

# Philips Lighting

CI/SfB

(63)

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## CATALOGUE 1989/90

*Philips Lighting*

Philips Lighting



**PHILIPS**



# CONTENTS

<b>SERVICES FROM PHILIPS LIGHTING</b> Good lighting saves more than energy	v xvi
<b>FLUORESCENT LIGHTING</b>	1
<b>INDUSTRIAL DISCHARGE LIGHTING</b>	33
<b>ROADLIGHTING</b>	37
<b>AMENITY AND SECURITY LIGHTING</b>	49
<b>FLOODLIGHTING</b>	71
<b>DISPLAY AND DECORATIVE LIGHTING</b>	91
<b>LIGHTING CONTROL</b>	175
<b>LAMPS AND CONTROL GEAR</b>	185
<b>BATTERIES AND TORCHES</b>	285
<b>TECHNICAL INFORMATION</b>	291
<b>LAMP PERFORMANCE AND CONTROL GEAR SCHEDULES</b>	549

PLEASE SEE OVER  
FOR INDEX OF  
CATALOGUE  
NUMBERS

	Product	Technical
	description	information
	page	page
<b>A</b>		
A1 projection lamps	281	534
Actinic lamps	270	527
Apollo A500	86	386
Appliance lamps	203	466
Argenta Rose lamps	206	467
<b>B</b>		
Ballasts	236	492
Ballasts (HFR)	236	494
Batteries	286	543
Blacklight lamps	262	519
Black Watch	66	367
Bollards HGC	57	359
<b>C</b>		
Candle lamps	207, 208	467, 468
Chef-Aid	172	457
Circular fluorescent lamps	235	490
Colorenta lamps	210	470
Coloured display lamps	214	474
Coloured GLS	206	467
Commando	31	336
Controls HFR	181	458
Controls 50Hz	183	460
CP lamps	283	538
CPS 200	54	356
Crown silvered lamps	212	474
CSX lamps	265	522
<b>D</b>		
DHF016	81	383
Dichroic lamps	217	475
Dimming 50Hz	183	460
Discharge control gear	251	507
DVF 102	81	383
<b>F</b>		
FBS 601	25	332
FCS 312/PL	16	318
FCS 800/PL	17	319
Feature	7	300
FGC 100	60	362
Fireglow lamps	203	466
Fortress	30	335
FWX	169	455
<b>G</b>		
GB Indoor gearboxes	255	514
Globe lamps	209	469
GLS lamps	189	462
GLS lamps (coloured)	206	467
GTX rack lighting	10	308
<b>H</b>		
Halogen capsules	219	478
Halogen dichroic	217	475
Halogen coloured aluminium	216	—
Halogen linear	217	477
Halogena	219	476
HD 2500/4000	34	337
Hermes 2 gearbox	254	513
Hermes 3 High Bay	34	337
HF lamps	232	489
HFR control equipment	181	458
HGS 203	43	350
HLRG lamp	273	530
HNF 001	74	371
HNF 002	75	373
HNF 003	76	375
HNF 206	77	377
HPA lamps	268	525
HPI lamps	248	503
HPL/HPL Comfort lamps	247	501
HPM lamps	267	524
HPR 125W lamp	266	523
HTQ lamps	269	526

	Product	Technical
	description	information
	page	page
<b>I</b>		
IDE lamps	218	478
IR lamps	259	516
IRK lamps	260	517
IRZ fitting	261	518
<b>K</b>		
K halogen lamps	217	477
<b>L</b>		
Lampada	58	361
Lantern (torches)	289	547
Light Tiles	170	456
Litebeam trunking	8	305
LL lamps	272	529
LowBay LB	35	342
Low voltage reflector lamps	216	475
Luce	56	358
Lustre lamps	208	468
Luxpak	9	307
<b>M</b>		
M halogen lamps	218	477
Mains frequency dimming equipment	183	460
Mandoline	56	358
MA/SDX	38	346
MFB 16	63	364
MHN-TD/MHW-TD lamps	249	505
MI 26/36 (Midas)	41	347
MI 50/80	42	349
MI 55, MI 57 and XGS/SGS 201	44	351
Miniature halogen lamps	258	515
Miniature fluorescent lamps	234	490
MiniSox	65	366
ML/MLR lamps	250	506
MNF 200	89	389
MNF 307	78	379
MNF 400	90	390
MSB 18	65	366
Multipacks, incandescent	192	—
Mushroom lamps	190	463
<b>N</b>		
Night Light	191	463
NLK	168	454
NNF 020	79	380
<b>O</b>		
Oven lamps	202	465
<b>P</b>		
P1/2/3 photographic lamps	280	533
PAR 38-E	213	473
PAR 56	213	473
Pharo	55	357
PHF	28	333
Philinea	210	470
Pilot lamps	202	465
PLL 15mm lamps	227	484
PLS lamps	225	482
PL Light Tile	170	456
PL Wall Plaques	169	455
Plant Lighting Luminaires	171	456
PLB	61	363
PLC lamps	226	483
PLCE lamps	224	481
PLW011	62	364
Post top lanterns	52	353
Profilong PGP	55	357
Projector lamps (F.G.M)	282	536
Protector PHF	28	333
PSM	12	310
PSM/PLL	13	311
Pygmy/sign lamps	201	464
<b>Q</b>		
QVF	85	385

	Product	Technical
	description	information
	page	page
<b>R</b>		
R 7788E	84	384
Rechargeable batteries/charger	287	544
Reflector lamps	212	472
Road lanterns (non standard)	46	—
Rough service lamps	200	464
Round lamps	208	468
<b>S</b>		
SD 1500/2500/4000	34	337
SDW-I lamps	245	499
Security range		
FCC/FWC/XCC/XWC	67	368
SGS 203	43	350
SGS 204	45	352
SL lamps	222	479
SL'D lamps	223	480
SNF 011	80	381
SNF 70	87	387
SNF 100	88	388
SNF/MNF 200	89	389
SNF/MNF 400	90	390
SNK 70	69	370
Softone lamps	188	463
SON SON-T & Comfort	243	497
SON PLUS, SON-T Plus	244	498
SON-H lamps	246	500
SOX/SOX-E lamps	242	495
Spaciolita 2	94	391
SRL	24	330
Starters	236	492
Streamlite	5	292
Streamlite HF	6	298
Strip Lite lamps	209	469
Studio and theatre lamps (CP, T, P2, PAR, MSR)	283	538
Sunlamps	271	528
Superlux lamps	191	463
Switchboard indicator lamps	201	465
SXX 36	68	369
<b>T</b>		
T8 lamps	231	485
T12 lamps	231	485
Takeo B	58	361
TBS 300	22	325
TCS 058	9	307
TCS 312	14	312
TCS 605/607	20	323
TCS 660 System	18	320
TLD HF lamps	232	489
TL circular lamps	235	490
TL miniature lamps	234	490
TMW 065	29	334
Traffic signal lamps	200	464
Torches	289	547
Tunnel luminaire	46	—
TUV lamps	263	520
<b>V</b>		
Vehicle lamps	276, 277	531, 532
<b>W</b>		
W4321 and W4326	64	365
Wall Plaques	169	455
White SON lamps	245	499
<b>X</b>		
XGC 001	65	366
XGS 201	44	351
XOP lamps	264	521
<b>Z</b>		
Zonalux	11	309
ZZN series	158	—
ZZX series	157	—
ZZZ 350	158	—

## LITA DISPLAY AND ACCENT LIGHTING PRODUCTS

### Lighting systems

TCS 660	18
Spaciolita	94

### Display and accent lighting

Direct contact system accessories	157
Downlights, adjustable	119
Downlights, fully recessed	99
Downlights, semi recessed	109
Downlights, slatted ceiling	125
Downlights, surface mounted	113

Spotlights, basic	131
Spotlights, classic	135
Spotlights, low voltage	147
Spotlights, specific	153
Spotlights, technical	141
Track systems	
(2- & 3-circuit and low voltage)	161
Transformers, low voltage	159
Accessories and attachments	156

### Decorative lighting

Ceiling drum (PL*)	168
Ceiling lights, decorative (PL*)	170
Food service luminaire	172
Plant lighting sets	171
Uplights/directional luminaires	166
Wall lights, decorative (PL*)	169

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**PACK**

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BC PL CACL  
BC ST CAWH  
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BC ST CAWH  
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BC ST CAWH  
BC ST CAWH  
ES ST CAWH

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BC ST CAWH

Order Code

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BC ST CAWH  
BC ST CAWH  
BC ST CAWH  
BC ST CAWH



## Lita display and accent lighting products (contd.)

Reference	Product description page	Technical information page
<b>A</b>		
<b>Aztec projectors</b>	145	435
<b>D</b>		
DBN 282/150	120	413
DBN 282/P38	120	413
DBN 282/R63	120	413
DBN 282/R95	120	413
DCN 350	132	422
DRN 102	154, 167	453, 466
DRN 103	167	453
DRN 402	132	422
DRN 502	132	422
DRN 512	132	422
DRN 522	133	423
DRN 532	133	423
<b>F</b>		
FBD 234/111	112	408
FCD 234/111	116	412
FCN 305	154	446
<b>L</b>		
Lighting track	161	449
Lighting track (low voltage)	161	449
Low voltage lamp transformers	159	448
Low voltage (spotlights)	147	-
<b>M</b>		
MBS 101	167	453
MBS 101/70	124	417
MBS 101/150	124	417
MCG 101	166	453
MDK 300	171	456
MFG 101	167	453
Montana Ceramique	151	442
Montana, white	152	444
Montana track	163	452
Montana transformers	163	452
MPG 101	167	453
<b>P</b>		
PLS 160	171	456
<b>Q</b>		
QBS 101	167	453
QBS 101/300	123	416
QCG 101/300	166	453
QCN 210/35	148	438
QCN 210/50	148	438
QCN 220/15 LP	148	438
QCN 220/15 SP	148	438
QCN 605	154	446
QFG 101	167	453
QRN 302	154	446

Reference	Product description page	Technical information page
14	158	—
15	158	—
121	134	424
124	134	424
202	146	436
282	121	414
300	152	444
301	152	444
303	152	444
310	152	445
311	152	445
313	152	445
320	151	442
330	151	442
331	151	442
340	151	442
600	126	419
601	126	419
602	100	395
603	101	396
604	100	395
606	101	396
608	102	397
610	102	395
612	105	400
613	104	399
615	110	406
616	126	419
617	126	419
618	110	406
619	110	406
620	102	397
621	103	398
622	102	397
623	103	398
624	108	403
625	104	399
627	104	399
629	103	398
630	101	396
631	110	406
632	103	398
635	111	407
636	111	407
640	101	396
641	122	415
642	105	400
645	104	399
646	111	407
647	107	402
650	105	400
651	100	395
652	122	415
653	121	414
654	112	408
656	121	414
659	121	414
660	123	416
663	122	415
664	122	415
670	123	416
673	111	407
674	106	401
680	123	416
681	106	401
682	106	401
685	107	402
689	107	402
690	106	401
691	108	403
692	108	403
693	107	402
803	136	426
809	142	432
814	136	426
815	149	439
819	142	432
823	136	426
824	137	427
826	146	436
827	146	436
828	142	432
829	142	432
834	137	427
834S36	94	391
834S58	94	391
835	149	439
839	143	433
844	137	427
849	143	433
858	143	433
859	143	433

Reference	Product description page	Technical information page
860	149	439
869	144	434
870	149	439
880	150	440
885	144, 166	434, 453
899	144	434
1314	156	—
1607	102	397
1608	102	397
1613	105	400
1614	105	400
1630	126	419
1631	126	419
1632	126	419
1633	126	419
1634	127	420
1635	127	420
1636	127	420
1637	127	420
1642	127	420
1643	127	420
1860	158	—
3312	156	—
3317	166	453
3330	152	444
6301	114	409
6311	114	409
6321	115	410
6323	115	410
6324	116	412
6326	115	410
6329	115	410
6350	116	411
6393	116	411
6505	166	453
6509	142	432
6514	136	426
6519	142	432
6520	114	409
6526	146	437
6527	146	437
6528	142	432
6529	142	432
6530	114	409
6544	137	427
6549	143	433
6558	143	433
6559	143	433
6560	149	438
6569	144	434
6570	149	439
6580	150	440
6589	144	434
6599	144	434
40000 to 47999 series are Lita track components, see 156		
48000 series are Spacialita components, see 156		
50400	138	428
50460	138	428
50461	138	428
50466	138	428
59800	138	428
59860	138	428
59861	138	428
59866	138	428
60000	133	423
60002	133	423
60011	139	429
60012	139	429
60014	139	429
60104	134	424
60121	134	424
70845	139	429
70865	140	430
89000	145	435
89001	145	435
89002	145	435
89003	145	435



# SERVICES FROM PHILIPS LIGHTING

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**To make contact with any Philips Lighting customer services, please:**

- Write to the required service at:

Philips Lighting,  
City House,  
420-430 London Road,  
Croydon CR9 3QR

- Telex the required service on UK telex 946443
- Telephone 01-689 2166 and ask the operator for the service you require
- Telephone 01-689 2166 and ask for Fax to use this service.

**For Lighting Sales enquiries only:**

The Telefax service connects directly with the Lighting Sales Desk on:

Fax: 01-684 0136  
Telex: 923845 or 923846

The products in this Catalogue, many of which are included for the first time, are backed by a unique range of services to contractors, wholesalers, specifiers and end users.

Philips customer service departments have been created not only to ensure that equipment is simple to order and available on-site when required. The technical and advisory services exist to help you to obtain the optimum benefit from the inbuilt ability of the latest high-technology products to bring light to life.

Most of the services described on the following pages are provided without charge as part of Philips commitment to customer service. Enquiries can be sent by post, phone, telex or facsimile, and personal visits to customers' premises by qualified lighting engineers can be arranged.





### **FIELD SALES FORCES**

Philips salesmen operate nationwide in three distinct teams:

#### **Market Development**

The team maintains day-to-day contact with major lighting users, contractors and specifiers, and its members have expertise in lighting design and application. All sales engineers have the backing of Philips central technical and market support services.

#### **Wholesale development**

This team is devoted exclusively to servicing the needs of wholesale distributors.

#### **Specialist activities**

This group, which is supported by comprehensive back-up functions including technical services and computer-aided scheme design, exists to help in specialised lighting activities including roadlighting.



### **PROJECT QUOTATIONS**

You can telephone the Customer Service Sales Office from most major UK centres for the cost of a local telephone call. In conjunction with the Technical Services departments, they can provide fast, accurate quotations for any size of lighting scheme.



### **ORDER PROCESSING**

All Philips Lighting ordering, warehousing and distribution personnel are linked by the LASER real-time order processing system, which uses computers and high-speed data links to collate and communicate stock availability, current prices, shipment status and other information to all departments in the order processing chain.



## CUSTOMER SERVICE ORDER DESK

The Order Desk accepts orders, and provides immediate information on product prices and availability, for the cost of a telex or, from many areas, for the cost of a local telephone call. The LASER system ensures that prices quoted are current, and also enables customers to be told either that goods are actually in stock or precisely when delivery can be expected.

## DISTRIBUTION

Your requirements are transmitted direct to Philips central warehouse via the LASER system to generate the necessary documentation for the immediate release of goods to any of twelve regional distribution centres. Deliveries from the regional centres to the customers are made by appropriate local transport.

London Carriers, the Philips distribution and central stores network, operates a fleet of long-haul and short-haul delivery vehicles which provide a 24-hour service between the central stores, the 12 regional distribution centres and customers nationwide.



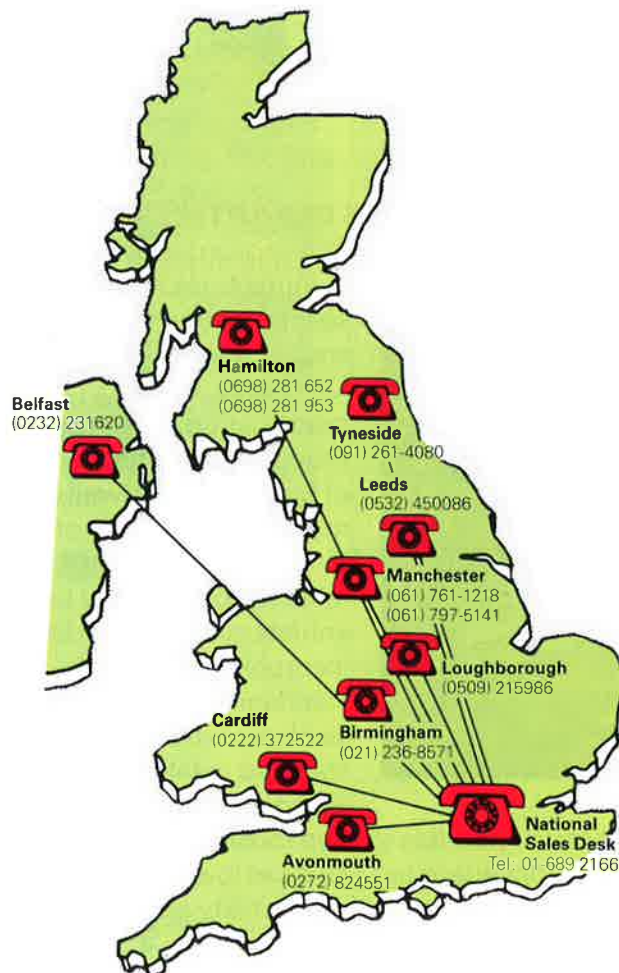
## DISTRIBUTION CENTRES

- Avonmouth**  
(02752) 4647
- Cambridge**  
(0223) 66121
- Nottingham**  
(0602) 292716
- Eastleigh**  
(0703) 617866
- Belfast**  
(0232) 751121
- Croydon**  
01-688 7766  
Night lines:  
Haulage 01-688 2803  
Traffic 01-686 3108
- Heywood**  
(0706) 66371
- Potter's Bar**  
(0707) 58520
- Sywell (Northampton)**  
(0604) 43611  
(Night line) 491707
- Sutton Coldfield**  
(021) 351 3628
- Hamilton**  
(0698) 282111  
(Night line) (05522) 23513
- Washington**  
(0632) 467289

## OUT OF AREA TELEPHONE NUMBERS

Direct connection to Customer Service Order Desk, Croydon, for the cost of a local telephone call from these exchanges:

- Avonmouth** (0272) 824551
- Belfast** (0232) 231620
- Birmingham** (021) 236 8571
- Cardiff** (0222) 372522
- Hamilton** (0698) 281652  
and 281953
- Leeds** (0532) 450086
- Loughborough** (0509) 215986
- Manchester** (061) 761 1218
- Tyneside** (091) 261 4080



## CUSTOMER SERVICES TECHNICAL DEPARTMENT

This department is manned by lighting engineers who are capable of answering most queries on the spot. All technical enquiries, by phone, fax or telex, should therefore be addressed to Customer Services Technical in the first instance.

The department has direct access to highly specialised technical groups within the Philips organisation capable of undertaking development work or providing advice on applied lighting technology:

### LIDEC

Philips Lighting Design and Engineering Centre is a professional design service for use by architects, consultants, contractors and end users. Using computer-aided design techniques, the department can assist in the implementation of the most complex lighting schemes. LIDEC has designed the aesthetic floodlighting for many heritage buildings such as Salisbury, Canterbury and Lincoln Cathedrals.



## SPECIAL LUMINAIRES DEPARTMENT



This group designs and manufactures luminaires with special features to customers' specification. These luminaires may be modifications of standard products, providing a choice of body colour as well as many different types of diffuser, controller or reflector, or they may be entirely custom-built to incorporate electrical, mechanical, optical or aesthetic features beyond the standard catalogue range.

Standard components are used wherever possible to keep tooling costs low, and minimum order quantities can be as low as 50 units, depending on type, technical feasibility and production economies.

## PRODUCT AND APPLICATION ENGINEERING DEPARTMENTS



Specialist engineers with detailed knowledge of the latest high-technology products and their applications are available to solve day-to-day lighting product problems. Product engineers are in continuous contact with Philips overseas to keep fully up-to-date with international lighting developments.

## BETTER LIGHTING GROUP

This advisory service covers every aspect of high-performance lighting, including energy-saving consultancy, and operates in liaison with the other specialist services provided by Philips Lighting. Because of its wide brief, the department is able to advise on general concepts, and may provide the most convenient introduction to the company's comprehensive technical services in specialised areas.



## LIGHTING APPLICATION SERVICES

### LIGHTING APPLICATION CENTRE

#### Where light comes to life

The most important characteristic of a luminaire is no longer its physical appearance, but the effect it produces in its intended setting.

To demonstrate light in action, Philips have constructed a 200 m<sup>2</sup> theatre in their Croydon headquarters, dedicated to the demonstration of light itself, and what its many forms and colours can do to contribute to a basic design concept.

The Centre is open to small parties of specifiers, architects, designers, contractors and users by appointment.



Visitors start their tour of the Centre in an area dedicated to teaching the principles of lighting. As well as video and back-projection audio/visual facilities, the area is provided with practical demonstrations of visual effects. The ceiling of the area is covered with fluorescent luminaires fitted with various lamps and mirror system controllers to give meaning to published data on colour and optical properties.

Two identical 'offices' can be viewed simultaneously. The first is equipped with conventional ceiling-mounted luminaires fitted with high-frequency control gear with light output regulation and with the latest mirror controllers. The second office demonstrates a scheme where light also makes a major contribution to the decor. It is lit by a mixed installation of downlights, wall-washers, wall-mounted and free-standing uplighters and the new TCS660 suspended lighting system, which combines task lighting with high-quality ambient lighting.

## LIGHTING APPLICATION CENTRE



The Centre contains a Lita 'cube' – a small, bare room whose ceiling is covered with downlights. It demonstrates the precise effects produced by various luminaires and display lamps of different beam angles.



A shop window with dressing is divided for comparison purposes. Here, display lighting techniques can be demonstrated by showing the effect of beam intensity, width, direction and colour, and how these can be combined to achieve a final result. Behind the window is a shop interior, also divided for comparison, in which the various lighting techniques for visual merchandising can be demonstrated.



After their tour, visitors are able to relax in a well-appointed relaxation area with full refreshment facilities. The wall display tells the history of artificial light.



Major users can use the Centre as a lighting studio, in which to experiment with various lighting effects for their actual merchandise, furnishings and interior layouts.

# LIGHTING DESIGN GUIDES AND PROGRAMS



Where applicable, KombiPak products (i.e. those supplied with all parts needed on site packed in a single carton) are supplied complete with a simple lighting design guide showing the optimum mounting positions and spacings for a given lighting requirement. For convenience, these design guides are also printed on the appropriate technical pages of this Catalogue. In addition, Philips has available for purchase four further aids to lighting design:

## Standard sports floodlighting schemes

A guide to the floodlighting of sports and recreational areas using standard, proven luminaires and layouts, published in the form of a binder.

## Guide to display and accent lighting

A guide to the correct application of modern, energy-effective display and accent luminaires to achieve the required aesthetic effect as well as good light technical performance. Published in the form of a booklet.

## Hand-held lighting design computer

This package is regarded by many contractors and designers as an essential aid for giving fast, on-site answers to lighting design problems. It contains a powerful Hewlett Packard pocket computer, a book of bar codes which enable detailed photometric information on products to be loaded into the computer by light pen and two Philips user-friendly software kits:

INTLITE permits new lighting to be designed using sophisticated products.

REFURB provides before-and-after comparisons of any number of refurbishment proposals, including breakdown of costings into capital and running costs with correctly amortised capital payback periods from energy savings.

Operation is simple; users are prompted throughout the programs. Bar codes are regularly updated by Philips as new products become available.



## **Calculux IBM-compatible lighting design software**

This three-in-one lighting design software package, which runs on any IBM-compatible desk computer, not only saves hours of routine calculations, but also enables specifiers to explore several different lighting solutions to a problem. Each scheme can be accompanied by detailed costings and accurate predictions of actual lighting result.

The **indoor lighting program** makes calculations either according to the lumen method (CIBSE TM5 and 10) or makes point calculations based on luminaire type and layout. The program also checks that uniformity is within specified limits. The cost calculation facility enables different design proposals to be compared with each other and the existing installation on a fully-amortised cost basis.

The **floodlighting program** calculates the effect of an installation from siting and aiming data of specified projectors using the inverse square and cosine laws of lighting. It shows the illuminance over a specified grid on the VDU screen, as well as the maximum/minimum and minimum/average illumination ratios. A time-saving symmetry option reduces the input data needed by 75% if the installation is to be completely symmetrical.

The **roadlighting program** produces accurate displays of overall uniformity, lengthwise uniformity, average luminance and threshold increment on a single or dual carriageway with dimensions and surface specified by the operator, for various lantern layouts, types and lamps. The design can be modified on-screen to take into account specialised needs, such as the need to avoid annoyance to residents, saving hours of sitework and avoiding expensive mistakes. This program is particularly useful for implementing roadlighting schemes to the new Codes for traffic routes and residential areas.





## LIGHTING MANAGEMENT SERVICE



The Philips Lighting Management Service (LMS) scheme replaces the problems and cost variables associated with installing and operating a lighting installation with a single, periodic payment which is fixed and agreed for the duration of the LMS contract. It also avoids the need for capital investment in a depreciating asset. In effect, the Philips LMS customer is buying light itself, rather than the hardware which provides it.

Under the scheme, Philips Lighting assumes responsibility for:

1. Designing an appropriate lighting scheme.
2. Supplying the hardware through the normal wholesaler/contractor distribution chain.
3. Installing and commissioning the equipment by contract with a qualified electrical contractor (usually one of Philips Registered Contractors).
4. Maintaining the installation so that it provides its design illuminance for the duration of the LMS Agreement.
5. Managing all aspects of the lighting on behalf of the LMS client.
6. Financing the scheme.

LMS can offer many benefits to customers:

- Where new lighting has the potential of increasing profitability, for example if it is used to extend the use of outdoor sports facilities into the hours of darkness, the lighting can be provided immediately, without the need for capital investment, and the LMS payment can be funded from increased earnings.
- Developers can use LMS to free development capital to enhance amenities in other areas.
- The large and variable hidden expenses of maintaining and managing lighting are removed, and replaced by a fixed (and therefore highly budgetable) payment that covers everything.
- Obsolete lighting which is impairing work performance as well as wasting energy can be replaced with an up-to-date energy-effective system complying with the latest lighting standards, without capital investment.

The LMS payment can include the electricity consumed by the installation if the supply can be separately metered, and the energy-saving potential of modern equipment is so great that the total payment is sometimes no greater than the electricity bill alone for the old installation.



Philips Lighting Marketing Services department is responsible for the production of all marketing support literature, including this Catalogue, as well as the following publications and services:

### **International Lighting Review**

A quarterly journal of lighting technology and marketing with a worldwide editorial platform and designed to present information on advanced lighting developments in a form acceptable both to professionals and laymen with an interest in lighting.

### **Insight**

A periodical for specifiers, architects and designers to provide a medium for exchange of news and views on the latest achievements in lighting application.

### **Contractor**

A periodical specifically for electrical contractors containing product news, technical and lighting design information, market trends and contractors' own views of the industry.

### **Kaleidoscope**

A periodical specifically for electrical wholesalers containing product news and the opportunities they provide for business development, as well as trade news.

Subscriptions for Insight, Contractor and Kaleidoscope are available free on request to the editors.

### **REGISTERED CONTRACTORS' SCHEME**

This scheme keeps electrical contractors continuously updated on the latest lighting product developments, and advises them on the intended application of today's energy-effective technology. After successfully completing a residential course, the contractor or his delegate is given a certificate and placed on a nationwide Register of contractors maintained by Philips.

The course includes seminars on:

- Energy and lighting technology
- Intermediate lighting design
- Advanced lighting design
- Display lighting
- Marketing
- Economic evaluation of lighting solutions.

Since the introduction of the scheme in 1980, design techniques have been developed to cater for new technologies such as high-rack lighting and developments in display and accent lighting. To accommodate these topics, the duration of the course has been extended to 4½ days.

These courses are also open to delegates who are professionally concerned with lighting application and need to upgrade their knowledge.



## GOOD LIGHTING SAVES MORE THAN ENERGY

The pace of lighting product development is now so fast that replacement of an installation only ten years old with today's energy-effective lamps and luminaires can more than halve energy costs – and improve lighting quality at the same time. The new installation will quickly repay its capital cost from the energy it saves, and thereafter show a profit.

But its potential to save energy, important though it is, can be dwarfed by some of the other benefits today's lighting products bring to the user.



### Increased productivity

Modern, low-energy lamps in luminaires specifically designed to provide optimum illuminance of the worktask can raise productivity in both factories and offices – and an increase in output as little as 0.3% will pay for ALL the capital costs of new lighting over the average factory floor. In offices, the TOTAL costs of lighting are usually well below 1% of the wages bill.

### Reduced accidents, rejects and absenteeism

In factories and offices, appropriate lighting can reduce mistakes which not only erode profitability but can be costly in terms of human misery. Lamps with Deluxe colour rendering can dramatically cut reject rates in factories engaged in colour-critical work. Offices with VDUs need special low-brightness lighting to avoid visually-disabling reflections in the screens. Skilled staff in their forties may need twice as much light as youngsters in their twenties to work at their peak efficiency. And bad lighting can actually increase absenteeism.



### Reduced maintenance costs

Modern lighting stays brighter longer than its predecessors – and this can save a fortune in hidden maintenance costs. Compact fluorescents, for example, last eight times as long as filament lamps, cutting maintenance costs by more than 80%. One local authority discovered that the labour cost for changing a single filament lamp in sheltered accommodation was £13.50 – 40 times the cost of the new bulb. The change to compact fluorescents has made a saving in maintenance labour costs far greater than the 75% energy cost saving inherent in compact fluorescents.

# GOOD LIGHTING SAVES MORE THAN ENERGY

## Improved security and safety

Modern, energy-effective lighting charges a very low premium for the insurance it provides against road accidents, falls and other domestic and residential accidents, break-ins and vandalism. On motorways, for example, the installation of lighting has been shown to reduce the incidence of accidents by 60%. Proper lighting in residential areas reduces mugging – and fear. In the home, all-night interior lighting of landings and stairwells can safeguard old people and children – and domestic exterior lighting of residential, commercial and industrial premises is recommended by the Home Office as one of the most effective deterrents of all against break-ins and vandalism.



## An enhanced visual environment

Good lighting, using the latest product technology, is now applied by designers to enrich every aspect of our lives.

■ High Street stores use light, not only for the visual merchandising that sells their wares more effectively, but also to create a design that dramatically influences the mood of shoppers. Light makes their stores a pleasure to visit.

■ Authorities use light to beautify their town centres and the historic buildings in their charge in a way that would have delighted the original architects.

■ Offices increasingly use light, not simply to enable people to perform their work but to create an environment in which staff will be happy and relaxed.

■ Sports and leisure centres use high-technology light to increase visual amenity and even improve a player's game.

■ An increasing number of householders are using, not simply light fittings but light itself to introduce new design elements into their homes.

**Light brings with it a great gift – the opportunity to improve the quality of life. The products in this Catalogue represent the means by which the gift of light can be enjoyed by us all.**



**UNITS AND ABBREVIATIONS**

SI units and abbreviations are used throughout this catalogue, except where specifically stated otherwise.

All linear dimensions are millimetres and all weights kilograms unless otherwise indicated.

Temperatures are normally quoted in °C.

**CONVERSION TABLES, FOR GUIDANCE ONLY****Millimetres to Inches**

mm	Inches	mm	Inches
1	0.04	500	19.69
2	0.08	600	23.62
3	0.12	700	27.56
4	0.16	800	31.50
5	0.20	900	35.43
6	0.24	1000	39.37
7	0.28	1100	43.31
8	0.31	1200	47.24
9	0.35	1300	51.18
10	0.39	1400	55.12
20	0.79	1500	59.06
30	1.18	1600	63.29
40	1.57	1700	66.93
50	1.97	1800	70.87
60	2.36	1900	74.80
70	2.76	2000	78.74
80	3.15	2100	82.68
90	3.54	2200	86.61
100	3.94	2300	90.55
200	7.87	2400	94.47
300	11.81	2500	98.42
400	15.75		

**Inches to Millimetres**

Inches	mm
1	25.40
2	50.80
3	76.20
4	101.60
5	127.00
6	152.4
7	177.8
8	203.2
9	228.6
10	254.0
11	279.4
12	304.8
24	609.6
36	914.4
48	1219.2
60	1524.0
72	1828.8
84	2133.6
96	2438.4
108	2743.2
120	3048.0

**IP CLASSIFICATION OF ENCLOSURES**

Luminaires are classified according to the protection against dust and moisture provided by their enclosures.

The 'Degree of Protection' is indicated by the letters IP followed by two numerals, the first referring to dust and the second to moisture. (Note: the two numerals should be pronounced separately.) The full classification for equipment in general is listed in the table.

The IP system supersedes the earlier classification of equipment as 'rainproof' etc. accompanied by marking with symbols. Naturally, the only IP classifications relevant to luminaires are:

IP23	IP24	IP25
—	IP54	IP55
—	IP64	IP65

# TECHNICAL AND EDITORIAL NOTES

Derivation of the two IP Classification numerals.  
Numerals used for luminaires are in bold type.

Degrees of Protection indicated by the first characteristic numeral.

<i>First characteristic numeral</i>	<i>Short description</i>	<i>Degree of Protection Details of objects which will be 'excluded' from the enclosure</i>
0	Non-protected	No special protection
1	Protected against solid objects greater than 50mm	A large surface of the body, such as a hand (but no protection against deliberate access). Solid objects exceeding 50mm in diameter
<b>2</b>	<b>Protected against solid objects greater than 12mm</b>	<b>Fingers or similar objects not exceeding 80mm in length. Solid objects exceeding 12mm in diameter</b>
3	Protected against solid objects greater than 2.5mm	Tools, wires, etc., of diameter or thickness greater than 2.5mm. Solid objects exceeding 2.5mm diameter
4	Protected against solid objects greater than 1.0mm	Wires or strips of thickness greater than 1.0mm. Solid objects exceeding 1.0mm in diameter
<b>5</b>	<b>Dust-protected</b>	<b>Ingress of dust is not totally prevented but dust does not enter in sufficient quantity to interfere with satisfactory operation of the equipment</b>
<b>6</b>	<b>Dust-tight</b>	<b>No ingress of dust</b>

Degrees of Protection indicated by the second characteristic numeral

<i>Second characteristic numeral</i>	<i>Short description</i>	<i>Degree of Protection Details of the type of protection provided by the enclosure</i>
0	Non-protected	No special protection
1	Protected against dripping water	Dripping water (vertically falling drops) shall have no harmful effect
2	Protected against dripping water when tilted up to 15°	Vertically dripping water shall have no harmful effect when the enclosure is tilted at any angle up to 15° from its normal position
<b>3</b>	<b>Protected against spraying water</b>	<b>Water falling as a spray at an angle up to 60° from the vertical shall have no harmful effect</b>
<b>4</b>	<b>Protected against splashing water</b>	<b>Water splashed against the enclosure from any direction shall have no harmful effect</b>
<b>5</b>	<b>Protected against low-pressure water jets</b>	<b>Water projected by a standard nozzle against the enclosure from any direction shall have no harmful effect</b>
6	Protected against heavy seas	Water from heavy seas or water projected in powerful jets shall not enter the enclosure in harmful quantities
7	Protected against the effects of immersion	Ingress of water in a harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time
8	Protected against submersion	The equipment is suitable for continuous submersion in water under conditions which shall be specified by the manufacturer



<b>INCANDESCENT LAMPS</b>	<b>187</b>
<b>COMPACT FLUORESCENT LAMPS</b>	<b>221</b>
<b>FLUORESCENT LAMPS AND GEAR</b>	<b>229</b>
<b>DISCHARGE LAMPS AND GEAR</b>	<b>239</b>
<b>SPECIAL PURPOSE LAMPS AND LUMINAIRE</b>	<b>257</b>
<b>VEHICLE LAMPS</b>	<b>275</b>
<b>PHOTOGRAPHIC AND THEATRE LAMPS</b>	<b>279</b>





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## GLS RANGE

General Lighting Service, mushroom and Softone lamps **188**

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## SPECIAL PACKS

GLS multipacks, Softone multipacks, candle multipacks, blister packs **192**

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## SPECIAL SERVICE LAMPS

Rough service, pygmy/sign, appliance, oven, Fireglow, etc. **199**

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## DECORATIVE LAMPS

Coloured GLS, candle, round, coloured pygmy/sign, tubular, globes, striplites **205**

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## REFLECTOR LAMPS

Display reflectors, crown silvered, PAR 38-E, PAR 56 **211**

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## HALOGEN AND LOW VOLTAGE HALOGEN LAMPS

Dichroic and aluminium spot lamps for display and task lighting. Linear and single-ended floodlight lamps. **215**

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## INCANDESCENT LAMPS GENERAL LIGHTING SERVICE (GLS) AND SOFTONE

A comprehensive range of tungsten filament lamps for general lighting service, including ordinary pearl and clear bulbs as well as the Argenta-White 'K', Superlux mushroom types and Softone for more decorative applications. The GLS range also includes Night Lights, plus low voltage and high power lamps up to 1000W.

TYPE	Product	Technical
<b>SOFTONE</b>	<b>188</b>	<b>463</b>
<b>SOFTONE 'with a hint of ...'</b>	<b>188</b>	<b>463</b>
<b>STANDARD GLS</b>	<b>189</b>	<b>462</b>
<b>GLS SPECIAL RATINGS</b>	<b>189</b>	<b>462</b>
<b>K-MUSHROOM</b>	<b>190</b>	<b>463</b>
<b>K-SUPERLUX</b>	<b>191</b>	<b>463</b>
<b>NIGHTLIGHT</b>	<b>191</b>	<b>463</b>

## SOFTONE



A new range of lamps with an internal white or lightly coloured finish for maximum diffusion creating a 'soft' light with less glare, ideal for use in the home.

The coiled-coil filament gives high light output, while the internal coating and new Philips Softone shape create a discrete effect when the lamp is unlit.

Available in twin-packs with bayonet cap in ratings of 40W, 60W and 100W.

### SOFTONE

240V Lamps	BC Cap
	White
40W	○
60W	○
100W	○

### SOFTONE 'WITH A HINT OF ...' RANGE

240V Lamps	BC Cap
	with a hint of .....
60W	Pink
	Yellow
	Blue
	Peach
	Green

For technical information please see page 463

High eff  
output t  
Availab  
The clea  
produce

STAN

240V  
Lamps  
25W  
40W  
60W  
75W  
100W  
150W

For details

250V  
Lamps  
25W  
40W  
60W  
75W  
100W  
150W

GLS lam  
non-sta  
systems

There ar  
from 20

GLS L

240V  
Lamps  
15W  
200W  
300W  
500W

250V  
Lamps  
15W  
300W  
500W

GLS L

110V  
Lamps  
25W  
40W  
60W  
100W  
150W  
200W  
300W  
500W

# STANDARD GLS COILED-COIL TYPES

High efficiency lamps with coiled-coil filaments producing more light output than single-coil and long-life lamps of equivalent wattage. Available with Edison screw or bayonet caps in ratings from 25W to 150W. The clear bulbs provide sparkle in glass luminaires, while pearl bulbs produce a diffused light that reduces filament glare and softens shadows.

## STANDARD GLS COILED COIL TYPES

240V Lamps	BC Cap		ES Cap	
	Pearl	Clear	Pearl	Clear
25W	○	○		
40W	○	○	○	
60W	○	○	○	○
75W	○	○	○	○
100W	○	○	○	○
150W	○	○	○	○

For details of Multipacks see page 210.

250V Lamps	BC Cap		ES Cap	
	Pearl	Clear	Pearl	Clear
25W	○			
40W	○	○		
60W	○	○	○	
75W	○			
100W	○	○	○	
150W	○		○	○



## GLS SPECIAL RATINGS LOW AND HIGH WATTAGE AND LOW VOLTAGE

GLS lamps are available with a choice of caps and finishes for non-standard voltages, including 25/50V bulbs for emergency lighting systems and lamps for 110V supplies.

There are also low power 15W lamps, and a range of high power lamps from 200W to 500W, for use on 240V and 250V supplies.

### GLS LOW AND HIGH WATTAGE

240V Lamps	BC Cap		ES Cap		GES Cap
	Pearl	Clear	Pearl	Clear	
15W	○				
200W	○	○	○	○	
300W					○
500W					○

250V Lamps	BC Cap		GES Cap
	Pearl	Clear	
15W	○		
300W			○
500W			○

### GLS LOW VOLTAGE 110V

110V Lamps	BC Cap		GES Cap
	Pearl	Clear	
25W	○		
40W	○		
60W	○	○	
100W	○	○	
150W	○	○	
200W	○	○	
300W	○	○	
500W			○
			○



(See over for 25V and 50V lamps)

For technical information please see page 462

# GLS SPECIAL RATINGS LOW AND HIGH WATTAGE AND LOW VOLTAGE



## GLS LOW VOLTAGE 25V AND 50V

25/50V Lamps	Pearl			
	25V		50V	
	BC Cap	ES Cap	BC Cap	ES Cap
25W	○	○	○	○
40W	○	○	○	○
60W	○	○	○	○
100W	○	○	○	○

## K-MUSHROOM



Compact lamps with an internal Argenta-White finish for maximum diffusion, creating a 'softer' light. The use of a coiled-coil filament gives high light output, while the white coating and mushroom shape produce an unobtrusive effect when the lamp is unlit.

Available with bayonet cap only in ratings from 40W to 150W.

### K-MUSHROOM

240V Lamps	Argenta-White BC Cap
40W	○
60W	○
100W	○
150W	○

A directi  
while ret  
display a  
beam ref  
K-Mush

### K-SUF

240V Lamps
40W
60W
100W
150W

An 8W la  
people w  
occasion  
for all-ni

### NIGHT

240/250V Lamp
8W

A directional mushroom lamp giving a wide, diffused downward beam, while retaining some upward light. Useful for task lighting and in some display and decorative applications as an economical alternative to wide beam reflector lamps. It has the same Argenta-White finish as the K-Mushroom, with a pearl front.

## K-SUPERLUX

240V Lamps	Argenta-White	
	BC Cap	ES Cap
40W		○
60W	○	
100W	○	
150W	○	



# NIGHT LIGHT

An 8W lamp providing a subdued glow to reassure children and elderly people when used in bedrooms, nurseries and hospitals, and allow occasional movement at night. Low power consumption is economical for all-night operation.

## NIGHTLIGHT

240/250V Lamp	BC Cap
	Pearl
8W	○



## INCANDESCENT LAMPS MULTI PACKS

Many types of incandescent lamp are available in Multi Packs. This range provides an alternative to the standard pack (as detailed in the technical information pages). The following pages give information on the packs, and to avoid confusion Order Code information is included with each lamp and pack type.

TYPE	PRODUCT	TECHNICAL
<b>10-WAY GLS PEARL</b>	192	462
<b>2-PACK GLS</b>	193	462
<b>3-PACK GLS PEARL</b>	193	462
<b>4-PACK GLS</b>	194	462
<b>2-PACK SOFTONE</b>	194	463
<b>2-PACK MUSHROOM</b>	195	463
<b>3-PACK MUSHROOM</b>	195	463
<b>10-WAY MUSHROOM</b>	192	463
<b>PLAIN CANDLE MULTIPACK</b>	196	468
<b>SOFTONE CANDLE MULTIPACK</b>	196	468

## GLS MULTIPACKS 10WAY SHRINKWRAP GLS PEARL & K-MUSHROOM



Convenient package of 10 sleeved lamps in a shrink pack – 100 lamps to outer carton.

### 10 WAY SHRINKWRAP GLS PEARL AND MUSHROOMS

Watts	Volts	Cap	Finish	Packed in	Order Code
40	240	BC	Pearl	1/10/100	40 BC PE 10W
60	240	BC	Pearl	1/10/100	60 BC PE 10W
100	240	BC	Pearl	1/10/100	100 BC PE 10W

### 10 WAY SHRINKWRAP GLS K-MUSHROOM

Watts	Volts	Cap	Finish	Packed in	Order Code
40	240	BC	Argenta-White	1/10/100	40 BC MU 10W
60	240	BC	Argenta-White	1/10/100	60 BC MU 10W
100	240	BC	Argenta-White	1/10/100	100 BC MU 10W
150	240	BC	Argenta-White	1/10/100	150 BC MU 10W

For technical information please see pages 462–463

# GLS MULTIPACKS

## 2-PACK GLS

Consumer orientated twin packs in 20 lamp merchandising tray, 2 trays in a shrinkwrap. No outer carton. Twin cartons are EAN bar coded.

### 2-PACK GLS

Watts	Volts	Cap	Finish	Packed in	Order Code
40	240	BC	Clear	2/20/40	40 BC CL 2P
40	240	BC	Pearl	2/20/40	40 BC PE 2P
60	240	BC	Clear	2/20/40	60 BC CL 2P
60	240	BC	Pearl	2/20/40	60 BC PE 2P
75	240	BC	Pearl	2/20/40	75 BC PE 2P
100	240	BC	Clear	2/20/40	100 BC CL 2P
100	240	BC	Pearl	2/20/40	100 BC PE 2P



# GLS MULTIPACKS

## 3-PACK GLS

Consumer orientated triple packs in 36 lamp merchandising trays, 2 trays in a shrinkwrap. No outer carton. Triple cartons are EAN bar coded.

