJS-600-3 ASTM A536: 80-60-03	AISI 303 EN 1.4305 X8CrNiS18-9	EN 1563: GJS-450-10 ASTM A536: 65-45-12	AlCu4Mg1 / EN AW-2024-T3 AA: 2024 T4/T6
Factor, f min				
0.4	0.5	0.5	0.8	0.5

ROUNDNESS TOLERANCE



To ensure reliable functioning of the KOENIG CHECK VALVE® with regard to pressure performance and to ensure leak tight sealing, a roundness tolerance of $t = 0.05$ mm must be held. By using a double-lipped twist drill, the called out hole and roundness tolerances are reached. Better tolerances, particularly for larger diameter holes, can be held by using a triple-lipped twist drill.

CONICITY OF THE BORE

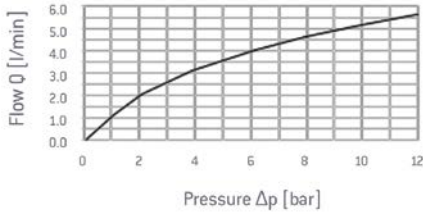
Within the effective anchorage area of the KOENIG CHECK VALVE®, the bore must be in accordance with the dimensional sheets. The bore lead in can be chamfered up to a depth of $0.25 \times d_1$ (check valve diameter) because this area has no significant effect on the anchorage function.

Technical Information for Koenig Check Valve®

Flow Curves

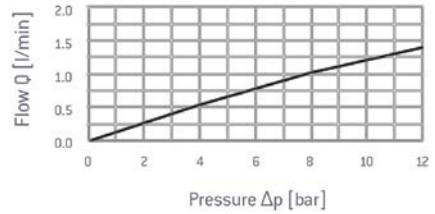
CHECK VALVE FLOW CURVE - UNSCREENED

BFAA055U014; T=50°C; Hydraulic Oil HLP46



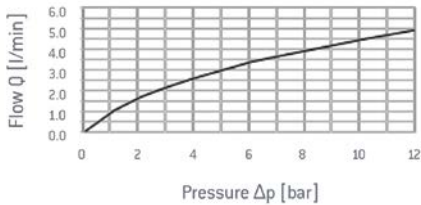
CHECK VALVE FLOW CURVE - SCREENED

BFAA055S014; T=50°C; Hydraulic Oil HLP46



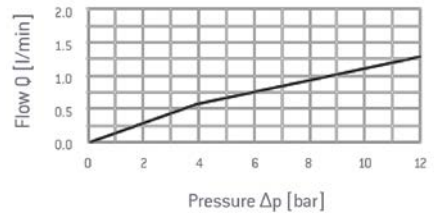
CHECK VALVE FLOW CURVE - UNSCREENED

BRAA055U014; T=50°C; Hydraulic Oil HLP46



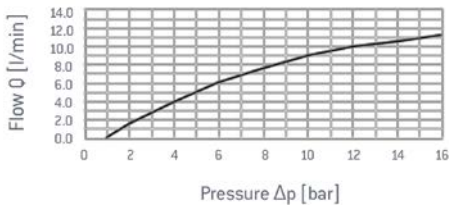
CHECK VALVE FLOW CURVE - SCREENED

BRAA055S014; T=50°C; Hydraulic Oil HLP46



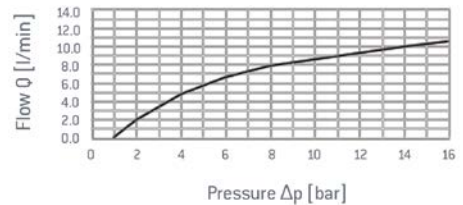
CHECK VALVE FLOW CURVE - UNSCREENED

BF660080024100; T=50°C; Hydraulic Oil HLP46



CHECK VALVE FLOW CURVE - UNSCREENED

BR660080024100; T=50°C; Hydraulic Oil HLP46



Technical Information Koenig Restrictor®

SFC KOENIG provides several restrictor options for different application requirements, and customers can select the restrictor's orifice size. This allows you to have complete design control – CV expansion and threaded restrictors are custom-made to meet your orifice performance requirements. As with any component in your system design, there are many technical factors to consider. This is one method for calculating orifice diameter for the SFC KOENIG restrictor products.

- / This equation was derived by rearranging Bernoulli's Equation and using a Coefficient of Discharge (CD).
- / The Coefficient of Discharge (CD) accounts for pressure losses resulting from factors such as orifice geometry, turbulence near the orifice hole, the length of the orifice hole, and flow dynamics.
- / This equation for calculating the restrictor orifice diameters should be used as reference only. SFC KOENIG recommends that you perform testing in the actual application environment to determine the flow constant.
- / This equation is intended as a guide for fluid applications only; it is not applicable for gas flow applications.

METRIC

To calculate restrictor orifice diameter in mm:

$$d_{\text{orifice}} \approx \sqrt{2.144 \times Q \left(\sqrt{\frac{SG}{\Delta p}} \right)}$$

To calculate restrictor flow rate in mm:

$$Q \approx \frac{d_{\text{orifice}}^2}{2.144 \times \sqrt{\frac{SG}{\Delta p}}}$$

Where:

- d_{orifice} > Orifice diameter, measured in mm
- Q > Fluid flow rate, measured in liters/minute
- Δp > Fluid pressure difference across the restrictor, measured in bar
- SG > Specific gravity of the fluid
- 2.144 > Constant = Unit conversion factor x CD

Please visit our web site for a more precise flow calculator formula.

METRIC

To calculate orifice length in mm:

$$L = (\emptyset \times 0.207) + t$$

L = length of orifice (mm)

\emptyset = orifice diameter (mm)

t = see chart to right

Tolerance: +/- (($\emptyset \times 0.021$) + 0.13) mm

RE Size	t (mm)
4 mm	0.67
5 mm	0.76
6 mm	0.97
7 mm	0.89
8 mm	0.81
9 mm	1.14
10 mm	1.14

Hardness Conversion Table

For Hardening Carbon and Low Alloy Steel

Tensile Strength 2) N/mm ²	Vickers Hardness (F ≥ 98 n)	Brinell Hardness 1) $\left(0.102 \cdot \frac{F}{d^2} = 30 \frac{N}{mm^2}\right)$	Rockwell Hardness		
			HRB	HRC	HRA
255	80	76.0			
270	85	80.7	41.0		
285	90	85.5	48.0		
305	95	90.2	52.0		
320	100	95.0	56.2		
335	105	99.8			
350	110	105	62.3		
370	115	109			
385	120	114	66.7		
400	125	119			
415	130	124	71.2		
430	135	128			
450	140	133	75.0		
465	145	138			
480	150	143	78.7		
495	155	147			
510	160	152	81.7		
530	165	156			
545	170	162	85.0		
560	175	166			
575	180	171	87.1		
595	185	176			
610	190	181	89.5		
625	195	185			
640	200	190	91.5		
660	205	195	92.5		
675	210	199	93.5		
690	215	204	94.0		
705	220	209	95.0		
720	225	214	96.0		
740	230	219	96.7		
755	235	223			
770	240	228	98.1	20.3	60.7
785	245	233		21.3	61.2
800	250	238	99.5	22.2	61.6
820	255	242		23.1	62.0
835	260	247	(101)	24.0	62.4
850	265	252		24.8	62.7
865	270	257	(102)	25.6	63.1
880	275	261		26.4	63.5
900	280	268	(104)	27.1	63.8
915	285	271	(105)	27.8	64.2
930	290	276		28.5	64.5
950	295	280		29.2	64.8
965	300	285		29.8	65.2
995	310	295		31.0	65.8
1030	320	304		32.2	66.4
1060	330	314		33.3	67.0
1095	340	323		34.3	67.6
1125	350	333		35.5	68.1