### 3-PACK GLS

Watts	Volts	Cap	Finish	Packed in	Order Code
60	240	BC	Pearl	3/36/72	60 BC PE 3P
100	240	BC	Pearl	3/36/72	100 BC PE 3P





## GLS MULTIPACKS 4-PACK GLS



Consumer orientated 4 packs in 36 lamp merchandising trays, 2 trays in a shrinkwrap. No outer carton. 4 pack cartons are EAN bar coded.

### 4-PACK GLS

Watts	Volts	Cap	Finish	Packed in	Order Code
60	240	BC	Pearl	4/36/72	60 BC PE 4P
100	240	BC	Pearl	4/36/72	100 BC PE 4P

## GLS MULTIPACKS 2-PACK SOFTONE WHITE



Consumer orientated twin packs in 20 lamp merchandising trays, 2 trays in a shrinkwrap. No outer carton. Twin cartons are EAN bar coded.

### 2-PACK SOFTONE WHITE

Watts	Volts	Cap	Finish	Packed in	Order Code
40	240	BC	White	2/20	40 BC ST WH 2P
60	240	BC	White	2/20	60 BC ST WH 2P
100	240	BC	White	2/20	100 BC ST WH 2P

## GLS MULTIPACKS 2-PACK MUSHROOM

Consumer orientated twin pack in 20 lamp merchandising trays. 2 trays in a shrinkwrap. No outer carton. Twin cartons are EAN bar coded.

### 2-PACK MUSHROOM

Watts	Volts	Cap	Finish	Packed in	Order Code
40	240	BC	Argenta-White	2/20/40	40 BC MU 2P
60	240	BC	Argenta-White	2/20/40	60 BC MU 2P
100	240	BC	Argenta-White	2/20/40	100 BC MU 2P



## GLS MULTIPACKS 3-PACK MUSHROOM WINDOW PACK

Consumer orientated triple pack with acetate windows to show actual product in carton. 36 lamps in a merchandising tray with 2 trays in a shrinkwrap.

### 3-PACK MUSHROOM - WINDOW PACK

Watts	Volts	Cap	Finish	Packed in	Order Code
60	240	BC	Argenta-White	3/36/72	60 BC MU 3P
100	240	BC	Argenta-White	3/36/72	100 BC MU 3P



# CANDLE MULTIPACK 35mm PLAIN CANDLES



Consumer orientated single and twin lamp packs in 10 lamp shrinkwrap, 50 lamps in an outer carton.

## 35mm PLAIN CANDLES – SINGLE LAMP PACK

Watts	Volts	Cap	Finish	Packed in	Order Code
25	240/250	BC	Clear	1/10/50	25 BC PL CA CLR
25	240/250	BC	White	1/10/50	25 BC ST CA WH
25	240/250	SBC	White	1/10/50	25 SBC ST CA WH
25	240/250	SES	White	1/10/50	25 SES ST CA WH
40	240/250	BC	Clear	1/10/50	40 BC PL CA CLR
40	240/250	BC	White	1/10/50	40 BC ST CA WH
40	240/250	SBC	White	1/10/50	40 SBC ST CA WH
40	240/250	SES	White	1/10/50	40 SES ST CA WH
60	240/250	BC	Clear	1/10/50	60 BC PL CA CLR
60	240/250	BC	White	1/10/50	60 BC ST CA WH
60	240/250	SBC	White	1/10/50	60 SBC ST CA WH
60	240/250	SES	White	1/10/50	60 SES ST CA WH

## 35mm PLAIN CANDLES – TWIN LAMP PACK

Watts	Volts	Cap	Finish	Packed in	Order Code
25	240/250	BC	Clear	2/10/50	25 BC PL CA CLR
25	240/250	BC	White	2/10/50	25 BC ST CA WH
40	240/240	BC	Clear	2/10/50	40 BC PL CA CLR
40	240/250	BC	White	2/10/50	40 BC ST CA WH
60	240/250	BC	Clear	2/10/50	60 BC PL CA CLR
60	240/250	BC	White	2/10/50	60 BC ST CA WH

# SOFTONE CANDLE MULTIPACKS 35mm 'With a hint of' CANDLES – TWIN PACK RANGE



## 'Hint of' CANDLES – TWIN PACK RANGE

Watts	Volts	Cap	Finish	Packed in	Order Code
40	240/250	BC	Pink	2/20	40 BC ST CA PL
40	240/250	BC	Peach	2/20	40 BC ST CA PL
40	240/250	BC	Green	2/20	40 BC ST CA PL
40	240/250	BC	Yellow	2/20	40 BC ST CA PL
40	240/250	BC	Blue	2/20	40 BC ST CA PL

shrinkw...

**ACK**

- Code
- C PL CA CL 10
- C ST CA WH 10
- BC ST CA WH 10
- S ST CA WH 10
- C PL CA CL 10
- C ST CA WH 10
- BC ST CA WH 10
- S ST CA WH 10
- C PL CA CL 10
- C ST CA WH 10
- BC ST CA WH 10
- S ST CA WH 10

**CK**

- C PL CA CL 20
- C ST CA WH 20
- C PL CA CL 20
- C ST CA WH 20
- C PL CA CL 20
- C ST CA WH 20

der Code

- BC ST CA PL 20
- BC ST CA PE 20
- BC ST CA GR 20
- BC ST CA YE 20
- BC ST CA BL 20





# INCANDESCENT LAMPS SPECIAL SERVICE

Tungsten filament lamps manufactured for specific applications or particular conditions of service, such as rough service lamps for machine lighting, coloured pygmy/sign lamps, heat-resistant oven lamps, and traffic signal lamps including halogen versions.

<b>TYPE</b>	<b>Product</b>	<b>Technical</b>
<b>ROUGH SERVICE</b>	<b>200</b>	<b>464</b>
<b>TRAFFIC SIGNAL</b>	<b>200</b>	<b>464</b>
<b>PYGMY/SIGN</b>	<b>201</b>	<b>464</b>
<b>SWITCHBOARD INDICATOR</b>	<b>201</b>	<b>465</b>
<b>PILOT</b>	<b>202</b>	<b>465</b>
<b>OVEN LAMPS</b>	<b>202</b>	<b>465</b>
<b>APPLIANCE LAMPS</b>	<b>203</b>	<b>466</b>
<b>FIREGLOW</b>	<b>203</b>	<b>466</b>

# ROUGH SERVICE



Reinforced internal construction gives increased resistance to filament breakage caused by jolts and vibration. Suitable for hand inspection lamps, industrial lighting and similar applications.

## ROUGH SERVICE

240/250V Lamps	Pearl	
	BC Cap	ES Cap
40W	○	○
60W	○	○
100W	○	○

## ROUGH SERVICE

110/120V Lamps	Pearl
	BC Cap
40W	○
60W	○
100W	○

# TRAFFIC SIGNAL



Special service lamps for use in traffic signals.

## TRAFFIC SIGNAL

Lamp	Wattage	Voltage	GY 6.35 Cap	
			Clear	ES Cap Clear
Traffic Signal	65W	240V		○
Halogen M/32	50W	12V	○	
Halogen M/28	100W	12V	○	

For technical information please see page 464

Clear and holders.

PYGMY

Lamp and Wattage  
16W  
15W  
15W  
15W  
16W

Special pur

SWITCH

200/260V  
10W

Clear and coloured types. These lamps may be used externally in suitable holders.

## PYGMY/SIGN

Lamp and Voltage	Voltage	BC Cap		ES Cap	SES Cap	SBC Cap
		Clear	Coloured	Clear	Clear	Clear
15W	25V	○				
15W	50V	○				
15W	110/115V	○		○	○	○
15W	120/130V	○		○		
15W	200/250V	○	○○○○○○	○	○	○



# SWITCHBOARD INDICATOR

Special purpose lamp for telephone switchboard indication.

## SWITCHBOARD INDICATOR

ES Cap	BC Cap
Clear	Clear
○	○







Small indicator lamps with a choice of caps and ratings for many applications.

**PILOT**

Lamp	Voltage	SBC Cap	SES Cap	E12 Cap
		Clear	Clear	Clear
6W	100/130V	○	○	○
10W	200/250V	○	○	○

**OVEN LAMPS**



Lamps specially designed to withstand high oven temperature (300°C).

**OVEN LAMPS (300°C)**

Lamp	Voltage	SES Cap
		Clear
15W 22mm Tubular	240/250V	○
25W 28mm Pygmy/Sign	240V	○
40W 45mm Round	240V	○

**BAKERS OVEN (250°C)**

Lamp	Voltage	BC Cap
		Clear
60W 60mm GLS	240V	○

Lamps for use in sewing machine appliance lamp that can be sp  
**APPLIAN**  
 Lamp  
 40W 44mm Pez  
 25W 44mm Ron  
 25W 25mm Tut  
 25W 25mm Tut  
 \*30W 22mm Tut  
 \*For sewing mach

A durable re decorative a  
**FIREGLO**  
 240/250V Lamp  
 60W

Lamps for use in a wide variety of general appliances eg. cooker hoods, washing machines, microwave and standard ovens. Other tubular appliance lamps are available subject to a minimum ordering quantity that can be specified on request.

## APPLIANCE LAMPS

Lamp	Voltage	BC Cap		ES Cap	SES Cap	
		Clear	Pearl	Pearl	Pearl	Clear
250W 44mm Pear	230/250V		○	○		
250W 44mm Round	230/250V			○		
250W 25mm Tubular	240V	○				○
250W 25mm Tubular	230/240V				○	
250W 22mm Tubular	230/240V				○	

\*For washing machines and microwave ovens.



## FIREGLOW

A durable red lacquer bulb for use in fuel-effect fires and to create a decorative appeal.

## FIREGLOW

SES Cap	BC Cap	3 Pin BC Cap
Clear		
○	Red	Red
○		
○		





## INCANDESCENT LAMPS DECORATIVE

Tungsten filament lamps for use on 240/250V mains supply for effect and decorative lighting. In addition to decorative shapes, the range includes several lamps with decorative finishes, which also give an improved appearance when unlit.

<b>TYPE</b>	<b>Product</b>	<b>Technical</b>
<b>COLOURED GLS</b>	<b>206</b>	<b>467</b>
<b>ARGENTA ROSE</b>	<b>206</b>	<b>467</b>
<b>PLAIN CANDLE:</b> Clear	<b>207</b>	<b>467</b>
<b>SOFTONE CANDLE:</b> White and hint of colour	<b>207</b>	<b>468</b>
<b>TWISTED CANDLE</b>	<b>208</b>	<b>468</b>
<b>FLAMBEAU CANDLE</b>	<b>208</b>	<b>468</b>
<b>ROUND LUSTRE LAMPS</b>	<b>208</b>	<b>468</b>
<b>SOFTONE-GLOBE:</b> White and hint of colour	<b>209</b>	<b>469</b>
<b>STRIPLITE</b>	<b>209</b>	<b>469</b>
<b>PHILINEA</b>	<b>210</b>	<b>470</b>
<b>COLORENTA</b>	<b>210</b>	<b>470</b>

## COLOURED GLS



Lamps for colour effects and festive lighting applications. 15W and 25W ratings can be used outdoors with weatherproofing lampholders.

### COLOURED GLS

240/250V Lamps	BC Cap
	Finish for all types
15W	Red, Blue,
25W	Green, Yellow,
40W	Amber, Pink
60W	

## ARGENTA ROSE



Gives a soft pink light for an intimate atmosphere.

### ARGENTA ROSE

240/250V Lamps	BC Cap
60W	○
100W	○

For technical information please see page 467

Attractive sha  
chandeliers to

### PLAIN CA

240/250V Lamps
25W
40W
60W
60W

Highly diffuse  
or with a hint

### SOFTONE

240/250V Lamps
25W
40W
60W

### SOFTONE

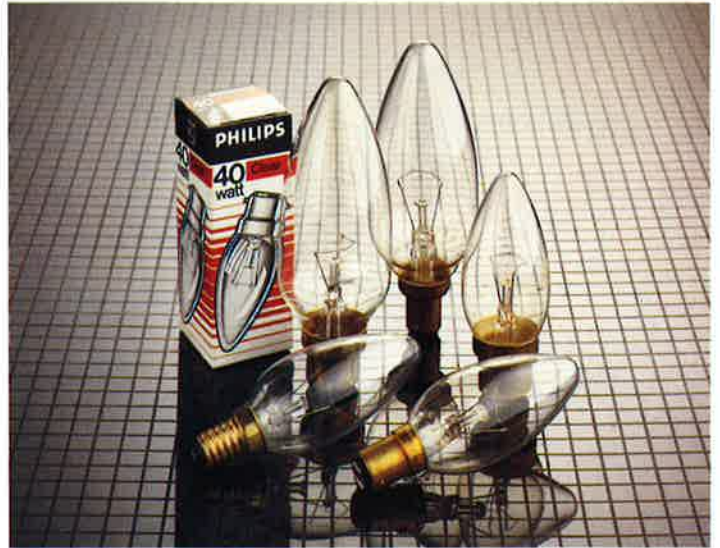
240/250V Lamps
40W
40W
40W
40W
40W

# PLAIN CANDLE CLEAR

Attractive shape in clear finish. Clear candles are frequently used in glass chandeliers to create sparkle.

## PLAIN CANDLE CLEAR

240/250V Lamps	Lamp Diameter (mm)	BC Cap	SBC Cap	SES Cap
25W	35	○	○	
40W	35	○	○	○
60W	35	○	○	
60W	45	○		



# SOFTONE CANDLE WHITE AND 'WITH A HINT OF' RANGE

Highly diffused finish for reduced glare and shadows. Available in white or with a hint of colour.

## SOFTONE WHITE

240/250V Lamps	Lamp Diameter (mm)	BC Cap	SBC Cap	SES Cap
25W	35	○	○	○
40W	35	○	○	○
60W	45	○	○	○

## SOFTONE 'WITH A HINT OF' COLOUR

240/250V Lamps	Lamp Diameter (mm)	BC Cap	'Hint of' colour
40W	35	○	Pink
40W	35	○	Peach
40W	35	○	Green
40W	35	○	Yellow
40W	35	○	Blue



# TWISTED CANDLE CLEAR



Decorative, slim twisted shape in clear finish; an alternative to the plain candle lamp.

## TWISTED CANDLE CLEAR

240/250V Lamps	Lamp Diameter (mm)	BC Cap	SBC Cap
25W	35	○	
40W	35	○	○
40W	47	○	○
60W	47	○	



## FLAMBEAU CANDLE CLEAR

Decorative, slim twisted shape with textured glass in clear finish; an alternative to the plain candle lamp.

240V Lamp	Lamp Diameter (mm)	BC Cap
60W	47	○

# ROUND LUSTRE LAMPS



45mm round lamps with clear or Argenta-White finish. Frequently used when lamp itself forms part of the design of the luminaire.

## ROUND LUSTRE LAMPS

240/250V Lamps	BC Cap		SBC Cap	ES Cap	SES Cap
	Argenta-White	Clear	Argenta-White	Argenta-White	Argenta-White
25W	○	○	○	○	○
40W	○	○	○	○	○

For technical information please see page 468

Globe lamps in three sizes and ratings, with highly diffused white finish, for use with or without shades. 95mm lamps are also available with a hint of colour to harmonise with decor or create special effects.

## SOFTONE GLOBE LAMPS

240V Lamps	Wattage	BC Cap
		White
G80	60W	○
G80	60W	○
G95	60W	○
G95	100W	○
G120	60W	○
G120	100W	○

## SOFTONE GLOBE 'WITH A HINT OF' COLOUR

240V Lamps	Wattage	BC Cap
		Colour
G95	100W	Pink
G95	100W	Peach
G95	100W	Blue
G95	100W	Green
G95	100W	Yellow



# STRIPLITE

Double cap, clear or opal, in two lengths. Useful for concealed lighting or for low glare (opal), over mirrors, bedheads, aquaria etc.

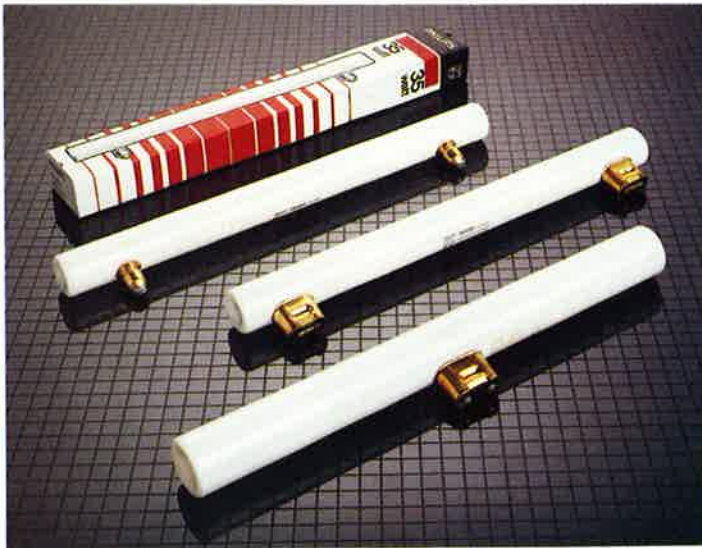
## STRIPLITE

240/250V Lamps	Length mm	S15s Cap	
		Opal	Clear
30W	221	○	○
60W	221	○	○
30W	284	○	○
60W	284	○	○





# PHILINEA 1 AND 2



### PHILINEA 1

Architectural straight lamp with two peg or flat S14s concealed caps. Available in several lengths, with similar surface brightness. Opal white finish.

Lamps and Length	Voltage	S14s Cap	
		Peg Cap	Opal
35W 300mm	240/250V	○	
35W 300mm	240V		○
60W 500mm	240/250V	○	
60W 500mm	240V		○
75W 610mm	240/250V	○	

### PHILINEA 2

Architectural straight lamp with single central concealed flat cap. Opal finish.

Lamps and Length	Voltage	S14d Cap	
		Peg Cap	Opal
35W 300mm	240V		○
60W 500mm	240/250V		○

# COLORENTA



A long, single-cap lamp with an internal Argenta-White finish, giving a uniform, softly diffused light over the whole lamp.

### COLORENTA

240/250V Lamps	Wattage	BC Cap	
		Argenta-White	
Colorenta	60W		○

# TUNGSTEN REFLECTOR LAMPS DISPLAY

Internally silvered reflector lamps providing a wide choice of lighting effects for accent, display and task lighting. The range includes lamps rated from 25W to 300W in various beam widths, including miniature spot lamps, coloured spots and robust pressed glass lamps.

<b>TYPE</b>	<b>Product</b>	<b>Technical</b>
<b>BLOWN BULB</b>	<b>212</b>	<b>472</b>
<b>CROWN SILVERED</b>	<b>212</b>	<b>474</b>
<b>PAR 38-E</b>	<b>213</b>	<b>473</b>
<b>PAR 56</b>	<b>213</b>	<b>473</b>
<b>COLOURED DISPLAY LAMPS</b>	<b>214</b>	<b>474</b>

# BLOWN BULB REFLECTORS



A comprehensive range of spot and flood lamps with beam widths from 30° to 80°, capable of producing beam centre intensities as high as 2300 candelas. They include several miniaturised types for the latest compact display luminaires.

## BLOWN BULB REFLECTOR

Lamps and Wattage	Beam Angle	Voltage	Diffused		
			BC Cap	ES Cap	SES Cap
R39	30W	42°	240V		
R50	25W	30°	240V		
R50	40W	30°	240V		
R60	40W	25°	240V	○	○
R60	60W	25°	240V	○	○
R63	40W	30°	240/250V	○	○
R63	60W	30°	240/250V	○	○
R80 (R080)	60W	80°	240/250V	○	○
R80 (R080)	75W	80°	240/250V	○	○
R80 (R080)	100W	80°	240/250V	○	○
R80-30	75W	30°	240/250V		○
R80-30	100W	30°	240/250V		○
R95	75W	30°	240/250V	○	○
R95	100W	30°	240/250V	○	○
R95	150W	30°	240/250V	○	○

# CROWN SILVERED LAMPS



Crown silvered (bowl reflector) lamps are used mainly with an external reflector to give a narrow, sharp-edged beam of high intensity for accenting.

## CROWN SILVERED DISPLAY LAMPS

240/250V Lamps	Clear			
	BC Cap	ES Cap	SES Cap	BC S-Par Cap
40W (Ogive)			○	
60W	○	○		
100W	○	○		○

Precision re  
PAR 38-E  
about 20%  
ratings, and

## PAR 38-

Lamps
60W
60W
80W
80W
120W
120W
120W
120W
120W
120W

300W lamp  
patterns,  
Ideal for hig

## PAR 56 L

Lamps
300W
300W
300W
300W*

\*Suitable for u

## PRESSED GLASS LAMPS PAR38-E

Precision reflector lamps with 2000 hour average life. PAR 38-E produce the same useful light as previous PAR38 lamps, for about 20% less electricity. Available in various combinations of three ratings, and three beam angles.

### PAR 38-E LAMPS

Lamps	Voltage	Beam Angle		Clear	
				ES Cap	
60W	240V	Spot	12°	○	
60W	240V	Flood	30°	○	
80W	240V	Spot	12°	○	
80W	240V	Flood	30°	○	
120W	240V	Spot	12°	○	
120W	240V	Flood	30°	○	
120W	240V	Cool Spot	12°	○	
120W	110/120V	Spot	12°	○	
120W	110/120V	Flood	30°	○	
120W	24V	Spot	10°	○	



## PRESSED GLASS LAMPS PAR 56

300W lamps giving a powerful elliptical beam in a choice of three patterns. Ideal for high-mounted long-throw applications.

### PAR 56 LAMPS

Lamps	Beam Angle	Voltage	Clear	
			Cap GLX16d	Screw Terminal
300W	Narrow Spot 12° x 8°	240V	○	
300W	Medium Flood 25° x 11°	240V	○	
300W	Wide Flood 40° x 16°	240V	○	
300W*	Wide Flood 40° x 16°	12V		○

\*Available for underwater applications in appropriate luminaire.





Standard blown bulb reflector lamps in three sizes, including the clear-fronted R80 "Disco" type, generating a sparkling colour effect from the heat resistant transparent lacquer, and tough PAR 38-E.

### Coloured Display Lamps

Lamps	Voltage	Coloured	
		BC Cap	ES Cap
R63 40W Coloured	240/250V	Red, Blue, Green, Yellow	Red, Blue, Green, Yellow
R80 (R080) 60W Disco lamp	240/250V		Red, Blue, Green, Yellow, Amber, Violet
R95 75W Coloured	240/250V	Red, Blue, Green, Yellow	Red, Blue, Green, Yellow, Amber, Violet
Par 38-E 80W Coloured flood	240V		Red, Blue, Green, Yellow
Par 38-E 120W Coloured spot	240V		Red, Blue, Green, Yellow



For technical information please see page 474

## DISPLAY LAMPS

### TUNGSTEN HALOGEN AND LOW VOLTAGE TUNGSTEN HALOGEN

Mains voltage and low-voltage tungsten halogen display lamps combining the benefits of white light, extended life and good lumen maintenance. The small filaments of low-voltage types permit precise optical control to give high-intensity, pencil-beam accent lighting. Dichroic and coloured versions are available.

TYPE	Product	Technical
<b>LOW VOLTAGE HALOGEN SPOT LAMPS</b>		
Aluminium and coloured aluminium	216	475
<b>LOW VOLTAGE HALOGEN SPOT LAMPS</b>		
Closed dichroic	217	475
<b>HALOGEN FLOODLIGHT LAMPS</b>		
Double ended (K)	217	477
<b>HALOGEN DISPLAY LAMPS</b>		
Single ended	218	477
<b>HALOGEN FLOODLIGHT LAMPS</b>		
Single ended (IDE)	218	478
<b>LOW VOLTAGE HALOGEN CAPSULES</b>		
	219	478
<b>HALOGENA</b>	219	476

## LOW VOLTAGE HALOGEN SPOTLAMPS ALUMINIUM SPOTS



Integral polished aluminium reflector with protective front glass that isolates the quartz capsule and prevents soiling of the reflector. This combines with halogen technology to ensure constant white light output throughout the long 2000 hour life, while minimising ultra-violet fading of sensitive display materials.

4° and 6° pencil beam types give high beam intensities, ideal for longer throw pin-point display.

Available in various beam widths and wattages at 6V and 12V, with positive and 'user friendly' small bayonet cap mounting.

### LV Aluminium Spots

6V Lamps	Beam Angle at $\frac{1}{2}$ Peak	Diameter mm	SBC Cap
15W Narrow Spot	6°	37	○
15W Narrow Spot	4°	56	○
35W Narrow Spot	6°	56	○
35W Spot	14°	56	○

12V Lamps	Beam Angle at $\frac{1}{2}$ Peak	Diameter mm	SBC Cap
20W Narrow Spot	6°	37	○
20W Spot	18°	37	○
20W Flood	32°	37	○
50W Spot	10°	56	○
50W Medium	25°	56	○

For technical information please see page 475

## LOW VOLTAGE HALOGEN SPOTLAMPS COLOURED ALUMINIUM SPOTS



Integral polished aluminium reflector with coloured protective front glass. Available with 6° pencil beams, in 12V 50W ratings.

### 12V Coloured Aluminium Spots

Colour	Wattage	Beam angle at $\frac{1}{2}$ peak	Diameter mm	SBC Cap
Green	50	6°	56	○
Blue	50	6°	56	○
Amber	50	6°	56	○
Red	50	6°	56	○

**NEW PRODUCT – No technical section.**  
Please contact Philips Lighting for further information.

# LOW VOLTAGE HALOGEN SPOTLAMPS

## CLOSED DICHROIC SPOTS

Two-pin all-glass lamps with integral dichroic reflector that reduces forward heat throw by up to 60%, and creates a 'cool beam' ideal for heat sensitive display materials. The protective front glass isolates the quartz capsule and prevents soiling of the reflector. Discretely small, yet remarkably efficient, they add sparkle and power to display lighting. Available in various beam widths on the compact GZ4 and GX5-3 two-pin bases.

### LV Dichroic Spots

12V lamps	Beam angle at 1/2 peak	Diameter mm	Cap GX5.3	Cap GZ4
20W	10°	35	—	○
20W	20°	35	—	○
20W	30°	35	—	○
20W	7°	51	○	—
20W	12°	51	○	—
20W	36°	51	○	—
50W	8°	51	○	—
50W	13°	51	○	—
50W	24°	51	○	—
50W	28°	51	○	—
50W	38°	51	○	—
65W	13°	51	○	—
65W	38°	51	○	—



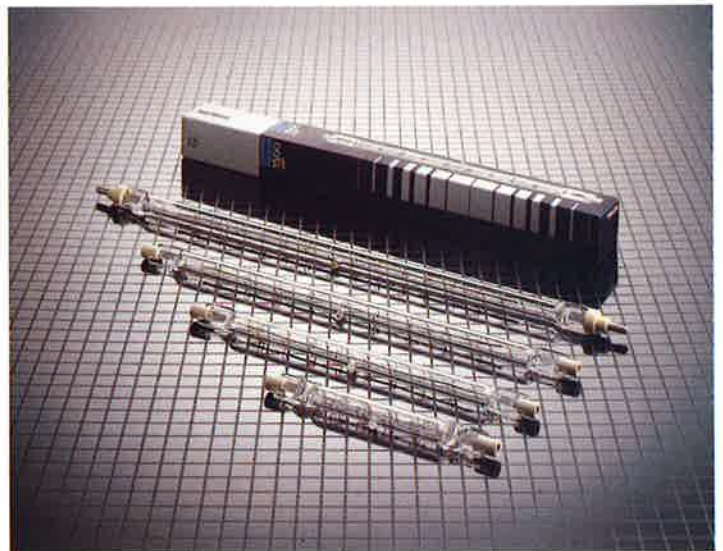
# HALOGEN FLOODLIGHT LAMPS

## DOUBLE ENDED (K)

Long-life floodlighting lamps for both external and indoor applications. Light output is up to 20% higher than GLS lamps of similar wattage. Suitable for compact lightweight luminaires, yet offering ratings as high as 2000W, with the particular advantage of instantaneous light when switched on and excellent colour rendering. The 200W K/11 is particularly useful because it is interchangeable with existing 300W and 500W lamps, giving an opportunity for energy cost savings where a lower light level is acceptable. It thus widens the field of application of popular, low-cost floodlighting luminaires.

### HALOGEN FLOODLIGHT LAMPS

Lamps	Voltage	Cap R7s-15
K/11 200W	240/250V	○
K/9 300W	240/250V	○
K/1 500W	115/120V	○
K/1 500W	240/250V	○
K/3 750W	240/250V	○
K/4 1000W	115/120V	○
K/4 1000W	240/250V	○
K/5 1500W	240/250V	○
K/6 2000W	240/250V	Cap Fa 4 ○





## HALOGEN DISPLAY LAMPS SINGLE ENDED



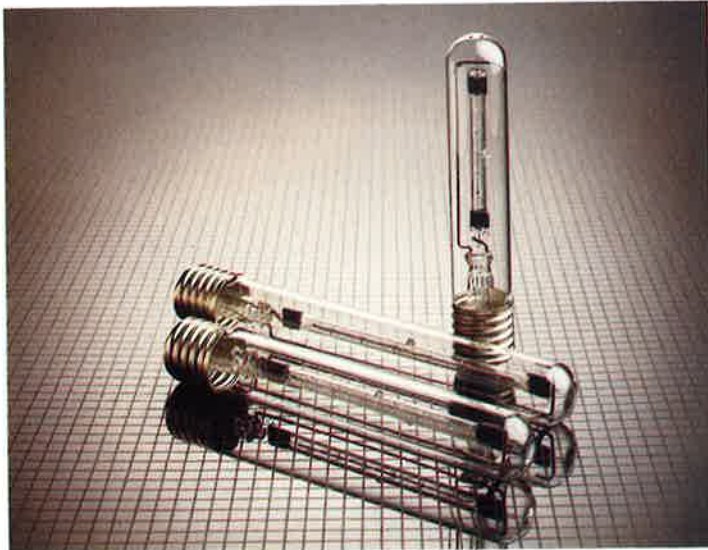
Compact light source offering the advantages of lasting, white illumination on mains voltage, with simple small bayonet fixing.

Lamps require no voltage transformer and can be used in any burning position, thus ideally suited for relatively lightweight luminaires, yet enabling formation of well-defined beam distribution.

### Mains Voltage Halogen Display Lamps Single Ended

240/250V Lamps	Wattage	SBC Cap	
		Clear	Frosted
M/77	75W	○	
M/78	100W	○	
M/79	150W	○	
M/77F	75W		○
M/78F	100W		○
M/79F	150W		○

## HALOGEN FLOODLIGHT LAMPS SINGLE ENDED (IDE)



2000 hour floodlighting lamps consisting of double-ended halogen lamps of various wattages, contained in thermal shock-resistant single-ended outer envelopes. These overcome the handling and installing difficulties normally associated with linear halogen lamps whilst permitting unusually high lumen output.

Indoors, the high colour temperature of these light sources is particularly suited to the illumination of studios, public halls, factories, sports halls and so on. Outdoors, their high luminous efficacy makes them ideal for illumination of sports grounds, car parks, building suites, public gardens, general displays etc.

### Halogen Floodlight Lamps Single Ended (IDE)

Lamps	Voltage	Cap GES
500W (IDE)	240/250V	○
500W (IDE)	110/120V	○
1000W (IDE)	240/250V	○
2000W (IDE)	240/250V	○

Compact,  
power sup  
economic  
luminaires

Halogen

12V Lar  
20W  
50W  
100W

24V Lar  
20W  
50W  
100W

Low-watt  
efficacy,  
lighting a  
envelope  
in any pos

240/250  
7  
7  
7  
7  
10  
10  
10  
10  
15  
15  
15

# LOW VOLTAGE HALOGEN CAPSULES

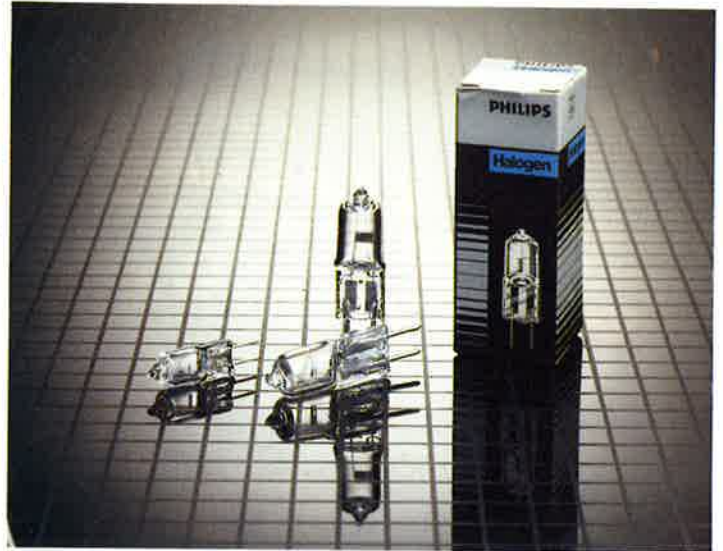
Compact, 2-pin halogen quartz capsules for operation on 12V and 24V power supply. With efficacies up to 25.5 lumens per watt they are an economical and practical light source for use within fixed reflector luminaires, desk lights etc.

## Halogen Capsules

12V Lamps		
	Cap G4	Cap GY6.35
20W	○	
50W		○
100W		○

24V Lamps		
	Cap G4	Cap GY6.35
20W	○	
50W		○
100W		○



# HALOGENA

Low-wattage halogen lamps bringing the benefits of high luminous efficacy, crisp white light and extended life (2000 hours) to general lighting applications. The linear quartz burner is enclosed in a glass outer envelope with a standard ES or BC cap. Halogena lamps may be operated in any position.

240/250V lamps	Bulb shape/finish	Cap BC	Cap ES
75W	Shaped/clear	○	
75W	Shaped/opal	○	
75W	Tubular/clear		○
75W	Tubular/opal		○
100W	Shaped/clear	○	
100W	Shaped/opal	○	
100W	Tubular/clear		○
100W	Tubular/frosted		○
150W	Shaped/clear		○
150W	Tubular/clear		○
150W	Tubular/frosted		○



For technical information please see pages 476 and 478



# COMPACT FLUORESCENT LAMPS

TYPE	Product	Technical
<b>SL* LAMPS</b> Directly replace GLS lamps	222	479
<b>SL*D, SL*DE, SL* Aqua, SL*DR Horticultural, SL*DER LAMPS</b>	223	480
<b>PL*CE LAMPS</b>	224	481
<b>PL*S LAMPS</b>	225	482
<b>PL*C LAMPS</b>	226	483
<b>PL*L LAMPS</b>	227	484

# SL LAMPS



Energy-saving compact fluorescent lamps which directly replace ordinary light bulbs in many existing luminaires and reduce electricity consumption to one-quarter. SL lamps have a rated average life of 8000 hours – eight times as long as ordinary filament lamps – minimising lamp replacement labour costs. They provide a similar quality of light to tungsten filament lamps.



For technical information please see page 479

**RANGE**

SL lamps are available with prismatic glass envelopes, and with ES or bayonet caps to fit existing lampholders, in the following ratings:

SL9W similar applications to 40W GLS

SL13W similar applications to 60W GLS

SL18W similar applications to 75W GLS

SL25W similar applications to 100W GLS

**LAMP COLOUR AND APPLICATIONS**

SL lamps use triphosphors from the Philips Colour 80 Series to provide high applications combined with good colour rendering.

Their colour appearance is warm and closely matched to that of tungsten filament lamps, making SL lamps suitable for commercial, industrial, public, leisure and domestic situations.

**SL'D**

Direct repl...  
Globe dec...  
indoor use...  
enclosed v...  
particular...  
luminaires...  
part of the...  
rating only...  
approxima...  
bulb, with...  
cap.

**SL'DE**

120mm gl...  
lightweigh...  
control gea...  
quick-start...  
efficiency...  
types. Avail...  
with outpu...  
100W filam...  
globe and

**SL'DER**

Globe lamp...  
electronic...  
reflector th...  
the immed...  
150W GLS...  
downlight...  
in 20W rat...  
reflector ar

**SL'Aqua**

Direct repl...  
Globe dec...  
unshaded...  
lamp forms...  
sealed to t...  
IP54; for u...  
rooms in c...  
luminaire...  
only, with...  
that of 60...  
globe and

**SL'R Home**

Globe lamp...  
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**APPLICA**

SLD lamps...  
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SLDE

## SL\*D LAMPS

SL\*D, SL\*DE, SL\*DER, SL\* Aqua,  
SL\*R Horticultural

**E**nergy-saving compact fluorescent lamps for decorative and professional use. The lamps can replace ordinary light bulbs in many existing luminaires, save up to 80% of the energy required for equivalent light output and last, on average, eight times as long. They provide a quality of light similar to tungsten filament lamps.

**SL\*D**  
Direct replacement for 120mm Globe decorative filament lamp for indoor use, or for outdoor use in enclosed waterproof luminaires; particularly useful in unshaded luminaires where the lamp forms part of the design. Available in 18W rating only, with output approximately that of 75W filament bulb, with opal globe and ES or BC cap.

**SL\*DE**  
120mm globe lamp with lightweight, quick-start electronic control gear giving flicker-free, quick-start operation and increased efficiency over non-electronic types. Available in 20W rating only, with output approximately that of 100W filament bulb, with opal globe and ES cap.

**SL\*DER**  
Globe lamp with quick-start electronic control gear and internal reflector that directs more light on to the immediate working plane than a 150W GLS lamp. For use as a downlighter or task light. Available in 20W rating only, with internal reflector and ES cap.

**SL\*Aqua**  
Direct replacement for 120mm Globe decorative lamp or for use in unshaded luminaires where the lamp forms part of the design. Lamp sealed to the Degree of Protection IP54; for unshaded use, e.g. in damp rooms in conjunction with an IP54 luminaire. Available in 13W rating only, with output approximately that of 60W filament bulb, with opal globe and ES cap.

**SL\*R Horticultural**  
Globe lamp with internal reflector for domestic use, functional lighting in industry and horticulture, especially for photoperiodic lighting in greenhouses where it can have the same effect as a 150W GLS lamp. Available in 18W rating only, with internal reflector and ES or BC cap.

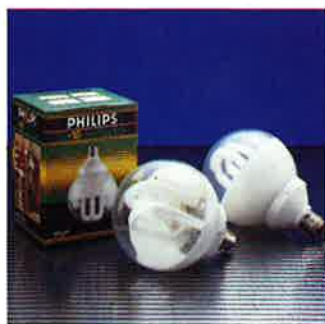
**LAMP COLOURS AND APPLICATIONS**  
SLD lamps use triphosphors from the Philips Colour 80 Series to provide high light output combined with good colour rendering. Their colour appearance is warm and similar to that of tungsten filament lamps, making SLD lamps suitable for commercial, industrial, public, leisure and domestic applications.



SLD lamps



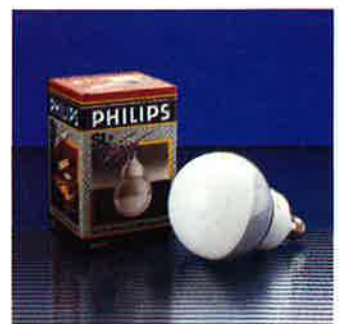
SL\*DE



SL\*DER



SL\*Aqua



SL\*R Horticultural

**For technical information please see page 480**

## PLC\*E LAMPS

Lightweight PL 'cluster' lamps with built-in quick-start electronic control gear and standard bayonet or Edison screw caps directly replace ordinary light bulbs in most existing luminaires, and reduce energy consumption to one-fifth. Rated average life is 8000 hours – eight times as long as ordinary GLS lamps – with similar colour appearance and quality.



For technical information please see page 481

### RANGE

Available in 7, 11, 15 and 20W ratings, corresponding approximately in light output to 40, 60, 75 and 100W filament lamps.

### LAMP COLOUR AND APPLICATIONS

PLC\*E lamps use triphosphor from the Philips Colour 80 Series to provide high light output combined with good colour rendering.

Their colour appearance is warm and similar to that of GLS filament lamps, making PLC\*E lamps suitable for commercial, industrial, public, leisure and domestic situations, particularly in luminaires where the slimline 'High-tech' appearance of the lamp can be used as a design feature.

These lamps are not suitable for use on dimming circuits.

### RANGE

Available in 5, 7, 11, 15, 20W ratings, corresponding approximately in light output to 25, 40, 60 and 75W filament lamps.

PLS lamps have caps with integrated electronic control gear to ensure that a lamp is fitted at each luminaire. They are suitable for use with ballast mounted luminaires. They are suitable for use on dimming circuits.

Recommended L23 and lamp

### LAMP COLOUR APPLICATIONS

PLS lamps use the Philips Colour 80 Series to provide high light output combined with good colour rendering.

Their colour appearance is warm and similar to that of filament lamps. They are suitable for commercial, industrial, public and domestic luminaires.

The G23 cap fits the lamp with integrated electronic control gear. Luminaires specified to maximise the benefits of these lamps are shown on pages 60, 61, 62, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

# PLS LAMPS COMPACT FLUORESCENT LAMPS

**M**iniaturised fluorescent lamps for use with external control gear in slimline, cool-running luminaires. PLS lamps are of similar light output and colour quality to that of GLS filament lamps, but last on average eight times longer and use only a quarter the electricity. Their small size, light weight and slim shape offer attractive opportunities for redesign of conventional luminaires.

**RANGE**  
Available in 5, 7, 9 and 11W ratings, corresponding approximately in light output to 25, 40, 60 and 75W filament lamps.

PLS lamps have two-pin G23 caps with integral starter to simplify embodiment wiring and to ensure that a fresh starter is fitted at each lamp change. They are for use with a small external ballast mounted within the luminaire. These lamps are not suitable for use in dimming circuits.

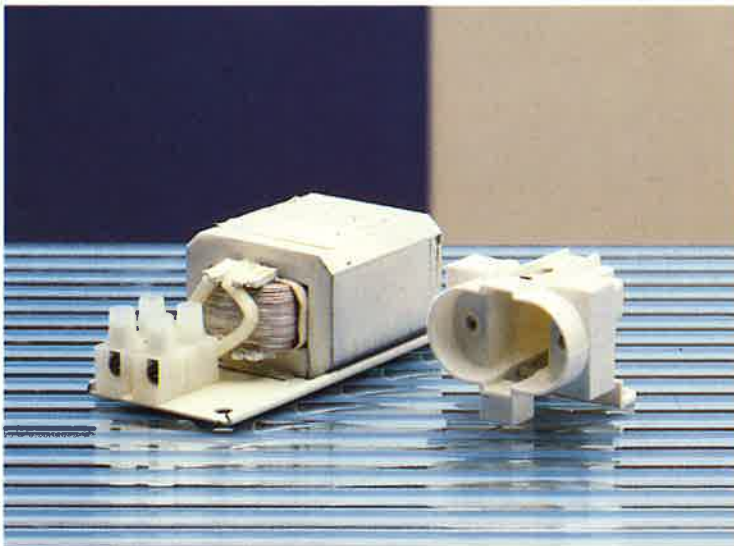
Recommended ballast BPL10 G23 and lampholder H28.

### LAMP COLOURS AND APPLICATIONS

PLS lamps use triphosphors from the Philips Colour 80 Series to provide high light output combined with good colour rendering.

Their colour appearance is warm and similar to that of tungsten filament lamps, making them suitable for commercial, industrial, public, leisure and domestic luminaires.

The G23 cap fitted to the PLS lamp with integral starter is an international standard. Philips luminaires specially designed to maximise the benefits of PLS lamps are shown on pages 55, 60, 61, 62, 67, 168, 169 and 170.

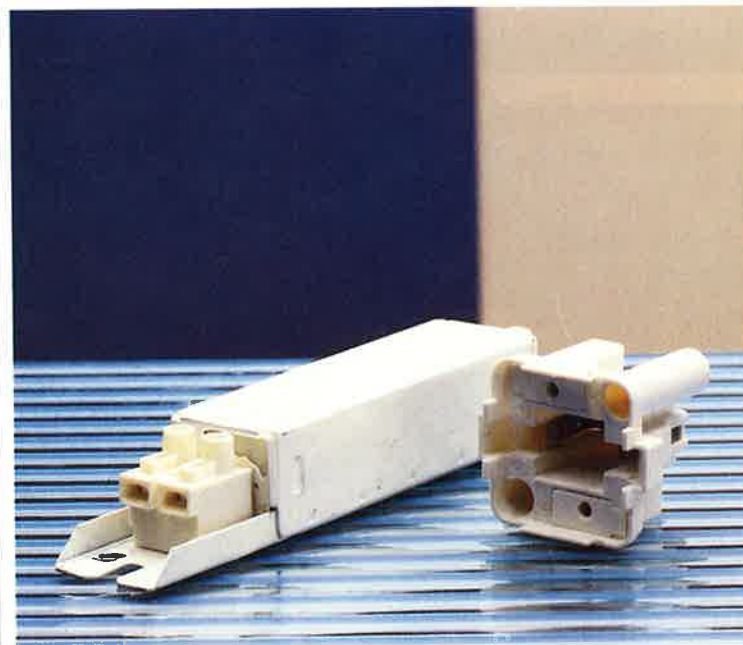


For technical information please see page 482



## PL\* C LAMPS

**PLC** 'cluster' lamps use Philips miniaturised fluorescent technology to produce a compact light source for table lamps, downlighters, desk lights, small decorative luminaires and energy-effective display luminaires. PLC lamps use one-fifth the energy of corresponding GLS filament lamps, and their eight-fold longer rated average life further reduces lighting costs by cutting maintenance labour.



For technical information please see page 483

### RANGE

Available in four ratings with the following approximate GLS equivalents:

PLC 10W replaces 60W GLS  
 PLC 13W replaces 75W GLS  
 PLC 18W replaces 100W GLS  
 PLC 26W replaces 100/150W GLS

### LAMP COLOUR AND APPLICATIONS

PLC lamps use triphosphors from the Philips Colour 80 Series to provide high light output combined with good colour rendering.

Their colour appearance is warm and closely matches that of tungsten filament lamps, making PLC lamps suitable for commercial, industrial, public, leisure and domestic situations.

They are fitted with the internationally standardised G24d series caps. Philips luminaires specially designed to maximise the benefits of PLC lamps are shown in the Display Lighting Section on pages 103, 106, 107, 111, 115, 116, 142 and 143.

### CONTROL GEAR

The starter is integral, fitted within the lamp cap, and is replaced together with the lamp.

As with conventional tubular fluorescent lamps, a separate ballast is required, mounted within the luminaire.

**RANGE**  
 The range covers the following ratings:

Lamp	Rating
PLL 18W	
PLL 24W	
PLL 36W	

### LAMP COLOUR APPLICATIONS

PLL 15mm diameter triphosphor Colour 80 Series light output good colour rendering available in general office applications 83 for food lighting.

A number of recessed Philips designed special lamps are available for information 13, 16, 17 and 18.

### CONTROL

Unlike other fluorescent lamps, they do not embody a separate starter and require no separate control gear. They have a

**RANGE**  
The range consists of three ratings:

Lamp	Output (100 hrs) lumens	Length mm
PLL 18W	1200	225
PLL 24W	1800	320
PLL 36W	2900	415

**LAMP COLOURS AND APPLICATIONS**

PLL 15mm lamps use phosphors from the Philips Colour 80 Series to provide high light output combined with good colour rendering. They are available in 'cool' Colour 84 for general office and industrial applications, and 'warm' Colour 83 for food, leisure and domestic lighting.

A number of surface and recessed Philips luminaires designed specifically for PLL lamps are available: for further information please refer to pages 13, 16, 17 and 25 respectively.

**CONTROL GEAR**

Unlike other Philips compact fluorescent lamps, PLL lamps do not embody ballasts or starters, and require conventional switch start control gear or HF ballasts. They have a 2G11 4-pin cap.

Higher rated compact PLL lamps are about half the length of ordinary fluorescent lamps giving comparable light output. The 36W lamp is 415mm long and emits 2900 lumens, enabling a twin-lamp 600mm square luminaire to compete with a conventional 4 x 18W luminaire of the same size and running cost. PLL lamps provide opportunities for innovative lighting design, especially by breaking away from uniform rows of luminaires.



For technical information please see page 484



# FLUORESCENT LAMPS AND GEAR

<b>TYPE</b>	<b>Product</b>	<b>Technical</b>
<b>GUIDE TO FLUORESCENT LAMPS</b>	230	—
<b>MAIN RANGE: T8 AND T12</b>	231	485
<b>HIGH FREQUENCY LAMPS</b>	232	489
<b>MINIATURE LAMPS</b>	234	490
<b>CIRCULAR LAMPS</b>	235	490
<b>CONTROL GEAR AND ACCESSORIES</b>	236	491

**POWERSLIMMER LAMPS**

PowerSlimmers are fluorescent lamps with krypton instead of the traditional argon filling. They use 8% less electricity than argon lamps of similar colour, to produce equivalent light output, thus achieving an immediate and permanent saving in running costs, without any rewiring, adaptors or other expenditure.

PowerSlimmers are plug-in replacements for existing lamps in most **switchstart** luminaires. They are available in all standard lengths from 600mm to 2400mm.

PowerSlimmers are available in White 35 and in triphosphors.

**COLOUR 80 SERIES TRIPHOSPHOR LAMPS**

Philips Colour 80 Series lamps use three blended phosphors to provide improved colour rendering, comparable with that of traditional De Luxe lamps, combined with a light output higher than for conventional 'high efficiency' lamps. Colour 80 Series lamps can thus replace De Luxe lamps in existing installations, giving higher light levels with no increase in energy use; or replace White lamps to give better colour quality.

**COLOUR 90 SERIES TRIPHOSPHOR LAMPS**

Colour 90 Series fluorescent lamps use triphosphors with additives for high-fidelity colour rendering (Ra8=95). These lamps are particularly appropriate for use in art galleries, museums, quality retail stores and prestige offices.

**COLOUR**

Colour 80 Series and Colour 90 Series lamps are available in two colour appearances to suit the application: Colour 84 and 94 create a 'cool' efficient environment for offices and public buildings; while Colour 83 and 93 have a 'warm' tone better suited to leisure areas, food and fashion retailing, hotels and restaurants. The lamps are electrically and mechanically identical.

Philips fluorescent lamps cover the full range of lighting requirements, both for new installations, using the luminaires described elsewhere in this catalogue, and for relamping existing installations.

The following pages provide an introduction and guide to the choice and specification of the most appropriate fluorescent lamp.

**ENERGY COST EFFECTIVENESS**

The largest single element of total lighting cost – up to 90% in some cases – is the cost of electricity, and this depends primarily on the type of lamp.

Fluorescent lamps are more efficient than filament lamps – by a factor of four or more – but there can be large differences in the energy cost effectiveness of different kinds of fluorescent lamp. The control gear built into the luminaires can also have an effect on running costs, and the new **High Frequency** systems offer cost savings combined with visual comfort. Such factors are particularly important when comparing today's optimum systems with existing lighting installed as recently as five or even three years ago.

The drive for lower operating costs in standard tubular fluorescent lamps is represented by two main lines of development:

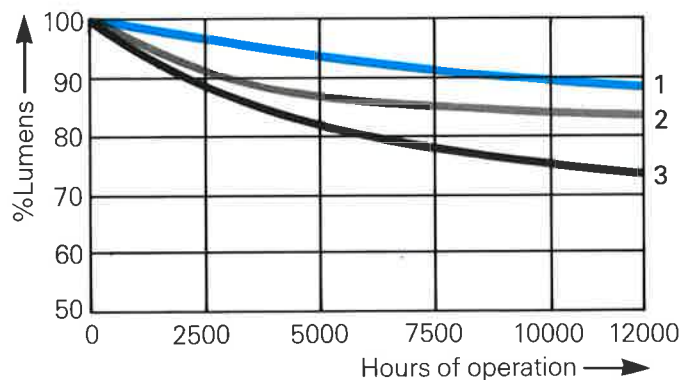
Philips PowerSlimmer energy saving lamps  
Philips high colour quality, energy-saving 'triphosphor' lamps

The main ranges of 38mm and 26mm diameter lamps, in both standard and high colour rendering types, are described on page 231.

Miniature and circular fluorescent lamps are shown on pages 234 and 235.

There are in addition two energy-related product developments described in more detail on later pages:

High Frequency operation (for further information please see page 232) Compact fluorescent lamps (page 221)

**Lumen depreciation**

1. HF Triphosphors 2. Triphosphors 3. Halophosphates

Colour 80 Series lamps are available in both conventional 38mm argon-filled form, for relamping existing De Luxe circuits to give more light for the same wattage; and as krypton-filled lamps that add an 8% energy saving of PowerSlimmer technology to other advantages of Colour 80 Series lamps.  
Colour 90 Series lamps are available in PowerSlimmer TLD and TLD HF form only.

**MATCHING TUNGSTEN LAMPS**

Triphosphor technology is used in Philips SL, PL and PLC compact fluorescent lamps, which fulfil similar functions to ordinary GLS filament lamps, but with one-quarter the electricity consumption and many times longer life. The triphosphors in these lamps are specially blended to achieve a light quality that **closely matches that of tungsten lighting**, providing both the warm colour appearance and the colour rendering of a filament lamp.

**'FIRST CHOICE' AND 'SECOND CHOICE' COLOURS**

Colour 80 Series and Colour 90 series triphosphors represent 'first choice' colours for most installations, since they provide the optimum combinations of light output and colour quality. White 35 is supplied as standard with Streamlite packs.

Philips also manufacture halophosphate lamps in 'second choice' colours which include most of the traditional De Luxe colours. Although now superseded by triphosphor lamps, De Luxe colours may be required for spot replacement into existing systems.

In addition, certain specialised colour matching duties require special phosphors such as Trucolor 38 and Northlight 55.

**TRIPHOSPHOR**

Triphosphor lamps are earth ph... light output... blue wavelen... spectrum. Th... to produce a... Deluxe colour... luminous eff... with high eff... halophosphor... can therefore... economies in... well as impro...

**Colour 80 s**

(Ra8 = 85) p... colour rende... establishme... factories eng... colour-critic...

**Colour 90 s**

(Ra8 = 95) p... colour rende... museums, re... office enviro...

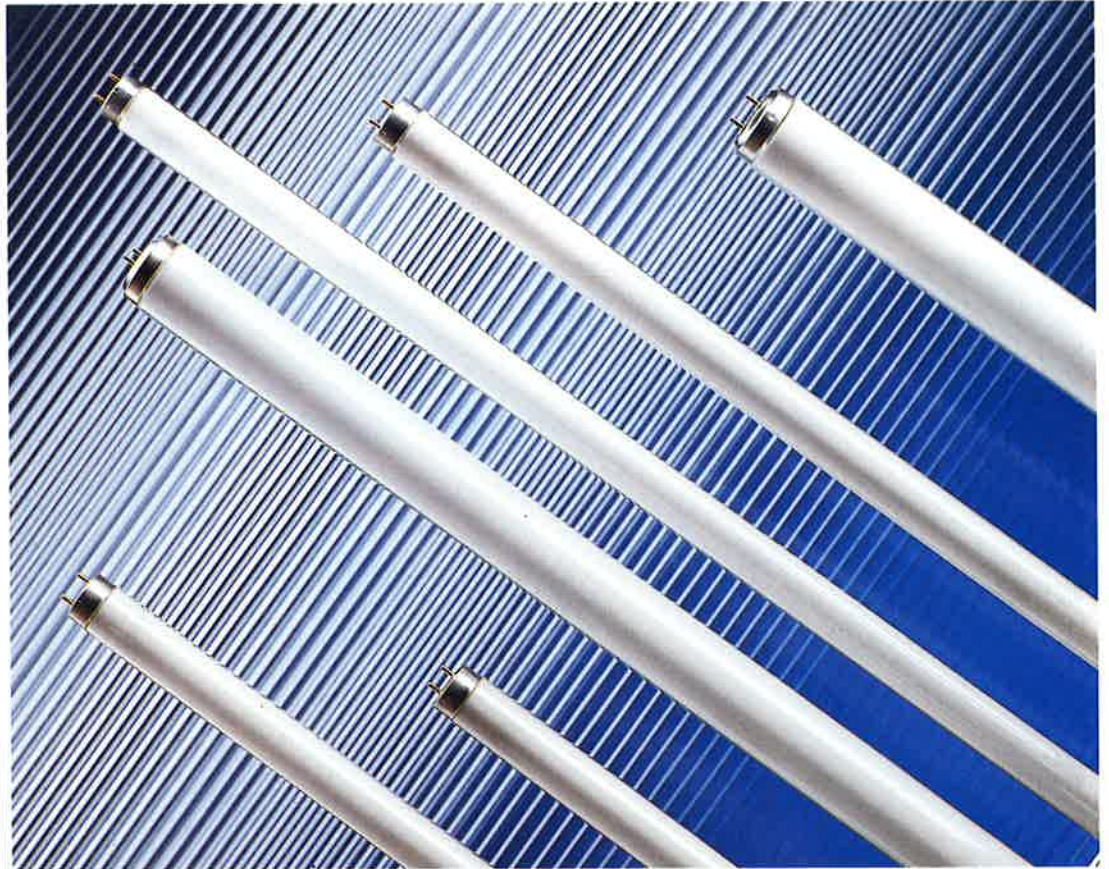
Both lamps a... 4000K (Colo... (Colour 94)... 83, Colour 9...

**COMPARIS HIGH EFFI TRIPHOSPHOR****Light output (58W lamps)****Colour Ren**

## STANDARD FLUORESCENT LAMPS

### MAIN RANGE (T8 AND T12)

A comprehensive range of standard linear fluorescent lamps, available as krypton-filled lamps for new installations, and as argon-filled lamps for replacement in special circuits.



#### LENGTHS AND RATINGS

Length	Krypton PowerSlimmer (most 26mm dia.)	Argon filled (All 38mm dia.)
600mm	18W	20W
1200mm	36W	40W
1500mm	58W	65W
1800mm	70W	75/85W
2400mm	100W	125W

#### APPLICATION RECOMMENDATIONS

Krypton PowerSlimmer lamps are recommended for new installations and for re-lamping most existing **switchstart** circuits.

Argon-filled 38-mm diameter lamps are mainly for replacement into older starterless circuits, including dimming and emergency lighting systems, and for low temperature use.

15W 450mm and 30W 900mm lamps (argon-filled 26mm diameter) are also available as replacement lamps.

#### COLOUR CHOICE

The five principal lengths are available as high colour rendering triphosphor lamps in the Philips Colour 80 Series, or as high-efficiency White 35 halophosphate lamps for general utility purposes.

These **'first choice'** colours are supplied in both krypton-filled PowerSlimmer types, recommended for all new installations, and in argon-filled types for re-lamping existing installations.

High-fidelity Colour 90 lamps are available in PowerSlimmer TLD and TLD High Frequency types.

Many lamps are also available in **'second choice'** halophosphate colours, including De Luxe types, for spot replacement of lamps into existing installations.

Specialist lamps are also available, including the Trucolor 38 and the Northlight 55 designed for critical colour matching purposes.

#### TRIPHOSPHOR LAMPS

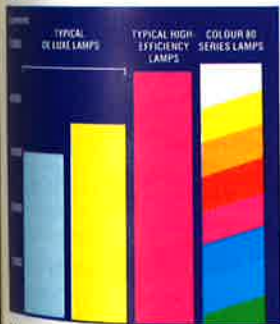
Triphosphor lamps use a blend of rare earth phosphors with high light output at the red, green and blue wavelengths of the spectrum. The colours combine to produce a white light of Deluxe colour rendering at a luminous efficacy associated with high efficiency halophosphate lamps. The lamps obtain therefore considerable economies in energy costs as well as improving visual amenity.

**Colour 80 series lamps** (Ra8=85) provide Deluxe colour rendering for offices, retail establishments, hotels and factories engaged in colour-critical work.

**Colour 90 series lamps** (Ra8=95) provide high-fidelity colour rendering for art galleries, museums, retail and prestigious office environments.

Both lamps are available in 4000K (Colour 84), 3800K (Colour 94) and 3000K (Colour 83, Colour 93) versions.

#### COMPARISON OF DE LUXE, HIGH EFFICIENCY AND TRIPHOSPHOR LAMPS



Light output at 2000 hours (58W lamps)

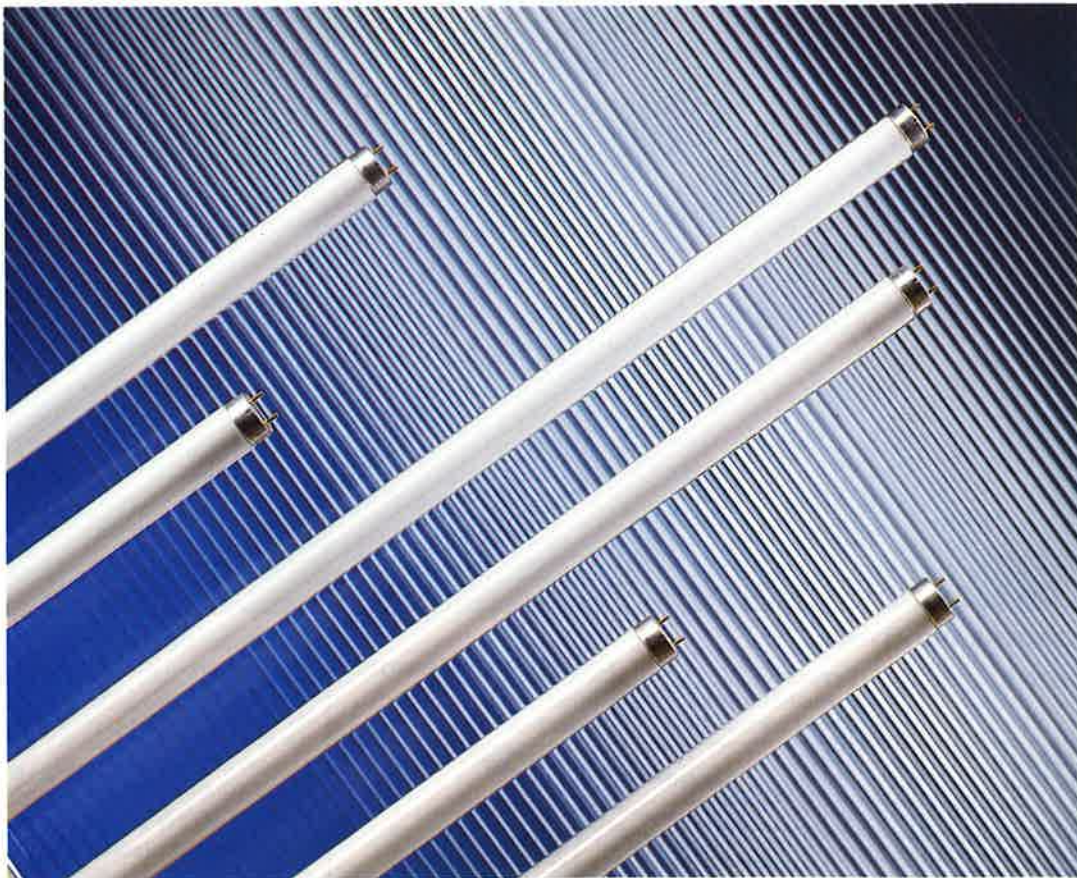


Colour Rendering Index (Ra 8)

## HIGH FREQUENCY FLUORESCENT LAMPS



Philips High Frequency lamps and luminaires provide important advantages over conventional fluorescent lighting, including energy cost savings of typically 30%; fast flicker-free starting; stable operation at lower temperatures; and the colour rendering of Philips Colour 80 Series lamps. Unlike ordinary fluorescent lighting, Philips HF lighting operates at a frequency of 28,000Hz, although it uses ordinary mains supply. An electronic ballast within the luminaire automatically converts 50Hz to 28,000Hz, giving reduced energy losses in the gear and also driving the lamps more efficiently.



### HF LAMPS

HF lamps have several major advantages over standard lamps in addition to energy saving. They are also much less susceptible to losing light output with age or rising temperatures. The latter point is particularly relevant for closed luminaires. In cold conditions HF lamps are particularly resistant to striation (light and dark bands appearing along the tube), and have higher light output.

The high operating frequency has the additional benefit of removing the usual ripple in light output which occurs with fluorescent lamps operated at mains frequency. In HF lamps the persistence of the lamp



**RANGE**  
HF lamps are available in the following colours:  
**Colour 84**  
Length V  
600mm 1  
1200mm 3  
1500mm 5  
1500mm 6  
**Colour 94**  
Length V  
1200mm 3  
1500mm 5  
**Colour 93**  
Length V  
1200mm 3  
1500mm 5  
Light output measured under conditions a  
HF lamps are available in luminaire gear.  
only in luminaire gear.  
Philips High Frequency lamps are available in standard Colour 84 triphosphor lamps. (For further information on colours, please refer to page 230).

**5FT 60W LAMP**  
A particular advantage of the Philips High Frequency lamp is that high light output is obtained from smaller lamps. This is due to the fact that the light output of a 1500mm triphosphor lamp is equivalent to that of a 2400mm triphosphor lamp. This is especially so in the HF lamp because of the depreciation of light output with age. Therefore, the Philips High Frequency luminaire, 1500mm long, will give the same light output as a standard luminaire, 2400mm long.

**HF LUMINAIRES**  
The most widely used luminaire in each of the Philips High Frequency fluorescent lamp series is the HF version described in the relevant product literature. For further information on the index page of the Philips High Frequency fluorescent lamp series.

**For technical information please see page 489**

# HIGH FREQUENCY FLUORESCENT LAMPS

phosphor is longer than one cycle of the 28,000Hz frequency. This can be a major advantage in some applications where the ripple could otherwise cause stroboscopic effects – for example, misleading impressions of speed with rotating machinery, and fast-moving objects seen as a series of blurred stills. Other benefits include low sensitivity to mains voltage variations. Starting is reliable and takes less than a second even in cold conditions. At the end of lamp life, an automatic cut-out eliminates the annoying flashing of a lamp that can no longer start.

## ENERGY EFFECTIVENESS

The total consumption of HF lamp and ballast is considerably less than that of conventional fluorescent lighting, typically saving 30% of energy cost for equivalent light output. Even more savings are available for air conditioned buildings, where a smaller capacity plant could be installed owing to the reduced heat load from the HF lighting.

The HF system offers particular advantages in twin lamp luminaires, because a single ballast drives two lamps instead of the two separate ballasts in conventional luminaires.

The following table compares HF energy effectiveness against conventional lamps in a widely used luminaire type. This highlights the halving of control gear losses, and the big jump in light output versus power consumed by the complete lamp/luminaire system.

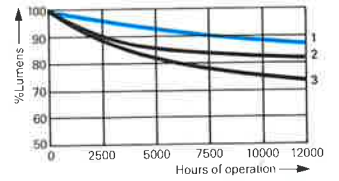
**Efficacy comparisons for representative 1500mm twin-lamp luminaires with Philips Colour 84 lamps**

	Traditional luminaire with 38mm MCF lamps	Philips 26mm PowerSlimmer TLD lamps and switchstart luminaire	Philips HF lamps and luminaires
Lamp wattage	2 x 65W	2 x 58W	2 x 50W
Control gear losses	2 x 14W = 28W	2 x 12W = 24W	1 x 11W = 11W
Total consumption	158W (taken as 100%)	140W (saving 8%)	111W (saving 29%)
Light output	2 x 4900 = 9800 lumens	2 x 5100 = 10,200 lumens	2 x 5100 = 10,200 lumens
Overall efficacy	62 lm/W	73 lm/W	92 lm/W

The exceptional cost effectiveness of HF lighting makes it particularly suitable where lighting is used 24 hours a day, 365 days a year, as for example in airport and harbour terminals; and for applications such as retailing, where a great deal of light is required over a large area. The energy cost saving yields rapid payback, typically within the life of the first set of lamps.

## LUMEN MAINTENANCE

Depreciation rates under controlled conditions are compared in the following graph.



1. HF Triphosphors 2. Triphosphors 3. Halophosphates

**RANGE**  
HF lamps are available in the following colours and ratings:

**Colours 84, 83**

Length	Wattage	Light Output
1200mm	16W	1300 lm
1300mm	32W	3200 lm
1500mm	50W	5100 lm
1500mm	60W	6100 lm

**Colour 94**

Length	Wattage	Light Output
1200mm	32W	2200 lm
1500mm	50W	3400 lm

**Colour 93**

Length	Wattage	Light Output
1200mm	32W	2200 lm
1500mm	50W	3500 lm

Light output is average, measured under standard conditions at 2000 hours.

HF lamps are suitable for use only in luminaires fitted with Philips High Frequency control gear.

HF lamps are available in Philips standard Colour 80 Series phosphor colours: 'cool' Colour 84 and 'warm' Colour 83. For further information on lamp colours, please refer to page 230.

### HF 60W LAMP

A particular advantage resulting from the enhanced total circuit efficacy of the Philips HF system is that high light output can be obtained from lower wattage lamps. This in turn enables a given light output to be obtained from smaller luminaires.

Thus a 1500mm 60W High Frequency lamp can produce 6100 lumens – as much light as many 1800mm and even some 2400mm traditional lamps, especially after taking account of the HF lamp's lower lumen depreciation over its life. For this reason, there are no 1800mm HF luminaires, but 60W versions of 1500mm luminaires.

### HF LUMINAIRES

The most widely used luminaires in each of Philips principal fluorescent ranges are available in HF versions. These are described in more detail on the relevant product pages; for further information, please refer to index pages 3, 21 and 27 'Fluorescent Lighting'.



## MINIATURE FLUORESCENT LAMPS

Short and slender fluorescent lamps providing a long-life economical alternative to filament striplights in slim-line amenity and task lighting applications, and for use in illuminated equipment.



### RANGE

Rating	Length	White 35	Warm White 29	Cool White 33
4W	150mm	—	Yes	Yes
6W	225mm	Yes	Yes	Yes
8W	300mm	Yes	Yes	Yes
13W	525mm	Yes	Yes	Yes

### COLOUR AND APPLICATIONS

The usual lamp colour for miniature fluorescent lamps is White 35, combining the advantage of high efficiency with satisfactory colour rendering for most purposes. Alternatively available in Warm White 29 and Cool White (Daylight) 33.

Applications include fluorescent striplights and bulkhead luminaires for illuminating mirrors, alcoves and other small spaces; and for exhibition, store signs and similar equipment.

### COLOUR AND APPLICATIONS

The lamp colour is White 29, which combines high output with a pleasing appearance, suitable for domestic lighting.

Circular lamps are convenient for use in vending machines and for equipment.

### RANGE

Available in three sizes:

**Wattage**  
22W  
32W  
40W  
60W

All lamps are available in four-pin cap conventional gear.

## CIRCULAR FLUORESCENT LAMPS

Circular fluorescent lamps have the long life and high efficacy associated with fluorescent lamps, combined with a convenient shape for applications where a linear lamp is unsuitable.

### COLOUR AND APPLICATIONS

The lamp colour is Warm White 29, which combines high light output with a warm colour appearance, for commercial and domestic lighting applications.

Circular lamps provide a convenient light source for signs and for equipment such as vending machines.

### RANGE

Available in four ratings and three sizes:

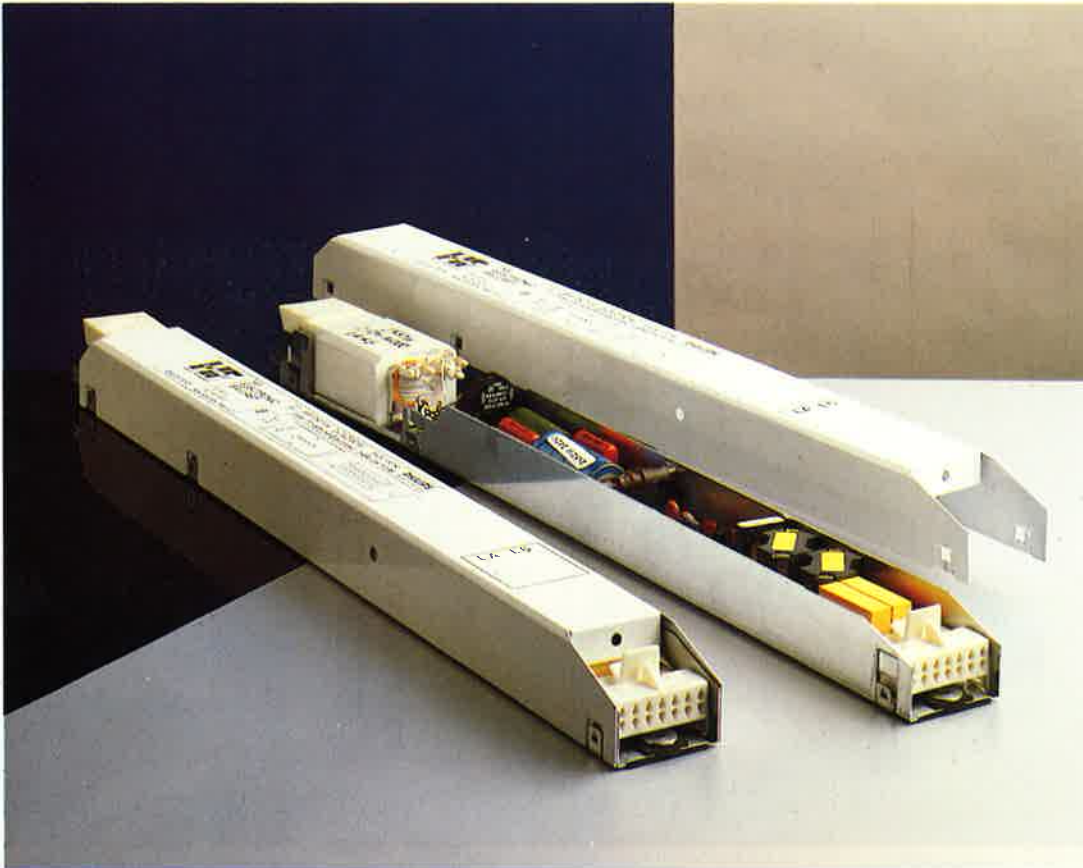
Wattage	Nominal overall diameter
22W	210mm
32W	305mm
40W	406mm
60W	406mm

All lamps are fitted with G10q four-pin caps and operate from conventional switchstart control gear.



## FLUORESCENT CONTROL GEAR AND ACCESSORIES

**H**igh Frequency (HF) and HF Regulation (HFR) ballasts represent the way ahead for fluorescent control gear. In addition, there are comprehensive ranges of starters, ballasts, capacitors and accessories available as spares for conventional mains frequency luminaires.



*High Frequency (HF) ballast*



*High Frequency Regulation (HFR) ballast*



*Mains frequency control gear components and accessories*

### HF SYSTEM

The Philips HF system provides energy cost savings up to 30% compared with ordinary fluorescent lighting, and has many additional benefits described on page 232. The electronic ballast raises the mains frequency to the HF operating frequency of 28,000Hz.

HF ballasts are available for the operation of TL HF lamps and the 36 watt PLL lamp.

### HFR SYSTEM

The Philips HF Regulating system provides the same benefits as HF and in addition provides flexibility and further energy savings. With Philips High Frequency Regulation you can vary the light output levels of fluorescent lighting from 10% to 100% of full output. (25-100% for 36W PLL and 16W TLD.)

HFR ballasts are available for the operation of TL HF lamps and the 36 watt PL range.

Daylight linking via photo-cell light sensors can provide a total cost saving of up to 60% compared with conventional fluorescent lighting.

For HFR Controls please refer to page 181 of this catalogue.

### MAINS CONTROL GEAR

Conventional starters and ballasts as well as power factor capacitors and series capacitors are available for operation of standard fluorescent lamps from the 4W miniature types up to 2400mm 125W lamps.

The technical pages at the rear of this catalogue also contain details of fluorescent lamp **circuits** (please see page 492).

Many electrical and mechanical accessories such as lampholders and lamp clips are also listed.



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e page 491

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lampholders  
also listed



TYPE	Product	Technical
<b>INTRODUCTION: TYPES AND WATTAGES</b>		
Choice for colour rendering and efficiency	240	—
Life expectancy and lumen depreciation	241	—
Discharge lamps comparison chart	241	—
<b>SOX-E ECONOMY LOW PRESSURE SODIUM</b>		
	242	495
<b>SOX LOW PRESSURE SODIUM</b>		
	242	495
<b>SON, SON-T, SON COMFORT, SON-T COMFORT HIGH PRESSURE SODIUM</b>		
	243	497
<b>SON PLUS, SON-T PLUS HIGH PRESSURE SODIUM</b>		
	244	498
<b>SDW-T WHITE SON</b>		
	245	499
<b>SON-H PLUG-IN SON LAMPS</b>		
	246	500
<b>HPL AND HPL COMFORT MERCURY FLUORESCENT LAMPS</b>		
	247	501
<b>HPI METAL HALIDE LAMPS</b>		
	248	503
<b>MHN-TD AND MHW-TD DOUBLE-ENDED METAL HALIDE LAMPS</b>		
	249	505
<b>MERCURY BLENDED LAMPS</b>		
	250	506
<b>CONTROL GEAR AND ACCESSORIES</b>		
SOX/SOX-E lamp gear	251	507
High pressure sodium lamp gear	252	509
HPL and HPI lamp gear	253	511
Hermes 2 pre-wired gearbox	254	513
Indoor gearbox range	255	514

LAMP MARKINGS	UK marking	Philips International marking
Mercury fluorescent	MBF MBF/U	HPL-N HPL-N
Mercury fluorescent reflector	MBFR	HPL-R
Metal halide	MBI	HPI
Mercury blended	MBTF MBTF/R	ML MLR

**LOW PRESSURE SODIUM**

Low pressure sodium lamps provide the highest efficacy and therefore the lowest operating cost of all light sources.

The characteristic yellow colour has significant advantages in applications such as road lighting and security lighting, because the human eye achieves higher visual acuity under this particular monochromatic light than under a similar low level of white light.

**HIGH PRESSURE SODIUM SON**

An excellent combination of high efficacy and adequate colour rendering for a very wide range of applications, especially where energy cost effectiveness is important.

Its colour appearance is most attractive for such purposes as industrial lighting, residential street lighting and other public amenity uses.

SON lamps will operate at extremely low temperatures.

**SON Comfort**

SON Comfort lamps provide improved colour rendering, while retaining the advantage of low electricity cost.

**SON Plus**

SON Plus lamps provide improved luminous efficacy, increasing the energy-saving benefits of SON Lighting.

**SDW-T White SON**

White SON is a new generation in high pressure sodium lamps, providing a high colour rendering index of 80, especially suitable for display and accent lighting giving good colour definition.

Discharge lighting is versatile, reliable and cost effective, and much cheaper to run than other forms of lighting.

Discharge lamps are available in ratings from 18W to 2kW, giving light outputs up to 189,000lm.

Such lamps are exceptionally energy effective: low pressure sodium lamps – the world's most efficient light source – can achieve efficacies as high as 200lm/W, making them specially attractive for street lighting and other energy intensive applications.

Choice between the different types of discharge lighting rests mainly upon the relative importance of first cost, electricity cost and colour/quality of the light, in which there are wide variations.

The following notes provide only an outline of discharge lamp characteristics, and users are recommended to consult specific product pages for additional information relevant to lamp choice.

**MERCURY FLUORESCENT HPL**

A good low-cost source where white light is required. HPL lamps are relatively inexpensive to buy and install, and achieve economic running cost for most general purposes.

A particular advantage is the wide range of power ratings available.

**HPL Comfort**

HPL Comfort adds to HPL properties improved colour rendering and appearance with colour temperature on the black body locus.

**METAL HALIDE**

The optimum choice for energy effectiveness when high colour quality is required, such as prestige commercial and leisure applications, department stores and lighting of major sports venues for colour TV broadcasting.

**HPI**

HPI lamps are widely employed in colour-critical industrial applications, for example in the printing industry.

**MHN and MHW**

These lamps are smaller low wattage versions of metal halide lamps with similar colour characteristics designed specifically for display use.

**MERCURY BLENDED**

An energy cost effective alternative to tungsten filament lighting, giving similar colour appearance and colour rendering at very much lower electricity cost.

They also dramatically cut maintenance labour costs, giving a service life of typically 6000 hours.

**LIFE EXPECTANCY****LUMEN DEPRECIATION****DISCHARGE****LAMP LIFE****INDEX**

## LIFE EXPECTANCY AND LUMEN DEPRECIATION IN DISCHARGE LAMPS

Lamp life is a very complex subject. In order to give some assistance for light technical and economic calculations, we show the typical curves of life survival, lumen depreciation and economic service based on tests carried out by our Quality Department Light (QDL).

- 1. Life Survival Curve** – The average life expectancy of a large batch of lamps under controlled laboratory test conditions.
- 2. Lumen Depreciation Curve** – The average fall-off in lumen output of a batch of lamps measured over a specific period of time. The initial light output is measured after 100 hours operation and subsequently at regular intervals with the lamps operated at nominal wattage by controlling the input supply to the lamp.
- 3. Economic Service Curve** – The additive percentage value of the

Life Survival Curve and the Lumen Depreciation Curve after a period of time, e.g. assuming at 8000 hours a life survival figure is given as 90% (10% failures) and a corresponding lumen depreciation figure is 90% (10% lumen fall in light output) the resultant economic service figure is determined as 80%. This figure of 80% means that the original installation is now running at 20% below its design efficiency. Applied to an indoor industrial scheme designed to give 400 lux initial lighting level, this means that after 8000 hours the lighting level will have fallen to 320 lux (this does not include depreciation due to accumulation of dust or non maintenance schedules).

**The Average Rated Life** – The average rated life obtained from large representative groups of lamps under controlled conditions, at five or more burning hours per switch. It is based on the survival of at least 50% of the lamps and allows for

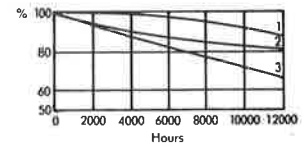
individual lamps or groups of lamps to vary from the average.

However, life obtained in service can vary due to a number of parameters such as:

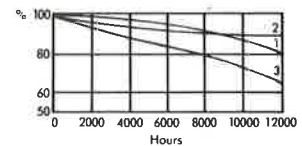
- Switching cycle
- Mains voltage (plus tolerances)
- Burning position (horizontal or vertical)
- Mechanical influence (vibration, shocks)
- Ambient temperature (free burning, enclosed)
- Luminaire and gear specifications.

The information above is intended to give practical guidance to the user or specifier in determining the replacement lamp cycle best suited to his needs, based on the particular condition of the installation in question. With all installations, group replacement of lamps will generally reduce total cost by reducing the labour cost content in changing individual lamps when these fail.

The technical information pages for discharge lamps include the curves described above for each lamp type. To assist understanding, two examples are shown here:



**HPL Comfort**



**SON and SON-T**

The life survival, lumen depreciation and economic service curves shown are indicative of one lamp wattage, and may not accurately represent all wattages in the range.

## DISCHARGE LAMPS COMPARISON CHART

Lamp Type	Philips International Marking	UK Marking	Lowest Rating	Light Output (2000 hours)	Highest Rating	Light Output (2000 hours)	Colour Appearance/CCT	Colour Rendering/Ra 8	Typical System Efficacy	Notes
Low Pressure Sodium	SOX	SOX	35W	4300 lm	180W	31,500 lm	Deep Yellow/NA	Nil/NA	130 lm/W	Low energy cost
Low Pressure Sodium	SOX-E	SOX-E	18W	1710 lm	131W	24,700 lm	Deep Yellow/NA	Nil/NA	170 lm/W	Lowest energy cost
High Pressure Sodium	SON SON/T	SON SON/T	50W 50W	3100 lm 3600 lm	1kW 1kW	110,000 lm 123,000 lm	Golden White/2000K	Fair/20	105 lm/W	Excellent energy cost effectiveness in general applications
High Pressure Sodium (Colour Improved)	SON SON/T	SON SON/T	150W 150W	11,000 lm 12,000 lm	400W 400W	30,000 lm 32,000 lm	Warm White/2150K	Good/60	80 lm/W	
High Pressure Sodium (Plug-in)	SON-H	SON-H	210W	17,250 lm	350W	32,600 lm	Golden White/2000K	Fair/20	90 lm/W	
High Pressure Sodium (White SON)	SDW-T	SDW-T	35W	1300 lm	100W	4080 lm	Warm White/2500K	Very Good/80	45 lm/W	
Mercury Fluorescent	HPL-N	MBF/U	50W	1700 lm	2kW	110,000 lm	Cool White/4000K	Fair/45	50 lm/W	Modest initial cost and running cost
Mercury Fluorescent	HPL Comfort	MBF Deluxe	50W	1890 lm	400W	22,800 lm	White/3300K	Good/60	55 lm/W	
Metal Halide	HPI	MBI	250W	13,600 lm	2kW	166,530 lm	White/3-4000K	Very Good/70	80 lm/W	Ideal for colour critical uses
Metal Halide	MHN/TD MHW/TD	HQITS	70W	5000 lm	250W	20,000 lm	Cool/Warm White/3-4000K	Very good/70	80 lm/W	Ideal for colour critical display
Mercury Blended	ML/MLR	MBTF/ MBTF/R	100W	1000 lm	500W	14,000 lm	White/3500K	Good/55	30 lm/W	Economically replaces GLS



## SOX-E AND SOX LOW PRESSURE SODIUM LAMPS

The low pressure sodium lamp is the most efficient light source known, giving exceptionally low running cost for energy intensive applications such as road lighting and all-night security lighting. Philips SOX-E (Economy) technology has produced a further rise in efficacy to more than 200 lm/W, while retaining interchangeability with ordinary SOX lamp control gear.



### CHARACTERISTICS AND APPLICATIONS

Low pressure sodium lamps produce a characteristic yellow light, and are therefore suitable for applications where long life and energy cost effectiveness are more important than colour rendering. Colour quality is identical for SOX-E and SOX.

Lighting schemes designed around SOX-E lamps can achieve 30% lower electricity cost than ordinary SOX lighting.

### RANGE

SOX-E lamps are mechanically interchangeable with ordinary SOX lamps of the following ratings:

SOX-E 26 replaces 35W SOX  
SOX-E 36 replaces 55W SOX  
SOX-E 66 replaces 90W SOX  
SOX-E 91 replaces 135W SOX  
SOX-E 131 replaces 180W SOX

There is also a SOX-E 18W lamp which gives 40% more light than a 100W GLS filament lamp, yet with a total circuit power of only 25W.

Efficacy and light output depend on control gear employed, and users are advised to refer to the technical section at the back of this catalogue for further information on compatibility of SOX-E and SOX systems.

### CHARACTERISTICS AND APPLICATIONS

SON lamps produce a golden-white light, pleasant to the eye, and adequate colour rendering for many industrial purposes. They are excellent for floodlighting, colour quality appearance, stone work, and are low.

They operate at low temperatures, making them suitable for exposed locations.

### RANGE

High pressure sodium lamps are available in ratings from 100W to 1000W in both SON and SON (SON) and are available very easily for distribution.

Floodlighting SON Comfort and elliptical SON in 150, 250 and 400W.

All SON lamps require external ballast gear and 50W and 70W lamps are principally available with ignitors that require no wiring.

## SON/SON-T AND SON/SON-T COMFORT HIGH PRESSURE SODIUM LAMPS

High pressure sodium lamps combine extremely high efficacies – up to 112 lm/W – with an attractive colour quality that makes them ideal for industrial, public amenity and outdoor lighting. Their low energy cost makes them particularly suitable for applications where a large amount of lighting is in continuous use. An improved colour rendering range designated SON Comfort is also available.

### CHARACTERISTICS AND APPLICATIONS

SON lamps produce a warm golden-white light that's pleasant to work under and gives adequate colour rendering for many industrial and amenity purposes. The higher powered lamps are excellent for floodlighting because their colour quality enhances the appearance particularly of stonework, and running costs are low.

They operate reliably at temperatures down to  $-40^{\circ}\text{C}$ , making them ideal for cold, exposed locations.

### RANGE

High pressure sodium lamps are available in ratings from 50W to 1000W in both elliptical form (SON) and as tubular lamps that enable very exact control of light distribution, for example in floodlighting (SON-T).

SON Comfort lamps in tubular and elliptical form are available in 150, 250 and 400W ratings.

All SON and SON/T lamps require external control gear, but 50W and 70W elliptical types are principally available with internal ignitors that simplify installation wiring.



For technical information please see page 497

## SON PLUS/SON-T PLUS HIGH-OUTPUT HIGH PRESSURE SODIUM LAMPS

A range of high-pressure sodium lamps with improved luminous efficacy to increase their energy-saving potential in industrial, public amenity and outdoor lighting.



### CHARACTERISTICS AND APPLICATIONS

SON Plus and SON-T Plus lamps produce a pleasing golden-white light with colour rendering adequate for many industrial and amenity purposes. SON-T lamps permit close optical control in floodlight projectors for low-energy floodlighting.

All SON Plus and SON-T Plus lamps operate reliably at temperatures down to  $-40^{\circ}\text{C}$ , making them ideal for cold, exposed locations.

### RANGE

Available in the following ratings:

SON Plus (elliptical outer envelope, white diffusive coating):-  
150W

SON-T Plus (clear tubular outer envelope):-  
70W, 150W

### CHARACTERISTICS AND APPLICATIONS

SDW-T White warm colour provide excellent rendering. They are used to indoor use and downlighting as an energy saving maintenance free and effective PAR-38 spot bowl mirror high-voltage

### RANGE

SDW-T 35W  
SDW-T 50W  
SDW-T 100W

All lamps require gear.