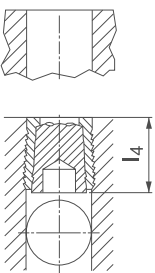
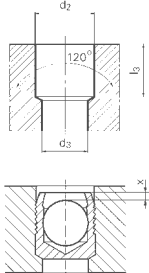
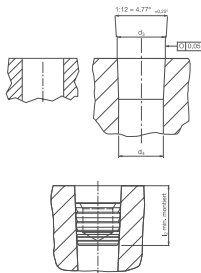
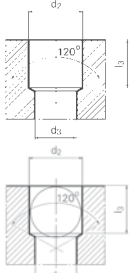
Tensile Strength 2) N/mm ²	Vickers Hardness (F ≥ 98 n)	Brinell Hardness 1) $\left(0.102 \cdot \frac{F}{d^2} = 30 \frac{N}{mm^2}\right)$	Rockwell Hardness		
			HRB	HRC	HRA
1155	360	342		36.6	68.7
1190	370	352		37.7	69.2
1220	380	361		38.8	69.8
1255	390	371		39.8	70.3
1290	400	380		40.8	70.8
1320	410	390		41.8	71.4
1350	420	399		42.7	71.8
1385	430	409		43.6	72.3
1420	440	418		44.5	72.8
1455	450	428		45.3	73.3
1485	460	437		46.1	73.6
1520	470	447		46.9	74.1
1555	480	(456)		47.7	74.5
1595	490	(466)		48.4	74.9
1630	500	(475)		49.1	75.3
1665	510	(485)		49.8	75.7
1700	520	(494)		50.5	76.1
1740	530	(504)		51.1	76.4
1775	540	(513)		51.7	76.7
1810	550	(523)		52.3	77.0
1845	560	(532)		53.0	77.4
1880	570	(542)		53.6	77.8
1920	580	(551)		54.1	78.0
1955	590	(561)		54.7	78.4
1995	600	(570)		55.2	78.6
2030	610	(580)		55.7	78.9
2070	620	(589)		56.3	79.2
2105	630	(599)		56.8	79.5
2145	640	(608)		57.3	79.8
2180	650	(618)		57.8	80.0
	660			58.3	80.3
	670			58.8	80.6
	680			59.2	80.8
	690			59.7	81.1
	700			60.1	81.3
	720			61.0	81.8
	740			61.8	82.2
	760			62.5	82.6
	780			63.3	83.0
	800			64.0	83.4
	820			64.7	83.8
	840			65.3	84.1
	860			65.9	84.4
	880			66.4	84.7
	900			67.0	85.0
	920			67.5	85.3
	940			68.0	85.6

Numbers in parentheses indicate hardness values, which are outside the definition area of the standard hardness test, but often used as approximate values. The Brinell values in parenthesis are only used when measured with a hard metal ball.

1) Calculated as: HB = 0.95 x HV

2) The tensile strength values shown in the table are only to be used as approximate values. To get the exact tensile strength values a tensile test must be performed.


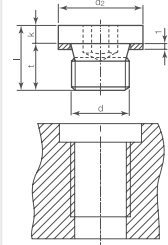
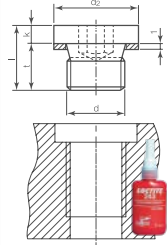
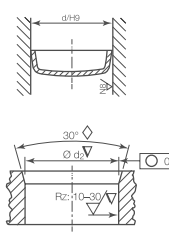
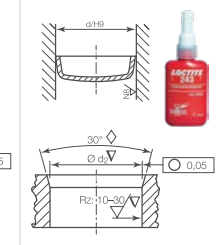
SFC KOENIG EXPANDER® SYSTEMS / PRODUCT COMPARISON

Type of Sealing Element	Expander Series SK/LK	Expander Series MB/CV	Expander Series LP	Ball
Operations				
Bore	■	■	■	■
Bore (step)	□	■	□	□
Chamfering	□	□	□	■
Face Milling	□	□	□	(■ ³⁾)
Reaming	□	□	□	■
Tapping	□	□	□	□
Cleaning	■	■	■	■
Placing Sealant on Screw	□	□	□	□
Positioning of Element	■ By Setting Tool	■ Put Into Bore	■ By Setting Tool	■
Setting of Sealing Element	■ By Pulling the Mandrel	■ By Setting Tool	■ By Setting Tool	■ By Setting Tool
Cramping	□	□	□	■
Torque Check (in line)	□	□	□	□
Insertion-Control	(■ ²⁾)	(■ ²⁾)	(■ ²⁾)	(■ ²⁾)
Pressure Test	□ Upon Request Only	□ Upon Request Only	□ Upon Request Only	
Total No. of Operation	4 (5)	5 (6)	4 (5)	8 (10)
Warranty by Supplier	Provided	Provided	Provided	None
Expander Diameter Available	4 -12/4 -20 mm	3 - 22/4 -18 mm	4.4 -12.7 mm	

¹⁾ = Without Bore Applicable as Well ²⁾ = Optional Control Unit ³⁾ = In Dependence on Assembly □ = Unnecessary ■ = Necessary

Systems / Product Comparison

SFC KOENIG EXPANDER® SYSTEMS / PRODUCT COMPARISON

	Set Screw	Screwed Sealing Plug (metallic sealing)	Screwed Plug with Sealant (e.g. Loctite)	DIN Plug	DIN Plug
Operations					
Bore	■	■	■	■	■
Bore (step)	□	■	■	□	□
Chamfering	■	■	■	■	■
Face Milling	□	□	□	(■ ³⁾)	(■ ³⁾)
Reaming	□	□	□	■	■
Tapping	■	■	■	□	□
Cleaning	■	■	■	■	■
Placing Sealant on Screw	■	□	■	□	■
Positioning of Element	■	■	■	■ By Setting Tool	■ By Setting Tool
Setting of Sealing Element	■	■	■	■ By Pressing In	■ By Pressing In
Cramping	□	□	□	□	□
Torque Check (in line)	■	■ ²⁾	■ ²⁾	□	□
Insertion-Control	□	□	□	(■ ²⁾)	(■ ²⁾)
Pressure Test	■	■	■	■ Upon Request Only	■ Upon Request Only
Total No. of Operation	9	9	10	7 (9)	8 (10)
Warranty by Supplier	None	None	None	None	None

¹⁾ = Without Bore Applicable as Well ²⁾ = Optional Control Unit ³⁾ = In Dependance on Assembly □ = Unnecessary ■ = Necessary

Tapping Drill Sizes

Metric Coarse Sizes

Tap Size	Drill Size
M1 x 0.25	0.75mm
M1.1 x 0.25	0.85mm
M1.2 x 0.25	0.95mm
M1.4 x 0.3	1.1mm
M1.6 x 0.35	1.25mm
M1.8 x 0.35	1.45mm
M2 x 0.4	1.6mm
M2.2 x 0.45	1.75mm
M2.5 x 0.45	2.05mm
M3 x 0.5	2.5mm
M3.5 x 0.6	2.9mm
M4 x 0.7	3.3mm
M4.5 x 0.75	3.7mm
M5 x 0.8	4.2mm
M6 x 1	5mm
M7 x 1	6mm
M8 x 1.25	6.8mm
M9 x 1.25	7.8mm
M10 x 1.5	8.5mm
M11 x 1.5	9.5mm
M12 x 1.75	10.2mm
M14 x 2	12mm
M16 x 2	14mm
M18 x 2.5	15.5mm
M20 x 2.5	17.5mm
M22 x 2.5	19.5mm
M24 x 3	21mm
M27 x 3	24mm
M30 x 3.5	26.5mm
M33 x 3.5	29.5mm
M36 x 4	32mm
M39 x 4	35mm
M42 x 4.5	37.5mm
M45 x 4.5	40.5mm
M48 x 5	43mm
M52 x 5	47mm
M56 x 5.5	50.5mm
M60 x 5.5	54.5mm
M64 x 6	58mm
M68 x 6	62mm

Metric Fine Sizes

Tap Size	Drill Size
M4 x 0.35	3.6mm
M4 x 0.5	3.5mm
M5 x 0.5	4.5mm
M6 x .5	5.5mm
M6 x .75	5.25mm
M7 x .75	6.25mm
M8 x .5	7mm
M8 x .75	7.25mm
M8 x 1	7.5mm
M9 x 1	8mm
M10 x 0.75	9.25mm
M10 x 1	9mm
M10 x 1.25	8.8mm
M11 x 1	10mm
M12 x .75	11.25mm
M12 x 1	11mm
M12 x 1.5	10.5mm
M14 x 1	13mm
M14 x 1.25	12.8mm
M14 x 1.5	12.5mm
M16 x 1	15mm
M16 x 1.5	15mm
M18 x 1	17mm
M18 x 2	16mm
M20 x 1	19mm
M20 x 1.5	18.5mm
M20 x 2	18mm
M22 x 1	21mm
M22 x 1.5	20.5mm
M22 x 2	20mm
M24 x 1.5	22.5mm
M24 x 2	22mm
M26 x 1.5	24.5mm
M27 x 1.5	25.5mm
M27 x 2	25mm
M28 x 1.5	26.5mm
M30 x 1.5	28.5mm
M30 x 2	28mm
M33 x 2	31mm
M36 x 3	33mm

Steel Hardness Testing Comparison Chart

Each hardness testing method does not test the same material properties at a given time

Brinell Hardness	Rockwell C	Rockwell B	Vickers	Tensile Strength
HB (10 mm Ball, 3000Kg Load)	HRC (Indenter 150Kg Load)	HRB (1/16 Ball, 100Kg Load)	HV (Diamond Indenter, 120Kg Load)	N/mm ²
800	72			
780	71			
760	70			
752	69			
745	68			
746	67			
735	66			
711	65			
695	64			
681	63			
658	62			
642	61			
627	60			
613	59			
601	58		746	
592	57		727	
572	56		694	
552	55		649	
534	54	120	589	
513	53	119	567	
504	52	118	549	
486	51	118	531	
469	50	117	505	
468	49	117	497	
456	48	116	490	1569
445	47	115	474	1520
430	46	115	458	1471
419	45	114	448	1447
415	44	114	438	1422
402	43	114	424	1390
388	42	113	406	1363
375	41	112	393	1314
373	40	111	388	1265
360	39	111	376	1236
348	38	110	361	1187
341	37	109	351	1157
331	36	109	342	1118
322	35	108	332	1089
314	34	108	320	1049

Continued on next page

Each hardness testing method does not test the same material properties at a given time

Brinell Hardness	Rockwell C	Rockwell B	Vickers	Tensile Strength
HB (10 mm Ball, 3000Kg Load)	HRC (Indenter 150Kg Load)	HRB (1/16 Ball, 100Kg Load)	HV (Diamond Indenter, 120Kg Load)	N/mm ²
308	33	107	311	1035
300	32	107	303	1020
290	31	106	292	990
277	30	105	285	971
271	29	104	277	941
264	28	103	271	892
262	27	103	262	880
255	26	102	258	870
250	25	101	255	853
245	24	100	252	838
240	23	100	247	824
233	22	99	241	794
229	21	98	235	775
223	20	97	227	755
216	19	96	222	716
212	18	95	218	706
208	17	95	210	696
203	16	94	201	680
199	15	93	199	667
191	14	92	197	657
190	13	92	186	648
186	12	91	184	637
183	11	90	183	617
180	10	89	180	608
175	9	88	178	685
170	7	87	175	559
167	6	86	172	555
166	5	86	168	549
163	4	85	162	539
160	3	84	160	535
156	2	83	158	530
154	1	82	152	515
149		81	149	500
147		80	147	490
143		79	146	482
141		78	144	481
139		77	142	480
137		76	140	475
135		75	137	467

Continued on next page

Steel Hardness Testing Comparison Chart

Each hardness testing method does not test the same material properties at a given time

Brinell Hardness	Rockwell C	Rockwell B	Vickers	Tensile Strength
HB (10 mm Ball, 3000Kg Load)	HRC (Indenter 150Kg Load)	HRB (1/16 Ball, 100Kg Load)	HV (Diamond Indenter, 120Kg Load)	N/mm ²
131		74	134	461
127		72	129	451
121		70	127	431
116		68	124	422
114		67	121	412
111		66	118	402
107		64	115	382
105		62	112	378
103		61	108	373
95		56	104	
90		52	95	
81		41	85	
76		37	80	

ISO Limits and Fits for Holes

The ISO system for limits and fits is a generally recognised method for manufacturing processes where there are corresponding holes and shafts.