**CHARACTERISTICS AND APPLICATIONS**

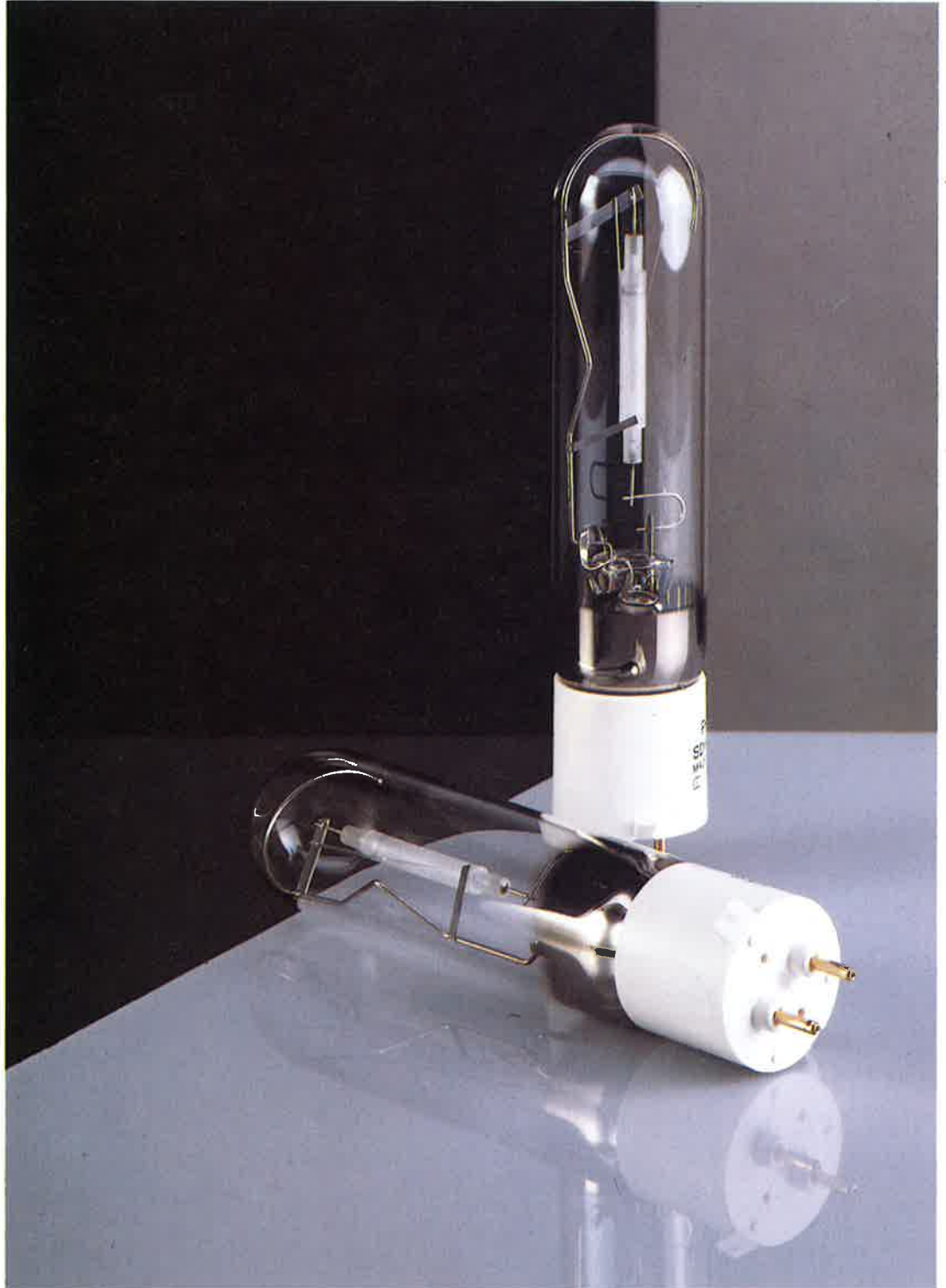
SDW-T White SON lamps have a warm colour appearance and provide excellent colour rendering. They are ideally suited to indoor use in display, accent and downlighting applications as an energy-saving, low maintenance light source; and as an effective alternative to PAR-38 spot and flood lamps, bowl mirror lamps and high-voltage halogen lamps.

**RANGE**

SDW-T 35W  
SDW-T 50W  
SDW-T 100W

All lamps require external control gear.

A new development in high pressure sodium lighting, SDW-T White SON lamps produce a warm light very similar to that of GLS tungsten lamps. Operating efficiencies are in the region of 40 lumens/Watt, a four-fold increase over equivalent GLS lamps. SDW-T lamps, additionally, last five times as long as GLS equivalents for even greater economy.



For technical information please see page 499

## PLUG-IN SON-H HIGH PRESSURE SODIUM LAMPS

Self-starting SON-H lamps can directly replace mercury fluorescent lamps in existing luminaires, using the existing mercury control gear without the need for an ignitor. Their much higher efficacy over mercury fluorescent yields an immediate 54% increase in light output, combined with a significant reduction in energy consumption, making them ideal for cost-saving refurbishment.



For technical information please see page 500

### CHARACTERISTICS AND APPLICATIONS

The initial efficacy of SON-H is 97 lm/W, 65% higher than a standard mercury fluorescent lamp. Plug-in replacement at the next routine lamp change means that existing lighting can be considerably upgraded, without any labour cost or need for capital expenditure on new control gear, and with an immediate energy cost saving.

SON-H lamps with their warm golden-white light are suitable for indoor purposes such as factory and warehouse lighting, sports halls and public buildings, and outdoors for road and floodlighting.

### RANGE

Available in 210W and 350W ratings, for use with 250W and 400W mercury control gear.

### CHARACTERISTICS AND APPLICATIONS

Mercury fluorescent lamps produce a cool, bluish-white light, providing accurate rendering for most purposes such as streets, factories, schools and public buildings. SON-H lamps are available as improved colour display and display lamps in retail, commercial and industrial premises.

They start reliably at low temperatures, providing an alternative to mercury fluorescent lamps in chilly indoor environments.

### RANGE

HPL-N elliptical lamps, from 50W to 400W, are economically priced and suitable for use with mercury control gear.

HPL-R reflector lamps produce a directional beam of light for display purposes. Their pear shape minimizes light output loss through the glass envelope.

The Comfort range is available in 250W and 400W.

## HPL/HPL COMFORT MERCURY FLUORESCENT LAMPS

**M**ercury fluorescent lamps are versatile and economical for a very wide range of commercial, industrial and outdoor applications that require pleasing colour quality at moderate installation and operating costs. They are available in a great many types and ratings.

### CHARACTERISTICS AND APPLICATIONS

Mercury fluorescent lamps produce a cool white light that provides acceptable colour rendering for many utility purposes such as lighting for streets, factories and public buildings. Some ratings are also available as 'Comfort' lamps with improved colour rendering for display and decorative purposes in retail, commercial and leisure premises.

They start reliably at temperatures as low as  $-30^{\circ}\text{C}$ , providing an acceptable alternative to conventional fluorescent lighting in outdoor or chilly indoor environments.

### RANGE

**HPL-N elliptical** lamps range from 50W lamps that can economically replace filament lamps, up to 2kW floodlighting lamps.

**HPL-R reflector** lamps produce a directional beam ideal for display purposes, while their shape minimises reduction of light output caused by soiling of the glass envelope.

The **Comfort quality** is available in elliptical lamps up to 400W.



For technical information please see page 501

## HPI METAL HALIDE LAMPS

**M**etal halide lamps produce a crisp white light giving excellent colour rendering, ideal for demanding industrial and commercial applications. HPI lamps are available up to very large light outputs, with high efficiency.



HPI-T lamps



HPI-BUS lamp

### CHARACTERISTICS AND APPLICATIONS

Metal halide lamps provide excellent colour rendering among discharge lamps, making them ideal for lighting of colour TV broadcasts and for other applications where good colour is important, such as lighting of fashion stores and printing works.

The very high ratings – up to 2kW lamps, producing 166,000 lm – and efficacies as high as 90 lm/W make them very suitable for large-scale floodlighting at low energy cost.

### RANGE

Metal halide lamps are supplied in four ratings from 250W to 2kW as HPI/T tubular lamps, which enable very precise optical control.

A 400W HPI/BUS elliptical lamp is also available, with the advantage of requiring no external ignitor.

### CHARACTERISTICS AND APPLICATIONS

The 70W M...  
warm white  
150W and  
lamps proce  
beam. Both  
excellent c  
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display, eff  
lighting. Th  
also be use  
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### RANGE

MHN-TD 2  
MHN-TD 2  
MHN-TD 2  
MHW-TD

## MHW-TD AND MHN-TD DOUBLE-ENDED METAL HALIDE LAMPS

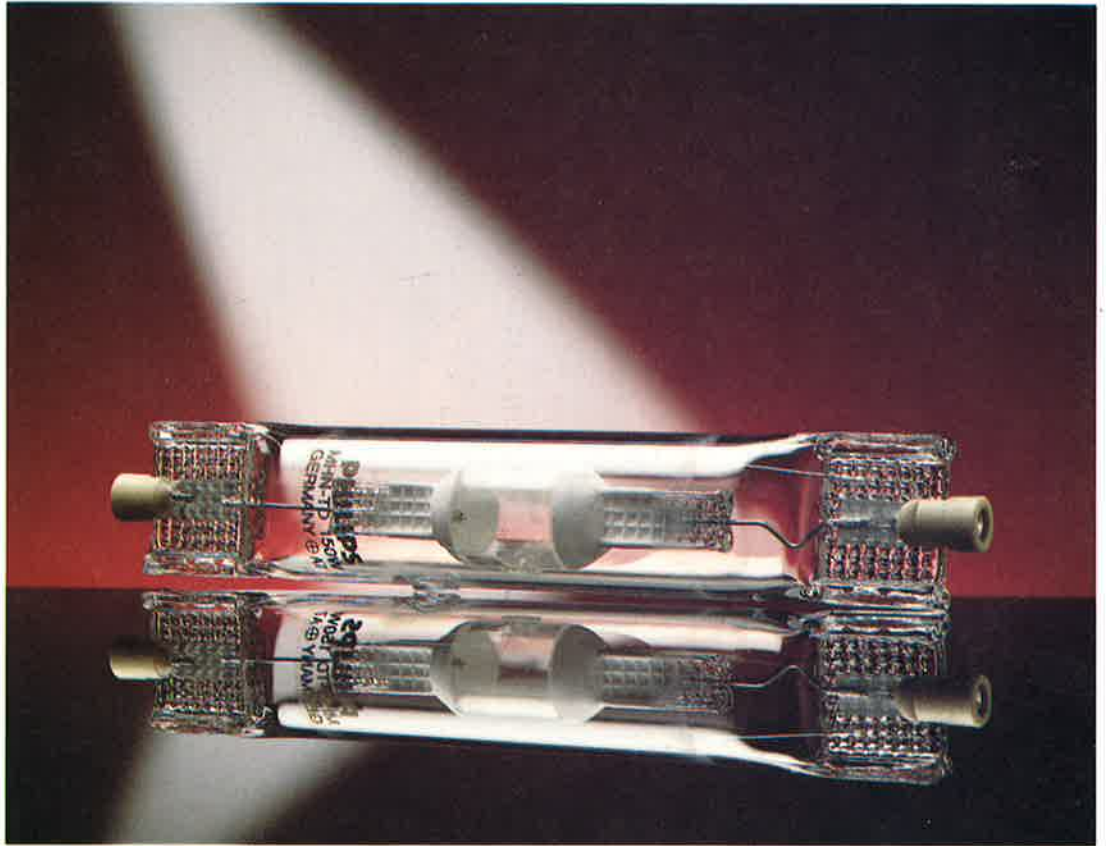
A range of double-ended metal halide lamps for use in indoor luminaires. Slimline envelopes permit use in small, high-performance luminaires. Lamp efficiency is up to four times that of tungsten halogen equivalents, with three times the life expectancy.

### CHARACTERISTICS AND APPLICATIONS

The 70W MHW-TD lamp emits a warm white light while the 150W and 250W MHN-TD lamps produce a cool white beam. Both types provide excellent colour rendering and are well suited to indoor use for display, effect and ambient lighting. The 250W lamp can also be used for indoor and outdoor floodlighting wherever a high quality white light is required.

### RANGE

MHN-TD 70W - cool white  
MHN-TD 150W - cool white  
MHN-TD 250W - cool white  
MHW-TD 70W - warm white



For technical information please see page 505



## ML AND MLR MERCURY BLENDED LAMPS

Mercury blended lamps combine warm white light and good colour rendering with long life and high efficiency, to provide a high quality light source that's cheap to install and economical to run. They are most convenient in use, requiring no control gear and providing light immediately after switch-on.



ML lamps



MLR reflector lamp

### CHARACTERISTICS AND APPLICATIONS

Mercury blended lamps produce a warm colour quality similar to that of tungsten filament lamps, and give good colour rendering. Lamp life up to 6000h makes them excellent replacements for GLS filament lamps, especially where access for lamp changing is difficult or expensive.

### RANGE

Elliptical ML lamps are available in 100W and 160W ratings with standard ES or bayonet caps to directly replace GLS lamps, and in 250W and 500W ratings with GES caps to replace high power filament lamps.

The 160W MLR reflector lamp has an internal reflector to ensure that soiling cannot reduce its efficacy, and is shaped to avoid accumulation of dirt on the light window.

### BALLASTS

Ballasts act as devices and low pressure circuits. They can be required. Low the ballasts operation and conservation

### CAPACITORS

Philips capacitor correct essential part accordance requirement authority, and currents in the cables. They shown in the provided on metallised paper used in their self-healing electrical break 'dry' construction chance of long operation.

### IGNITORS

Philips elect contain reliable circuitry which high-voltage start SOX-E After starting automatically the circuit and power during Igniters can faults, and on switch off automatically eliminating problems.

### RANGE OF

Control gear available for following PH sodium lamp

### SOX

35W SOX  
55W SOX  
90W SOX  
135W SOX  
180W SOX

**CS AND**

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on the light

**BALLASTS**

Ballasts act as current-limiting devices and are essential in all low pressure sodium lamp circuits. They are easily installed and can be column-mounted if required. Low wattage losses in the ballasts ensure economical operation and good energy conservation.

**CAPACITORS**

Philips capacitors provide power factor correction or are an essential part of the circuit in accordance with the requirements of the electricity authority, and help to reduce currents in the supply circuit cables. They should be used as shown in the circuit diagrams provided on page 508. The metallised polypropylene film used in their production has self-healing characteristics after electrical breakdown and their epoxy construction eliminates the chance of leakage during operation.

**IGNITORS**

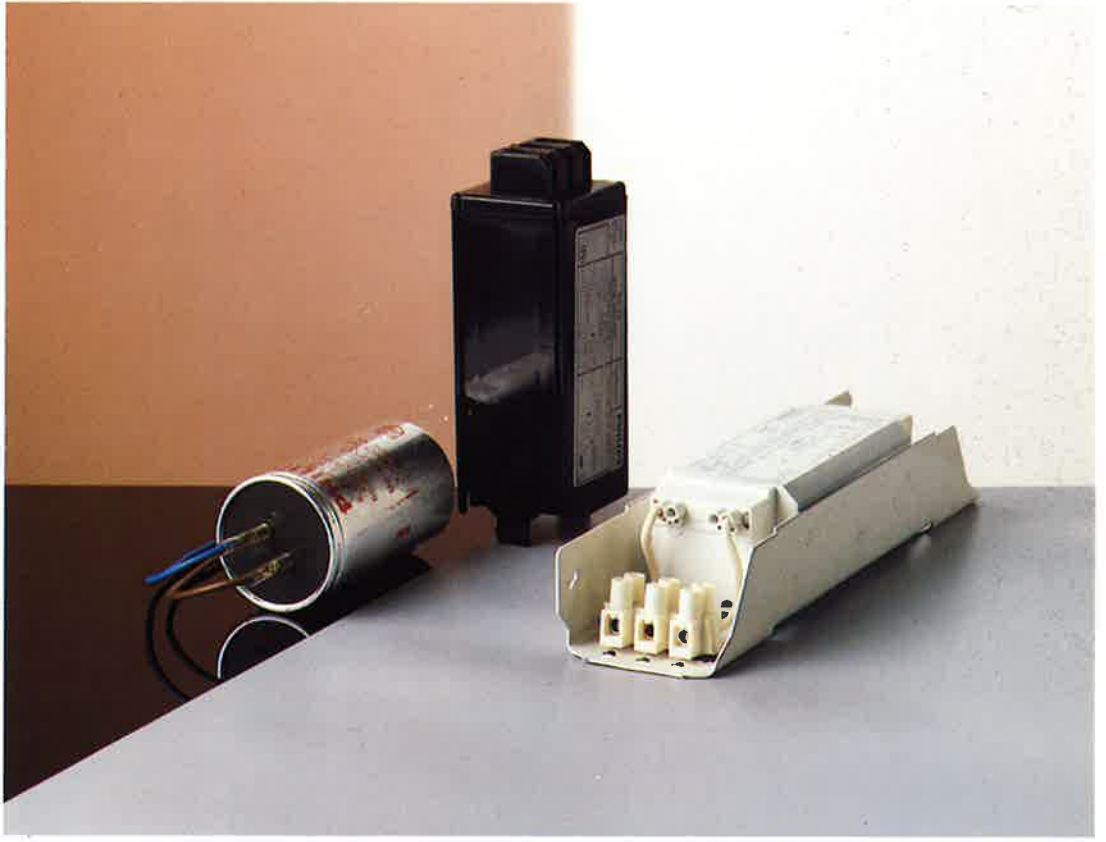
Philips electronic ignitors contain reliable, solid-state circuitry which provides the high-voltage pulses necessary to start SOX-E and SOX lamps. After starting, the ignitor is automatically switched out of the circuit and consumes no power during lamp operation. Ignitors can also detect lamp faults, and once again, will switch off automatically, eliminating radio interference problems.

**RANGE OF APPLICATION**

Control gear components are available for use with the following Philips low pressure sodium lamps:

SOX	SOX-E
150W SOX	SOX-E18
150W SOX	SOX-E26
150W SOX	SOX-E36
150W SOX	SOX-E66
150W SOX	SOX-E91
150W SOX	SOX-E131

SOX and SOX-E lamp gear comprises a range of ballasts, capacitors and ignitors for use with Philips low pressure sodium lamps. SOX lamps continue to run on dedicated SOX gear components, but the introduction of new, optimum-hybrid control gear for SOX-E lamps means these can now operate at lower wattages whilst providing equivalent lumen outputs. The result is greater energy-effectiveness, with SOX-E lamps now capable of producing more than 200 lumens/watt.



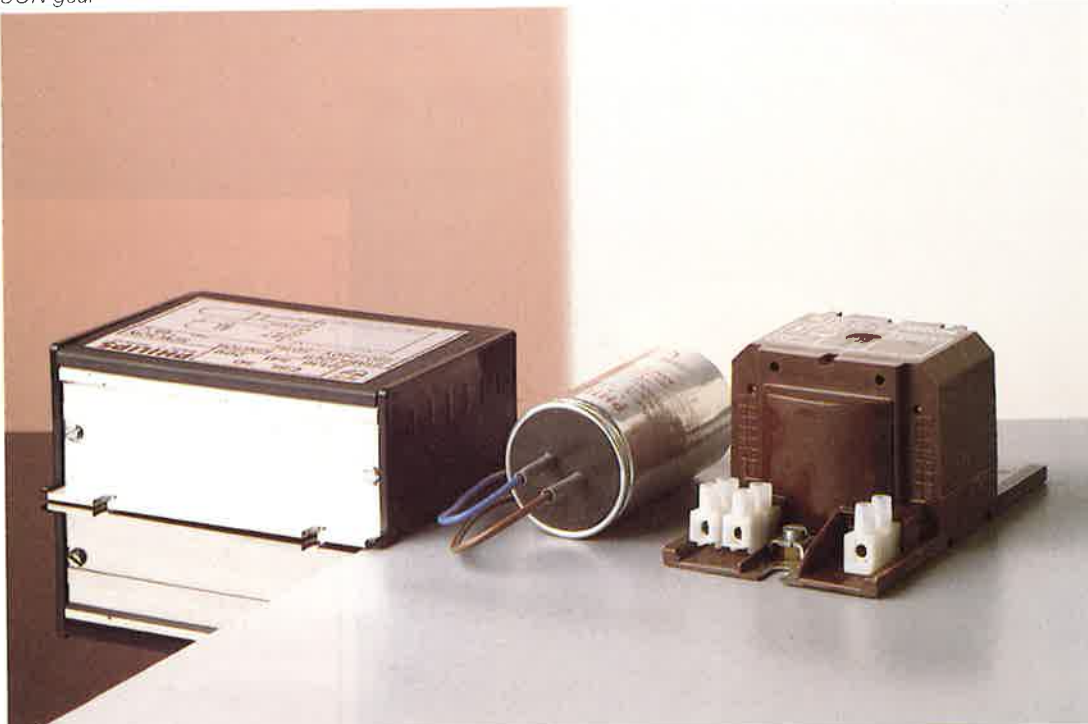
SOX gear

## HIGH PRESSURE SODIUM LAMP GEAR

Control gear for high pressure sodium lamps includes current-limiting ballasts, self-healing dry film capacitors for power factor correction and electronic ignitors to provide the high-voltage pulses needed to start SON lamps. All gear components can be supplied loose in multiples of their packing quantities, or in exact quantities when ordered with appropriate luminaires.



SON gear



SDW-T gear

### BALLASTS

The introduction of new production techniques has led to the nylon encapsulation of high pressure sodium lamp ballasts. This automated process affords greater quality control and provides improved electrical tolerances in the ballasts, so that lamps run closer to optimum conditions. They are also lighter and smaller than their predecessors for easier handling and installation, and low wattage losses in the ballasts ensure economical operation.

### CAPACITORS

Philips capacitors provide power factor correction in accordance with the requirements of the electricity authority, and help to reduce currents in the supply circuit cables. They should be used as shown in the circuit diagrams provided on page 519. The metallised polypropylene film used in their production has self-healing characteristics after electrical breakdown and their 'dry' construction eliminates the chance of leakage during operation.

### IGNITORS

Philips electronic ignitors contain reliable solid-state circuitry which provides the high-voltage pulses necessary to start high pressure sodium lamps. The ignitor is automatically switched out of the circuit once the lamp has started, and consumes no power during lamp operation. Re-ignition of a hot lamp after mains interruption usually occurs in less than one minute even at the high ambient temperatures found in multi-lamp luminaires.

### CONTROLLERS

An electric ignitor has been designed specifically for use with SDW-T WHITE SON lamps incorporating a stabilising circuit to ensure the lamp is run at its optimum performance throughout life.

**RANGE OF APPLICATION**  
**SON and SON/T**  
 50W, 70W, 100W, 150W, 250W, 400W and 1kW.

**SON/SON-T Comfort**  
 150, 250 and 400W.

**SON-T Plus**  
 70 and 150W.

**SDW-T**  
 35, 50 and 100W

### BALLAST

The introduction of new production techniques has led to the nylon encapsulation of high pressure sodium lamp ballasts. This automated process affords greater quality control and provides improved electrical tolerances in the ballasts, so that lamps run closer to optimum conditions. They are also lighter and smaller than their predecessors for easier handling and installation, and low wattage losses in the ballasts ensure economical operation.

### CAPACITORS

Philips capacitors provide power factor correction in accordance with the requirements of the electricity authority, and help to reduce currents in the supply circuit cables. They should be used as shown in the circuit diagrams provided on page 519. The metallised polypropylene film used in their production has self-healing characteristics after electrical breakdown and their 'dry' construction eliminates the chance of leakage during operation.

### IGNITORS

Philips electronic ignitors contain reliable solid-state circuitry which provides the high-voltage pulses necessary to start high pressure sodium lamps. The ignitor is automatically switched out of the circuit once the lamp has started, and consumes no power during lamp operation.

### RANGE OF APPLICATION

Control gear is available for the following lamp types:  
 metal halide

**HPL-N metal halide reflector**  
 50W, 80W, 100W, 150W, 250W, 400W, 1kW.

**HPL-Com fluorescent**  
 50W, 80W, 100W, 150W, 250W, 400W.

**HPL-R metal halide reflector**  
 125W, 250W, 400W, 1kW.

**HPI metal halide reflector**  
 HPI/T: 250W, 400W, 1kW.

**MHN-TD**  
 70W, 150W.

**MHW-TD**  
 70W.

## BALLASTS

The introduction of new production techniques has led to the nylon encapsulation of mercury and metal halide lamp ballasts. This automated process affords greater quality control and provides improved electrical tolerances in the ballasts, so that lamps run closer to optimum conditions. They are also lighter and smaller than their predecessors for easier handling and installation, and low wattage losses in the ballasts ensure economical operation.

## CAPACITORS

Philips capacitors provide power factor correction in accordance with the requirements of the electricity authority, and help to reduce currents in the supply circuit cables. They should be used as shown in the circuit diagrams provided on page 512. The metallised polypropylene film used in their production has self-healing characteristics after electrical breakdown and their 'dry' construction eliminates the chance of leakage during operation.

## IGNITORS

(for metal halide lamps)

Philips electronic ignitors contain reliable, solid-state circuitry which provides the high-voltage pulses necessary to start metal halide lamps. The ignitor is automatically switched out of the circuit once the lamp has started, and consumes no power during lamp operation.

## RANGE OF APPLICATION

Control gear components are available for use with the following Philips mercury and metal halide lamps:

**HPL-N mercury fluorescent**  
50W, 80W, 125W, 250W, 400W, 700W, 1kW and 2kW.

**HPL Comfort mercury fluorescent**  
50W, 80W, 125W, 250W and 400W.

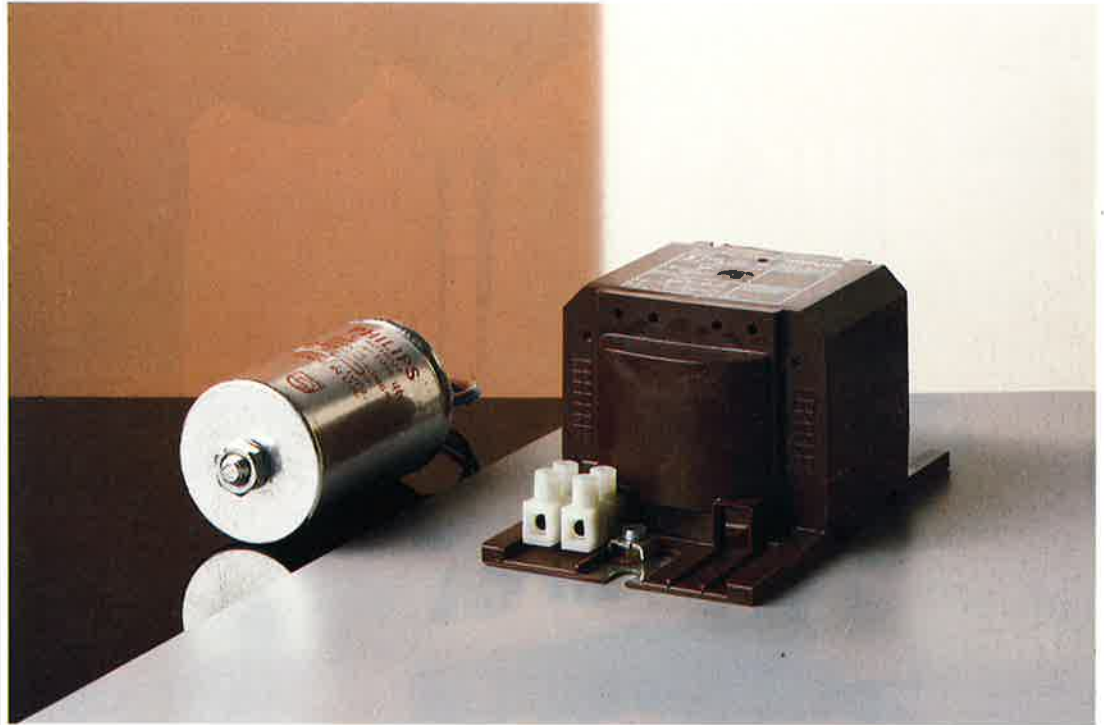
**HPL-R mercury fluorescent reflector**  
125W, 250W, 400W, 700W and 1kW.

**HPI metal halide**  
HPI/T: 250W, 400W, 1kW, 2kW (240V and 415V) HPI/BUS: 500W.

**MHN-TD metal halide**  
150W, 150W and 250W.

**MHW-TD metal halide**  
250W.

Control gear for these lamp types incorporates a range of current limiting ballasts, self-healing dry film capacitors for power factor correction and, for metal halide lamps, a selection of electronic ignitors which provide the high-voltage pulses needed for lamp ignition. All gear components can be supplied loose in multiples of their packing quantities, or in exact quantities when ordered with appropriate luminaires.



HPL gear



MHW-TD gear

For technical information please see page 511

## HERMES 2 PRE-WIRED GEAR BOX

There are five pre-wired, cast alloy gear boxes available in the Hermes 2 range. Each is fitted with a potted ballast for use with high pressure sodium, mercury fluorescent or metal halide lamps. A hinged lid facilitates access to the boxes and a simple wiring system speeds installation. They are all protected to IP54 and, therefore, suitable for outdoor use with remote-gear luminaires in floodlighting, road and security lighting applications.



### RANGE OF APPLICATION SON AND SON/T

150W, 250W, 400W

### HPI

250W, 400W

### SON/ST

150W

### HPL

250W, 400W

### RANGE OF APPLICATION

For 50W HPI

YGB 50M

For 80W HPI

YGB 80M

For 125W HPI

Comfort -

For 70W M

SON/T, SC

For 150W HPI

SON/T - Y

For 250W HPI

SON/T - Y

For 50W S

YGB 50S

For 50W S

YGB 50S

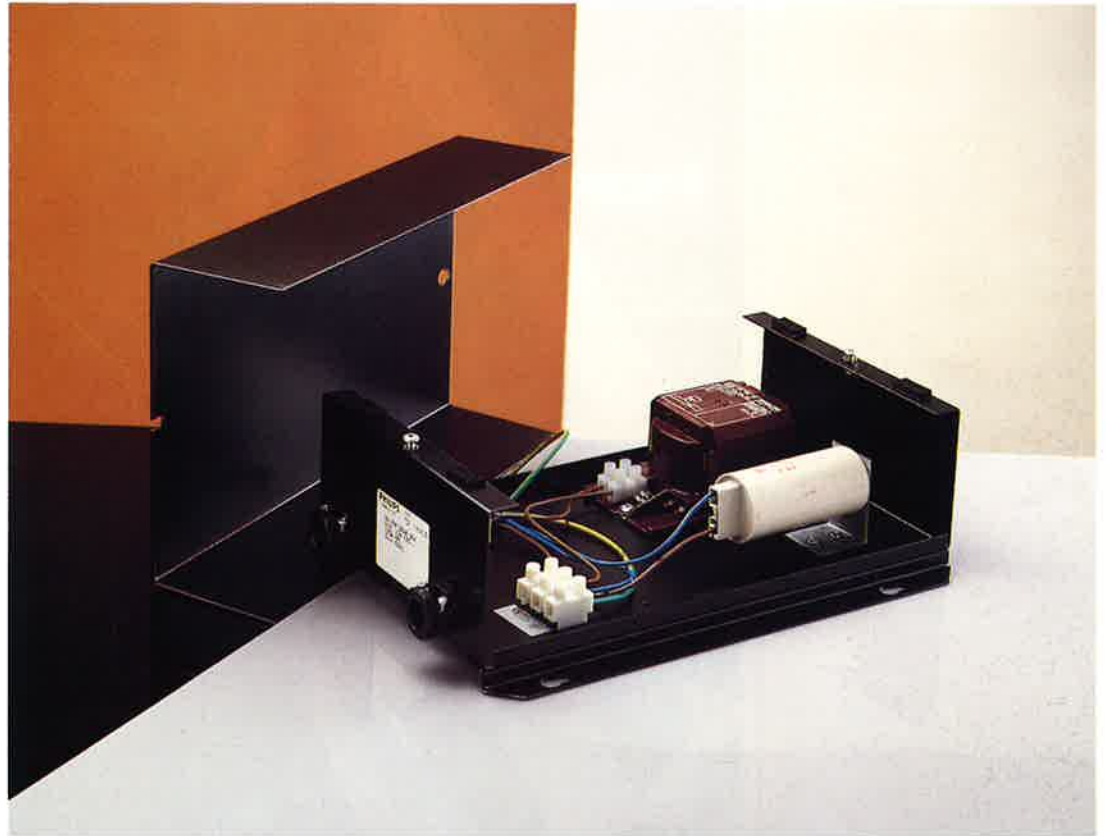
For 70W S

YGB 70S

**RANGE OF APPLICATION**

- For 50W HPL-N, HPL Comfort - **YGB 50M**
- For 80W HPL-N, HPL Comfort - **YGB 80M**
- For 125W HPL-N, HPL-R, HPL Comfort - **YGB 125M**
- For 70W MHN-TD, MHW-TD, SON/T, SON/E - **YGB 70H**
- For 150W MHN-TD, SON, SON/T - **YGB 150H**
- For 250W MHN-TD, SON, SON/T - **YGB 250H**
- For 50W SDW-T WHITE SON - **YGB 50W**
- For 50W SON-I (internal ignitor) - **YGB 50S**
- For 70W SON-I (internal ignitor) - **YGB 70S**

**A** range of nine pre-wired gear boxes, each fitted with pre-wired control gear for the appropriate lamp. The gear box can be easily installed for a variety of interior applications.





# SPECIAL PURPOSE LAMPS AND LUMINAIRES

TYPE	Product	Technical
<b>HARD GLASS MINIATURE HALOGEN LAMPS</b> For torches and motor vehicles etc	258	515
<b>REFLECTOR HEAT LAMPS</b> For infrared heating	259	516
<b>IRK LINEAR QUARTZ HEAT LAMPS</b> High intensity infrared heating	260	517
<b>IRZ QUARTZ HEAT LAMP LUMINAIRE</b> For industrial processes	261	518
<b>BLACKLIGHT LAMPS</b> UV activation of fluorescent materials	262	519
<b>TUV GERMICIDAL LAMPS</b> Inhibit growth of bacteria and moulds	263	520
<b>XOP PULSED XENON LAMPS</b> For copying machines and graphic arts use	264	521
<b>CSX XENON PROJECTION LAMPS</b> For cinema and optical systems	265	522
<b>HPR 125W MERCURY REFLECTOR LAMP</b> For reprographic applications etc	266	523
<b>HPM METAL HALIDE PRINTING LAMPS</b> For plate making equipment etc	267	524
<b>HPA METAL HALIDE PHOTOCHEMICAL LAMPS</b> For UV sensitive processes	268	525
<b>HTQ HIGH PRESSURE MERCURY LAMPS</b> For UV lacquer hardening and printing	269	526
<b>ACTINIC 03/05/09 LAMPS</b> UVA sources	270	527
<b>FLUORESCENT SUNLAMPS</b> UVA for cosmetic tanning	271	528
<b>LL SPECTRAL LAMPS</b> Line sources for scientific purposes	272	529
<b>HLRG 400W HORTICULTURAL LAMP</b> To promote plant growth	273	530



## HARD GLASS MINIATURE HALOGEN LAMPS

**T**iny low-voltage lamps using halogen technology to produce a large output of brilliant white light from a low wattage. Their small size, high efficiency through a long service life and low energy consumption make them ideal for portable and battery powered applications.



### FEATURES

Robust construction – high shock resistance.

Accurate filament positioning.

Hard glass (not quartz) for easy handling.

### APPLICATIONS

Cycle and moped lights

Emergency lights

Miners' cap lamps

Spotlight (machine/reading)

Torches

Warning lights

Microscopes

Temporary road signals

Security lighting

Fibre optics

### RANGE

Available with a choice of bases including prefocus type P13.5s and capless wedge base W4 x 4 in a variety of ratings from 2.4W to 20W, at 4V to 13.5V.

### APPLICAT

Livestock re

Personnel c

Entrance ca

both light a

Food warmi

Process hea

Paint drying

Pre-heating

### RANGE

Available in

four ratings

and in energ

175W press

versions tha

cost by abou

equivalent h

'Hard glass'

thermal sho

situations w

exposed to

in canteens

Also availab

glass to redu

output in ap

livestock re

## REFLECTOR HEAT LAMPS

**T**ungsten filament heat lamps providing a beam of short-wave infrared energy for industrial, commercial, agricultural and personnel comfort applications. Their advantages include high efficiency, instant warm-up, long service life and easy, versatile installation.

### APPLICATIONS

Livestock rearing  
Personnel comfort  
Entrance canopies, to provide both light and warmth  
Food warming  
Process heating  
Paint drying and curing  
Pre-heating

### RANGE

Available in blown bulb form in four ratings from 150W to 375W, and in energy-saving 100W and 175W pressed-glass 'economy' versions that reduce electricity cost by about one-third, for equivalent heating effect.

'Hard glass' versions which resist thermal shock are available for situations where lamps are exposed to splashing liquids, as in canteens.

Also available with a red front glass to reduce visible light output in applications such as livestock rearing.

### HIGH INTENSITY INFRARED

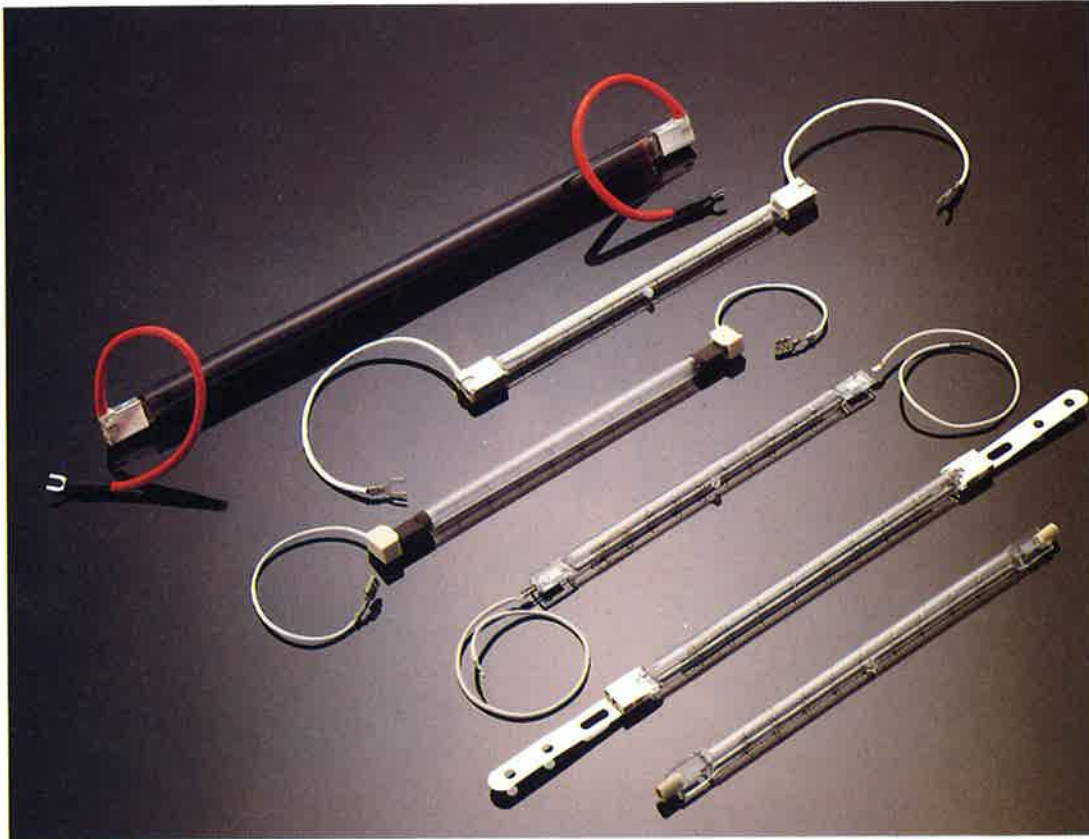
These lamps are for applications requiring intensities up to 10kW/m<sup>2</sup> installed.

For higher intensities, please see Philips IRK heat lamps on page 260.



## IRK LINEAR QUARTZ HEAT LAMPS

Very powerful tungsten filament heat lamps producing high-intensity short-wave infrared radiation. Full output can be achieved within 1s of switch-on, producing product temperatures as high as 1350°C. IRK lamps are easy to install, versatile and readily controllable.



### APPLICATIONS

Used with suitable reflector units, IRK heat lamps can give very high rates of heat transfer, reducing processing times and space requirements, in situations such as:

- Zone heating, with or without ruby sleeve
- Manufacture of PETP bottles
- Preheating and mass heating
- Drying
- Paint drying and baking of powder paints
- Curing applications
- Food preparation
- Stress relieving, expanding, fusing, etc
- Printing ink drying.

### RANGE

Available with outputs from 300W to 4.6kW, for a variety of termination and mounting requirements.

### LOWER INTENSITY INFRARED

Lower powered reflector heat lamps are available for applications such as food warming and light industrial uses: For details please see page 259.

### APPLICATIONS

IRZ fittings designed to IRK heat lamp heat sink lamp mounted on with fixing s highly polished reflector is r

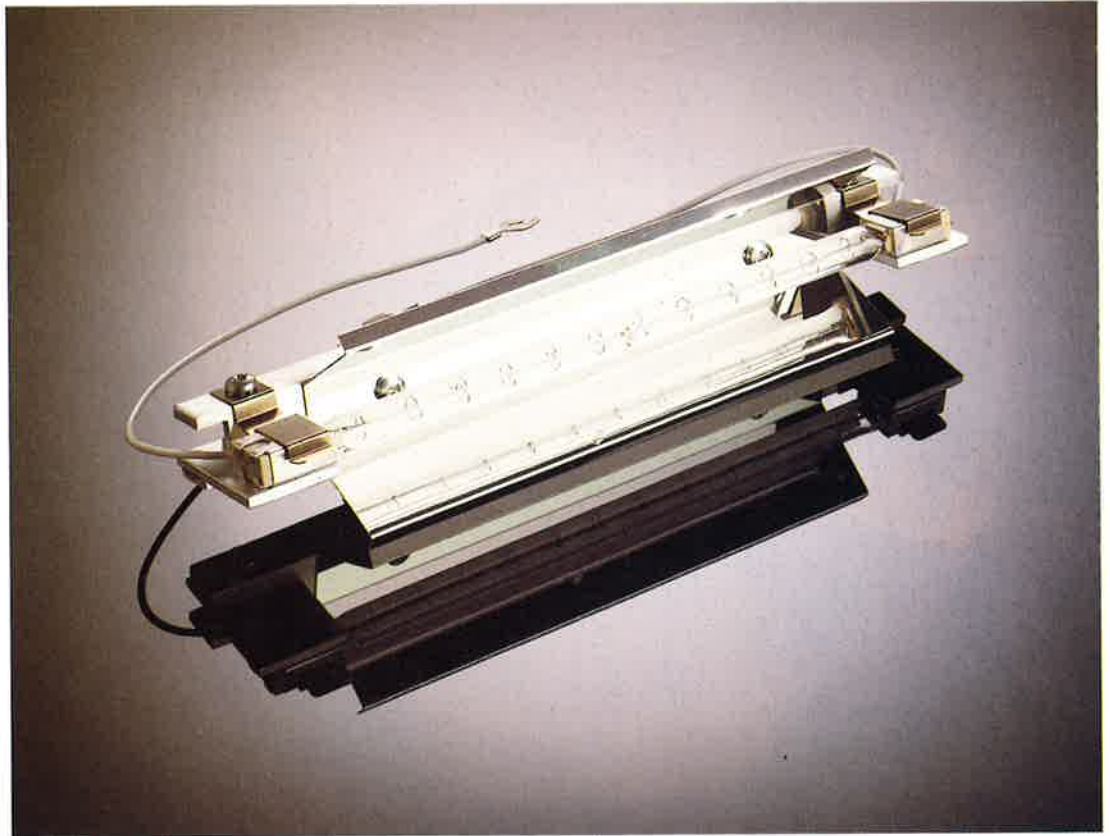
IRZ heat lamp economical linear infra-r laboratory o equipment, etc.

### RANGE

IRZ 500: for 500W lamp.  
IRZ 1000: for 1kW lamp.  
For lamp des page 260.

## RZ LINEAR HEAT LAMP FITTING

**S**imple, easy-to-install reflector fittings for Philips 500W and 1kW linear quartz heat lamps. Reflector shields lamp from mechanical damage, improves directional heating efficiency, and raises overall efficiency by redirecting radiant heat emitted from the workpiece.



### APPLICATIONS

Reflector fittings are specially designed to accept the Z version RZ heat lamps. Spring clip and heat sink lamp fixings are mounted on an aluminium spine. With fixing screws supplied. The highly polished aluminium reflector is removable.

RZ heat lamp fittings offer an economical way of mounting linear infra-red lamps into laboratory or production equipment, heating canopies etc.

### RANGE

RZ 500: for Philips 13169Z/98 500W lamp.

RZ 1000: for Philips 13713Z/98 1kW lamp.

For lamp description, please see page 260.

## BLACKLIGHT LAMPS

**T**ubular and ovoid lamps producing long-wave ultraviolet radiation for activation of fluorescent materials. Lamps have a special filter glass envelope to reduce visible radiation.



### APPLICATIONS

These lamps are designed for industrial process applications and are also suitable for theatrical and display use.

### RANGE

Tubular fluorescent lamps with filter glass envelopes in ratings from 4W to 36W.

125W ovoid mercury lamp.

160W ovoid mercury/tungsten self-ballasting blended lamp with filter glass envelope.

### CAUTION

UV output – see page 519.