ISO Tolerances for Holes																				
Metric Nominal hole sizes																				
over	3	6	10	18	30	40	50	65	80	100	120	140	160	180	200	225	250	280	315	355
inc.	6	10	18	30	40	50	65	80	100	120	140	160	180	200	225	250	280	315	355	400
Metric Limits in Micrometres (Where there is no - take as +)																				
E6	28	34	43	53	66	79	94	110	129	142	161									
	20	25	32	40	50	60	72	85	100	110	125									
E7	32	40	50	61	75	90	107	125	146	162	185									
	20	25	32	40	50	60	72	85	100	110	125									
E11	95	115	142	170	210	250	292	335	390	430	485									
	20	25	32	40	50	60	72	85	100	110	125									
E12	140	175	212	250	300	360	422	485	560	630	695									
	20	25	32	40	50	60	72	85	100	110	125									
E13	200	245	302	370	440	520	612	715	820	920	+1 015									
	20	25	32	40	50	60	72	85	100	110	125									
F6	18	22	27	33	41	49	58	68	79	88	98									
	10	13	16	20	2	30	36	43	50	56	62									
F7	22	28	34	41	50	60	71	83	96	108	119									
	10	13	16	20	25	30	36	43	50	56	62									
F8	28	35	43	53	64	76	90	106	122	137	151									
	10	13	16	20	25	30	36	43	50	56	62									
G6	12	14	17	20	25	29	34	39	44	49	54									
	4	5	6	7	9	10	12	14	15	17	18									
G7	16	20	24	28	34	40	47	54	61	69	75									
	4	5	6	7	9	10	12	14	15	17	18									
G8	22	27	33	40	48	56	66	77	87	98	107									
	4	5	6	7	9	10	12	14	15	17	18									
H6	8	9	11	13	16	19	22	25	29	32	36									
	0	0	0	0	0	0	0	0	0	0	0									
H7	12	15	18	21	25	30	35	40	46	52	57									
	0	0	0	0	0	0	0	0	0	0	0									
H8	18	22	27	33	39	46	54	63	72	81	89									
	0	0	0	0	0	0	0	0	0	0	0									
H9	30	36	43	52	62	74	87	100	115	130	140									
	0	0	0	0	0	0	0	0	0	0	0									
H10	48	58	70	84	100	120	140	160	185	210	230									
	0	0	0	0	0	0	0	0	0	0	0									
H11	75	90	110	130	160	190	220	250	290	320	360									
	0	0	0	0	0	0	0	0	0	0	0									
J6	5	5	6	8	10	13	16	18	22	25	29									
	-3	-4	-5	-5	-6	-6	-6	-7	-7	-7	-7									
J7	6	8	10	12	14	18	22	26	30	36	39									
	-6	-7	-8	-9	-11	-12	-13	-14	-16	-16	-18									

Continued on next page

ISO Limits and Fits for Holes

ISO Tolerances for Holes																				
Metric Nominal hole sizes																				
over	3	6	10	18	30	40	50	65	80	100	120	140	160	180	200	225	250	280	315	355
inc.	6	10	18	30	40	50	65	80	100	120	140	160	180	200	225	250	280	315	355	400
Metric Limits in Micrometres (Where there is no - take as +)																				
J8	10	+12	15	20	+24		+28		+34		41		+47		+55		60			
	-8	-10	-12	-13	-15		-18		-20		-22		-25		-26		-29			
JS6	4	4.5	5.5	6.5	+8		+9.5		+11		12.5		+14.5		+16		18			
	-4	-4.5	-5.5	-6.5	-8		-9.5		-11		-12.5		-14.5		-16		-18			
JS7	6	7.5	9	10.5	+12.5		+15		+17.5		20		+23		+26		28.5			
	-6	-7.5	-9	-10.5	-12.5		-15		-17.5		-20		-23		-26		-28.5			
JS8	9	+11	13.5	16.5	+19.5		+23		+27		31.5		+36		+40.5		44.5			
	-9	-11	-13.5	-16.5	-19.5		-23		-27		-31.5		-36		-40.5		-44.5			
K6	2	+2	2	2	+3		+4		+4		4		+5		+5		7			
	-6	-7	-9	-11	-13		-15		-18		-21		-24		-27		-29			
K7	3	+5	6	6	+7		+9		+10		12		+13		+16		17			
	-9	-10	-12	-15	-18		-21		-25		-28		-33		-36		-40			
K8	5	+6	8	10	+12		+14		+16		+20		+22		+25		28			
	-13	-16	-19	-23	-27		-32		-38		-43		-50		-56		-61			
M6	-1	-3	-4	-4	-4		-5		-6		-8		-8		-9		-10			
	-9	-12	-15	-17	-20		-24		-28		-33		-37		-41		-46			
M7	0	0	0	0	0		0		0		0		0		0		0			
	-12	-15	-18	-21	-25		-30		-35		-40		-46		-52		-57			
M8	2	+1	2	4	+5		+5		6		8		9		9		11			
	-16	-21	-25	-29	-34		-41		-48		-55		-63		-72		-78			
N6	-5	-7	-9	-11	-12		-14		-16		-20		-22		-25		-26			
	-13	-16	-20	-24	-28		-33		-38		-45		-51		-57		-62			
N7	-4	-4	-5	-7	-8		-9		-10		-12		-14		-14		-16			
	-16	-19	-23	-28	-33		-39		-45		-52		-60		-66		-73			
N8	-2	-3	-3	-3	-3		-4		-4		-4		-5		-5		-5			
	-20	-25	-30	-36	-42		-50		-58		-67		-77		-86		-94			
P6	-9	-12	-15	-18	-21		-26		-30		-36		-41		-47		-51			
	-17	-21	-26	-31	-37		-45		-52		-61		-70		-79		-87			
P7	-8	-9	-11	-14	-17		-21		-24		-28		-33		-36		-41			
	-20	-24	-29	-35	-42		-51		-59		-68		-79		-88		-98			
P8	-12	-15	-18	-22	-26		-32		-37		-43		-50		-56		-62			
	-30	-37	-45	-55	-65		-78		-91		-106		-122		-137		-151			
R6	-12	-16	-20	-24	-29		-35	-37	-44	-47	-56	-58	-61	-68	-71	-75	-85	-89	-97	-103
	-20	-25	-31	-37	-45		-54	-56	-66	-69	-81	-83	-86	-97	-100	-104	-117	-121	-133	-139
R7	-11	-13	-16	-20	-25		-30	-32	-38	-41	-48	-50	-53	-60	-63	-67	-74	-78	-87	-93
	-23	-28	-34	-41	-50		-60	-62	-73	-76	-88	-90	-93	-106	-109	-113	-126	-130	-144	-150

ISO Limits and Fits for Shafts

The ISO system for limits and fits is a generally recognised method for manufacturing processes where there are corresponding holes and shafts.

ISO Tolerances for Shafts																				
Metric Nominal Shaft Sizes																				
over	3	6	10	18	30	40	50	65	80	100	120	140	160	180	200	225	250	280	315	355
inc.	6	10	18	30	40	50	65	80	100	120	140	160	180	200	225	250	280	315	355	400
Metric Limits in Micrometres (Where there is no - take as +)																				
a12	-270	-280	-290	-300	-310	-320	-340	-360	-380	-410	-460	-520	-580	-660	-740	-820	-920	-1050	-1200	-1350
	-390	-430	-470	-510	-560	-570	-640	-660	-730	-760	-860	-920	-980	-1120	-1200	-1280	-1440	-1570	-1770	-1920
d6	-30	-40	-50	-65	-80		-100		-120		-145		-170		-190		-210			
	-38	-49	-61	-78	-96		-119		-142		-170		-199		-222		-246			
e6	-20	-25	-32	-40	-50		-60		-72		-85		-100		-110		-125			
	-28	-34	-43	-53	-66		-79		-94		-110		-129		-142		-161			
e13	-20	-25	-32	-40	-50		-60		-72		-85		-100		-110		-125			
	-200	-245	-302	-370	-440		-520		-612		-715		-820		-920		-1015			
f5	-10	-13	-16	-20	-25		-30		-36		-43		-50		-56		-62			
	-15	-19	-24	-29	-36		-43		-51		-61		-70		-79		-87			
f6	-10	-13	-16	-20	-25		-30		-36		-43		-50		-56		-62			
	-18	-22	-27	-33	-41		-49		-58		-68		-79		-88		-98			
f7	-10	-13	-16	-20	-25		-30		-36		-43		-50		-56		-62			
	-22	-28	-34	-41	-50		-60		-71		-83		-96		-108		-119			
g5	-4	-5	-6	-7	-9		-10		-12		-14		-15		-17		-18			
	-9	-11	-14	-16	-20		-23		-27		-32		-35		-40		-43			
g6	-4	-5	-6	-7	-9		-10		-12		-14		-15		-17		-18			
	-12	-14	-17	-20	-25		-29		-34		-39		-44		-49		-54			
g7	-4	-5	-6	-7	-9		-10		-12		-14		-15		-17		-18			
	-16	-20	-24	-28	-34		-40		-47		-54		-61		-69		-75			
h4	0	0	0	0	0		0		0		0		0		0		0			
	-4	-4	-5	-6	-7		-8		-10		-12		-14		-16		-18			
h5	0	0	0	0	0		0		0		0		0		0		0			
	-5	-6	-8	-9	-11		-13		-15		-18		-20		-23		-25			
h6	0	0	0	0	0		0		0		0		0		0		0			
	-8	-9	-11	-13	-16		-19		-22		-25		-29		-32		-36			
h7	0	0	0	0	0		0		0		0		0		0		0			
	-12	-15	-18	-21	-25		-30		-35		-40		-46		-52		-57			
h8	0	0	0	0	0		0		0		0		0		0		0			
	-18	-22	-27	-33	-39		-46		-54		-63		-72		-81		-89			
h9	0	0	0	0	0		0		0		0		0		0		0			
	-30	-36	-43	-52	-62		-74		-87		-100		-115		-130		-140			
h10	0	0	0	0	0		0		0		0		0		0		0			
	-48	-58	-70	-84	-100		-120		-140		-160		-185		-210		-230			
h11	0	0	0	0	0		0		0		0		0		0		0			
	-75	-90	-110	-130	-160		-190		-220		-250		-290		-320		-360			

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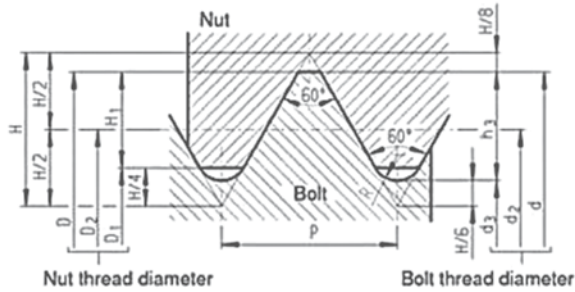
ISO Limits and Fits Summary

The ISO system for limits and fits is a generally recognised method for manufacturing processes where there are corresponding holes and shafts.

Fit Type	Description	ISO Symbols	
		Hole Tolerances	Shaft Tolerances
Clearance Fits	Loose fit	H11	c11
	Free running	H9	d9
	Easy running	H8	f8
	Sliding fit	H7	g6
	Close clearance	H8	f7
	Location clearance	H7	h6
Transition Fits	Slight interference	H7	k6
	Transition	H7	n6
Interference Fits	Press fit	H7	p6
	Medium fit	H7	s6
	Force fit	H7	u6

Metric Coarse Thread

Threaded fasteners, bolts, nuts, screws and fastenings



H	0.86603 P	D ₁	d = 2 H ₁
H ₁	0.54127 P	d ₂	D ₂ d = 0.64952 P
h ₃	0.61343 P	d ₃	d = 1.22687 P
R	$\frac{H}{6}$ 0.14434 P		

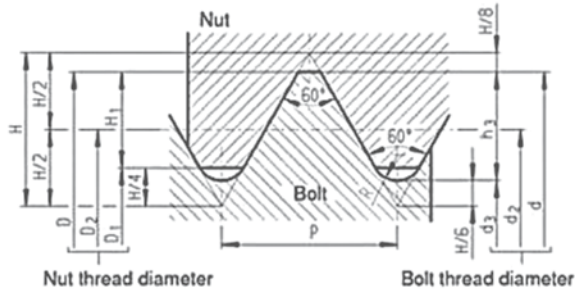
ISO Metric Coarse	PITCH	Major Diameter	Root Radius	Pitch Diameter	Minor Dia. Male Thread	Minor Dia. Female Thread	Thread Height Male Thread	Thread Height Female Thread	Tap Drill
	P	d=D	r	d2=D2	d3	D1	h3	H1	
M1	0.25	1.00	0.036	0.838	0.693	0.729	0.153	0.135	0.75
M1.1	0.25	1.10	0.036	0.938	0.793	0.829	0.153	0.135	0.85
M1.2	0.25	1.20	0.036	1.038	0.893	0.929	0.153	0.135	0.95
M1.4	0.30	1.40	0.043	1.205	1.032	1.075	0.184	0.162	1.10
M1.6	0.35	1.60	0.051	1.373	1.171	1.221	0.215	0.189	1.25
M1.8	0.35	1.80	0.051	1.573	1.371	1.421	0.215	0.189	1.45
M2	0.40	2.00	0.058	1.740	1.509	1.567	0.245	0.217	1.60
M2.2	0.45	2.20	0.065	1.908	1.648	1.713	0.276	0.244	1.75
M2.5	0.45	2.50	0.065	2.208	1.948	2.013	0.276	0.244	2.05
M3	0.50	3.00	0.072	2.675	2.387	2.459	0.307	0.271	2.50
M3.5	0.60	3.50	0.087	3.110	2.764	2.850	0.368	0.325	2.90
M4	0.70	4.00	0.101	3.545	3.141	3.242	0.429	0.379	3.30
M4.5	0.75	4.50	0.108	4.013	3.580	3.688	0.460	0.406	3.80
M5	0.80	5.00	0.115	4.480	4.019	4.134	0.491	0.433	4.20
M6	1.00	6.00	0.144	5.350	4.773	4.917	0.613	0.541	5.00
M7	1.00	7.00	0.144	6.350	5.773	5.917	0.613	0.541	6.00
M8	1.25	8.00	0.180	7.188	6.466	6.647	0.767	0.677	6.80
M9	1.25	9.00	0.180	8.188	7.466	7.647	0.767	0.677	7.80
M10	1.50	10.00	0.217	9.026	8.160	8.376	0.920	0.812	8.50
M11	1.50	11.00	0.217	10.026	9.160	9.376	0.920	0.812	9.50
M12	1.75	12.00	0.253	10.863	9.853	10.106	1.074	0.947	10.20
M14	2.00	14.00	0.289	12.701	11.546	11.835	1.227	1.083	12.00
M16	2.00	16.00	0.289	14.701	13.546	13.835	1.227	1.083	14.00
M18	2.50	18.00	0.361	16.376	14.933	15.394	1.534	1.353	15.50
M20	2.50	20.00	0.361	18.376	16.933	17.294	1.534	1.353	17.50
M22	2.50	22.00	0.361	20.376	18.933	19.294	1.534	1.353	19.50