### APPLICATIONS

Suitable for industrial process applications and moulds including:

Air and water hospitals

Bacteriology

Pharmaceuticals

Dairies

Beauty salons

Food storage

Air conditioning

### RANGE

Linear lamps

fluorescent

30 and 40W

8W single-ended

internal ballast

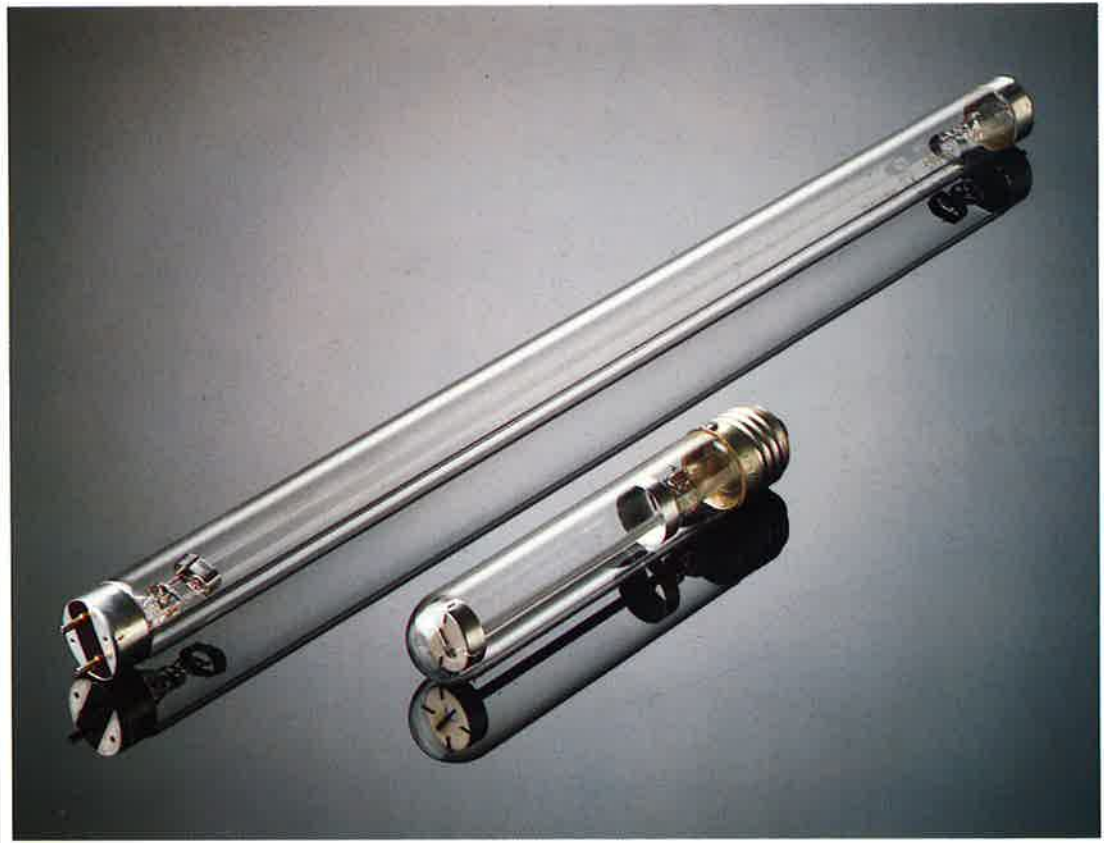
direct from mains

### CAUTION

UV output –

# TUV GERMICIDAL LAMPS

A range of lamps with sharply defined ultraviolet output at 253.7nm, close to the wavelengths most effective at inhibiting bacteria and moulds. Suitable for practical and research applications in scientific, medical and industrial facilities.



**APPLICATIONS**

Suitable for inhibiting bacteria and moulds in many situations, including:  
Air and water disinfection in hospitals  
Bacteriological research  
Pharmaceutical manufacture  
Dairies  
Beauty salons  
Food storage rooms  
Air conditioning systems.

**RANGE**

Linear lamps, for use with normal fluorescent control gear, in 15, 30 and 40W ratings.  
20W single-ended lamp with internal ballast for operation direct from mains.

**CAUTION**

UV output - see page 520.

## XOP PULSED XENON LAMPS

Low pressure xenon-filled discharge lamps providing a pulsed light output with spectral characteristics similar to those of normal daylight. Primarily for use in the reprographic industries.



### APPLICATIONS

Ideal for lighting horizontal and vertical copy-boards in the graphic arts industry.

Since the lamps strike instantly they are also suitable for use in stop-and-repeat copying machines.

### RANGE

Ratings from 750W to 8kW.

**Caution: These lamps emit UV radiation – see page 521**

**Caution:** The quartz envelope must not be touched with the fingers. If touched, clean with methylated spirits before use.

### APPLICATIONS

Ideal for advanced systems used in instrumentation

### RANGE

Vertical operation available in ratings up to 2500W.

Horizontal operation available in ratings up to 4000W.

### SPECTRAL CHARACTERISTICS

In addition to the visible spectrum visible lamps produce infrared line spectra which can be isolated for suppressed if required.

### CAUTION

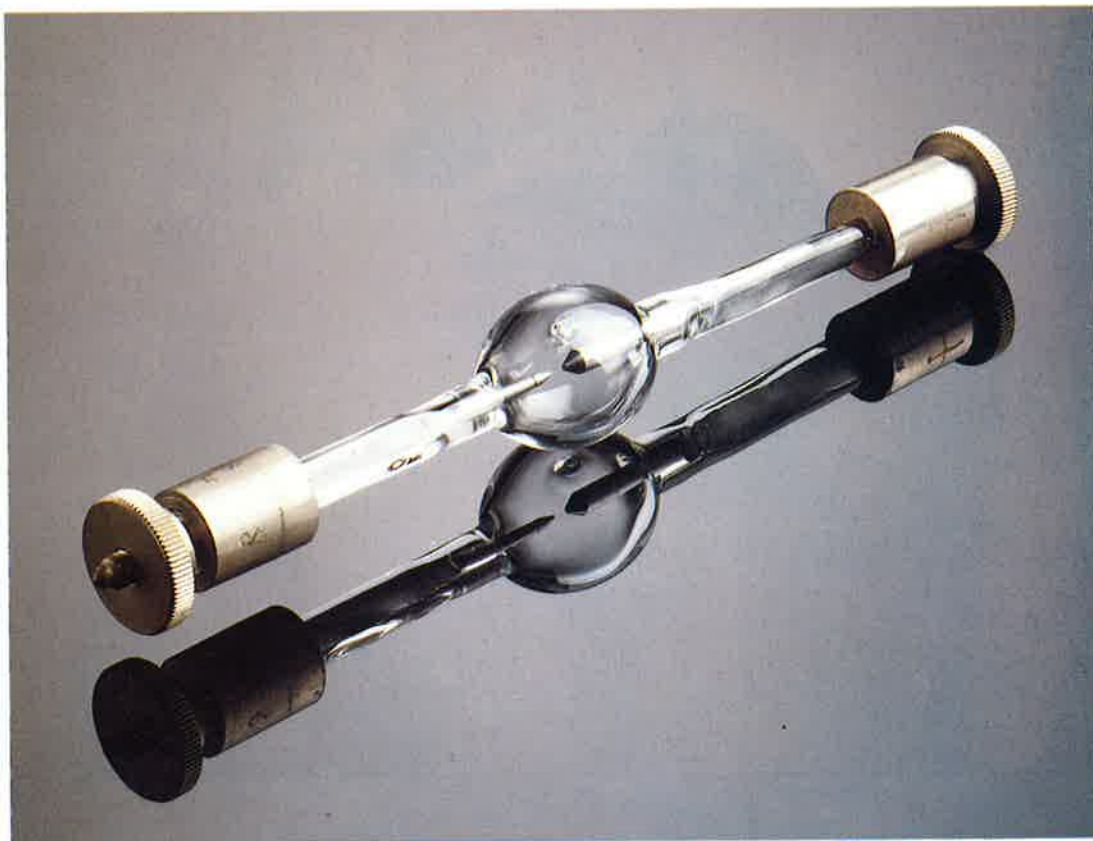
UV output – see page 521

The quartz envelope must not be touched with the fingers. If touched, clean with methylated spirits before use.

These lamps are low pressure.

## CSX XENON PROJECTION LAMPS

**C**ompact-source xenon lamps with excellent colour rendering and high light output combined with high efficacy. The small source permits high optical efficiency in such applications as professional cinema projection, optical systems and fading tests. Ozone-free quartz glass envelopes are used.



### APPLICATIONS

Ideal for advanced optical systems used in projection and instrumentation.

### RANGE

Vertical operating lamps are available in ratings of 75W to 1500W.

Horizontal operating lamps are available in ratings of 500W to 1000W.

### SPECTRAL CHARACTERISTICS

In addition to their wide spectrum visible output, CSX lamps produce a pronounced coloured line spectrum which can be isolated for IR applications or suppressed if desired.

### CAUTION

UV output – see page 522.

The quartz envelope must not be touched with the fingers. If touched, clean with methylated spirits before use.

These lamps operate at high pressure.

**For technical information please see page 522**



## HPR 125W MERCURY DISCHARGE REPROGRAPHIC LAMP

**R**eflector lamp producing a homogeneous beam of bluish-white light with strong actinic radiation, making it specially suitable for black-and-white copying and reproduction purposes.



### FEATURES

High output coupled with long life reduces installation and running costs.

Simply installed into standard lampholder; runs from normal mercury discharge control gear.

### APPLICATIONS

In reprographics, the lamp is particularly suitable for copyboard lighting and silk-screen processing.

Used with a separate Woods glass filter, the lamp can be used as a 'black light' source for UV irradiation.

The internal reflector produces a homogeneous output beam.

### CAUTION

UV output – see page 523.

### FEATURES

Principal output  
long-wave UV

Ozone-free.

Well-maintain  
long life.

### APPLICATIONS

Photochemical

Plate-making  
printing.

Exposure of ph  
chemical milli  
circuit etching

### RANGE

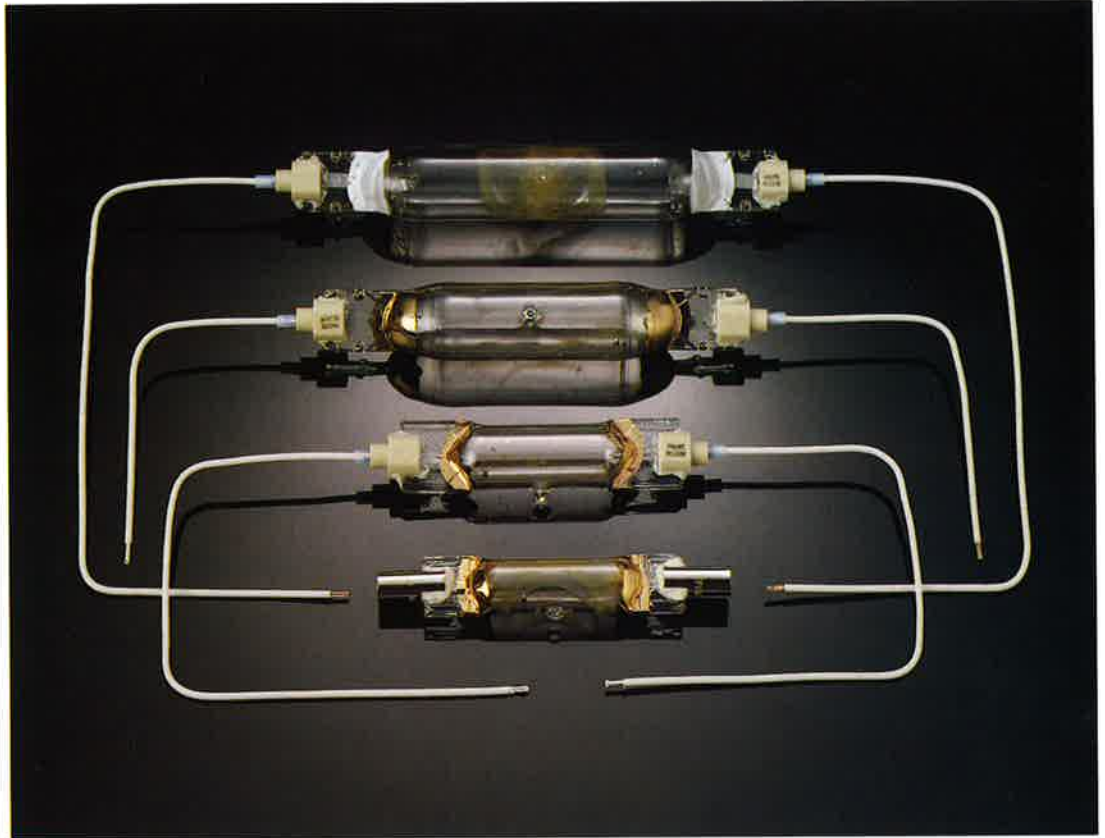
Rated from 4

### CAUTION

UV output – s

# HPM METAL HALIDE PRINTING LAMPS

High pressure mercury discharge lamps with lead and gallium iodide additives to suit application sensitivities between 320 nm and 440 nm, for lithographic platemaking and other photochemical processes.



**FEATURES**

Principal output is in the long-wave UV-A region.  
Mercury-free.  
Well-maintained output during long life.

**APPLICATIONS**

Photochemical processes.  
Plate-making for lithographic printing.  
Exposure of photo-resists for chemical milling and printed circuit etching.

**RANGE**

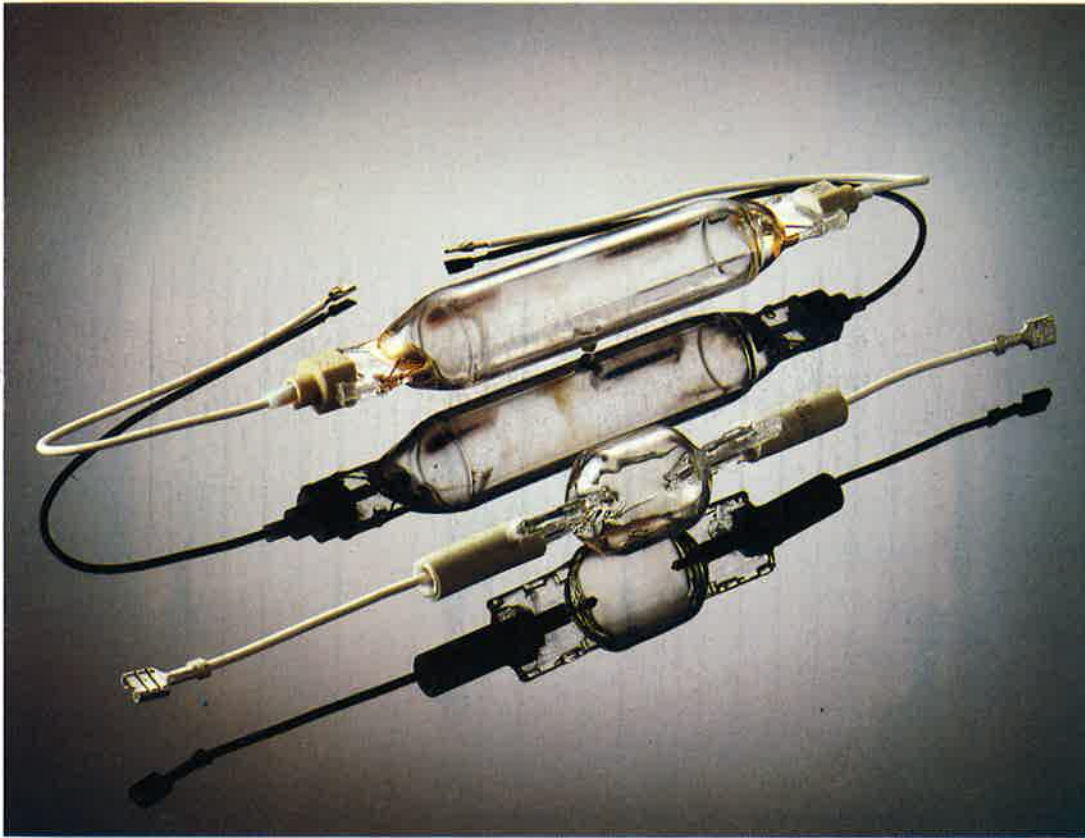
Range from 400W to 5kW.

**CAUTION**

UV output - see page 524.

## HPA METAL HALIDE PHOTOCHEMICAL LAMPS

**M**edium pressure metal halide lamps with iron and cobalt additives to produce ozone-free radiation mainly between 300 nm and 400 nm for photochemical processing and reprographic uses.



### FEATURES

Principal output is in the UV-B region, suitable for a wide variety of applications.

Used for suntanning with suitable filters to remove most UV-B and all UV-C emissions.

Ozone-free.

Well-maintained output over long life.

### APPLICATIONS

Photochemical processes: Plate-making for lithographic printing.

Exposure of photo-resists for chemical milling and printed circuit etching.

### RANGE

Ratings from 400W to 2000W.

### CAUTION

UV output – see page 525.

### FEATURES

Lamps do not p...  
operation. High...  
to reduce insta...  
running costs.

### APPLICATIONS

Although origi...  
for light-printin...  
lamps now find...  
application in t...  
synthetic lacqu...  
considerably sh...  
can be achieve...  
conventional d...

### RANGE

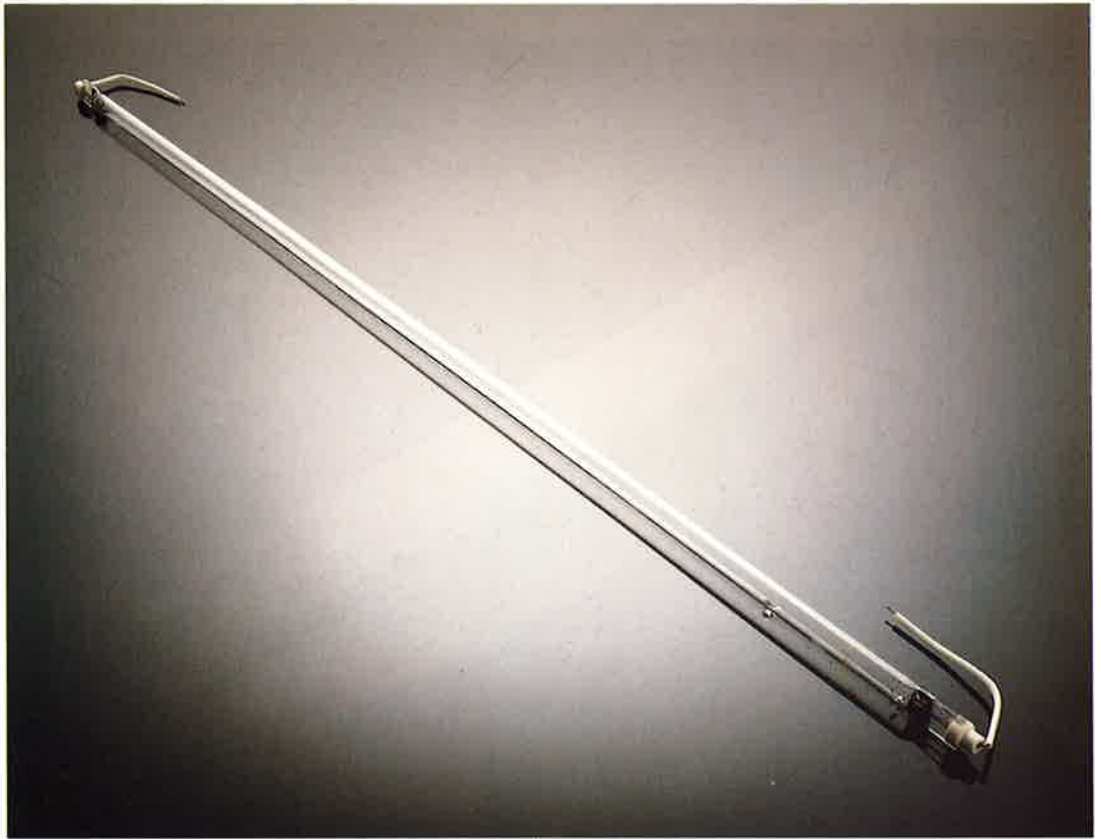
HTQ7: Nomina...  
HTQ14: Nomina...

### CAUTION

UV output – see...

# HTQ PHOTOCHEMICAL LAMPS

Linear lamps of high pressure mercury discharge type, with outputs suitable for light-printing applications and polymerisation of photosensitive additives in polyester lacquers.



**FEATURES**

Lamps do not produce ozone in operation. High output and long life reduce installation and running costs.

**APPLICATIONS**

Although originally developed for light-printing purposes, the lamps now find major application in the hardening of synthetic lacquer coating in considerably shorter times than can be achieved using conventional drying processes.

**RANGE**

HTQ7: Nominal rating 2000W.  
HTQ14: Nominal rating 4000W.

**CAUTION**

UV output - see page 526.

## ACTINIC FLUORESCENT LAMPS (03, 05, 09)

Linear fluorescent lamps which provide large outputs of actinic radiation in the violet or ultraviolet range, with a variety of commercial and industrial uses including reprographics, insect traps and photochemical processing.



### FEATURES

Identical dimensions and electrical characteristics to the corresponding standard white tubular fluorescent lamps, enabling them to be used with similar control gear.

Low installation, running and maintenance costs make possible inexpensive apparatus with short warm-up times and simple cooling arrangements. 03 lamps peak at about 420nm, 05 at 370nm, and 09 at 355nm.

### APPLICATIONS

Printing and copying processes.

Diazo printing (03).

Lacquer prehardening.

Insect traps (05).

Photochemical processes.

### RANGE

Available in three ranges (03, 05 and 09 phosphors) with slightly different spectral characteristics in ratings from 4W to 140W to suit various applications.

### CAUTION

UV output – see page 527.

### FEATURES

The 09 phosphor combination of wavelengths output, which reduces UVB.

Integral reflector external reflector construction eliminating the need for reflector design.

03 and 10 phosphors increase intensity by using integral reflector with lamp/reflector combinations.

Recommend 03 and 09R lamp and 85mm, and 10R.

09 lamps have a life of about 6000 hours.

APPLICATIONS Especially designed for use in sunlamps and tanning in sunbeds.

### RANGE

09 types (blue lamps):

TL20W/09A

TLK40W/09A

TL40W/09A

TL80W/09A

TL100W/09A

09R types (pink lamps):

TL80W/09W

TL100W/09W

09R types (blue reflector)

TLK40W/09R

TL80W/09RA

TL100W/09R

09R types (pink reflector)

TL80W/09RW

TL100W/09RW

10R types (blue reflector)

TLK40W/10R

TL80W/10R

TL100W/10R

CAUTION

UV output – see page 527.

# FLUORESCENT SUNLAMPS

## 09, 09R, 10R

Purpose designed for cosmetic tanning, R-UVA lamps use Philips 09 or 10 phosphors with an *internal* reflector, making possible high efficiency sunbeds and canopies. Non-reflector lamps with 09 phosphors are for sunbeds with external reflectors.



### FEATURES

The 09 phosphor and lamp glass combination reduces UVB wavelengths to 0.5% of UV output, whilst the 10 phosphor reduces UVB to 0.1%.

Integral reflector eliminates external reflector, simplifying construction of sunbeds and eliminating loss of efficiency due to reflector deterioration.

09 and 10 phosphors with integral reflector increase UVA intensity by up to 40% compared with lamp/reflector combinations.

Recommended spacings for 09 and 09R lamps are between 60 and 85mm, and about 45mm for 10R.

09 lamps have a useful service life of about 600 hours; 10 lamps have a service life of about 1000 hours.

### APPLICATIONS

Especially designed for cosmetic tanning in sunbeds and canopies.

### RANGE

#### 09 types

Blue lamps:

- TL20W/09A
- TL40W/09A (2ft)
- TL40W/09A
- TL80W/09A
- TL100W/09A

Pink lamps:

- TL80W/09W
- TL100W/09W

#### 09R types (Integral reflector)

Blue lamps:

- TL40W/09RA (2ft)
- TL80W/09RA
- TL100W/09RA

Pink lamps:

- TL80W/09RW
- TL100W/09RW

#### 10R types (Integral reflector)

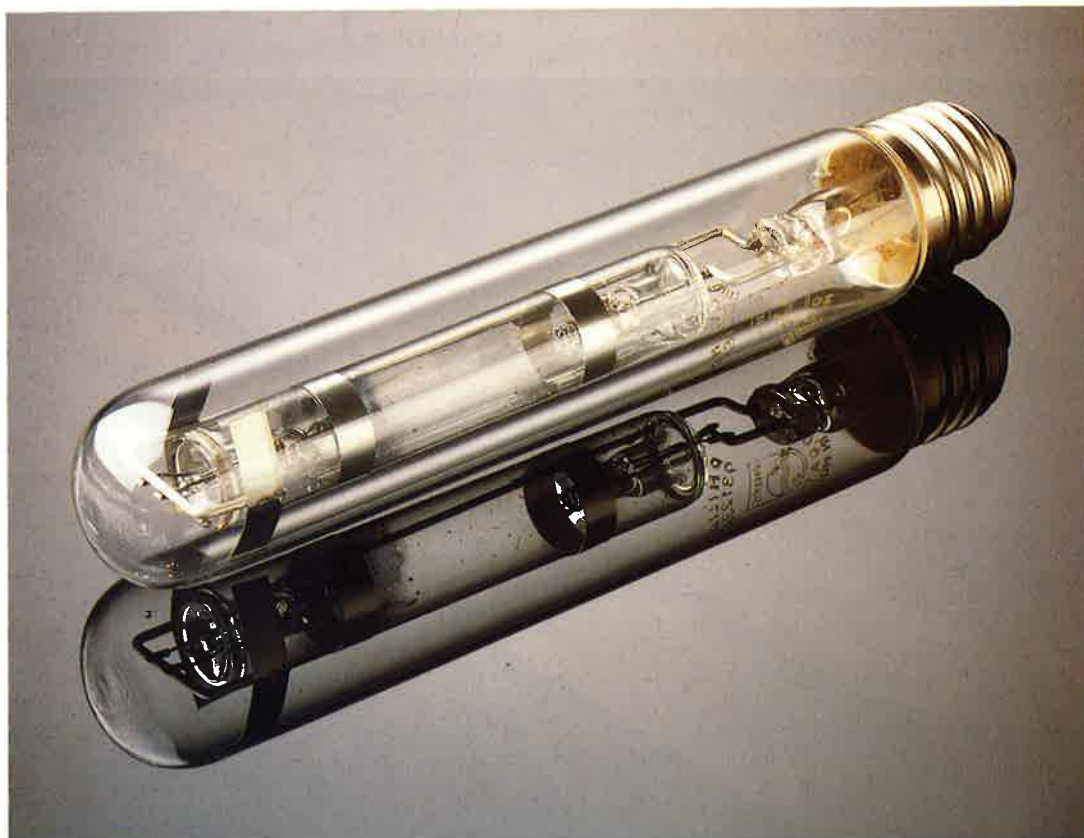
- TL40W/10R (2ft)
- TL80W/10R
- TL100W/10R

### CAUTION

UV output - see page 528.

## LL SPECTRAL LAMPS

Interchangeable laboratory sources with identical dimensions and electrical characteristics, producing lines of known wavelengths.



### FEATURES

Lamp interchangeability permits comparative test.

Lamps with quartz discharge tubes and outer envelopes permit UV investigations.

All lamps are fitted with standard ES cap.

### APPLICATIONS

Polarimetry

Spectroscopy

Interferometry

### RANGE

Twenty-five lamps, containing high-purity gases or vapours as follows:

#### Glass envelopes

Hg (low pressure)

Hg (high pressure)

Cd

Zn

Hg, Cd, Zn

He

Ne

A

Kr

Xe

Na

Rb

Cs

K

#### Quartz envelopes

In

Tl

Ga

\*Hg (low pressure)

\*Hg (high pressure)

\*Cd

\*Zn

\*Hg, Cd, Zn

\*In

\*Tl

\*Ga

\*These lamps are primarily intended for producing ultraviolet spectra.

### CAUTION

UV output – see page 529.

# HLRG

## 400W HORTICULTURAL LAMP

**A** powerful mercury reflector lamp with spectral characteristics suited to supplement daylight.



### FEATURES

High output coupled with long life reduces installation and running costs.

Ultraviolet radiation is limited to prevent damage to plants.

Can be installed into standard E27 lamp holder; runs in conjunction with normal mercury discharge control gear. Can be used without external reflector.

### APPLICATIONS

Specially designed for promoting plant growth in professional, amateur and research projects in horticulture.





TYPE	Product	Technical
<b>Tungsten auto bulbs</b>		
Standard		
Heavy duty (24V)	276	531
<b>Halogen auto bulbs</b>		
Standard		
Rally	277	532

# TUNGSTEN AUTOBULBS

A range of autobulbs for use on road vehicles for main and auxiliary running lights, including double filament (Duplo-D) headlight lamps in clear or cadmium yellow finish. The range also includes types for signalling, dashboard and interior illumination.



## PHILIPS AUTOBULBS

Philips autobulbs are specified as original equipment by vehicle manufacturers throughout the world because of their reliability and low incidence of premature failure.

Philips reputation for quality results from a programme of continuous improvement based on a zero defects philosophy of quality control, and computer-assisted design and test techniques. Philips lamps for motor vehicles comply with all relevant regulations.

## APPLICATIONS

A range of lamps for use in vehicles.

- Side, tail and auxiliary lighting.
- Festoons.
- Double filament (Duplo-D) auto headlights.

## RANGE

Duplo-D bulbs are available in 12 and 24V versions for 45/40W and 55/50W headlamps.

Indicator and auxiliary bulbs, as well as festoon lamps, are also available for 6, 12 and 24V operation, in a wide range of ratings.

Certain 24V types are also available as Heavy Duty (HD).

## HALOGEN

Philips were of the deve high-effici using the tr cycle, and autobulbs original eq manufact world beca and high p

Philips repu results from continuous on a zero d quality con computer-a test technic motor vehi relevant Eu

## RANGE

Single tran filament, in versions.

Double fila versions, in cadmium y

High-powe and compe

Miniature 1 application with relativ is required.

## DICHROIC

In Philips h with cadmi convention is replaced dichroic fin directly on t This improv increasing t improving c

For technical information please see page 531

## HALOGEN AUTOBULBS

Philips were one of the pioneers of the development of high-efficiency, long-life lamps using the tungsten halogen cycle, and Philips halogen autobulbs are specified as original equipment by vehicle manufacturers throughout the world because of their reliability and high performance.

Philips reputation for quality results from a programme of continuous improvement based on a zero defects philosophy of quality control, and computer-assisted design and test techniques. Philips lamps for motor vehicles comply with all relevant European Regulations.

### RANGE

Single transverse or axial filament, in 6V, 12V and 24V versions.

Double filament in 12V and 24V versions, in clear or dichroic cadmium yellow finish.

High-power versions for rally and competition use only.

Miniature 12V 20W, for any application where a small lamp with relatively high light output is required.

### DICHOIC YELLOW

In Philips halogen autolamps with cadmium yellow finish, the conventional yellow outer bulb is replaced by a multi-layer dichroic finish which is applied directly on to the quartz lamp. This improves performance by increasing the light output and improving colour consistency.

Halogen autobulbs bring the advantages of tungsten halogen lighting to road vehicles by achieving high light output sustained over a long service life. Single filament lamps provide main beam for four headlamp systems and auxiliary lighting such as spot and fog units; while double filament lamps with shielded dip filaments provide anti-dazzle, sharp cut off low beams.





# PHOTOGRAPHIC AND THEATRE LAMPS

279

<b>TYPE</b>	<b>Product</b>	<b>Technical</b>
<b>CLASSES P1, P2 AND P3</b> Photographic and darkroom lamps	<b>280</b>	<b>533</b>
<b>CLASS A1</b> Projection lamps	<b>281</b>	<b>534</b>
<b>CLASSES F, G AND M</b> Projector lamps for microfilm and miscellaneous applications	<b>282</b>	<b>536</b>
<b>CLASSES CP, T PAR AND MSR</b> Studio and theatre lamps	<b>283</b>	<b>538</b>
<b>GENERAL DATA AND LAMP BASES</b>	<b>—</b>	<b>541</b>

## PHOTOGRAPHIC AND DARKROOM LAMPS CLASSES P1, P2 AND P3

Ranges of studio and darkroom lamps, including safelight and enlarger lamps, for professional and amateur photographers and photo-processors.



### RANGE AND APPLICATIONS

**Class P1 Photoflood:** High light output balanced for 3400K colour cine films and suitable for black and white photography.

**Class P1 Tungsten Halogen:** Maintained high output balanced for 3400K colour cine films.

**Class P2 Photoparl:** Longer life lamps balanced for 3200K colour films and suitable for TV camera lighting.

**Class P3 Photocrescent:** Enlarger lamps for both amateur and professional use.

**Darkroom:** Safelight lamps made from dark red or yellow/green coloured glass, for use with orthochromatic film and bromide papers respectively. A simple, plug-in, alternative to more expensive safelight fittings.

### RANGE

Philips pro  
manufactu  
with intern

A small ran  
non-halog  
please see  
availability  
halogen la  
light outpu  
throughou  
with small

### APPLICA

For use in s  
projectors,  
application

Overhead p

Microfilm a  
and copiers

Medical ap

Fibre optic

## PROJECTION LAMPS CLASS A1

281

### RANGE

Philips projection lamps are manufactured in accordance with international standards.

A small range of older non-halogen types is shown—please see current price list for availability. The tungsten halogen lamps provide increased light output, well maintained throughout a longer life, coupled with small size.

### APPLICATIONS

For use in slide and film projectors, and for further applications such as:

- Overhead projectors
- Microfilm and microfiche readers and copiers
- Medical apparatus
- Fibre optic systems.

An extremely wide variety of mains and low voltage lamps for film and slide projectors, and for scientific, medical and industrial apparatus. Manufactured with great accuracy for good optical properties, and available in halogen and non-halogen types.



*Halogen types*



*Non-halogen types*

For technical information please see page 534



## MISCELLANEOUS PROJECTOR LAMPS

A wide range of tungsten and tungsten halogen single-ended projector lamps for many kinds of optical and industrial equipment, especially microfilm readers. Halogen types provide higher light output, maintained throughout a longer working life.



*Class M lamps*



*Dichroic Microfiche lamps*

### RANGE

Philips Classes F, G and M lamps are manufactured in accordance with international standards and are listed in the Lighting Industry Federation (LIF) Classification system. The range includes certain types unique to Philips. Their high standard of accuracy in manufacture ensures precise optical properties.

Among the lamps for microfilm readers, Philips have designed lamps which use axial filament reflectors, which replace either of two similar faceted mirror types of American origin, with no compromise in performance.

### APPLICATIONS

Suitable for use in miscellaneous equipment such as:

- Micro-projectors
- Cine editors
- Microscopes
- Microfiche and microfilm readers and copiers
- Traffic signals
- Display and floodlight narrow spot luminaires
- Optical sound projectors
- Disco effects projectors

### RANGES AND APPLICATIONS

**Class CP** versions of 600W, 650W, 2.5kW, 2.5kW

They are designed for spotlighting purposes with balanced optical properties.

**Class T** is for spotlighting more important colour balance.

This class includes versions of 650W, 1kW ratings, plus glass types.

**Class P2** is double-ended balanced for floodlighting.

(For other purposes, please refer to the lighting, please.)

**PAR Lamp** pressed glass PAR36, PAR64 in wattages up to 1kW; mostly for display and lighting.

**MSR Lamp** 700W, 1200W balanced for lighting at 5000K, and projectors.

# STUDIO AND THEATRE LAMPS

## CLASSES CP, T, P2, PAR AND MSR

### RANGES AND APPLICATIONS

**Class CP** consists of biplane versions of the popular 300W, 600W, 650W, 1kW, 1.2kW, 2kW, 2.5kW and 5kW ratings.

They are designed for studio spotfiling and similar purposes where output must be balanced for 3200K.

**Class T** is for theatre spotfiling, where long life is more important than exact colour balance.

This class includes biplane versions of the popular 500W, 600W, 1kW and 1.2kW halogen ratings, plus four conventional glass types still in demand.

**Class P2** consists of double-ended linear lamps balanced for 3200K studio floodlighting.

(For other photographic lighting, please see page 280).

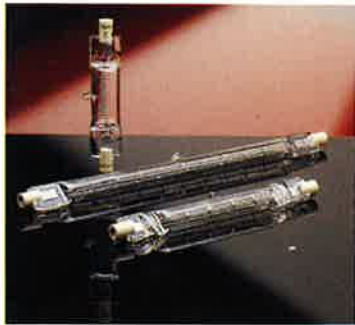
**PAR Lamps** – a range of pressed glass reflector lamps PAR36, PAR46, PAR56 and PAR64 in wattages from 30W to 1kW; mostly used for disco, display and effects lighting.

**MSR Lamps** – a range of 400W, 600W, 1200W and 2.5kW lamps balanced for daylight 'fill' lighting at 5600K for TV and filming, and for disco effects projectors.

Spotfiling and floodlighting lamps with ratings as high as 5kW, providing balanced light outputs for studio and theatrical work. Most lamps are halogen types which provide virtually constant lumen output and colour temperature through a long service life, and have compact 'biplane' filaments for improved optical performance in luminaires.



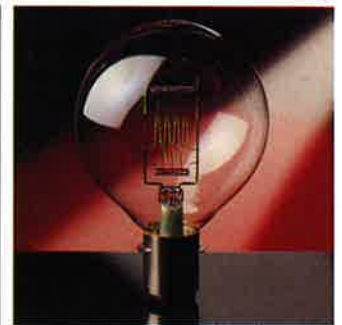
CLASS CP lamps



Double-ended Linear lamps



Halogen Class T



Non-halogen Class T



PAR lamps



MSR Lamps

For technical information please see page 538

## MISCELLANEOUS PROJECTOR LAMPS

A wide range of tungsten and tungsten halogen single-ended projector lamps for many kinds of optical and industrial equipment, especially microfilm readers. Halogen types provide higher light output, maintained throughout a longer working life.



Class M lamps



Dichroic Microfiche lamps

### RANGE

Philips Classes F, G and M lamps are manufactured in accordance with international standards and are listed in the Lighting Industry Federation (LIF) Classification system. The range includes certain types unique to Philips. Their high standard of accuracy in manufacture ensures precise optical properties.

Among the lamps for microfilm readers, Philips have designed lamps which use axial filament reflectors, which replace either of two similar faceted mirror types of American origin, with a compromise in performance.

### APPLICATIONS

Suitable for use in miscellaneous equipment such as:

- Micro-projectors
- Cine editors
- Microscopes
- Microfiche and microfilm readers and copiers
- Traffic signals
- Display and floodlight narrow spot luminaires
- Optical sound projectors
- Disco effects projectors

RANGES A  
APPLICATIONS  
Class CP of  
versions of  
500W, 650W,  
2kW, 2.5kW

They are de  
spotlighting  
purposes w  
balanced fo

Class T is f  
spotlighting  
more impor  
colour balanc

This class in  
versions of  
650W, 1kW  
ratings, plus  
glass types

Class P2 co  
double-end  
balanced fo  
floodlighting

(For other p  
ighting, ple

PAR Lamp  
pressed glas  
PAR36, PAR  
PAR64 in w  
1kW; mostly  
display and

MSR Lamp  
700W, 1200  
balanced fo  
ighting at 5  
filing, and  
projectors.

# STUDIO AND THEATRE LAMPS

## CLASSES CP, T, P2, PAR AND MSR

**S**potlighting and floodlighting lamps with ratings as high as 5kW, providing balanced light outputs for studio and theatrical work. Most lamps are halogen types which provide virtually constant lumen output and colour temperature through a long service life, and have compact 'biplane' filaments for improved optical performance in luminaires.

### RANGES AND APPLICATIONS

**Class CP** consists of biplane versions of the popular 300W, 500W, 650W, 1kW, 1.2kW, 2kW, 2.5kW and 5kW ratings.

They are designed for studio spotlighting and similar purposes where output must be balanced for 3200K.

**Class T** is for theatre spotlighting, where long life is more important than exact colour balance.

This class includes biplane versions of the popular 500W, 650W, 1kW and 1.2kW halogen ratings, plus four conventional glass types still in demand.

**Class P2** consists of double-ended linear lamps balanced for 3200K studio floodlighting.

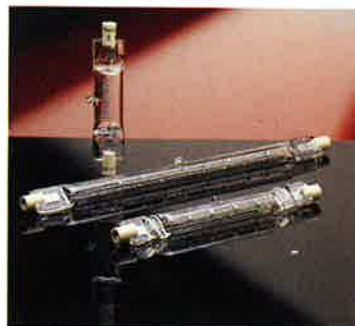
(For other photographic lighting, please see page 280).

**PAR Lamps** – a range of pressed glass reflector lamps PAR36, PAR46, PAR56 and PAR64 in wattages from 30W to 1kW; mostly used for disco, display and effects lighting.

**MSR Lamps** – a range of 400W, 600W, 1200W and 2.5kW lamps balanced for daylight 'fill' lighting at 5600K for TV and filming, and for disco effects projectors.



CLASS CP lamps



Double-ended Linear lamps



Halogen Class T



Non-halogen Class T



PAR lamps



MSR Lamps

**For technical information please see page 538**



Batteries & Torches

# BATTERIES AND TORCHES

TYPE	Product	Technical
<b>DRY CELLS</b> Zinc carbon, zinc chloride, alkaline	286	543
<b>RECHARGEABLE BATTERIES AND CHARGER</b>	287	544
<b>MINI CELLS</b> Alkaline, mercury, silver oxide, lithium	288	545
<b>TORCHES</b>	289	547

# DRY CELL BATTERIES

Seven ranges of dry cells to cover most home, leisure and professional requirements, for intermittent or continuous high drain applications, plus purpose-designed batteries for personal stereos and photography. Robust steel jacket and open date coding provide users with the assurance of reliable service. Polyvinyl sleeving ensures maximum resistance to leaks.



Alkaline



Super



Extra



Normal



Fotoflash



Walkaline



Greenline

### NORMAL

The economic choice for occasional use and low-drain applications such as torches, clocks and small toys. Available in three widely used sizes.

### EXTRA

Six popular types with ammonium chloride electrolyte, giving ample power for intermittent use in torches, motor-driven toys, computer games, clocks and small audio products.

### SUPER

Incorporating a zinc chloride electrolyte for maximum power in a non-alkaline battery. Ideal for shavers, remote control units, measuring instruments, movie cameras and large cassette/radios.

### ALKALINE

Powerful, heavy duty batteries giving a long reliable life and capable of operation at temperatures as low as  $-20^{\circ}\text{C}$ . Highly resistant to leaks. Specially suitable where continuous high demands are made.

### WALKALINE

Long life alkaline cells specifically designed for the demanding personal stereo application.

### FOTOFLASH

Alkaline batteries made specially for camera flash applications. Long-life cells, highly leak resistant.

### GREENLINE

Environmentally friendly batteries with low mercury content and 10% more power than super batteries.

RANGE AN  
Batteries  
NCR20 - R  
NCR14 - R  
NCR6 - R  
NCR03 - R  
6NCR22 - R  
battery.

Charger  
PNC200 - U  
overcharge a  
protection ar

PERFORMANC  
CELLS



DISCHARGE CU  
NICKEL CAD  
ZINC CARB



# RECHARGEABLE BATTERIES AND CHARGER

A range of five blister-packed nickel-cadmium rechargeable batteries to replace dry cell zinc-carbon and alkaline batteries in most battery-operated appliances, and a universal battery charger with integral electronic timer.

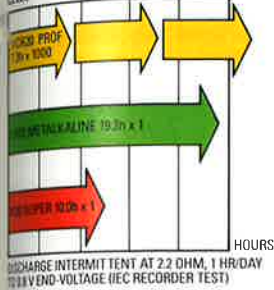


## RANGE AND APPLICATIONS

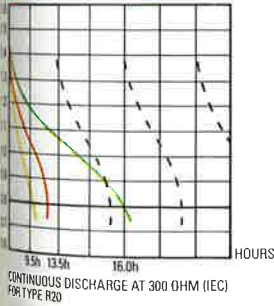
- Batteries**
- PHILIPS NCR20 - Replaces HP2 cell.
  - PHILIPS NCR14 - Replaces HP11 cell.
  - PHILIPS NCR6 - Replaces HP7 cell.
  - PHILIPS NCR03 - Replaces R03 cell.
  - PHILIPS NCR22 - Replaces PP3-P battery.

**Charger**  
 PHILIPS NC200 - Universal, with overcharge and reverse polarity protection and electronic timer.

PERFORMANCE COMPARISON OF R20-SIZED CELLS



DISCHARGE CURVES OF R20-SIZED CELLS





## MINI CELL BATTERIES

A comprehensive range of mini cell batteries for demanding consumer and professional applications, particularly in watches, cameras, pocket calculators and other portable electronic equipment.



For technical information please see page 545

### ALKALINE

Economical batteries used primarily in consumer products such as clocks, lighters, calculators, cameras and electronic games.

### MERCURY

Used where voltage stability is important, especially in cameras.

### SILVER OXIDE

A reliable high-quality power source for calculators, photographic equipment and radiopagers.

### LITHIUM

Provides a higher voltage (nominally 3V) than other mini cells – used particularly in watches.

### HALOGEN

Three robust torches for powerful beams.

### Long range

A robust pocket torch with up to 1000 hours of operation. ABS-coated, lightweight, rigidly attached thermoplastic housing with signal strap and a this torch is for patrols and organisation.

### Watertight

Watertight torch with wide-angle beam. Ideal for subterranean work. Thermoplastic moulded grip. Thumb-actuated operation, and a safety write ballast sum.

### Dual-bearing torch

A rugged torch with shock-resistance. The angled beam is specially designed to split the beam into two. The up the area while the main beam picks out details. Outdoor torch need a powerful beam in all weathers.

### AVUS RANGE

Two all-purpose torches with impact-resistant housings. Ergonomic hand grips and hanging loops. Storage, with two additional signalling beams.

### HALOGEN RANGE

These robust, heavy-duty torches containing halogen bulbs for brilliant white light and powerful beam penetration.

#### Long range halogen torch

A robust power-torch with a focused halogen beam reaching up to 1000 metres. The strong, lightweight casing is made from anodised aluminium and is rigidly attached to an anti-roll thermoplastic head. Complete with signalling button, safety strap and a convenient belt clip. This torch is ideal for security patrols and search and rescue organisations.

#### Watertight halogen torch

Watertight down to 50 metres, this sturdy torch has a brilliant, wide-angle halogen beam – ideal for submarine and underwater explorers alike. The thermoplastic casing has a moulded grip and positive thumb-action switch for easy operation, and is equipped with a safety wrist strap and integral elast sump for underwater use.