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ISO Metric Coarse	PITCH	Major Diameter	Root Radius	Pitch Diameter	Minor Dia. Male Thread	Minor Dia. Female Thread	Thread Height Male Thread	Thread Height Female Thread	Tap Drill
	P	d=D	r	d2=D2	d3	D1	h3	H1	
M24	3.00	24.00	0.433	22.051	20.319	20.752	1.840	1.624	21.00
M27	3.00	27.00	0.433	25.051	23.319	23.752	1.840	1.624	24.00
M30	3.50	30.00	0.505	27.727	25.706	26.211	2.147	1.894	26.50
M33	3.50	33.00	0.505	30.727	28.706	29.211	2.147	1.894	29.50
M36	4.00	36.00	0.577	33.402	31.093	31.670	2.454	2.165	32.00
M39	4.00	39.00	0.577	36.402	34.093	34.670	2.454	2.165	35.00
M42	4.50	42.00	0.650	39.077	36.479	37.129	2.760	2.436	37.50
M45	4.50	45.00	0.650	42.077	39.479	40.129	2.760	2.436	40.50
M48	5.00	48.00	0.722	44.752	41.866	42.857	3.067	2.706	43.00
M52	5.00	52.00	0.722	48.752	45.866	46.587	3.067	2.706	47.00
M56	5.50	56.00	0.794	52.428	49.252	50.046	3.374	2.977	50.50
M60	5.50	60.00	0.794	56.428	53.252	54.046	3.374	2.977	54.50
M64	6.00	64.00	0.866	60.103	56.639	57.505	3.681	3.248	58.00
M68	6.00	68.00	0.866	64.103	60.639	61.505			

Metric Fine Threads

Threaded fasteners, bolts, nuts, screws and fastenings



$$\begin{aligned}
 H &= 0.86603 P & D_1 &= d - 2 H_1 \\
 H_1 &= 0.54127 P & d_2 &= D_2 = d - 0.64952 P \\
 h_3 &= 0.61343 P & d_3 &= d - 1.22687 P \\
 R &= \frac{H}{6} = 0.14434 P
 \end{aligned}$$

ISO Metric Fine	PITCH	Major Diameter	Root Radius	Pitch Diameter	Minor Dia. Male Thread	Minor Dia. Female Thread	Thread Height Male Thread	Thread Height Female Thread	Tap Drill
	P	d=D	r	d2=D2	d3	D1	h3	H1	
M1	0.20	1.0	0.029	0.870	0.755	0.783	0.123	0.108	0.80
M1.1	0.20	1.1	0.029	0.970	0.855	0.883	0.123	0.108	0.90
M1.2	0.20	1.2	0.029	1.070	0.955	0.983	0.123	0.108	1.00
M1.4	0.20	1.4	0.029	1.270	1.155	1.183	0.123	0.108	1.20
M1.6	0.20	1.6	0.029	1.470	1.355	1.383	0.123	0.108	1.40
M1.8	0.20	1.8	0.029	1.670	1.555	1.583	0.123	0.108	1.60
M2	0.25	2.0	0.036	1.838	1.693	1.729	0.153	0.135	1.75
M2.2	0.25	2.2	0.036	2.038	1.893	1.929	0.153	0.135	1.95
M2.5	0.35	2.5	0.051	2.273	2.071	2.121	0.215	0.189	2.10
M3	0.35	3.0	0.051	2.773	2.571	2.621	0.215	0.189	2.60
M3.5	0.35	3.5	0.051	3.273	3.071	3.121	0.215	0.189	3.10
M4	0.50	4.0	0.072	3.675	3.387	3.459	0.307	0.271	3.50
M4.5	0.50	4.5	0.072	4.175	3.887	3.959	0.307	0.271	4.00
M5	0.50	5.0	0.072	4.675	4.387	4.459	0.307	0.271	4.50
M5.5	0.50	5.5	0.072	5.175	4.887	4.959	0.307	0.271	5.00
M6	0.75	6.0	0.108	5.513	5.080	5.188	0.460	0.406	5.20
M7	0.75	7.0	0.108	6.513	6.080	6.188	0.460	0.406	6.20
M8	0.75	8.0	0.108	7.513	7.080	7.188	0.460	0.406	7.20
M8	1.00	8.0	0.144	7.350	6.773	6.917	0.613	0.541	7.00
M9	0.75	9.0	0.108	8.513	8.080	8.188	0.460	0.406	8.20
M9	1.00	9.0	0.144	8.350	7.773	7.917	0.613	0.541	8.00
M10	0.75	10.0	0.108	9.513	9.080	9.188	0.460	0.406	9.20
M10	1.00	10.0	0.144	9.350	8.773	8.917	0.613	0.541	9.00
M10	1.25	10.0	0.180	9.188	8.466	8.647	0.767	0.677	8.80
M11	0.75	11.0	0.108	10.513	10.080	10.188	0.460	0.406	10.20
M11	1.00	11.0	0.144	10.350	9.773	9.917	0.613	0.541	10.00

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ISO Metric Fine	PITCH	Major Diameter	Root Radius	Pitch Diameter	Minor Dia. Male Thread	Minor Dia. Female Thread	Thread Height Male Thread	Thread Height Female Thread	Tap Drill
	P	d=D	r	d2=D2	d3	D1	h3	H1	
M12	1.00	12.0	0.144	11.350	10.773	10.917	0.613	0.541	11.00
M12	1.25	12.0	0.180	11.188	10.466	10.647	0.767	0.677	10.80
M12	1.50	12.0	0.217	11.026	10.160	10.376	0.920	0.812	10.50
M14	1.00	14.0	0.144	13.350	12.773	12.917	0.613	0.541	13.00
M14	1.25	14.0	0.180	13.188	12.466	12.647	0.767	0.677	12.80
M14	1.50	14.0	0.217	13.026	12.160	12.376	0.920	0.812	12.50
M15	1.00	15.0	0.144	14.350	13.773	13.917	0.613	0.541	14.00
M15	1.50	15.0	0.217	14.026	13.160	13.376	0.920	0.812	13.50
M16	1.00	16.0	0.144	15.350	14.773	14.917	0.613	0.541	15.00
M16	1.50	16.0	0.217	15.026	14.160	14.376	0.920	0.812	14.50
M17	1.00	17.0	0.144	16.350	15.773	15.917	0.613	0.541	16.00
M17	1.50	17.0	0.217	16.026	15.160	15.376	0.920	0.812	15.50
M18	1.00	18.0	0.144	17.350	16.773	16.917	0.613	0.541	17.00
M18	1.50	18.0	0.217	17.026	16.160	16.376	0.920	0.812	16.50
M18	2.00	18.0	0.289	16.701	15.546	15.835	1.227	1.083	16.00
M20	1.00	20.0	0.144	19.350	18.773	18.917	0.613	0.541	19.00
M20	1.50	20.0	0.217	19.026	18.160	18.376	0.920	0.812	18.50
M20	2.00	20.0	0.289	18.701	17.546	17.835	1.227	1.083	18.00
M22	1.00	22.0	0.144	21.350	20.773	20.917	0.613	0.541	21.00
M22	1.50	22.0	0.217	21.026	20.160	20.376	0.920	0.812	20.50
M22	2.00	22.0	0.289	20.701	19.546	19.835	1.227	1.083	20.00
M24	1.00	24.0	0.144	23.350	22.773	22.917	0.613	0.541	23.00
M24	1.50	24.0	0.217	23.026	22.160	22.376	0.920	0.812	22.50
M24	2.00	24.0	0.289	22.701	21.546	21.835	1.227	1.083	22.00
M25	1.00	25.0	0.144	24.350	23.773	23.917	0.613	0.541	24.00
M25	1.50	25.0	0.217	24.026	23.160	23.376	0.920	0.812	23.50
M25	2.00	25.0	0.289	23.701	22.546	22.835	1.227	1.083	23.00
M27	1.00	27.0	0.144	26.350	25.773	25.917	0.613	0.541	26.00
M27	1.50	27.0	0.217	26.026	25.160	25.376	0.920	0.812	25.50
M27	2.00	27.0	0.289	25.701	24.546	24.835	1.227	1.083	25.00
M28	1.00	28.0	0.144	27.350	26.773	26.917	0.613	0.541	27.00
M28	1.50	28.0	0.217	27.026	26.160	26.376	0.920	0.812	26.50
M28	2.00	28.0	0.289	26.701	25.546	25.835	1.227	1.083	26.00
M30	1.00	30.0	0.144	29.350	28.773	28.917	0.613	0.541	29.00
M30	1.50	30.0	0.217	29.026	28.160	28.376	0.920	0.812	28.50
M30	2.00	30.0	0.289	28.701	27.546	27.835	1.227	1.083	28.00
M30	3.00	30.0	0.433	28.051	26.319	26.752	1.840	1.624	27.00
M32	1.50	32.0	0.217	31.026	30.160	30.376	0.920	0.812	30.50
M32	2.00	32.0	0.289	30.701	29.546	29.835	1.227	1.083	30.00
M33	1.50	33.0	0.217	32.026	31.160	31.376	0.920	0.812	31.50
M33	2.00	33.0	0.289	31.701	30.546	30.835	1.227	1.083	31.00
M33	3.00	33.0	0.433	31.051	29.319	29.752	1.840	1.624	30.00
M35	1.50	35.0	0.217	34.026	33.160	33.376	0.920	0.812	33.50
M35	2.00	35.0	0.289	33.701	32.546	32.835	1.227	1.083	33.00
M36	1.50	36.0	0.217	35.026	34.160	34.376	0.920	0.812	34.50
M36	2.00	36.0	0.289	34.701	33.546	33.835	1.227	1.083	34.00
M36	3.00	36.0	0.433	34.051	32.319	32.752	1.840	1.624	33.00
M39	1.50	39.0	0.217	38.026	37.160	37.376	0.920	0.812	37.50
M39	2.00	39.0	0.289	37.701	36.546	36.835	1.227	1.083	37.00
M39	3.00	39.0	0.433	37.051	35.319	35.752	1.840	1.624	36.00
M40	1.50	40.0	0.217	39.026	38.160	38.376	0.920	0.812	38.50
M40	3.00	40.0	0.433	38.051	36.619	36.752	1.840	1.624	37.00

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Metric Fine Threads

ISO Metric Fine	PITCH	Major Diameter	Root Radius	Pitch Diameter	Minor Dia. Male Thread	Minor Dia. Female Thread	Thread Height Male Thread	Thread Height Female Thread	Tap Drill
	P	d=D	r	d2=D2	d3	D1	h3	H1	
M42	1.50	42.0	0.217	41.026	40.160	40.376	0.920	0.812	40.50
M42	2.00	42.0	0.289	40.701	39.546	39.835	1.227	1.083	40.00
M42	3.00	42.0	0.433	40.051	38.319	38.752	1.840	1.624	39.00
M42	4.00	42.0	0.577	39.402	37.093	37.670	2.454	2.165	38.00
M45	1.50	45.0	0.217	44.026	43.160	43.376	0.920	0.812	43.50
M45	2.00	45.0	0.289	43.701	42.546	42.835	1.227	1.083	43.00
M45	3.00	45.0	0.433	43.051	41.319	41.752	1.840	1.624	42.00
M45	4.00	45.0	0.577	42.402	40.093	40.670	2.454	2.165	41.00
M48	1.50	48.0	0.217	47.026	46.160	46.376	0.920	0.812	46.50
M48	2.00	48.0	0.289	46.701	45.546	45.835	1.227	1.083	46.00
M48	3.00	48.0	0.433	46.051	44.319	44.752	1.840	1.624	45.00
M48	4.00	48.0	0.577	45.402	43.093	43.670	2.454	2.165	44.00
M50	1.50	50.0	0.217	49.026	48.160	48.376	0.920	0.812	48.50
M50	2.00	50.0	0.289	48.701	47.546	47.835	1.227	1.083	48.00
M50	3.00	50.0	0.433	48.051	46.319	46.752	1.840	1.624	47.00
M52	1.50	52.0	0.217	51.026	50.160	50.376	0.920	0.812	50.50

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General Conditions of Sale

1 GENERAL

- (a) Save as otherwise agreed in writing by Boneham & Turner Limited ('The Company'), these conditions shall govern the contract to the entire exclusion of any other express or implied conditions.
- (b) Descriptions, illustrations and particulars of goods contained in the Company's price lists catalogues or other advertising material shall not form part of the contract unless specifically included.
- (c) If the goods required for any special use not reasonably to be inferred by the Company, the customer shall disclose such use before the Contract is entered into.

2 PERFORMANCE

- (a) The Company warrants that the goods shall at the time of delivery correspond with the specifications agreed (subject to any specified tolerance limits) and be free from defects in workmanship and materials. If any goods do not conform to this warranty the Company will at its option:
 - (i) replace the goods found not to conform to the warranty or
 - (ii) take such steps as the Company deems necessary to bring goods into conformity with the agreed specifications (subject as aforesaid) and into a state where they are free from such defects; or
 - (iii) take back the goods found not to conform to the warranty and refund the appropriate part of the purchase price.