#### Dual-beam rubber halogen torch

Rugged torch with a water and shock-resistant rubber casing. The angled head houses a specially designed reflector that splits the brilliant halogen beam into two. The 'ground' beam lights the area immediately ahead, while the main 'forward' beam picks out distant objects. A great outdoor torch for people who need a powerful, reliable light in all weathers.

### AVUS RANGE

Two all-purpose standard torches with blue, impact-resistant thermoplastic housings. Both have contoured hand grips for increased comfort and hanging loops for easy storage, while the larger of the two additionally has a morse signalling button.

Philips manufactures a comprehensive series of well-designed, high quality torches to suit a variety of uses and environments.



Halogen Range



Lantern Range



Harmony Range



Avus Range

### HARMONY RANGE

A new generation of super-torches featuring krypton bulbs for more light output than ordinary torch bulbs. All three Harmony torches provide a dual light beam; a wide-angle, diffused beam for good short-range visibility and an exceptionally powerful forward beam for long-range work. Moulded in impact-resistant ABS thermoplastic, they are easy to hold, while their rectangular design prevents rolling on a horizontal surface. The larger two in the range are equipped with morse-signalling buttons and slide-out nylon hanging rings for easy storage.

### LANTERN RANGE

Two multi-purpose lanterns ideal for the motorist. The smaller version offers a side-mounted fluorescent lamp and magnifying torch, perfect for map reading and other close detail work. The larger lantern incorporates a powerful fluorescent lamp, torch beam and bright orange hazard flasher that's invaluable in breakdown situations. Complete with adjustable strap and power cable for d.c. operation from cigar lighter socket. Both lanterns are constructed from impact-resistant thermoplastic.

### POCKET LIGHT

A 'fun' torch available in red, green, blue or yellow, complete with transfer kit for customising.



Pocket Light



<b>FLUORESCENT LIGHTING</b>	<b>292</b>
<b>INDUSTRIAL DISCHARGE LIGHTING</b>	<b>337</b>
<b>ROAD LIGHTING</b>	<b>346</b>
<b>AMENITY AND SECURITY LIGHTING</b>	<b>353</b>
<b>FLOODLIGHTING</b>	<b>371</b>
<b>DISPLAY AND DECORATIVE LIGHTING</b>	<b>391</b>
<b>LIGHTING CONTROL SYSTEMS</b>	<b>458</b>
<b>LAMPS AND CONTROL GEAR</b>	<b>461</b>
<b>BATTERIES</b>	<b>543</b>
<b>TORCHES</b>	<b>547</b>
<b>LAMP PERFORMANCE AND CONTROL GEAR SCHEDULES</b>	<b>549</b>

# GENERAL NOTES ON INCANDESCENT LAMPS

## GLS LAMPS

### GENERAL INFORMATION: General Lighting Service lamps

**Quality**  
The Philips range of incandescent filament lamps has well earned reputation for all-round quality. Most types tested here are manufactured in one large factory, to the same high specification used in Philips factories worldwide, with the objective of ensuring uniformity of performance and reliability of the products.

**Safety**  
Philips recognise that product safety is critically important. Each lamp is automatically checked in all electrical respects while glass working expertise retains the incidence of glass failure under rigorous service conditions to a negligible level.

**Fuses**  
Proper fusing of filament lamps is of vital importance to safety in service. All Philips gasfilled GLS lamps of 25 watts and 100 volts rating, or greater, are individually fused. Bayonet capped versions have two fuses encapsulated within insulating foam to prevent explosive arcing within the cap at the end of life. Such arcing can lead to shattered lamps, damaged holders and house fuse failure.

### British and International Standards

Incandescent lamps shown within this section are manufactured to comply with the following standards, where applicable:-

British	International	Title
BS 161	IEC 64	Specification for Tungsten Filament Lamps for general service (batch testing).
BS 5971	IEC 432	Safety and Interchangeability of Tungsten Filament lamps for domestic and similar general lighting purposes
BS 5101	IEC 61	Specification for Lamp Caps and Holders together with gauges for the control of interchangeability and safety

### Normal efficiency. Pear-shaped

240V		110V	
WATTS	LUMENS	WATTS	LUMENS
15	115	25	225
200	2900	40	445
300	4650	60	770
500	8300	100	1420
		150	2360
		200	3300
		300	5200
		500	9400

### Incandescent Lamp Performance Characteristics

Relationships between light output, life and power consumed as applied voltage is varied are shown in Figures 1 and 2. These values apply to all GLS lamps irrespective of type. It should be remembered that these are average values however, and that individual lamps will not necessarily behave identically.

### Life Expectancy

Figure 1 illustrates that filament life is very strongly influenced by the actual voltage applied to the lamp. For example, operation of a 240V rated lamp on 250V will reduce average life expectancy to 57%.

### Light Output

Figure 2 shows that light output is more strongly affected than power consumed. In the example above, light output would increase by 15%, while lamp power rises by about 9%. Conversely, operation below rated volts to achieve longer life will reduce the lighting efficiency.

'Standard' GLS lamps have an average life expectancy of 1000 hours at rated volts. This value has been internationally standardised as representing a reasonable compromise between performance characteristics for optimum lighting efficiency, bearing in mind the low cost of replacement lamps and the high cost of electricity consumed.

Figure 1 CURVE 2  
VARIATIONS OF LIFE WITH APPLIED VOLTAGE

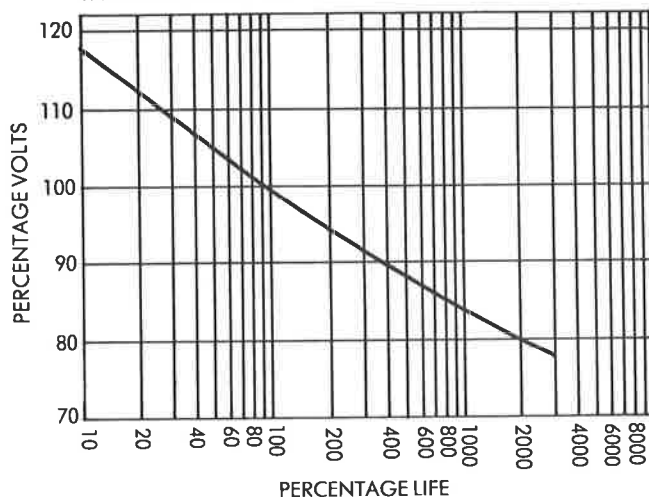
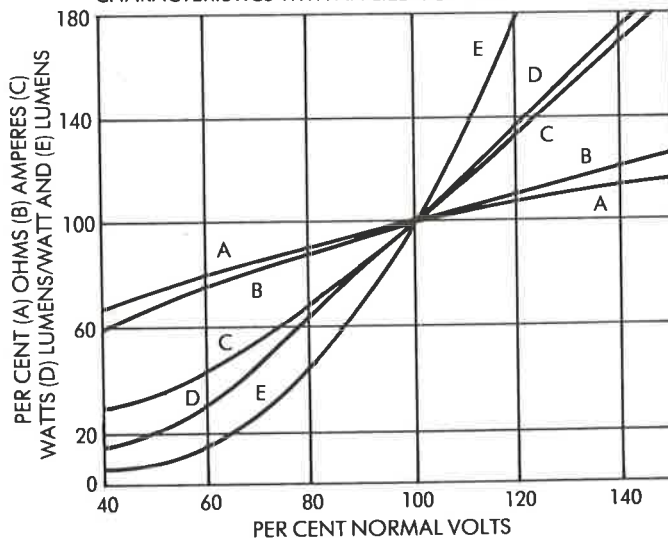


Figure 2 CURVE 1  
VARIATION OF ELECTRICAL AND LIGHT CHARACTERISTICS WITH APPLIED VOLTAGE



### STANDARD GLS PERFORMANCE DATA

Lumen output  
Initial rated lumens to BS 161

### High efficiency, coiled coil Pear-shaped 240V

WATTS	LUMENS
25	225
40	420
60	710
75	940
100	1360
150	2180

### K-MUSHROOM LAMPS (Argenta-white)

Initial lumens may be taken as 94% of equivalent high efficiency lamp values.

### K-SUPERLUX LAMPS

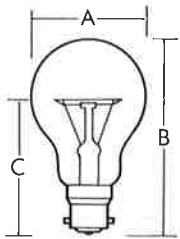
The Argenta-White coating acts as a semi-reflector. This increases the intensity through the non-coated crown to give 35% more 'useful' light.

### Lighting design notes

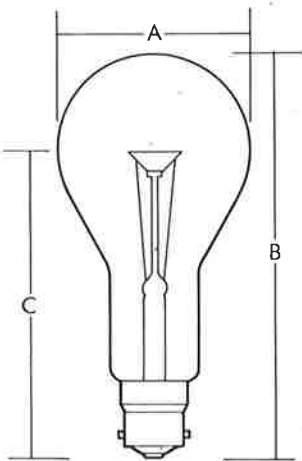
Lighting design lumens are usually taken about 94% of initial rated lumens. End of life lumens are typically 90% of initial rated lumens.

# GLS LAMPS

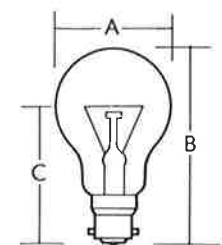
## STANDARD GLS LAMPS



GLS COILED COIL



GLS HIGH WATTAGE



GLS LOW VOLTAGE

ORDERING							DIMENSIONS		
Description and Wattage	Voltage	Cap	Finish	Packing* Quantity	Order Shortcode	A	B	C	
GLS Coiled-coil 25W	240	BC	Pearl/Clear	25	25 BC**	60	103	70	
GLS Coiled-coil 25W	250	BC	Pearl	25	250 25 BC PE	60	103	70	
GLS Coiled-coil 40W	240	BC	Pearl/Clear	25	40 BC** 1P	60	103	70	
GLS Coiled-coil 40W	240	ES	Pearl	25	40 ES PE	60	104.5	70	
GLS Coiled-coil 40W	250	BC	Pearl/Clear	25	250 40 BC**	60	103	70	
GLS Coiled-coil 60W	240	BC	Pearl/Clear	25	60 BC** 1P	60	103	70	
GLS Coiled-coil 60W	240	ES	Pearl/Clear	25	60 ES**	60	104.5	70	
GLS Coiled-coil 60W	250	BC	Pearl/Clear	25	250 60 BC**	60	103	70	
GLS Coiled-coil 60W	250	ES	Pearl	25	250 60 ES PE	60	104.5	70	
GLS Coiled-coil 75W	240	BC	Pearl	25	75 BC PE	60	103	70	
GLS Coiled-coil 75W	240	ES	Pearl	25	75 ES PE	60	104.5	70	
GLS Coiled-coil 75W	250	BC	Pearl	25	250 75 BC PE	60	103	70	
GLS Coiled-coil 100W	240	BC	Pearl/Clear	25	100 BC** 1P	60	103	70	
GLS Coiled-coil 100W	240	ES	Pearl/Clear	25	100 ES**	60	104.5	70	
GLS Coiled-coil 100W	250	BC	Pearl/Clear	25	250 100 BC**	60	103	70	
GLS Coiled-coil 100W	250	ES	Pearl	25	250 100 ES PE	60	104.5	70	
GLS Coiled-coil 150W	240	BC	Pearl/Clear	25	150 BC**	68	125	90	
GLS Coiled-coil 150W	240	ES	Pearl/Clear	25	150 ES**	68	126.5	90	
GLS Coiled-coil 150W	250	BC	Pearl	25	250 150 BC PE	68	125	90	
GLS Coiled-coil 150W	250	ES	Pearl/Clear	25	250 150 ES**	68	126.5	90	

\*For Multipack information see page 192.

\*\*Quote appropriate code for finish: ie PEARL = PE CLEAR = CL

## GLS LOW and HIGH WATTAGE LAMPS

ORDERING							DIMENSIONS		
Description and Wattage	Voltage	Cap	Finish	Packing Quantity	Order Shortcode	A	B	C	
GLS 15W	240	BC	Pearl	25	15 BC PE	60	103	70	
GLS 15W	250	BC	Pearl	25	250 15 BC PE	60	103	70	
GLS 200W	240	BC	Pearl	25	200 BC PE	80	160	120	
GLS 200W	240	BC	Clear	25	200 BC CL	80	160	120	
GLS 200W	240	ES	Pearl	25	200 ES PE	80	161.5	120	
GLS 200W	240	ES	Clear	25	200 ES CL	80	161.5	120	
GLS 300W	240	GES	Clear	20	300 GES CL	88	181	139	
GLS 300W	250	GES	Clear	20	250 300 GES CL	88	181	139	
GLS 500W	240	GES	Clear	10	500 GES CL	110	234.5	178	
GLS 500W	250	GES	Clear	10	250 500 GES CL	110	234.5	178	

### 110 VOLT LAMPS

GLS 25W	110	BC	Pearl	25	110 25 BC PE	60	103	70
GLS 40W	110	BC	Pearl	25	110 40 BC PE	60	103	70
GLS 60W	110	BC	Pearl	25	110 60 BC PE	60	103	70
GLS 60W	110	ES	Pearl	25	110 60 ES PE	60	104.5	70
GLS 100W	110	BC	Pearl	25	110 100 BC PE	60	103	70
GLS 100W	110	ES	Pearl	25	110 100 ES PE	60	104.5	70
GLS 150W	110	BC	Pearl	25	110 150 BC PE	80	160	120
GLS 150W	110	ES	Pearl	25	110 150 ES PE	80	161.5	120
GLS 200W	110	BC	Pearl	25	110 200 BC PE	80	160	120
GLS 200W	110	ES	Pearl	25	110 200 ES PE	80	161.5	120
GLS 300W	110	GES	Clear	20	110 300 GES CL	88	181	139
GLS 500W	110	GES	Clear	10	110 500 GES CL	110	234.5	178

## GLS LOW VOLTAGE LAMPS 25V AND 50V

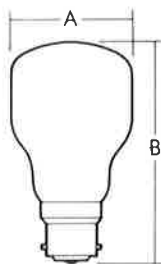
ORDERING							DIMENSIONS		
Description and Wattage	Voltage	Cap	Finish	Packing Quantity	Order Shortcode	A	B	C	
GLS low voltage 25W	25/50	BC	Pearl	25	**25 BC PE	60	103	70	
GLS low voltage 25W	25/50	ES	Pearl	25	**25 ES PE	60	104.5	70	
GLS low voltage 40W	25/50	BC	Pearl	25	**40 BC PE	60	103	70	
GLS low voltage 40W	25/50	ES	Pearl	25	**40 ES PE	60	104.5	70	
GLS low voltage 60W	25/50	BC	Pearl	25	**60 BC PE	60	103	70	
GLS low voltage 60W	25/50	ES	Pearl	25	**60 ES PE	60	104.5	70	
GLS low voltage 100W	25/50	BC	Pearl	25	**100 BC PE	60	103	70	
GLS low voltage 100W	25/50	ES	Pearl	25	**100 ES PE	60	104.5	70	

\*\* Quote appropriate voltage i.e. 25 = 25V 50 = 50V e.g. 25 25 BC PE

**For product description please see page 189-190**

# SOFTONE & SOFTONE COLOURS K-MUSHROOM & K-SUPERLUX NIGHT LIGHT

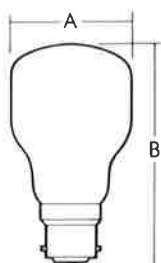
## SOFTONE (White)



SOFTONE

ORDERING						DIMENSIONS	
Description and Wattage	Voltage	Cap	Finish	Packing Quantity	Order Shortcode	A	B
SOFTONE 40W	240	BC	White	40	40 BC ST WH	60	101.5
SOFTONE 60W	240	BC	White	40	60 BC ST WH	60	101.5
SOFTONE 100W	240	BC	White	40	100 BC ST WH	60	101.5

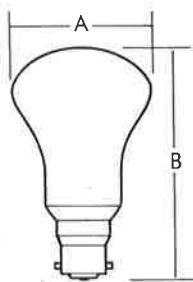
## SOFTONE (Colours) With a hint of . . .



SOFTONE

ORDERING						DIMENSIONS	
Description and Wattage	Voltage	Cap	Finish	Packing Quantity	Order Shortcode	A	B
Pink 60W	240	BC		20	60 BC ST PI	60	101.5
Yellow 60W	240	BC		20	60 BC ST YE	60	101.5
Blue 60W	240	BC		20	60 BC ST BL	60	101.5
Peach 60W	240	BC		20	60 BC ST PE	60	101.5
Green 60W	240	BC		20	60 BC ST GR	60	101.5

## K-MUSHROOM

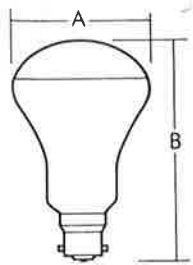


K-MUSHROOM

ORDERING						DIMENSIONS	
Description and Wattage	Voltage	Cap	Finish	Packing Quantity	Order Shortcode	A	B
K-Mushroom 40W	240	BC	Argenta-White	25	40 BC MU1P	60	100
K-Mushroom 60W	240	BC	Argenta-White	25	60 BC MU1P	60	100
K-Mushroom 100W	240	BC	Argenta-White	25	100 BC MU1P	60	100
K-Mushroom 150W	240	BC	Argenta-White	25	150 BC MU	75	120

\* For Multipack information see page 192.

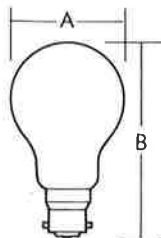
## K-SUPERLUX LAMPS



K-SUPERLUX

ORDERING						DIMENSIONS	
Description and Wattage	Voltage	Cap	Finish	Packing Quantity	Order Shortcode	A	B
K-Superlux 40W	240	ES	Argenta-White	20	40 ES SU	50	91.5
K-Superlux 60W	240	BC	Argenta-White	25	60 BC SU	60	100
K-Superlux 100W	240	BC	Argenta-White	25	100 BC SU	60	100
K-Superlux 150W	240	BC	Argenta-White	25	150 BC SU	75	120

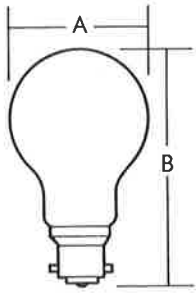
## NIGHT LIGHT LAMP



NIGHT LIGHT

ORDERING						DIMENSIONS	
Description and Wattage	Voltage	Cap	Finish	Packing Quantity	Order Shortcode	A	B
Night Light 8W	240/250	BC	Pearl	10 x 10	58 BC NI PEN	60	103

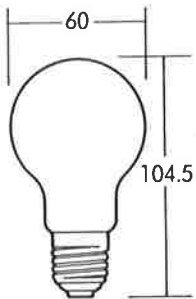
# SPECIAL SERVICE INCANDESCENT LAMPS



ROUGH SERVICE

**ROUGH SERVICE**

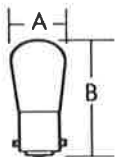
Strongly reinforced construction to withstand vibration.



TRAFFIC SIGNAL

**TRAFFIC SIGNAL**

Designed for high reliability over extended service periods. Type M/32 exceeds the requirements of BS505. 1971 for life expectancy and complies with IEC 357. Types M/32 and M/28 have platinum plated pins for contact durability. M/32 rated life 3000 hours (6000 hours under laboratory conditions).



PYGMY/SIGN  
COLOURED PYGMY/SIGN

**PYGMY/SIGN ES CAP**

These lamps should only be used in lampholders which are shrouded to prevent the touching of the cap.

**ROUGH SERVICE**

ORDERING							DIMENSIONS	
Description and Wattage	Voltage	Cap	Finish	Packing Quantity	Order Shortcode	A	B	
Rough Service 40W	240/250	BC	Pearl	25	40 BC RS PE	60	103	
Rough Service 40W	240/250	ES	Pearl	25	40 ES RS PE	60	104.5	
Rough Service 60W	240/250	BC	Pearl	25	60 BC RS PE	60	103	
Rough Service 60W	240/250	ES	Pearl	25	60 ES RS PE	60	104.5	
Rough Service 100W	240/250	BC	Pearl	25	100 BC RS PE	68	125	
Rough Service 100W	240/250	ES	Pearl	25	100 ES RS PE	68	126.5	
Rough Service 40W	110/120	BC	Pearl	25	110 40 BC RS PE	60	103	
Rough Service 60W	110/120	BC	Pearl	25	110 60 BC RS PE	60	103	
Rough Service 100W	110/120	BC	Pearl	25	110 100 BC RS PE	68	125	

**TRAFFIC SIGNAL**

ORDERING						Order Shortcode
Description and Wattage	Voltage	Cap	Finish	Packing Quantity	Order Shortcode	
Traffic Signal 65W	240	ES	Clear	25	65 ES TR SI	
Halogen M/32 50W	12	GY6.35	Clear	100	M32	
Halogen M/28 100W	12	GY6.35	Clear	100	M28	

**PYGMY/SIGN**

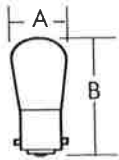
ORDERING							DIMENSIONS	
Description and Wattage	Voltage	Cap	Finish	Packing Quantity	Order Shortcode	A	B	
Pygmy Sign 15W	25	BC	Clear	100	25 15 BC SI CL	28	57	
Pygmy Sign 15W	50	BC	Clear	100	50 15 BC SI CL	28	57	
Pygmy Sign 15W	110/115	BC	Clear	100	110 15 BC SI CL	28	57	
Pygmy Sign 15W	110/115	SBC	Clear	100	110 15 SBC SI CL	28	63	
Pygmy Sign 15W	110/115	ES	Clear	100	110 15 ES SI CL	28	60.5	
Pygmy Sign 15W	110/115	SES	Clear	100	110 15 SES SI CL	28	64.5	
Pygmy Sign 15W	120/130	BC	Clear	100	125 15 BC SI CL	28	57	
Pygmy Sign 15W	120/130	ES	Clear	100	125 15 ES SI CL	28	57	
Pygmy Sign 15W	200/250	BC	Clear	100	15 BC SI CL	28	57	
Pygmy Sign 15W	200/250	SBC	Clear	100	15 SBC SI CL	28	63	
Pygmy Sign 15W	200/250	ES	Clear	100	15 ES SI CLE	28	60.5	
Pygmy Sign 15W	200/250	SES	Clear	100	15 SES SI CL	28	64.5	
Pygmy Sign 15W	200/250	BC	Coloured	10	15 BC SI **	28	57	

\*\* Quote appropriate colour code ie. Red = RE; Blue = BL; Green = GR; Yellow = YE; Amber = AM; Pink = PL



# SPECIAL SERVICE INCANDESCENT LAMPS

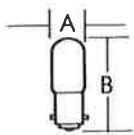
## SWITCHBOARD INDICATOR



SWITCHBOARD INDICATOR

ORDERING							DIMENSIONS	
Description and Wattage	Voltage	Cap	Finish	Packing Quantity	Order Shortcode	A	B	
Switchboard	10W	200/260	BC	Clear	100	10 BC SW CL	28	57

## PILOT

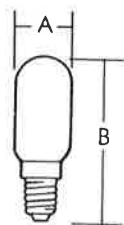


PILOT

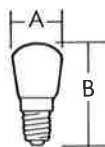
ORDERING							DIMENSIONS	
Description and Wattage	Voltage	Cap	Finish	Packing Quantity	Order Shortcode	A	B	
Pilot	6W	100/130	SBC	Clear	100	100 6 SBC PI CL	20	40
Pilot	6W	100/130	SES	Clear	100	100 6 SES PI CL	20	46
Pilot	6W	100/130	E12	Clear	100	100 6 CES PI CL	20	44
Pilot	10W	200/250	SBC	Clear	100	10 SBC PI CL	20	40
Pilot	10W	200/250	SES	Clear	100	10 SES PI CL	20	46
Pilot	10W	200/250	E12	Clear	100	10 CES PI CL	20	44

## OVEN LAMPS

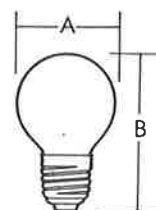
ORDERING							DIMENSIONS	
Description and Wattage	Voltage	Cap	Finish	Packing Quantity	Order Shortcode	A	B	
Oven Lamp (22mm Tubular)	15W	240/250	SES	Clear	25	15 SES OV CL	22	48
Oven Lamp (28mm Pygmy Sign)	25W	240	SES	Clear	20	25 SES OV CL	28	66
Oven Lamp (45mm Round)	40W	240	SES	Clear	10 x 10	40 SES OV CL	45	78
Baker's Oven Lamp (60mm GLS)	60W	240	BC	Clear	10 x 10	60 BC BA CL	60	103



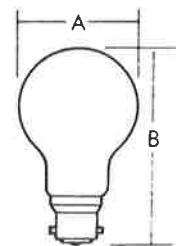
TUBULAR 22mm



PYGMY OVEN 28mm



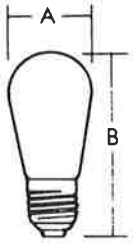
ROUND 45mm



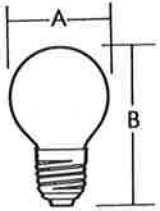
BAKERS OVEN 60mm

For product description please see pages 201-202

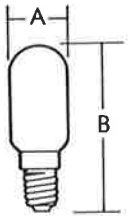
# SPECIAL SERVICE INCANDESCENT LAMPS



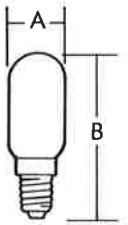
PEAR 45mm



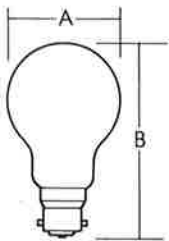
ROUND 45mm



TUBULAR 25mm



TUBULAR 22mm



FIREGLOW

**FIREGLOW LAMPS**

A durable red lacquered lamp of reinforced construction.

**APPLIANCE LAMPS**

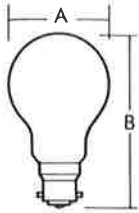
ORDERING							DIMENSIONS	
Description and Wattage	Voltage	Cap	Finish	Packing Quantity	Order Shortcode	A	B	
Appliance Lamp 40W (45mm Pear)	230/250	BC	Pearl	100	40 BC AP PE	45	92.5	
Appliance Lamp 40W (45mm Pear)	230/250	ES	Pearl	100	40 ES AP PE	45	94	
Appliance Lamp 25W (45mm Round)	230/250	ES	Pearl	50	25 ES AP PE	45	73	
Appliance Lamp 25W (25mm Tubular)	240	SES	Clear	20 × 5	25 SES AP 25 CL	25	66	
Appliance Lamp 25W (25mm Tubular)	240	BC	Clear	20 × 5	25 BC AP 25 CL	25	60.5	
Appliance Lamp 25W (25mm Tubular)	230/240	SES	Pearl	20 × 5	25 SES AP 25 PE	25	66	
Appliance Lamp 20W (22mm Tubular)	230/240	SES	Pearl	20 × 5	20 SES AP 20 PE	22	63.5	

**FIREGLOW LAMPS**

ORDERING						DIMENSIONS	
Description and Wattage	Voltage	Cap	Finish	Packing Quantity	Order Shortcode	A	B
Fireglow 60W	240/250	BC	Amber	10 × 10	60 BC FIN	60	103
Fireglow 60W	240/250	BC 3 Pin	Amber	10 × 10	60 BC3 FIN	60	103

For product description please see page 203

### COLOURED GLS

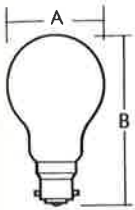


15W and 25W ratings may be used outdoors in suitable weatherproof holders

### COLOURED GLS

ORDERING							DIMENSIONS		
Description and Wattage	Voltage	Cap	Finish	Order code suffix	Packing Quantity	Order Shortcode Add colour suffix required	A	B	
Coloured GLS 15W	240/250	BC	10 x 10	All types:	15 BC **		60	103	
Coloured GLS 25W	240/250	BC	10 x 10	Red	RE	25 BC **	60	103	
Coloured GLS 40W	240/250	BC	10 x 10	Blue	BL	40 BC **	60	103	
Coloured GLS 60W	240/250	BC	10 x 10	Green	GE	60 BC **	60	103	
				Yellow	YE				
				Amber	AM				
				Pink	PI				

### ARGENTA ROSE

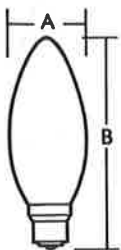


Soft pink opal finish

### ARGENTA ROSE

ORDERING							DIMENSIONS		
Description and Wattage	Voltage	Cap	Finish	Packing Quantity	Order Shortcode	A	B		
Argenta Rose 60W	240/250	BC	Argenta Rose	25	60 BC AR N	60	103		
Argenta Rose 100W	240/250	BC	Argenta Rose	25	100 BC AR N	60	103		

### PLAIN CANDLE



The 60 watt plain 35mm candle should not be operated continuously in the cap-up position

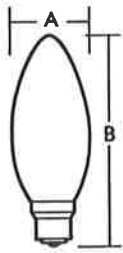
### PLAIN CANDLE: CLEAR

ORDERING							DIMENSIONS		
Description and Wattage and Bulb Diameter	Voltage	Cap	Finish	Packing Quantity	Order Shortcode	A	B		
35mm Plain Candle	25W	BC	Clear	50(5 x 10)	25 BC PL CA CL N	35	89		
35mm Plain Candle	25W	SBC	Clear	50(5 x 10)	25 SBC PL CA CL N	35	95.5		
35mm Plain Candle	40W	BC	Clear	50(5 x 10)	40 BC PL CA CL N	35	89		
35mm Plain Candle	40W	SBC	Clear	50(5 x 10)	40 SBC PL CA CL N	35	95.5		
35mm Plain Candle	40W	SES	Clear	50(5 x 10)	40 SES PL CA CL	35	97		
35mm Plain Candle	60W	BC	Clear	50(5 x 10)	60 BC 35 PL CA CL N	35	89		
35mm Plain Candle	60W	SBC	Clear	50(5 x 10)	60 SBC 35 PL CA CL N	45	127		
45mm Plain Candle	60W	BC	Clear	50(5 x 10)	60 BC PL CA CL	45	125		

\* For Multipack information see page 192.

# DECORATIVE INCANDESCENT LAMPS

PLAIN CANDLE

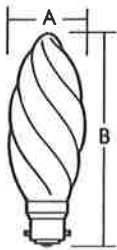


## SOFTONE PLAIN CANDLE: WHITE AND WITH A HINT OF COLOUR

ORDERING							DIMENSIONS	
Description and Wattage and Bulb Diameter	Voltage	Cap	Finish	Packing * Quantity	Order Shortcode	A	B	
<b>WHITE</b>								
35mm Plain Candle 25W	240/250	BC	White	50 (5 x 10)	25 BC ST CA WH	35	89	
35mm Plain Candle 25W	240/250	SBC	White	50 (5 x 10)	25 SBC ST CA WH	35	95.5	
35mm Plain Candle 25W	240/250	SES	White	50 (5 x 10)	25 SES ST CA WH	35	97	
35mm Plain Candle 40W	240/250	BC	White	50 (5 x 10)	40 BC ST CA WH	35	89	
35mm Plain Candle 40W	240/250	SBC	White	50 (5 x 10)	40 SBC ST CA WH	35	95.5	
35mm Plain Candle 40W	240/250	SES	White	50 (5 x 10)	40 SES ST CA WH	35	97	
35mm Plain Candle 60W	240/250	BC	White	50 (5 x 10)	60 BC ST CA WH	35	89	
35mm Plain Candle 60W	240/250	SBC	White	50 (5 x 10)	60 SBC ST CA WH	35	95.5	
35mm Plain Candle 60W	240/250	SES	White	50 (5 x 10)	60 SES ST CA WH			
<b>HINT OF COLOUR</b>								
35mm Plain Candle 40W	240/250	BC	Pink	50 (5 x 10)	40 BC ST CA PI	35	95.5	
35mm Plain Candle 40W	240/250	BC	Peach	50 (5 x 10)	40 BC ST CA PE	35	95.5	
35mm Plain Candle 40W	240/250	BC	Green	50 (5 x 10)	40 BC ST CA GR	35	95.5	
35mm Plain Candle 40W	240/250	BC	Yellow	50 (5 x 10)	40 BC ST CA YE	35	95.5	
35mm Plain Candle 40W	240/250	BC	Blue	50 (5 x 10)	40 BC ST CA BL	35	95.5	

\* For Multipack information see page 192.

TWISTED CANDLE



## TWISTED CANDLE: CLEAR

ORDERING							DIMENSIONS	
Description and Wattage and Bulb Diameter	Voltage	Cap	Finish	Packing * Quantity	Order Shortcode	A	B	
35mm Twisted Candle 25W	240/250	BC	Clear	50 (5 x 10)	25 BC TW CA CL	35	98	
35mm Twisted Candle 40W	240/250	BC	Clear	50 (5 x 10)	40 BC 35 TW CA CL	35	97	
35mm Twisted Candle 40W	240/250	SBC	Clear	50 (5 x 10)	40 SBC 35 TW CA CL	35	100	
47mm Twisted Candle 40W	240/250	BC	Clear	50 (5 x 10)	40 BC TW CA CL	47	125	
47mm Twisted Candle 40W	240/250	SBC	Clear	50 (5 x 10)	40 SBC TW CA CL	47	127	
47mm Twisted Candle 60W	240/250	BC	Clear	50 (5 x 10)	60 BC TW CA CL	47	125	

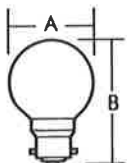
FLAMBEAU



## FLAMBEAU CANDLE: CLEAR

ORDERING							DIMENSIONS	
Description and Wattage	Voltage	Cap	Finish	Packing * Quantity	Order Shortcode	A	B	
47mm Flambeau Candle 60W	240	BC	Clear	50 (5 x 10)	60 BC FB CA CL	47	125	

ARGENTA LUSTRE



## ROUND LUSTRE LAMPS

ORDERING							DIMENSIONS	
Description and Wattage	Voltage	Cap	Finish	Packing * Quantity	Order Shortcode	A	B	
Clear Lustre 25W	240/250	BC	Clear	50 (5 x 10)	25 BC CL LU	45	68.5	
Clear Lustre 40W	240/250	BC	Clear	50 (5 x 10)	40 BC CL LU	45	68.5	
Argenta Lustre 25W	240/250	BC	Argenta-White	50 (5 x 10)	25 BC AR LU	45	68.5	
Argenta Lustre 25W	240/250	SBC	Argenta-White	50 (5 x 10)	25 SBC AR LU	45	73.5	
Argenta Lustre 25W	240/250	ES	Argenta-White	50 (5 x 10)	25 ES AR LU	45	70	
Argenta Lustre 25W	240/250	SES	Argenta-White	50 (5 x 10)	25 SES AR LU	45	75	
Argenta Lustre 40W	240/250	BC	Argenta-White	50 (5 x 10)	40 BC AR LU	45	68.5	
Argenta Lustre 40W	240/250	SBC	Argenta-White	50 (5 x 10)	40 SBC AR LU	45	73.5	
Argenta Lustre 40W	240/250	ES	Argenta-White	50 (5 x 10)	40 ES AR LU	45	70	
Argenta Lustre 40W	240/250	SES	Argenta-White	50 (5 x 10)	40 SES AR LU	45	75	

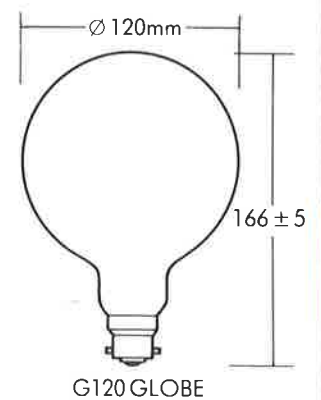
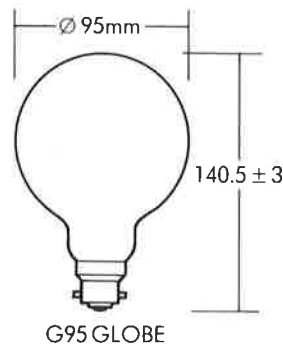
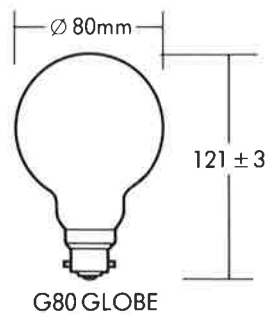
# DECORATIVE INCANDESCENT LAMPS

## SOFTONE GLOBE LAMPS

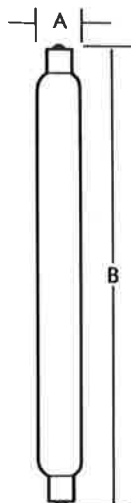
ORDERING						
Description and Wattage		Voltage	Cap	Finish	Packing Quantity	Order Shortcode
G80 Softone 60W		240	BC	White	10	60BCSTWHG80
G80 Softone 100W		240	BC	White	10	100BCSTWHG80
G95 Softone 60W		240	BC	White	10	60BCSTWHG95
G95 Softone 100W		240	BC	White	10	100BCSTWHG95
G120 Softone 60W		240	BC	White	10	60BCSTWHG120
G120 Softone 100W		240	BC	White	10	100BCSTWHG120

## SOFTONE GLOBE LAMPS "With a hint of"

ORDERING						
Description and Wattage		Voltage	Cap	Finish	Packing Quantity	Order Shortcode
G95 Softone 100W		240	BC	Pink	10	100BCSTPIG95
G95 Softone 100W		240	BC	Peach	10	100BCSTPEG95
G95 Softone 100W		240	BC	Blue	10	100BCSTBLG95
G95 Softone 100W		240	BC	Green	10	100BCSTGRG95
G95 Softone 100W		240	BC	Yellow	10	100BCSTYEG95



### STRIPLITE



## STRIPLITE

ORDERING							DIMENSIONS	
Description and Wattage and Length		Voltage	Cap	Finish	Packing Quantity	Order Shortcode	A	B
221mm STRIPLITE 30W		240/250	S15s	Clear	25	30 22 CL E	25	221
221mm STRIPLITE 30W		240/250	S15s	Opal	25	30 22 O P E	25	221
221mm STRIPLITE 60W		240/250	S15s	Clear	25	60 22 CL E	25	221
221mm STRIPLITE 60W		240/250	S15s	Opal	25	60 22 O P E	25	221
284mm STRIPLITE 30W		240/250	S15s	Clear	25	30 28 CL E	25	284
284mm STRIPLITE 30W		240/250	S15s	Opal	25	30 28 O P E	25	284
284mm STRIPLITE 60W		240/250	S15s	Clear	25	60 28 CL E	25	284
284mm STRIPLITE 60W		240/250	S15s	Opal	25	60 28 O P E	25	284

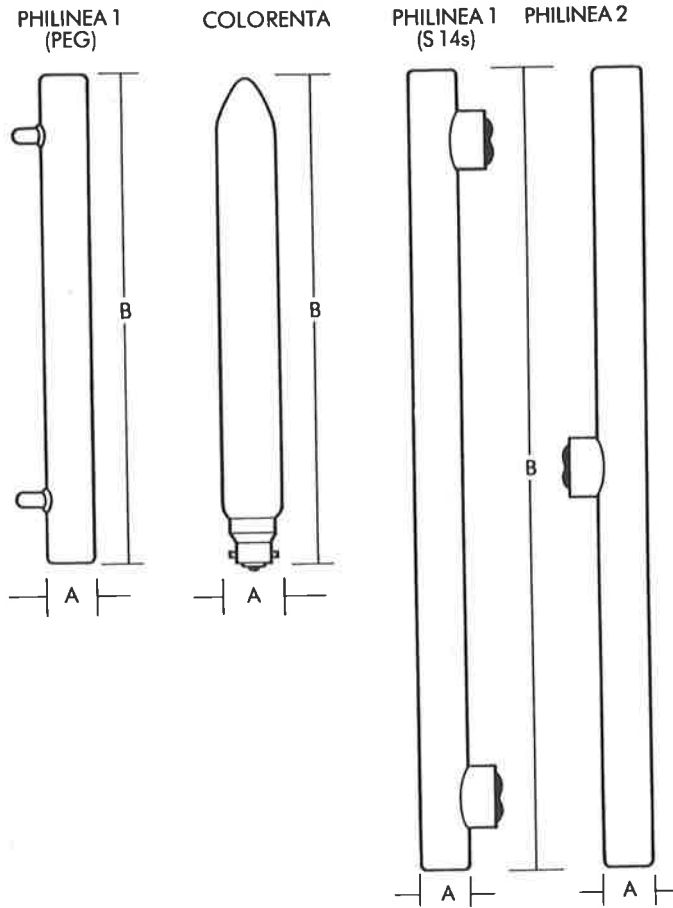
For product description please see page 209

# DECORATIVE INCANDESCENT LAMPS

## PHILINEA 1 AND 2 AND COLORENTA

ORDERING							DIMENSIONS	
Description and Wattage and Length	Voltage	Cap	Finish	Packing Quantity	Order Shortcode	A	B	
300mm PHILINEA 1 35W	240/250	Peg (S12)	Opal	25	35 PHA	26	300	
500mm PHILINEA 1 60W	240/250	Peg (S12)	Opal	25	60 PHA	26	500	
610mm PHILINEA 1 75W	240/250	Peg (S12)	Opal	25	75 PHA	26	610	
300mm PHILINEA 1 35W	240	S14s	Opal	25	35 S14S PH 1A	26	300	
500mm PHILINEA 1 60W	240	S14s	Opal	25	60 S14S PH 1A	26	500	
300mm PHILINEA 2 35W	240	Central Peg S14d	Opal	25	35 S14D PH 2A	26	300	
500mm PHILINEA 2 60W	240/250	Central Peg S14d	Opal	25	60 S14D PH 2A	26	500	
303mm COLORENTA 60W	240/250	BC	Argenta-White	25	60 BC.CO A	38	303	

NOTE: Most British made luminaires suit the S12 peg (nickel plated 12mm diameter). The S14s oval brass peg is used in European luminaires.



For product description please see page 210

# REFLECTOR LAMPS BEAM DIAGRAMS

**RANGE**

Blown Bulb Reflectors  
Pressed Glass Lamps (Par 38-E  
Par 56)  
Crown Silvered - Bowl  
Reflector.

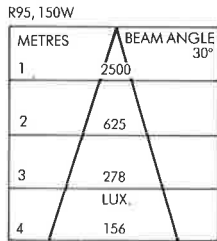
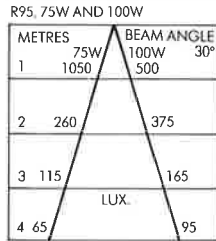
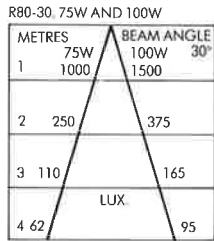
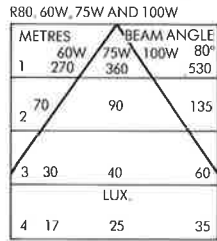
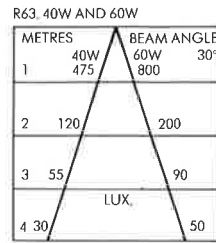
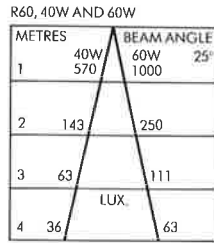
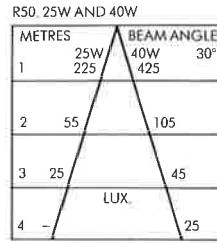
**Using the Guide**

The beam cones are drawn at the angles where the light intensity is 50% of the centre intensity. PAR 56 lamps give an elliptical beam.

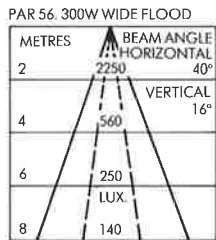
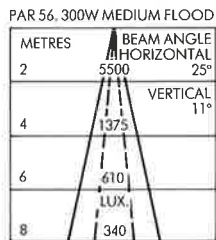
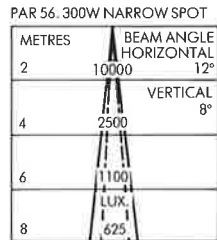
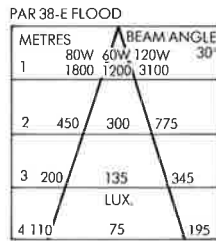
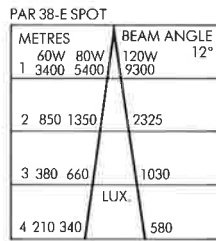
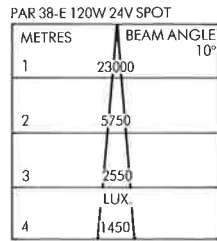
The 'Lux' is a measure of the illuminance on a surface (lumens per sq. metre), and the values given are at beam centre for the distances shown.

Lux is calculated by dividing intensity (candelas) by the distance squared (m<sup>2</sup>), for surfaces at 90° to the beam.

**INTERNALLY SILVERED**



**PRESSED GLASS**

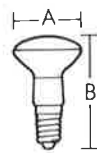


# BLOWN BULB REFLECTORS

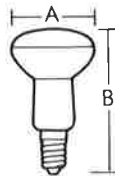
A comprehensive range of internally silvered lamps from narrow spot to wide flood in various voltages to suit lighting applications such as displays, exhibitions, task, reading and indoor spotlighting. The range includes standard coloured lamps with durable lacquered satin finish and the R80 'Disco lamp' in sparkling transparent colours with clear bulb and specular reflector, see page 474.