Provided that the liability of the Company shall in no event exceed the purchase price of the goods, and performance of any one of the above options shall constitute an entire discharge of the Company's liability under this warranty.
- (b) The foregoing warranty is conditional upon:
 - (i) the customer giving notice to the Company of the alleged defect or failure to correspond with specification immediately the customer discovers or ought to have discovered the same;
 - (ii) the customer affording the Company a reasonable opportunity to inspect the goods; and
 - (iii) the customer making no further use of the goods that are alleged to be defective or which do not correspond with specification after the time agreed the customer discovers or ought to have discovered the same.
- (c) Save as provided in paragraph (a) of this Condition:
 - (i) all conditions and warranties, express or implied, as to the quality or fitness for any purpose of the goods are hereby expressly excluded; and
 - (ii) the Company shall be under no liability for any loss or damage (whether direct, indirect or consequential) howsoever arising which may be suffered by the customer.
- (d) in the event that, notwithstanding the foregoing provisions of this Condition, the Company is found liable for any loss or damage suffered by the customer, that liability shall in no event exceed the purchase price of the goods.
- (e) The foregoing provisions of this Condition shall not apply to sales which are made to persons who deal as consumers (as the expression is defined in Section 12 of the Unfair Contract Terms Act 1977).

3 PRICE

- (a) The price payable for each consignment of goods exstock will be the Company's list price last published on the date on which that consignment is delivered to the customer.
- (b) In the case of goods which are not exstock the Company reserves the right to increase the contract price at any time after the date of the contract by such additional sums as may from time to time be necessary to cover increased costs due to:
 - (i) alteration of the customer's requirements;
 - (ii) suspension of work due to lack of or on the customer's instructions;

- (iii) any variation in costs of materials, labour, overheads or transport, or in conforming to any Act of Parliament or Order, Regulation or bye-laws made by any competent National or Local Authority arising after the date of the contract. Further in the case of specials the Company shall be entitled to deliver up to 110% of the quantity ordered and to increase the contract price accordingly.
- (c) The contract price is exclusive of Value Added Tax or any similar taxes, levies or duties, which will be added to or charged on invoices at the appropriate rate.
- (d) There is no minimum order value, but credit sales of goods having a total net value (exclusive of VAT, carriage, packing or postage) will be subject to an administration charge to cover the relatively high cost of processing such orders. See catalogue for details.

4 PAYMENT

Unless otherwise agreed in writing, the customer shall pay for the goods by cash on delivery. Where an order is designated as a credit order, payment shall be made on or before the tenth day of the month following the month of the invoice date. If the customer fails to make any payment in accordance with the agreed terms, the Company shall be entitled to charge interest at the rate of 3% per annum over the base rate of National Westminster Bank Limited on a day to day basis for the time being an all overdue payments.

5 DELIVERY

- (a) A date or period of delivery agreed by the Company shall be an estimate only. Every effort will be made to adhere to delivery dates, but the Company accepts no liability for any direct or any consequential loss or damage arising from delay in delivery or despatch, in particular where such delay is caused by lack of instructions from the customer, strikes, lock-outs, other industrial action, failure of the Company's suppliers to fulfil their obligations, or any other cause beyond the Company's reasonable control.
- (b) Unless otherwise stated, the price quoted is for the supply of the goods exworks and unpacked. All packing, postage and other costs of delivery, and costs of storage following any failure by the customer to take delivery, will be subject to an extra charge.
- (c) If the customer being a company shall pass a resolution or suffer an order of a court to be made for its winding-up, or if a receiver shall be appointed, or being an individual or partnership shall suspend payment or propose or enter into any composition with creditors or suffer a receiving order in bankruptcy, then the Company may without prejudice to any other right rescind the contract, or suspend or cancel delivery or recover the possession of any goods for which payment in full has not been received.

6 RISK AND PROPERTY

- (a) The risk in the goods shall pass to the customer upon delivery of the goods to him or any carrier acting on his behalf.
- (b) The property in the goods shall not pass to the customer until the price of the goods and any other goods delivered by the Company to the customer is paid.

In the event of the customer failing to pay for the goods, then all such goods of the Company not paid for shall be handed over to the Company on demand and the Company is hereby granted a licence to enter into the customer's premises for the purposes of recovering such property.

Without prejudice to the generality of the foregoing, if the said goods are sold by the customer then the Company's beneficial interest shall attach to any proceeds of such sale and the customer shall forthwith hand over to the Company any proceeds of such sale and the Company shall be entitled to call upon the customer to assign all claims that the customer may have in respect of such sale.

7 COPYRIGHT

All designs, drawings, plans or models prepared by the Company for the customer's information remain the Company's property and copyright, and neither they nor any copies thereof must be made use of by any person without the Company's written consent. In respect of any goods supplied to the customer the design or specification whereof shall have been supplied by the customer, the customer accepts responsibility for any claims which may arise in respect of the making, supplying or using for the purposes of the contract of any patented invention or process or registered design, and the customer agrees to indemnify the company against any action, claim or proceeding for infringement or alleged infringement in respect thereof.

8 CANCELLATION

Contracts are not subject to cancellation without the Company's written consent. Where cancellation is accepted, the Company shall in addition to any express terms of acceptance of cancellation be entitled to reimbursement of any costs incurred by the Company in connection with the contract.

9 FORCE MAJEURE

The Company shall have the right to cancel or to reduce the volume of the goods delivered if it is prevented from or hindered in delivering the goods through any circumstances beyond its control including (but not limited to) industrial action, war, fire, or prohibition or enactment of any kind, without incurring any liability for any loss or damage whatsoever resulting therefrom.

10 ARBITRATION

At the option of either party in writing, any question, dispute or difference arising between the Company and the customer in relation to the contract shall be referred to the arbitration in England of a person to be mutually agreed upon, or failing arrangement of some person appointed by the London Chamber of Commerce and Industry and the City Corporation in accordance with, and subject to the provisions of the Arbitration Act 1934 or any statutory modifications or re-enactment thereof.

11 LOSS OR DAMAGE IN TRANSIT

Where the price includes delivery other than at our works we will repair or at our option replace free of charge within a reasonable time all goods lost or damaged in transit, provided we are given written notice of such loss or damage within such time as will enable us to comply with the carriers conditions of carriage or where delivery is made by our own transport within seven days (exclusive of Public Holidays) after receipt of the Advice Note. If so requested by you prior to the despatch of the goods we will notify you of the name and address of the carrier (if any) and any time limit laid down by such carriers conditions of carriage.

12 GOVERNING LAW

The contract shall be governed by English Law.

NOTE: The Company's prices are calculated on the basis that the above Conditions will apply. Customers requiring prices to be quoted on a different basis should inform the Company. Information regarding any of our components that bears reference to the Health and Safety at Work Act 1974 will be available upon request.

Drawings are property of Eleso or Boneham & Turner Ltd and should not be replicated.

Notes

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