## BLOWN BULB REFLECTORS

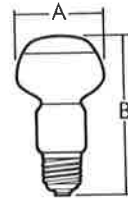
ORDERING								DIMENSIONS	
Description and Wattage	Voltage	Cap	Finish	Packing* Quantity	Order-Shortcode	A	B		
R39	42°	30W	240	SES	Diffused	20	30 SES R39	40	66.5
R50	30°	25W	240	SES	Diffused	25	25 SES R50	51	86
R50	30°	40W	240	SES	Diffused	25	40 SES R50	51	86
R60	25°	40W	240	BC	Diffused	25	40 BC R60	60	101.5
R60	25°	40W	240	ES	Diffused	25	40 ES R60	60	103
R60	25°	60W	240	BC	Diffused	25	60 BC R60	60	101.5
R60	25°	60W	240	SES	Diffused	25	60 ES R60	60	103
R63	30°	40W	240/250	BC	Diffused	25	40 BC R63	64	103
R63	30°	40W	240/250	ES	Diffused	25	40 ES R63	64	105.5
R63	30°	60W	240/250	BC	Diffused	25	60 BC R63	64	103
R63	30°	60W	240/250	ES	Diffused	25	60 ES R63	64	105.5
R80 (Ro80)	80°	60W	240/250	BC	Diffused	25	60 BC R80	81	113
R80 (Ro80)	80°	60W	240/250	ES	Diffused	25	60 ES R80	81	114.5
R80 (Ro80)	80°	75W	240/250	BC	Diffused	25	75 BC R80	81	113
R80 (Ro80)	80°	75W	240/250	ES	Diffused	25	75 ES R80	81	114.5
R80 (Ro80)	80°	100W	240/250	BC	Diffused	25	100 BC R80	81	113
R80 (Ro80)	80°	100W	240/250	ES	Diffused	25	100 ES R80	81	114.5
R80-30	35°	75W	240/250	ES	Diffused	25	75 ES R80 30	81	114.5
R80-30	35°	100W	240/250	ES	Diffused	25	100 ES R80 30	81	114.5
R95	30°	75W	240/250	BC	Diffused	10	75 BC R95	96	140
R95	30°	75W	240/250	ES	Diffused	10	75 ES R95	96	141.5
R95	30°	100W	240/250	BC	Diffused	10	100 BC R95	96	140
R95	30°	100W	240/250	ES	Diffused	10	100 ES R95	96	141.5
R95	30°	150W	240/250	BC	Diffused	10	150 BC R95	96	140
R95	30°	150W	240/250	ES	Diffused	10	150 ES R95	96	141.5



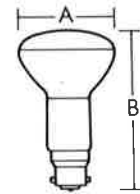
R39



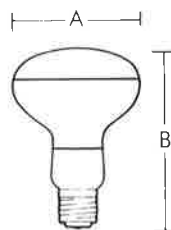
R50



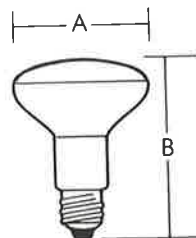
R60



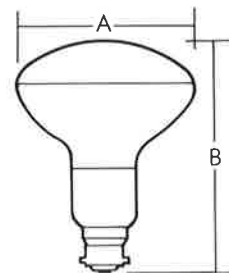
R63



R80



R80-30



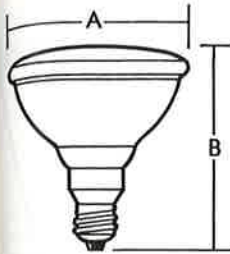
R95

For product description please see page 212

PAR 3  
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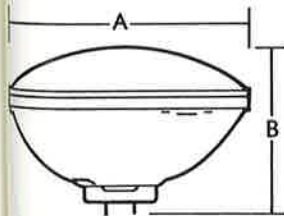




PAR 38

**PAR 38-E**

Recent improvements to reflector and filaments have enabled the wattage ratings of this range to be reduced and the emphasis of the display to be improved (PAR 38-E series). Beam intensities are greater than those obtained from blown bulb reflector lamps, and life is 2000 hours nominal average. The 'cool spot' has a special dichroic reflector which allows infra-red heating rays to pass to the rear of the lamp. Some luminaires carry a symbol warning against the use of 'cool spot' lamps. **Caution:** While PAR 38-E lamps are described as being suitable for unprotected use outdoors it is recommended that they are not used in critical areas such as swimming pools.



PAR 56

**PAR 56**

Available in three beam widths with an elliptical pattern. Frequently used in high-mounted long-throw applications and in purpose-built luminaires where it is located by means of the front lens. Protect from water splashes. The 12 volt version is used for underwater lighting. It is advisable to replace sealing baskets supplied with underwater luminaires at the same time that the lamps are replaced.

**PRESSED GLASS PAR 38-E LAMPS**

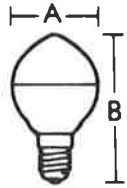
ORDERING								DIMENSIONS	
Description and Wattage								A	B
			Voltage	Cap	Finish	Packing Quantity	Order Shortcode		
PAR 38-E Spot	12"	60W	240	ES	Clear	15	60 SP	122.5	136
PAR 38-E Flood	30"	60W	240	ES	Clear	15	60 FL	122.5	136
PAR 38-E Spot	12"	80W	240	ES	Clear	15	80 SP	122.5	136
PAR 38-E Flood	30"	80W	240	ES	Clear	15	80 FL	122.5	136
PAR 38-E Spot	12"	120W	240	ES	Clear	15	120 SP	122.5	136
PAR 38-E Flood	30"	120W	240	ES	Clear	15	120 FL	122.5	136
PAR 38-E Cool Spot	12"	120W	240	ES	Clear	15	120 CO SP	122.5	136
PAR 38-E Spot	10"	120W	24	ES	Clear	15	24 120 SP	122.5	136
PAR 38-E Spot	12"	120W	110/120	ES	Clear	15	120 120 SP	122.5	136
PAR 38-E Flood	30"	120W	110/120	ES	Clear	15	120 120 FL	122.5	136

**PRESSED GLASS PAR 56 LAMPS**

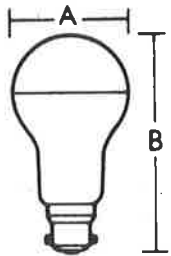
ORDERING								DIMENSIONS	
Description and Wattage								A	B
			Voltage	Cap	Finish	Packing Quantity	Order Shortcode		
PAR 56 12" x Narrow Spot	8"	300W	240	GLX16d	Clear	6	300 NA	179	127
PAR 56 25" x Medium Flood	11"	300W	240	GLX16d	Clear	6	300 ME	179	127
PAR 56 40" x Wide	16"	300W	240	GLX16d	Clear	6	300 WI	179	127
PAR 56 40" x Wide	16"	300W	12	Screw Terminal	Clear	6	12 300 WI	179	127

# DISPLAY REFLECTOR LAMPS CROWN SILVERED AND COLOURED

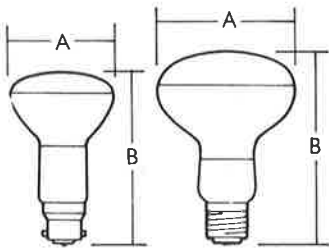
Principal use is within a parabolic reflector to give a sharply defined beam of high intensity for accent and display work. The filament position is controlled to permit interchangeability without altering the beam angle.



40W

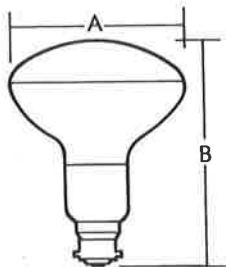


60W/100W

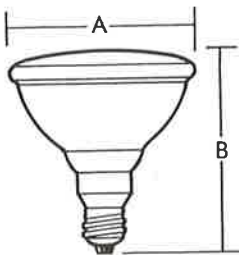


R63

R80



R95



PAR 38

## CROWN SILVERED DISPLAY LAMPS

ORDERING						DIMENSIONS	
Description and Wattage	Voltage	Cap	Finish	Packing Quantity	Order Shortcode	A	B
Bowl Reflector (Ogive) 40W	240/250	SES	Clear	20	40 SES BO RE	45	77.5
Bowl Reflector 60W	240/250	BC	Clear	25	60 BC BO RE1P	60	103.5
Bowl Reflector 60W	240/250	ES	Clear	25	60 ES BO RE1P	60	105
Bowl Reflector 100W	240/250	BC	Clear	25	100 BC BO RE1P	68	123
Bowl Reflector 100W	240/250	ES	Clear	25	100 ES BO RE1P	68	124.5
Bowl Reflector 100W	240/250	BC 3 Pin	Clear	25	100 BC3 BO RE1P	68	123

## COLOURED DISPLAY LAMPS

ORDERING						DIMENSIONS	
Description and Wattage	Voltage	Cap	Finish	Packing Quantity	Order Shortcode	A	B
R63 Coloured	40W	240	BC	12	40 BC R63 **	64	103
R63 Coloured	40W	240	ES	12	40 ES R63 **	64	105.5
<b>Colours Available:</b> Red, Blue, Green, Yellow							
R80 (Rø80) 'Disco Lamp'	60W	240/250	ES	12	60 ES R80 **	81	114.5
<b>Colours Available:</b> Red, Blue, Green, Yellow, Amber, Violet							
R95 Coloured	75W	240	BC	10	75 BC R95 **	96	140
R95 Coloured	75W	240	ES	10	75 ES R95 **	96	141.5
<b>Colours Available:</b> Red, Blue, Green, Yellow							
PAR 38-E Coloured Flood	80W	240	ES	15	80 FL **	122.5	136
PAR 38-E Coloured Spot	120W	240	ES	15	120 SP **	122.5	136
<b>Colours Available:</b> Red, Blue, Green, Yellow							

\*\* Quote appropriate colour code i.e. Red = RE; Blue = BL; Green = GR; Yellow = YE; Amber = AM; Violet = VI;

For product description please see pages 212 and 214

## GENERAL INFORMATION

Halogen lamps have physically small, tough 'quartz' glass envelopes with relatively high internal gas pressure. The combined effect of this and added halogen is to enable the filament to operate at a higher temperature, while the envelope remains unblackened, thus improving high output efficiency, colour temperature and lumen maintenance. They may be divided into LV (6V to 24V) and HV (100V to 250V) categories. LV types have compact filaments, permitting excellent optical control.

## NOTES FOR LUMINAIRE DESIGNERS

### Mounting

The preferred method of mounting *dichroic* 2-pin types is by means of the front rim, using a push-on socket. It is necessary to dissipate heat passing to the rear of the lamp.

Aluminium Halogen Spots:

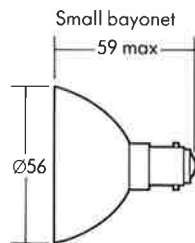


Fig. 1

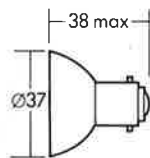


Fig. 2

Dichroic: GX5-3 2-pin

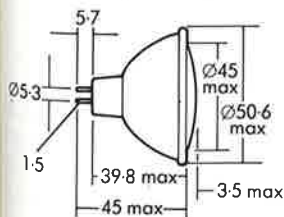


Fig. 3

Dichroic: GZ4 2-pin

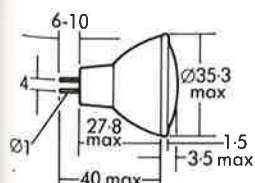


Fig. 4

## EXTERNAL FUSING

All HV halogen lamps should be protected from the possibility of a destructive current surge at end of life by means of an H.B.C., quick-acting fuse according to the table to the right.

## SAFETY SCREENS FOR HV HALOGEN LAMPS

A safety front glass should be fitted to luminaires used in indoor installations and in critical areas outdoors, eg. in close proximity to people and animals.

## Burning Position

Failure to operate lamps within prescribed burning angles can adversely affect life expectancy.

## HIGH VOLTAGE HALOGEN LAMP: EXTERNAL FUSE RATING

LAMP WATTAGE	100V to 130V	220V to 250V
75	-	500MA
100	-	500MA
150	-	800MA
200	-	1.25A
250	-	2.0A
300	4.0A	2.0A
500	6.0A	4.0A
1000	10.0A	6.0A
1500	-	10.0A
2000	-	10.0A

## LV ALUMINIUM SPOTS

### ORDERING INFORMATION

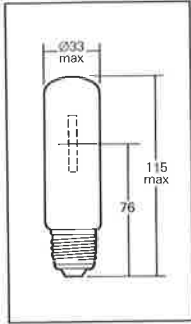
Description and Wattage	Beam Angle to 1/2 Peak	Cap	Lux at 1m Centred	Can Replace	Packing Quantity	Order Shortcode	Figure
6 volt 15W Narrow Spot	6°	SBC	6200	GBA	10	6424	2
6 volt 15W Narrow Spot	4°	SBC	12000	GBB	10	6425	2
6 volt 35W Narrow Spot	6°	SBC	15500	GBG	10	6429	1
6 volt 35W Spot	14°	SBC	3500	GBH	10	6430	1
12 volt 20W Narrow Spot	6°	SBC	7000	M55, GBD	10	6433	2
12 volt 20W Spot	18°	SBC	1400	M54, GBE	10	6434	2
12 volt 20W Flood	32°	SBC	350	M63, GBF	10	6435	2
12 volt 50W Spot	10°	SBC	11000	M57, GBJ	10	6438	1
12 volt 50W Medium	25°	SBC	1900	M56, GBK	10	6439	1

## LV CLOSED DICHROIC SPOTS

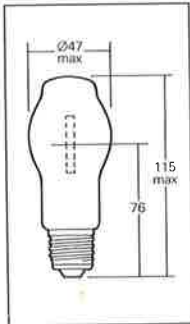
### ORDERING INFORMATION

Description and Wattage	Beam Angle to 1/2 Peak	Cap	Lux at 1m Centred	Can Replace	Packing Quantity	Order Shortcode	Figure
12 volt 20W Narrow Spot	10°	GZ4	5500	-	10	6709	4
12 volt 20W Spot	20°	GZ4	1500	-	10	6710	4
12 volt 20W Flood	30°	GZ4	600	-	10	6714	4
12 volt 20W Narrow Spot	7°	GX5.3	8200	-	10	6740	3
12 volt 20W Spot	12°	GX5.3	3300	6460	10	6744	3
12 volt 20W Flood	36°	GX5.3	460	6464	10	6747	3
12 volt 50W Narrow Spot	8°	GX5.3	12000	6440	10	6754	3
12 volt 50W Spot	13°	GX5.3	9150	-	10	6757	3
12 volt 50W Wide Spot	24°	GX5.3	3000	6441	10	6759	3
12 volt 50W Flood	28°	GX5.3	2500	-	10	6760	3
12 volt 50W Flood	38°	GX5.3	1500	6461	10	6761	3
12 volt 65W Spot	13°	GX5.3	11500	6442	10	6767	3
12 volt 65W Flood	38°	GX5.3	2000	6459	10	6769	3

T bulb



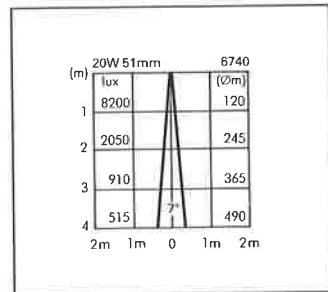
BTT bulb



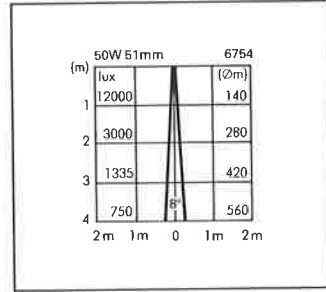
ORDERING

Description and wattage	Voltage	Cap	Finish	Packing Qty.	Order short code	TECHNICAL	
						Luminous flux	Average Life
75W Shaped (BTT) 13613	240-250	BC	Clear	72 (6 x 12)	75 BCCLBTT	1090	2000
75W Shaped (BTT) 13614	240-250	BC	Opal	72 (6 x 12)	75 BCPEBTT	990	2000
75W Tubular (BT) 13615	240-250	ES	Clear	72 (6 x 12)	75 ESCLBT	1090	2000
75W Tubular (BT) 13616	240-250	ES	Opal	72 (6 x 12)	75 ESPEBT	1040	2000
100W Shaped (BTT) 13617	240-250	BC	Clear	72 (6 x 12)	100 BCCLBTT	1600	2000
100W Shaped (BTT) 13618	240-250	BC	Opal	72 (6 x 12)	100 BCPEBTT	1450	2000
100W Tubular (BT) 13619	240-250	ES	Clear	72 (6 x 12)	100 ESCLBT	1600	2000
100W Tubular (BT) 13620	240-250	ES	Frosted	72 (6 x 12)	100 ESPEBT	1525	2000
150W Shaped (BTT) 13621	240-250	ES	Clear	72 (6 x 12)	150 ESCLBTT	2550	2000
150W Tubular (BT) 13622	240-250	ES	Clear	72 (6 x 12)	150 ESCLBT	2550	2000
150W Tubular (BT) 13623	240-250	ES	Frosted	72 (6 x 12)	150 ESPEBT	2450	2000

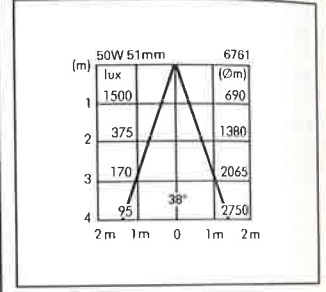
CLOSED DICHROIC SPOTS - PHOTOMETRICS



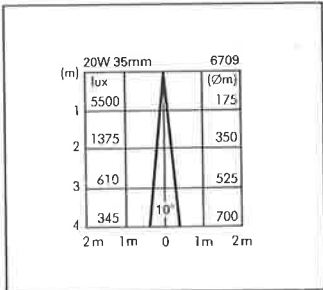
6740



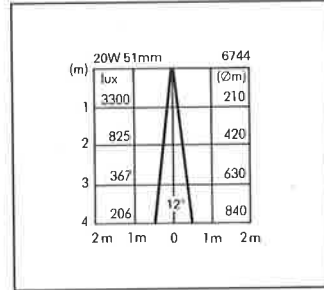
6754



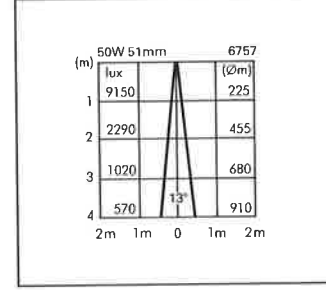
6761



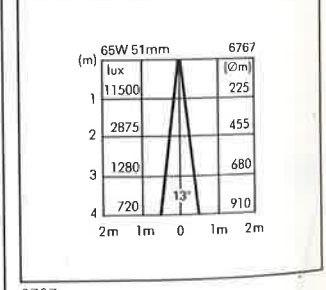
6709



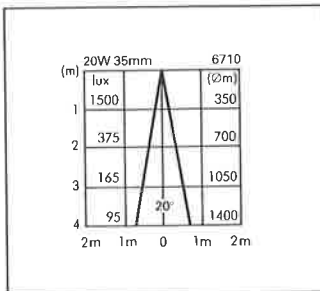
6744



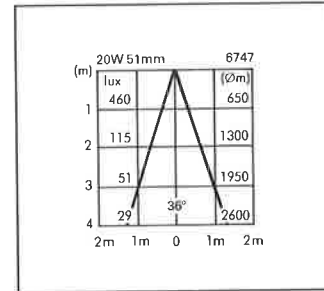
6757



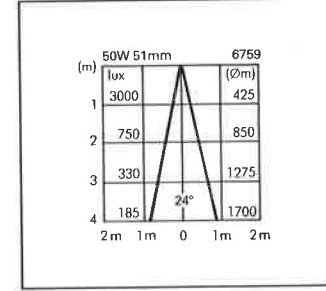
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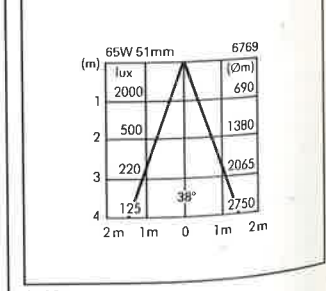
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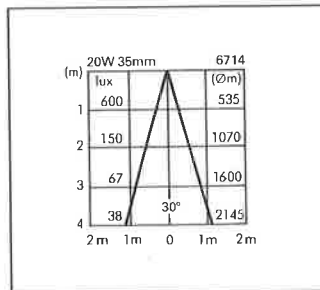
6747



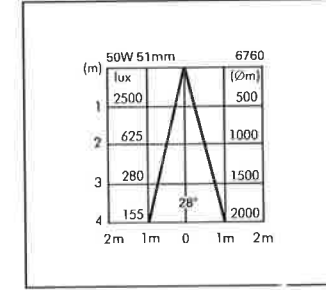
6759



6769



6714



6760

# TUNGSTEN HALOGEN FLOOD LAMPS

### FUSING (HV Lamps)

It is recommended for safety that external fuses, according to the table below, are incorporated in the supply circuit to each lamp.

Lamp Watts	115/120	240/250V
75-300	4A (3.15A)	2A
500	6A (6.3A)	4A
750	10A	4A
1000	10A	6A
1500	-	10A
2000	-	10A

HV Double Ended 200W, 300W and 500W ratings have internal fuses.

### SAFETY SHIELDS (HV Lamps)

Luminaires for HV halogen lamps are required to be fitted with safety glasses or shields, to comply with BS4533.

For reasons of safety these lamps should not be used in close proximity to personnel or animals unless protected by a safety shield.

### OPERATING TEMPERATURES Halogen Lamps

Lamp life and safety is prejudiced if the quartz 'pinch' exceeds 350°C, or bulb wall exceeds 900°C.

Minimum bulb wall temp. 250°C for halogen cycle operation.

### BURNING POSITIONS

HV Double-Ended: Horizontal  
HV Single-Ended: Any.

### BURNING POSITION



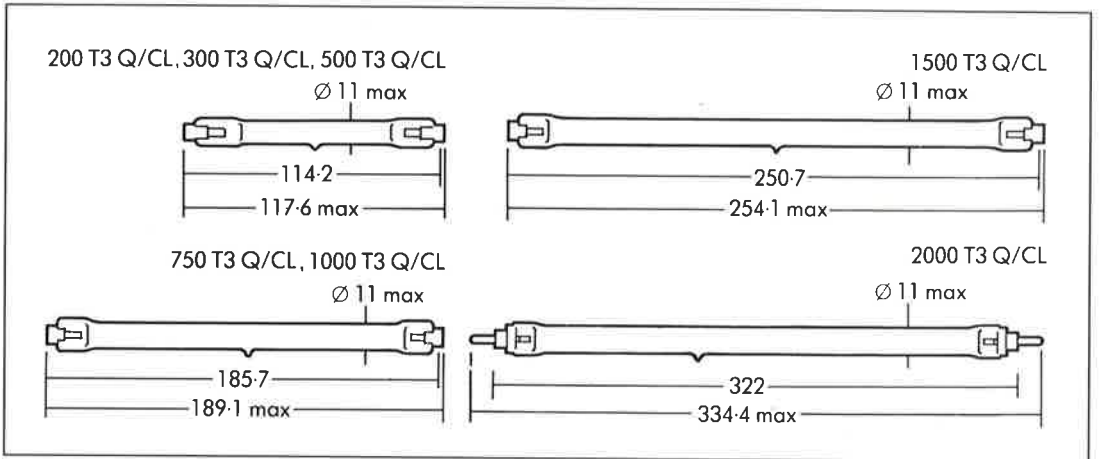
Horizontal ±4°

### MAX PERMISSIBLE TEMPERATURES

Pinch 350°C  
Tube 900°C

## HALOGEN FLOODLIGHT LAMPS DOUBLE-ENDED (K)

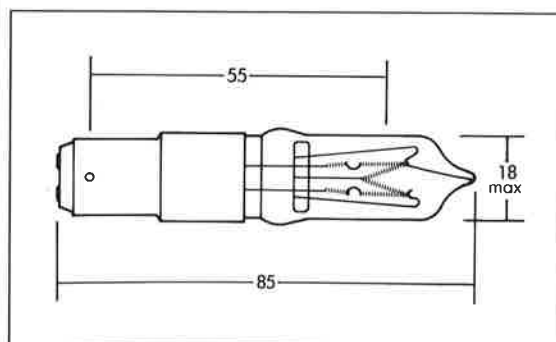
ORDERING		Catalogue Number	Volts	Cap	Nominal Luminous Flux (lm)	Packing Quantity	Order Shortcode
Description and Wattage							
K/11	200W	200T3Q/CL	240/250	R7s-15	3200	12	K11
K/9	300W	300T3Q/CL	240/250	R7s-15	5100	12	K9
K/1	500W	500T3Q/CL	115/120	R7s-15	9750	12	120 K1
K/1	500W	500T3Q/CL	240/250	R7s-15	9000	12	K1
K/3	750W	750T3Q/CL	240/250	R7s-15	15500	12	K3
K/4	1000W	1000T3Q/CL	115/120	R7s-15	22000	12	K4
K/4	1000W	1000T3Q/CL	240/250	R7s-15	22000	12	120 K4
K/5	1500W	1500T3Q/CL	240/250	R7s-15	34100	12	K5
K/6	2000W	2000T3Q/CL	240/250	Fa4	44000	12	K6



## HV SINGLE-ENDED HALOGEN LAMPS

ORDERING		Volts	Cap	Finish	Nominal Luminous Flux (lm)	Average Life (Hrs)	Packing Quantity	Order Shortcode
Description and Wattage								
M/77 Halogen Lamp	75W	240/250	SBC	Clear	1000	1000	10	75 SBC CL HAL
M/78 Halogen Lamp	100W	240/250	SBC	Clear	1400	1500	10	100 SBC CL HAL
M/79 Halogen Lamp	150W	240/250	SBC	Clear	2250	1500	10	150 SBC CL HAL
M/77F Halogen Lamp	75W	240/250	SBC	Frosted	1000	1000	10	75 SBC PE HAL
M/78F Halogen Lamp	100W	240/250	SBC	Frosted	1400	1500	10	100 SBC PE HAL
M/79F Halogen Lamp	150W	240/250	SBC	Frosted	2250	1500	10	150 SBC PE HAL

Note: Burning position: Universal.



For product description please see pages 217-218

# TUNGSTEN HALOGEN FLOODLAMPS

Double envelope, giving advantages of universal burning position and higher light output, without special handling precautions. External fuse recommended (see table below).

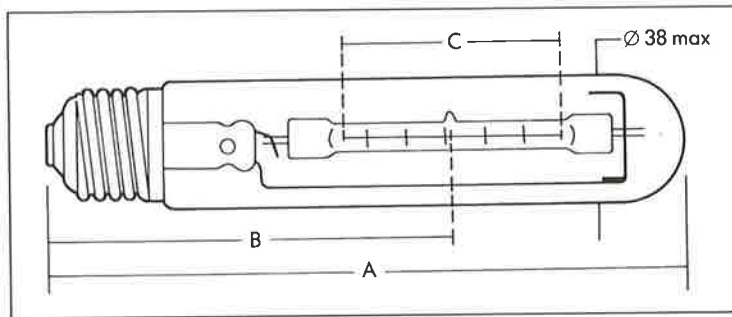
### Maximum Permissible Temperatures

Lamp base: 250°C  
Outer bulb: 500°C  
Burning Position: Any.

## HALOGEN FLOODLIGHT LAMPS SINGLE-ENDED (IDE)

ORDERING								DIMENSIONS		
Description and Wattage	Catalogue Number	Volts	Cap	Nominal Luminous Flux (lm)	Average Life (Hours)	Packing Quantity	Order Shortcode	A	B	C
IDE LAMP 500W	500T30/CLDE	240/250	GES	10250	2000	6	500 IDE	205 ± 5	129	70
IDE LAMP 500W	500T3Q/CLDE	125/130	GES	12000	2000	6	125 130 500 IDE	215 ± 5	141	70
IDE LAMP 1000W	1000T3Q/CLDE	240/250	GES	24000	2000	6	1000 IDE	255 ± 5	156	125
IDE LAMP 2000W	2000T3Q/CLDE	240/250	GES	50000	2000	6	2000 IDE	295 ± 5	186	132

Note: Burning position: Universal.



## LOW VOLTAGE HALOGEN CAPSULES

### LV HALOGEN CAPSULES

ORDERING								DIMENSIONS
Description and Wattage		Volts	Cap	Nominal Luminous Flux (lm)	Average Life (Hours)	Packing Quantity	Order Shortcode	LCL
Halogen Lamp 20W	13078	12	G4	350	2000	10	M/86	23.5 ± 0.25
Halogen Lamp 50W	13079	12	GY6.35	950	2000	10	M/87	30.0 ± 0.25
Halogen Lamp 100W	13083	12	GY6.35	2550	2000	10	M/28D	30.0 ± 0.25
Halogen Lamp 20W	13091	24	G4	350	1000	10	M/88	19.5 ± 0.25
Halogen Lamp 50W	13090	24	GY6.35	900	2000	10	M/89	30.0 ± 0.25
Halogen Lamp 100W	13089	24	GY6.35	2000	2000	10	M/90	30.0 ± 0.25

Note: M/87 is interchangeable with M/32 but gives more light.

2-pin low voltage lamps for use with external reflectors etc. 24V versions can reduce lamp cabling sizes.

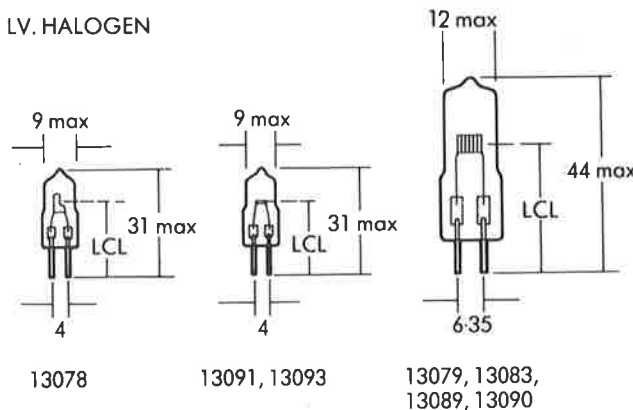
External fuse recommended for 24V types only, quick-acting HBC type.

External HBC Fuse		
Watts	Volts	Fuse
20	24	2A
50	24	4A
100	24	6A

### Maximum Permissible Temperatures

Bulb: 900°C  
Pinch: 350°C  
Pin Contact: 300°C

### LV. HALOGEN



For product description please see pages 218-219

### FEATURES

One-quarter the electricity cost of GLS lamp of equivalent light output.

8000 hour average rated life – eight times that of GLS – greatly reduces labour cost of lamp changing, especially where access is awkward, and minimises 'dark' periods and interruption of activity.

All the necessary control gear is integral within the lamp, so the SL lamp can directly replace a GLS lamp. See below.

Lamp starts and restarts quickly.

Philips special phosphors combine high efficacy with good colour rendering.

### RANGE OF OPERATION

240V 50Hz supplies.

Not suitable for dimming or electronic controls.

Not suitable for high frequency supplies or DC; e.g. in emergency lighting.

Operating position: Any (adequately supported).

Temperature of air inside luminaire surrounding bulb must not exceed 75°C. Small luminaires and luminaires for lamps with internal reflectors may not be suitable. Thermal blankets must be spaced away from luminaires.

Normal indoor conditions.

### Note:

Operation and starting may not be reliable below 0°C.

Especially in cap-down operation, light output falls as ambient temperature is reduced.

Lamps operated outdoors, at users' discretion, must be enclosed.

### FREE-SPACE DRAWINGS

Free-space drawings are available showing the required 'free-space' within luminaires.

### LUMINOUS DATA

Lamp Ratings	SL9	SL13	SL18	SL25
Average lumens at 100hrs	450	650	900	1200
Depreciation: % per 1000hrs	5	5	5	5
Correlated colour temperature (approx)	2700K	2700K	2700K	2700K
Colour rendering index (Ra8)	82	82	82	82
Time to 90% output (approx)	1 min.	1 min.	1 min.	1 min.

Chromaticity co-ordinates (all ratings)

X = 0.464

Y = 0.415

### SERVICE PERIOD

Average lamp, under standard conditions, lasts electrically at least 8000 hours. Preferably, lamps should be group-replaced at a predetermined percentage (e.g. 70%) of 100hr light output.

### STANDARDS

No current relevant Standards exist.

The lamp complies with CISPR radio interference limits for domestic appliances.

All information refers to average lamps, measured under standard conditions, at 240V.

### LUMINAIRES FOR SL LAMPS

The SL lamp can be used as a direct replacement for GLS lamps in most luminaires and will provide savings in energy costs without modification. However, since the lamp has larger dimensions and is heavier than a filament lamp of equivalent light output, the following checks should be made on the luminaires before installing the lamp:

1. Check that adequate space is available inside the luminaires to accommodate the lamp.
2. Check that the luminaires and wiring are able to support a lamp of the weight given in the table. Old or frayed wiring must be replaced.
3. Replace the lampholder if it is unsuitable or in poor condition. Lampholders for BC lamps should be all-metal (earthed), or of ceramic or of insulating material with a metal insert.

**Note:** Edison Screw lampholders provide better lamp fixing and support, and should therefore be used in new or refurbishing schemes. End support may be needed for the lamp if it is mounted in BC holders either horizontally or vertically cap down.

### POWER AND VA

For equal light output, SL lamps take about one-quarter the power of GLS lamps and about one-half the current and VA. In rare instances, SL lamps may constitute the majority of the load at the consumer terminals of a building, and it may be wished to improve the Power Factor.

( $PF = \frac{W}{VA}$ ). Suitable values of

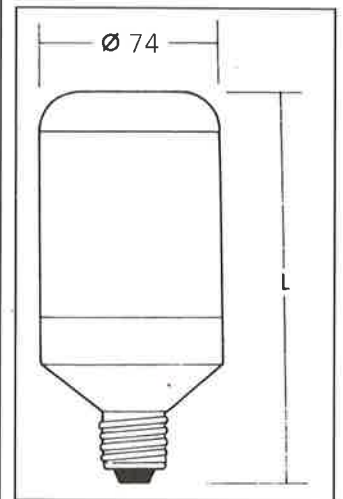
capacitance for group correction are 15-20  $\mu F$  per 10 lamps.

Note that the power taken cannot be measured by a current meter.

### PACKING QUANTITIES AND ORDERING

SL lamps are supplied in individual cartons, packed in boxes of 6. Please order in multiples of 6, specifying wattage, cap and finish as shown in the following example:

60 Philips SL lamps 18 ES-PR.



ORDERING	TECHNICAL								
	Description and Wattage	Cap	Catalogue Number	Norm. Overall Length (ES) L	Weight (approx) (g)	Norm. Power (incl. ballast) (W)	Norm. Current (mA)	Average lumens at 100 hours	Nearest GLS lamp
<b>SL LAMP</b>									
9W, Prismatic envelope	BC	9BCPR	151	460	9	90	450	40W	
9W, Prismatic envelope	ES	9ESPR	151	460	9	90	450	40W	
13W, Prismatic envelope	BC	13BCPR	161	470	13	120	650	60W	
13W, Prismatic envelope	ES	13ESPR	161	470	13	120	650	60W	
18W, Prismatic envelope	BC	18BCPR	171	540	18	165	900	75W	
18W, Prismatic envelope	ES	18ESPR	171	540	18	165	900	75W	
25W, Prismatic envelope	BC	25BCPR	181	590	25	205	1200	100W	
25W, Prismatic envelope	ES	25ESPR	181	590	25	205	1200	100W	

For product description please see page 222

# SL\*D LAMPS

## SL\*D, SL\*DE, SL\*DER, SL\* Aqua, SL\*R Horticultural

### FEATURES

One-quarter (one-fifth for electronic types) the electricity cost of GLS lamp of similar light output.  
8000 hour rated average life – eight times that of GLS – greatly reduces labour cost of lamp changing, especially where access is awkward, and minimises 'dark' periods and interruption of activity.

All the necessary control gear is integral within the lamp, so SLD lamps can directly replace GLS lamps, where the applications permit.

All lamps start and restart quickly.

Electronic versions combine quick start with flicker-free light to enhance visual comfort and eliminate stroboscopic effects.

Philips special phosphors combine high luminous efficacy with good colour rendering.

### RANGE OF OPERATION

Standard 240V 50Hz supplies.

Not suitable for dimming or electronic controls.

**Operating position:** Any (adequately supported).

Temperature of air inside luminaire surrounding bulb must not exceed 75°C.

Small luminaires may not be suitable. Thermal blankets must be spaced away from luminaires.

Normal indoor or protected outdoor conditions.

### Note

Operation and starting may not be reliable below 0°C.

Light output falls as ambient temperature is reduced.

The SL Aqua may be operated outdoors in a suitable non-enclosing waterproof luminaire. Other SLD lamps, if operated outdoors, at users' discretion, must be enclosed.

### LUMINOUS DATA

Lamp Ratings	SLD	SLDE	SLDER	SL Aqua	SLR Horticultural
Average lumens at 100 hrs	850	1200	140 cd*	550	90 cd*
Depreciation % per 100hrs	6	7	7	6	6
Correlated colour temperature (approx)	2700K	2700K	2700K	2700K	2700K
Colour rendering index (Ra8)	82	82	82	82	82
Time to 90% output (approx)	1 min.	1 min.	1 min.	1 min.	1 min.

Chromaticity co-ordinates (all ratings)

x = 0.462

y = 0.412

\* Luminous intensity on axis.

### SERVICE PERIOD

Average life under standard conditions is 8000 hours. Preferably, lamps should be group-replaced at a predetermined percentage (e.g. 70%) pf 100hr light output.

### STANDARDS

No current relevant Standards exist.

Lamps comply with CISPR radio interference limits for domestic appliances.

All information refers to average lamps, measured under standard conditions, at 240V.

### GLS (filament) LUMENS

The lumen output of GLS lamps of roughly equivalent light output is shown in the table for comparison. At 1000 hours the output is approx. 90% of initial lumens.

ORDERING			TECHNICAL					
Description and Wattage	Cap	Catalogue Number	Norm. Overall Length (ES) L	Weight (approx) (g)	Norm. Power (incl. ballast) (W)	Norm. Current (mA)	Average Lumens at 100 hours	Nearest GLS Lamp
<b>SLD</b>								
18W, Opal envelope	BC	SLD18BC	175	585	18	150	850	75W
18W, Opal envelope	ES	SLD18ES	175	585	18	150	850	75W
<b>SLDE</b>								
20W, Opal envelope	ES	SLDE20ES	185	300	20	175	1200	100W
<b>SLDER</b>								
20W, Opal envelope	ES	SLDER20ES	185	285	20	175	140 cd*	150W
<b>SL Aqua</b>								
13W, Opal envelope	ES	SL13AQUA	175	560	13	115	550	60W
<b>SLR Horticultural</b>								
18W, Clear envelope	BC	SLR18BC	175	585	18	150	90 cd*	150W
18W, Clear envelope	ES	SLR18ES	175	585	18	150	90 cd*	150W

\*Intensity on axis

### PACKING QUANTITY AND ORDERING

SLD lamps are supplied in individual cartons, packed in boxes of 4. Please order in multiples of 4, specifying wattage and cap as shown in the following example:

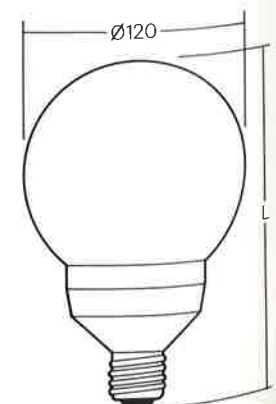
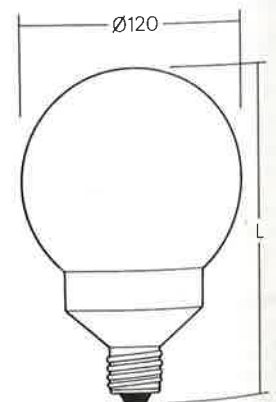
60 Philips SLD lamps SLD18BC.

### LUMINAIRES FOR SL\*D LAMPS

SLD lamps can be used as direct replacements for 120mm globe filament lamps in most luminaires, and will provide savings in energy costs without modification to circuitry. However, since the lamp is longer and heavier than its filament equivalent, the following checks should be made on the luminaires before installing the lamp:

1. Check that adequate space is available inside the luminaire to accommodate the lamp.
2. Check that the luminaire and wiring is able to support a lamp of the weight given in the table. Old or frayed wiring must be replaced.
3. Replace the lampholder if it is unsuitable or in poor condition. Lampholders for BC lamps should be all-metal (earthed), or of ceramic or of insulating material with a metal insert.

**Note:** Edison screw lampholders provide better lamp fixing and support, and should therefore be used in new or refurbishing schemes. End support may be needed for the lamp if it is mounted in BC lampholders either horizontally or vertically cap down.





## FEATURES

One-fifth the electricity cost of GLS lamps of similar light output.

8000 hour rated average life – eight times that of GLS lamps – greatly reduces labour cost of lamp changing, especially where access is awkward, and minimises 'dark' periods and interruptions of activity.

Miniaturised electronic control gear is built into the lamp which has a normal BC or ES cap, so that the PLC\*E can directly replace GLS lamps.

Electronic control gear provides fast, flicker-free starting and flicker-free operation for enhanced visual comfort.

The neat slimline appearance of the lamp provides a design feature in luminaires where the lamp is exposed.

High operating frequency (45kHz) enhances visual comfort compared with mains frequency (50Hz) operation.

Philips triphosphors combine De Luxe colour rendering with high luminous efficacy.

## RANGE OF OPERATION

Standard 240V 50Hz supplies.

Not suitable for dimming or external electronic controls.

Not suitable for high-frequency supplies or DC; e.g. in emergency lighting.

Operating position: Any.

Temperature of air inside luminaire must not exceed 70°C.

Normal indoor conditions only – lamps operated outdoors, at users' discretion, must be enclosed.

Light output falls at extremes of temperature. The operating temperature range for greater than 90% of maximum light output is 15°C to 40°C.

## LUMINAIRES FOR PLC\*E LAMPS

The PLC\*E lamp can be used as a replacement for GLS lamps in most luminaires and will provide savings in energy and maintenance costs without modification. However, since the lamp is longer than its GLS equivalent, particularly in the higher ratings, a check should be made that adequate space is available inside the luminaire to accommodate the lamp.

## LUMINOUS DATA

Lamp ratings	PLCE7	PLCE11	PLCE15	PLCE20
Average lumens at 100 hrs	400	600	900	1200
Correlated colour temperature	2700K	2700K	2700K	2700K
Colour rendering index (Ra8)	82	82	82	82

## Chromaticity co-ordinates

PLC*E 20	Other ratings
x = 0.468	x = 0.473
y = 0.420	y = 0.420

## SERVICE PERIOD

Rated averaged life under standard conditions is 8000 hours.

## STANDARDS

No current relevant Standards exist.

The lamp complies with CISPR radio interference limits for domestic appliances.

All information refers to average lamps, measured under standard conditions at 240V.

## GLS (filament) LAMPS

The lumen output of GLS lamps of roughly similar light output is shown in the table for comparison. At 1000 hours, the output of GLS lamps is approx. 90% of initial lumens.

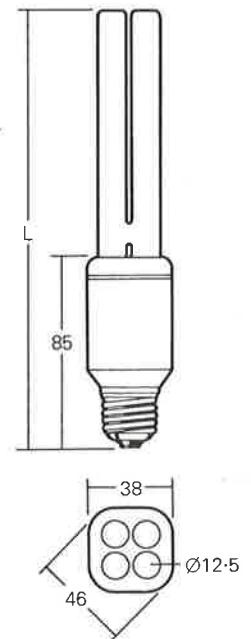
Description and wattage	ORDERING								TECHNICAL							
	Cap	Cap	Cap	Cap	Cap	Cap	Cap	Cap	Cap	Cap	Cap	Cap	Cap	Cap	Cap	
	Cap	Cap	Cap	Cap	Cap	Cap	Cap	Cap	Cap	Cap	Cap	Cap	Cap	Cap	Cap	
PLC*E 7W	BC	PLCE 7BC	161	110	7	80	40	420								
PLC*E 7W	ES	PLCE 7ES	161	110	7	80	40	420								
PLC*E 11W	BC	PLCE 11BC	161	110	11	100	60	710								
PLC*E 11W	ES	PLCE 11ES	161	110	11	100	60	710								
PLC*E 15W	BC	PLCE 15BC	195	125	15	150	75	940								
PLC*E 15W	ES	PLCE 15ES	195	125	15	150	75	940								
PLC*E 20W	BC	PLCE 20BC	210	130	20	185	100	1360								
PLC*E 20W	ES	PLCE 20ES	210	130	20	185	100	1360								

Lampholders for BC lamps should either be all-metal (earthed), ceramic or of insulating material with a metal insert. Frayed wiring and worn or unsuitable lampholders should be replaced; if the lampholder is to be replaced, it is recommended that an ES type is used, particularly if the lamp is to be operated horizontally.

## PACKING QUANTITY AND ORDERING

PLC\*E lamps are supplied in individual cartons, packed in boxes of 6. Please order in multiples of 6, specifying Wattage and cap as shown in the following example:

60 Philips PLC\*E 20ES lamps.



**PLS LAMPS**

Single-ended compact fluorescent lamps with integral starter, for use with separate ballast.

**RANGE**

- PLS5 – 5 lamp watts
- PLS7 – 7 lamp watts
- PLS9 – 9 lamp watts
- PLS11 – 11 lamp watts

**APPLICATIONS**

For use in new luminaires, and modified existing luminaires, in applications such as:

- Bulkhead luminaires.
- Wall-mounted luminaires.
- Table lamps.

And for building into other forms of equipment, such as:

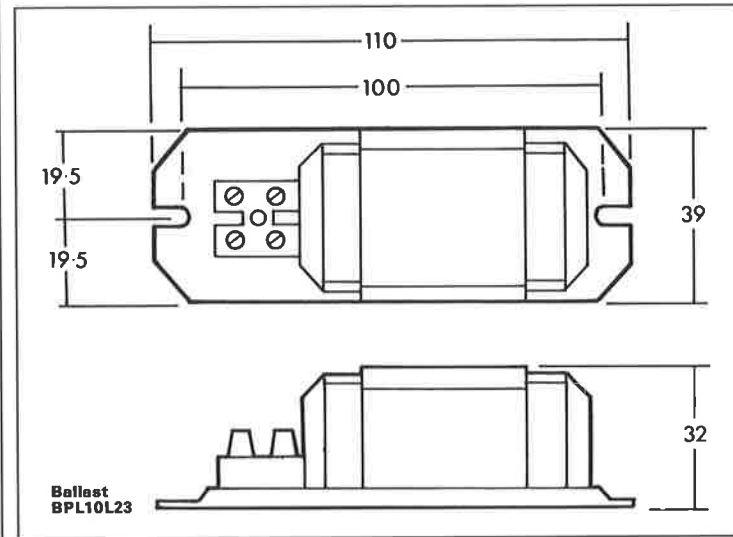
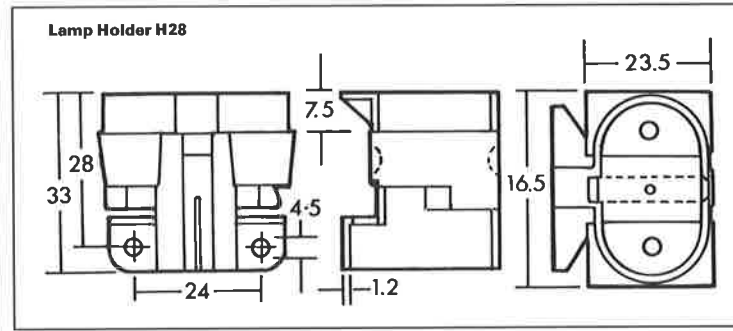
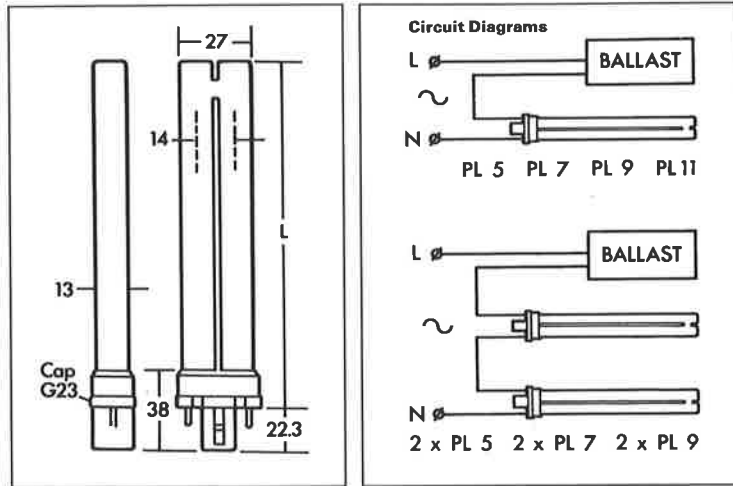
- Luminous displays.
- Cocktail cabinets and similar furniture.
- Built-in lighting in office furniture.

**FEATURES**

- Single-ended construction reduces cost of lampholders and associated wiring.
- Integral starter in lamp cap cuts component and wiring costs and saves space; starter is automatically replaced with lamp to increase reliability of luminaire.
- Double limb reduces overall length, and gives lighting width of two miniature lamps.
- Phosphor uses components from Philips Colour 80 Series to combine high efficacy with good colour rendering.
- New compact light source using a fraction of the power of a filament lamp of comparable output; needing fewer components than conventional miniature fluorescent lamps.
- On average, lasts at least eight times as long as conventional filament lamps.

**LUMINOUS DATA**

Depreciation: Approx. 5% per 1000 hrs.  
 Chromaticity co-ordinates:  
 x = 0.460  
 y = 0.414  
 Correlated Colour Temperature: 2700K  
 Colour Rendering Index: (Ra8) 81



ORDERING			TECHNICAL							
Description	Catalogue number	Packing quantity	Length (mm)	Weight (g)	Lumen output 100 hrs	Lumen output 2000 hrs	Lamp volts (V)	Lamp current (A)	Cap	Lampholder
5W	PL5	60	85	41	250	210	33	0.18	G23	H28
7W	PL7	60	115	43	400	360	45	0.18	G23	H28
9W	PL9	60	145	45	600	540	60	0.17	G23	H28
11W	PL11	60	215	47	900	810	90	0.16	G23	H28

Averages, measured under standard conditions.

**Temperature limits**

Light output and electrical characteristics vary with ambient temperature. Maximum temperature on metal band 135°C. Outdoor luminaires should be enclosed, with cap down.

**INSTALLATION AND OPERATION**

**Lampholder**  
 Lampholder H28 is made of GRP.

Electrical connection by means of insert contacts (no screws). For mounting on a plane parallel to the lamp.

**Ballasts and circuits**

Circuit: Switchstart only, with integral starter. PL5, PL7 and PL9 lamps may be operated two in series. Not suitable for use on dimmers or on DC or on most high-frequency supplies (capacitor incorporated in parallel with starter).

**CIRCUIT DIAGRAMS**

**Note:** Starter is incorporated in lamp. PF capacitors not usually required, but may be added at rate of approx 20 µF per 10 circuits.

**PACKING QUANTITIES AND ORDERING**

PL lamps are packed in 60s. Please order in the form given in the following example, in multiples of the packing quantity:  
 120 Philips PL9 fluorescent lamps.

For product description please see page 225

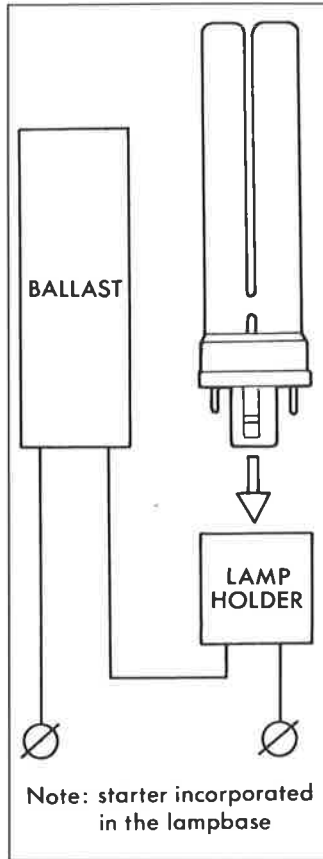
## FEATURES

Slim and short light source.  
 Light weight.  
 Efficacy: five times higher than that of GLS lamps.  
 Lifetime: at least eight times longer on average than GLS lamps, saving on maintenance costs.  
 Colour quality: good colour rendering, combined with 'warm' appearance closely matching filament lamps.  
 Single-ended design combined with integral starter for freedom of design, simple wiring, and fast easy replacement.  
 Low power consumption compared with filament lamps means low energy cost, less heat and wider choice in luminaire materials and construction.

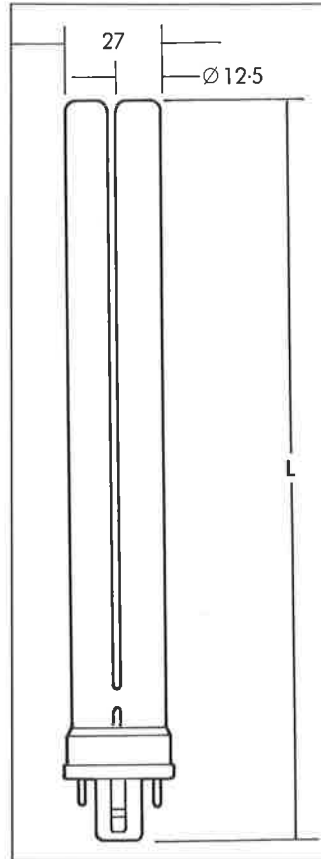
## PACKING QUANTITIES AND ORDERING

PLC lamps are packed in 40s. Please order in the form given in the following example, in multiples of the packing quantity:  
 40 Philips PLC 26 fluorescent lamps.

## CIRCUIT DIAGRAM



## DIMENSIONS



## ORDERING

## TECHNICAL

Lamp	Lumens (initial)	Luminous efficacy lamp lm/W	Colour temp. K	Colour rendering index Ra	Dimension 'L'	Ballast	Lampholder	Cap
PLC 10	600	60	2700	82	118	BTL13	H129	G24d-1
PLC 13	900	70	2700	82	153	BTL13	H129	G24d-1
PLC 18	1200	70	2700	82	173	BTP20	H130	G24d-2
PLC 26	1800	70	2700	82	193	BTP20	H131	G24d-3

For product description please see page 226

**SINGLE-ENDED FLUORESCENT LAMPS**

A range of single-ended 4-pin fluorescent lamps of compact dimensions. Argon-filled: 15mm (nom.) diameter tubing; no integral starter.

**RANGE**

- PL18W
- PL24W
- PL36W

All types available in Colour 80 Series triphosphors: Colour 84 (cool) and Colour 83 (warm).

**APPLICATIONS**

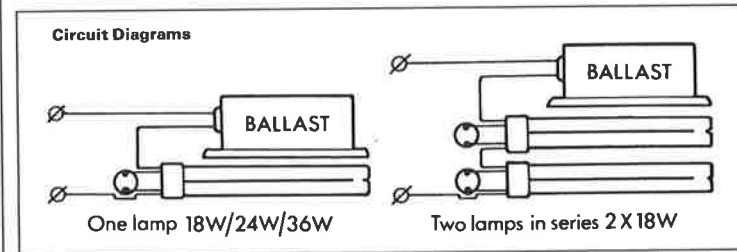
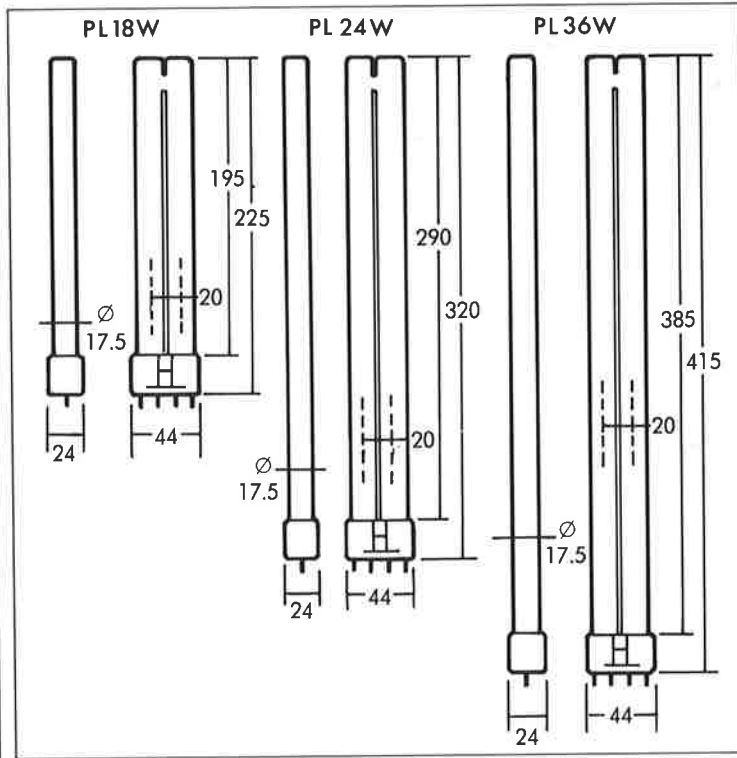
For luminaires, for signs, and for incorporation in equipment. The short length and high light output make the lamps particularly suitable for use in new compact luminaires.

**FEATURES**

- Short length and high light output aid the design of compact luminaires.
- Four-pin cap, without integral starter, permits use in both switchstart circuits and specified starterless circuits.
- Colour 80 Series triphosphors combine high efficacy with Deluxe colour rendering.
- Good lumen maintenance.
- Two-limb design with bridge weld establishes 'cool spots' to control pressure over wide temperature variations.
- Simple push-click action simplifies relamping.
- International 2G11 four-pin cap.

COLOUR DATA	COLOUR 84	COLOUR 83
Correlated colour temperature	4000K	3000K
Colour rendering index (Ra8)	85	85
Chromaticity co-ordinates	x: 0.380 y: 0.377	0.439 0.400

For spectral distribution graphs see Fluorescent Lamps and Gear Section on page 489.



**NOTE:**  
2 x 18W lamps can be operated with *one* ballast BTP40 L25 and *two* starters S2, giving a reduced total circuit watts of 46W instead of 58W.  
\*A lamp support is required for use with these lamps.

**PACKING QUANTITIES AND ORDERING**

PLL lamps are packed in 25s. Please order in the form given in the following example, stating colour required, and in multiples of the packing quantity:

100 Philips lamps PLL 24W/83

Control gear and accessories must be ordered separately. For details please see:

- Ballasts page 492
- Starters page 492

Rating and colour	TECHNICAL							SPARES			
	Catalogue number	Cap	Lamp volts (V)	Lamp current (A)	Lumens 100 Hrs	Weight (g)	Total circuit power (W)	Ballast	Starter	Lampholder	Lamp support
18W 'cool'	PLL18W/84	2G11	60	0.37	1200	97	28	BTP20L25	S10	H128	S129
18W 'warm'	PLL18W/83	2G11	60	0.37	1200	97	28	BTP20L25	S10	H128	S129
24W 'cool'	PLL24W/84	2G11	89	0.34	1800	130	32	BTP20L25	S10	H128	S129
24W 'warm'	PLL24W/83	2G11	89	0.34	1800	130	32	BTP20L25	S10	H128	S129
36W 'cool'	PLL36W/84	2G11	109	0.43	2900	167	45	BTP40L25	S10	H128	S129
36W 'warm'	PLL36W/83	2G11	109	0.43	2900	167	45	BTP40L25	S10	H128	S129

For product description please see page 227

# FLUORESCENT LAMPS – MAIN RANGE (T8 AND T12)

## REPLACING OTHER MAKES

Other make	PHILIPS
White	White 35
Warm White	Colour 83 or Warm White 29
Daylight	Colour 84 or Cool White 33
Natural	} Colour 84 or Natural 25
De Luxe Natural	
Plus White	
De Luxe Warm White	} Colour 83 or Softone 32
Warmtone	
Kolor-rite	Trucolor 38
Colour Matching	} Northlight 55
Northlight	
Pluslux	Colour 35, 29, 33
Polylux	Colour 80 series

Lamps of different makes should not normally be mixed in an installation. When Philips lamps are being used to replace an existing installation, the guide indicates a lamp that is approximately equivalent. The correct approach is not to seek a match, but to decide which of the Philips lamps is the best one for the particular application.

## SPECIAL PURPOSE LAMPS

Special-purpose fluorescent lamps not for general lighting, such as lamps with UV output, are listed in the Special Purpose section of this catalogue.

## ELECTRICAL SERVICE PERIOD

From a large group of fluorescent lamps operated under standard conditions, up to two per hundred may fail during the first 1000 hours. The failure rate is then negligible (less than 1 per cent per thousand hours) until there has been appreciable loss of emitter. Thereafter the failure rate accelerates.

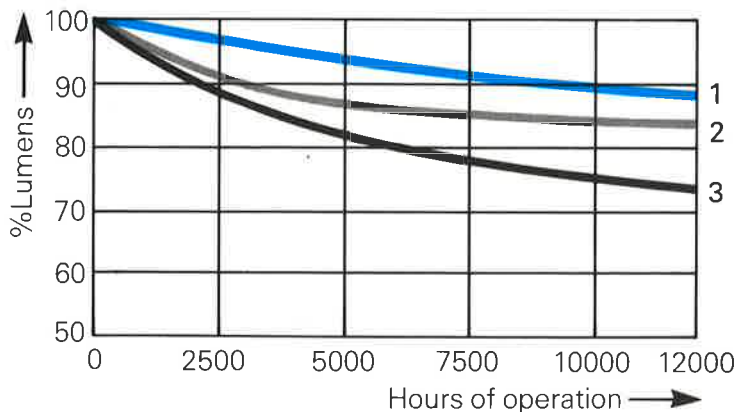
## LUMEN DEPRECIATION

There are two main determinants of the rate at which light output falls with operating time:

- 1) The type of phosphor. Modern Triphosphors (e.g. Colour 84, Colour 83) have a better lumen maintenance than the older halophosphates.
- 2) The temperature of the phosphor. For a given lamp diameter, temperature varies with loading (Watts per unit length). For example, for a given phosphor the lumen maintenance of a 50W 1500mm is better than that of a 58W 1500mm.

Philips HF argon-filled fluorescent lamps benefit on both counts. First, they incorporate only Triphosphors. Secondly, they are essentially low-loaded lamps.

Depreciation rates (under controlled conditions) are compared in the following graph.



1. HF Triphosphors 2. Triphosphors 3. Halophosphates

## MCFA

Low-pressure mercury lamp with fluorescent internal coat and external metal strip (to be connected to Earth). For switchstart and 10V starterless circuits.

## TL

As for MCF. Also means 'fluorescent lamp in general'.

## TLD

As for TL but 26mm diameter. The principal lamps are krypton-filled (70W, 58W, 36W, 18W). For switchstart circuits only.

## TLD...T

As for MCFE but 26mm diameter. Note that 26mm diameter silicone-coated lamps can also be described as MCFE.

## TLA

As for MCFA.

## TLM

As for TL but with external (but connected) strip. For switchstart or 3V starterless circuits.

## TLE/TLEK

Circular low-pressure mercury lamp with fluorescent internal coat. The 'K' suffix signifies high loading. For switchstart circuits only.

For TLD... HF High Frequency Lamps, see page 489.

The suffix **RS** implies rapid start (3V starterless) circuits and switchstart.

## PACKING QUANTITIES AND ORDERING

2400mm lamps are packed in 20s. All other standard fluorescent lamps are packed in 25s. Please order in multiples of the packing quantity, in the form given in the following example, adding colour designation after the oblique:

100 Philips fluorescent lamps  
TLD 58W/84

## ASSOCIATED PRODUCTS

Starters – see page 479  
Electronic starters – see page 478

Ballasts – see page 480  
Capacitors – see page 482  
Accessories (lampholders, etc.) – see page 482

High Frequency Ballasts – see page 481

## OTHER LAMPS

A number of special lamps are manufactured for incorporation into equipment but are not necessarily stock items, eg. TLX lamps (single contact cap) for use in ex 'e' luminaires.

## INTRODUCTION

The principal characteristics of fluorescent lamps of different colours are:

### Colour rendering index

**CRI** – an index of the lamp's ability to render colour. It ranges from 50 (representing the rendering of the original Warm White colour) to 100 (the colour rendering obtained from a complete spectrum light source such as daylight or an incandescent lamp). Ra8 refers to the rendering of eight sample surfaces.

### Correlated colour

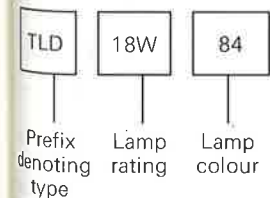
**temperature (CCT)** – the colour appearance of a 'white' lamp derived from the colour temperature of a complete spectrum light source nearest in colour appearance to the lamp. The temperature is measured in kelvin; 3000K is warm and 5000K is cool. The colour temperature is not related in any way to the running temperature of the lamp, nor is it any guide to colour rendering.

**Efficacy** – light output for power input, measured in lumens per watt.

## GUIDE TO LAMP PREFIXES

The standard description of a Philips fluorescent lamp consists of a prefix, lamp rating, and lamp colour number, as in the following example:

### TLD18W/84



It is not necessary to quote the lamp length.

This guide explains the meaning of the prefixes.

**MCFA**  
Low-pressure mercury lamp with fluorescent internal coat. For switchstart circuit only.

**MCFE**  
Low-pressure mercury lamp with fluorescent internal coat, silicone external coat and 10V electrodes (except the 85W 600mm lamp, which has 3V electrodes). For switchstart and starterless circuits. MCFEK refers to 85W 600mm.

# FLUORESCENT LAMPS ORDERING DATA FOR MAIN RANGE (T8 AND T12)

FIRST-CHOICE COLOURS				TRIPHOSPHOR		HALOPHOSPHATE	
				First-choice colours - for initial installations and for replacement		Initial lamp in batten packs	
Length	Rating	Type/Filling		Colour 84	Colour 83	White 35	
2400mm (8ft)	<b>100W</b> 125W Note 3	T12	K	<b>MCF 100W/84</b>	<b>MCF 100W/83</b>	<b>MCF 100W/35</b>	
		T12	A	MCFE 125W/84	MCFE 125W/84	MCFE 125W/35	
1800mm (6ft)	<b>70W</b> Note 3 75/85W	T8	K	<b>TLD 70W/84</b>	<b>TLD 70W/83</b>	<b>TLD 70W/35</b>	
		T12	A	MCFE 75/85W/84	MCFE 75/85W/83	MCFE 75/85W/35	
1500mm (5ft)	<b>58W</b> Note 3 65W	T8	K	<b>TLD 58W/84</b>	<b>TLD 58W/83</b>	<b>TLD 58W/35</b>	
		T12	A	MCFE 65/80W/84	MCFE 65/80W/83	MCFE 65/80W/35	
1200mm (4ft)	<b>36</b> 40W	T8	K	<b>TLD 36W/84</b>	<b>TLD 36W/83</b>	<b>TLD 36W/35</b>	
		T12	A	MCFE 40W/84	MCFE 40W/83	MCFE 40W/35	
600mm (2ft)	<b>18W</b> 20W	T8	K	<b>TLD 18W/84</b>	<b>TLD 18W/83</b>	<b>TLD 18W/35</b>	
		T12	A	MCFE 20W/84	MCFE 20W/83	MCFE 20W/35	
900mm (3ft)	30W Note 3	T8	A	<b>TLD 30W/84</b>	<b>TLD 30W/83</b>	TLD 30W/35	
450mm (18in)	15W Note 3	T8	A	—	—	TLD 15W/35	

**NOTES**

- Availability:** An entry denotes a normal stock type. Each entry is the standard ordering description of the lamp.
- Type/Filling:** K = Krypton-filled A = Argon-filled T8 = 26mm (1 in.) dia. T12 = 38mm (1½ in.) dia.
- Ratings and circuits:** \* 58W lamps must not be operated in 80W circuits.  
70W lamps must not be operated in 85W circuits.  
125W lamps must not be operated in 100W lagging circuits.  
TLD 30W and TLD 15W are switchstart only.

**LAMP CHOICE GUIDE**

- T8 (26mm) PowerSlimmer lamps; first choice for new installations and for most existing switchstart circuits.**
- T12 (38mm)** Retained for replacement into starterless circuits (including dimming and emergency) and for low temperatures.
- Colour 84** Cool appearance for work areas, especially shops, offices and factories. Meets DHSS requirements for clinical areas.
- Colour 83** Warm appearance for social areas, e.g. hotels, restaurants and the home.
- White 35** An initial lamp, intermediate appearance, in batten packs and KombiPaks.

**WHERE POSSIBLE, CHOOSE A KRYPTON-FILLED LAMP AND A TRIPHOSPHOR COLOUR.**

Krypton-filled power-saving lamps (mainly T8) operate on the same switchstart ballasts as the corresponding argon-filled lamps, and save about 8 per cent of circuit power. Triphosphor colours (Colour 80 Series) combine high efficacy and good colour rendering – first choice for almost all installations. Colour 80 Series are available in both krypton-filled and argon-filled lamps. Halophosphate colours are mainly for spot replacement in existing installations.

SECOND CHOICE COLOURS				HALOPHOSPHATE			
Mainly for spot replacement in existing installations							
				BASIC COLOURS		DE LUXE COLOURS	
Length	Rating	Type/Filling		Cool White 33 (Daylight 33)	Warm White 29	Natural 25	Softone 32
2400mm (8ft)	<b>100W</b> 125W Note 3	T12	K	—	—	—	—
		T12	A	MCFE 125W/33	MCFE 125W/29	MCFE 125W/25	MCFE 125W/32
1800mm (6ft)	<b>70W</b> Note 3 75/85W	18	K	—	—	—	—
		T12	A	MCFE 75/85W/29	MCFE 75/85W/29	MCFE 75/85W/25	MCFE 75/85W/32
1500mm (5ft)	<b>58W</b> Note 3 65W	18	K	TLD 58W/33	—	—	—
		T12	A	MCFE 65/80W/33	MCFE 65/80W/29	MCFE 65/80W/25	MCFE 65/80W/32
1200mm (4ft)	<b>36W</b> 40W	18	K	TLD 36W/33	—	—	—
		T12	A	MCFE 40W/33	MCFE 40W/29	MCFE 40W/25	MCFE 40W/32
600mm (2ft)	<b>18W</b> 20W	18	K	TLD 18W/33	—	—	—
		T12	A	MCFE 20W/33	MCFE 20W/29	MCFE 20W/25	MCFE 20W/32
900mm (3ft)	30W Note 3	18	A	TLD 30W/35	TLD 30W/29	TLD 30W/25	TLD 30W/32
450mm (18in)	15W Note 3	T8	A	TLD 15W/33	TLD 15W/29	TLD 15W/25	—
<b>Replacement recommendation</b>				Replace with Colour 84 and obtain improved colour rendering	Replace with Colour 83 and obtain improved colour rendering	Replace with Colour 84 and obtain higher output	Replace with Colour 83 and obtain higher output

K = Krypton filled A = Argon filled

SPECIALIST COLOURS				De Luxe halophosphates	
				Trucolor 38	Northlight 55 (Colour Matching 55)
Length	Rating	Type/Filling		For art galleries and museums	For critical colour matching: Complies with BS 950 Part 1 (visible component).
2400mm (8ft)	125W	T12	A	—	MCFE 125W/55
1800mm (6ft)	75/85W	T12	A	MCFE 75/85W/38	MCFE 75/85W/55
1500mm (5ft)	65/80W	T12	A	MCFE 65/80W/38	MCFE 65/80W/55
1200mm (4ft)	40W	T12	A	MCFE 40W/38	MCFE 40W/55
600mm (2ft)	20W	T12	A	MCFE 20W/38	MCFE 20W/55

A = Argon filled

# FLUORESCENT LAMPS LUMEN VALUES AND TECHNICAL DATA

## LUMEN VALUES

Rating and Length	First choice colours		Second choice colours			Specialist colours
	Colour 84 and Colour 83	White 35	Warm White 29 and Cool White 33	Softone 32	Natural 25	Tricolor 38 and Northlight 55
<b>KRYPTON-FILLED LAMPS</b>						
100W 2400mm (8ft)	8900	7800	—	—	—	—
70W 1800mm (6ft)	6300	5600	—	—	—	—
58W 1500mm (5ft)	5100	4500	4415	—	—	—
36W 1200mm (4ft)	3200	2800	2760	—	—	—
18W 600mm (2ft)	1300	1100	1060	—	—	—
<b>ARGON-FILLED LAMPS</b>						
125W 2400mm (8ft)	9400	8800	8800	5000	7000	5500
75/85W 1800mm (6ft)	5900	5600	5600	3100	4000	3500
65/80W 1500mm (5ft)	4900	4600	4600	2800	3500	3000
40W 1200mm (4ft)	3000	2700	2700	1800	2200	1900
20W 600mm (2ft)	1200	1000	1000	700	900	800
30W 900mm (3ft) T8	2400	2200	2120	1400	—	1250
15W 450mm (18ins) T8	—	800	800	—	720	—

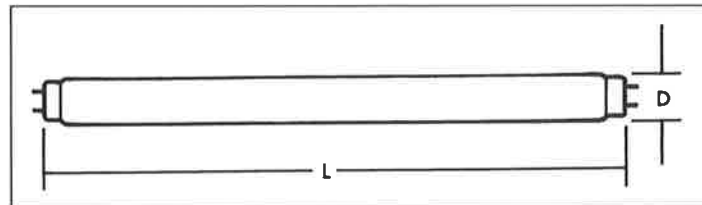
- Notes:**
- 1 The table lists rounded values of average light output measured under standard conditions at 2000 hours.
  - 2 This table is not a guide to availability.
  - 3 75/85W lamps: lumens measured at 75W (output is approximately 10% higher at 85W).
  - 4 65/80W lamps: lumens measured at 65W (output is approximately 10% higher at 80W).
  - 5 Cool White 33 was previously called Daylight 33, and Northlight 55 was previously called Colour Matching 55.

### Obsolescent lamp types – for replacement only

#### ARGON-FILLED T12

Rating	Colour 84	White 35	Natural 25	Softone 32	Warm White 29	Cool White 33	Northlight 55
85W 2400mm (8ft)	MCFE 85W/84	MCFE 85W/35	MCFE 85W/25	MCFE 85W/32	MCFE 85W/29	MCFE 85W/33	—
40W 600mm (2ft)	MCFEK 80W/84	MCFEK 40W/35	MCFEK 40W/25	—	MCFEK 40W/29	MCFEK 40W/33	MCFEK 40W/55

- Notes:**
- 1 MCFA earth strip lamps, lamps with internal reflectors and Colour 34 lamps are no longer made but may be available from stockists.
  - 2 80W BC lamps are available in White 35 only but their luminaires are old and should be replaced.
  - 3 85W 2400mm lumens approx. 70% of 125W. 40W 600mm lumens approx. 65% of 40W 1200mm.



## DIMENSIONS, WEIGHTS AND ELECTRICAL DATA

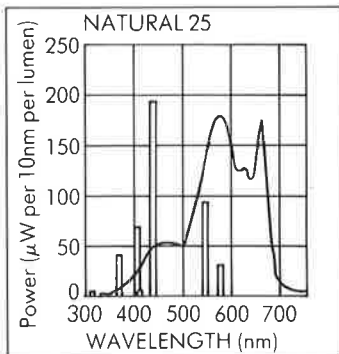
Nominal Rating	Under BS conditions			Maximum dimensions		Approx. Weight (g)
	Lamp power (W)	Lamp volts (V)	Lamp current (A)	Face-to-face length (L) (mm)	Diameter (D) (mm)	
<b>T12 (38mm/1½ in. dia.) krypton-filled</b> MCF 100W 2400mm (8ft)	99	125	0.96	2374.9	40.5	610
<b>T8 (26mm/1 in. dia.) krypton-filled</b>						
TLD 70W 1800mm (6ft)	69	128	0.70	1763.8	28.0	310
TLD 58W 1500mm (5ft)	58	110	0.67	1500.0	28.0	229
TLD 36W 1200mm (4ft)	36	102	0.44	1199.4	28.0	186
TLD 18W 600mm (2ft)	18	59	0.36	598.8	28.0	97
<b>T12 (38mm/1½ in. dia.) argon-filled</b>						
MCFE 125W 2400mm (8ft)	123	149	0.94	2374.9	40.5	610
MCFE 75/85W 1800mm (6ft)	73 (Note 2)	131	0.64	1763.8	40.5	451
MCFE 65/80W 1500mm (5ft)	64 (Note 2)	110	0.67	1500.0	40.5	360
MCFE 40W 1200mm (4ft)	39.5	103	0.43	1199.4	40.5	292
MCFE 20W 600mm (2ft)	19.3	57	0.37	598.8	40.5	156

- Notes:**
- 1 All above lamps have bi-pin caps G13.
  - 2 1800mm lamps on 75W ballast; 1500mm lamp on 65W ballast.

# FLUORESCENT LAMPS DE-LUXE AND BASIC HALOPHOSPHATES

## DE LUXE PHOSPHORS

Halophosphate lamps with relatively high colour rendering, and relatively low efficacy. Not available in T8 krypton-filled format.

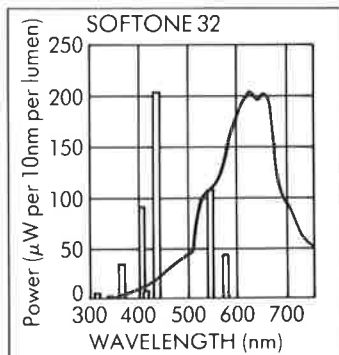


### NATURAL 25

De Luxe colour rendering and cool colour appearance. An early lamp colour, previously used in offices, shops and department stores; now being replaced by Colour 84, which has higher efficacy.

#### Lamp data

Correlated colour temperature: 4000K  
Colour rendering index (Ra8): 77  
Chromaticity co-ordinates:  $x=0.377$   
 $y=0.374$



### SOFTONE 32

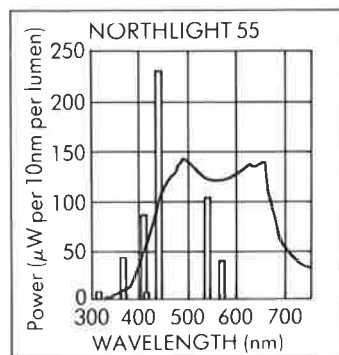
De Luxe colour rendering and warm colour appearance. An early lamp colour, previously used in restaurants, hotels and other social areas; now being replaced by Colour 83, which has higher efficacy.

#### Lamp data

Correlated colour temperature: 2900K  
Colour rendering index (Ra8): 85  
Chromaticity co-ordinates:  $x=0.444$   
 $y=0.404$

## SPECIALIST LAMPS

Halophosphate lamps for special purposes where the ability to render colours faithfully is the prime consideration. Not available in T8 krypton-filled format.

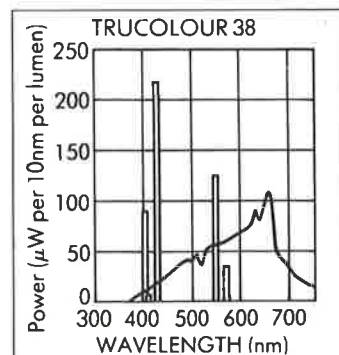


### NORTHLIGHT 55

A cold colour (6500K) with a high colour rendering index (95 on the Ra8 scale) used for critical colour matching or appraisal. Previously called Colour Matching 55. It is important that a high level of illumination (see BS 950 Part 1) is maintained over the whole area where matching is taking place. Northlight 55 complies with the visible spectrum requirements of BS950 Part 1, but does not include the UV component.

#### Lamp data

Correlated colour temperature: 6500K  
Colour rendering index (Ra8): 95  
Chromaticity co-ordinates:  $x=0.316$   
 $y=0.334$



### TRUCOLOR 38

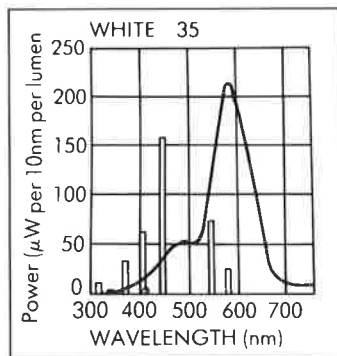
A cool colour (4000K) for installations where it is essential that colours are rendered with high fidelity (CRI 92 on the Ra8 scale); for example in art galleries and in fitting booths in clothing shops.

#### Lamp data

Correlated colour temperature: 4,000K  
Colour rendering index (Ra8): 92  
Chromaticity co-ordinates:  $x=0.381$   
 $y=0.377$

## BASIC PHOSPHORS

Halophosphate lamps with relatively high efficacy, and relatively low colour rendering. Not available in T8 krypton-filled format, except for White 35.

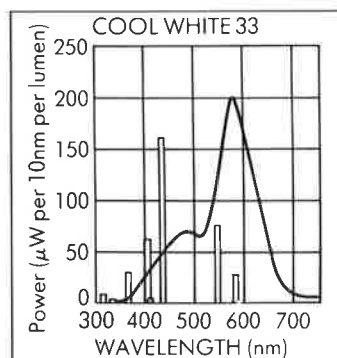


### WHITE 35

A lamp of intermediate appearance (3500K) principally for use in batten packs as an initial lamp.

#### Lamp data

Correlated colour temperature: 3500K  
Colour rendering index (Ra8): 58  
Chromaticity co-ordinates:  $x=0.412$   
 $y=0.392$

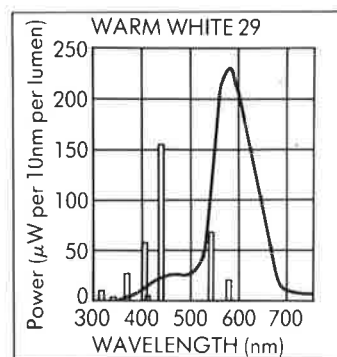


### COOL WHITE 33

Cool colour appearance. An early lamp colour previously called Daylight 33. Now mainly used in road lighting; in other applications replace with Colour 84, which has high output and improved colour rendering.

#### Lamp data

Correlated colour temperature: 4000K  
Colour rendering index (Ra8): 62  
Chromaticity co-ordinates:  $x=0.379$   
 $y=0.384$



### WARM WHITE 29

Warm colour appearance. An early lamp colour now accepted only for circular lamps; otherwise replace with Colour 83, which has higher output and good colour rendering.

#### Lamp data

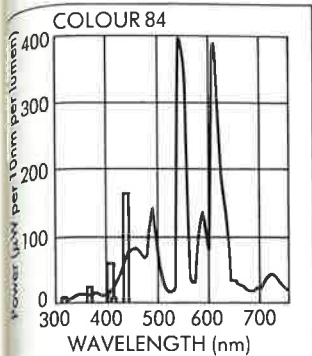
Correlated colour temperature: 2800K  
Colour rendering index (Ra8): 51  
Chromaticity co-ordinates:  $x=0.446$   
 $y=0.406$

### COLOUR 47

Colour 47 (Graphica) is a 5000K lamp incorporated by manufacturers of viewing cabinets complying with BS950 Part 2. The lamp is not a stock type.



# FLUORESCENT LAMPS TRIPHOSPHORS

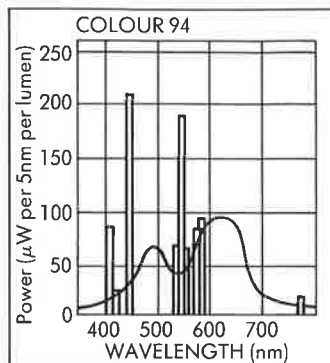


### COLOUR 84

Cool appearance, high efficacy and De Luxe colour rendering. First choice for work areas – offices, shops and factories.

#### Lamp data

Correlated colour temperature: 4000K  
Colour rendering index (Ra8): 85  
Chromaticity co-ordinates:  $x=0.380$   
 $y=0.377$

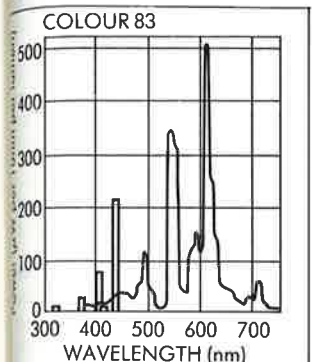


### COLOUR 94

Cool appearance, high efficacy and high-fidelity colour rendering. For applications where colours must be rendered faithfully such as the graphic trades, paint and printing industries.

#### Lamp data

Correlated colour temperature: 3800K  
Colour rendering index (Ra8): 95  
Chromaticity co-ordinates:  $x=0.387$   
 $y=0.371$

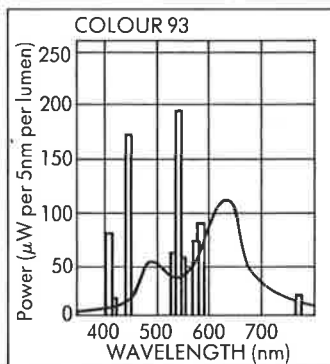


### COLOUR 83

Warm appearance, high efficacy and De Luxe colour rendering. First choice for social areas – restaurants and hotels, and certain foodstuffs.

#### Lamp data

Correlated colour temperature: 3000K  
Colour rendering index (Ra8): 85  
Chromaticity co-ordinates:  $x=0.441$   
 $y=0.404$



### COLOUR 93

Warm appearance, high efficacy and high-fidelity colour rendering. For faithful reproduction of colours in quality stores, museums and art galleries.

#### Lamp data

Correlated colour temperature: 3000K  
Colour rendering index (Ra8): 95  
Chromaticity co-ordinates:  $x=0.435$   
 $y=0.401$

## HIGH FREQUENCY FLUORESCENT LAMPS

### FEATURES

- High Frequency operation raises lamp efficacy, producing energy savings up to 30% for the same lighting effect, compared with conventional luminaires.
- Mains flicker and mains hum eliminated, and hence stroboscopic effects.
- Fast, reliable starting, even under cold conditions.
- De Luxe colour rendering.
- Low depreciation rate.

### MATERIALS AND FINISH

**Construction:** 26mm diameter glass tubing, with standard pin caps.  
**Filling:** Argon.  
**Phosphors:** Colour 80 Series and Colour 90 Series phosphor coating.

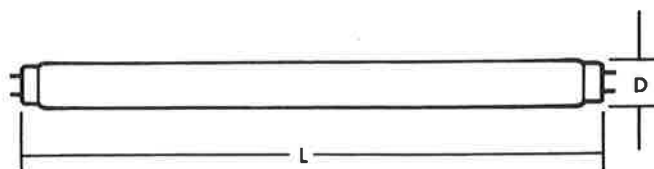
### SPECIFICATION

Type compliance with BS 1853 where applicable.  
Specify state: Argon-filled fluorescent lamps for use with Philips High frequency control gear. With phosphor coating. Substantially as Philips TLD HF lamps.

Description	ORDERING							TECHNICAL			
	Catalogue Number	Nominal length (mm)	Lamp Power (W)	Lamp Volts (V)	Lamp Current (A)	L	D	Approx. Weight (g)	Lighting Design Lumens (2)		
16W Colour 84 600mm (2ft)	TLD16W/84HF	600	16	63	0.25	589.8	28	97	1300		
16W Colour 83 600mm (2ft)	TLD16W/83HF	600	16	63	0.25	589.8	28	97	1300		
16W Colour 94 600mm (2ft)	TLD16W/94HF	600	16	63	0.25	589.8	28	97	950		
16W Colour 93 600mm (2ft)	TLD16W/93HF	600	16	63	0.25	589.8	28	97	950		
32W Colour 84 1200mm (4ft)	TLD32W/84HF	1200	32	128	0.25	1199.4	28	186	3200		
32W Colour 83 1200mm (4ft)	TLD32W/83HF	1200	32	128	0.25	1199.4	28	186	3200		
32W Colour 94 1200mm (4ft)	TLD32W/94HF	1200	32	128	0.25	1199.4	28	186	2300		
32W Colour 93 1200mm (4ft)	TLD32W/93HF	1200	32	128	0.25	1199.4	28	186	2300		
50W Colour 84 1500mm (5ft)	TLD50W/84HF	1500	50	142	0.35	1500.0	28	229	5100		
50W Colour 83 1500mm (5ft)	TLD50W/83HF	1500	50	142	0.35	1500.0	28	229	5100		
50W Colour 94 1500mm (5ft)	TLD50W/94HF	1500	50	142	0.35	1500.0	28	229	3600		
50W Colour 93 1500mm (5ft)	TLD50W/93HF	1500	50	142	0.35	1500.0	28	229	3700		
60W Colour 84 1500mm (5ft)	TLD60W/84HF	1500	60	135	0.45	1500.0	28	229	6100		
60W Colour 83 1500mm (5ft)	TLD60W/83HF	1500	60	135	0.45	1500.0	28	229	6100		

### NOTES

- Not for use in luminaires not fitted with Philips HF control gear
- Lighting Design Lumens are measured at 2000h, the basis for lighting design calculations
- Electrical data and lumens are averages, measured under standard conditions



### PACKING QUANTITY AND ORDERING

Please order lamps in the form given in the following example, in multiples of the packing quantity (25), indicating colour required after the oblique:

100 Philips High Frequency lamps TLD 50W/84HF

# MINIATURE FLUORESCENT LAMPS

**Note:** For switchstart operation, Certain emergency luminaires and transistorised ballasts may not operate these lamps correctly.

**LAMP COLOURS**

White 35: A high efficacy phosphor, the common colour for the majority of applications.

Warm White 29: Warm colour appearance, now tending to be replaced by White 35.

Cool White (Daylight) 33: Cool colour appearance, now tending to be replaced by White 35.

**CAPS**

Mini-bi-pin G5/15.

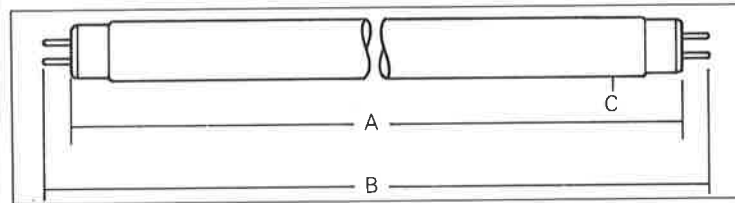
**PACKING QUANTITY AND ORDERING**

Lamps are packed in 25s. Please order in multiples of the packing quantity, in the form given in the following example, inserting lamp colour required after the oblique:

100 Philips fluorescent lamps TL 13W/35

Description	ORDERING			TECHNICAL						
	Catalogue Number *insert colour (35, 29, 33)	COLOURS		Lamp Volts (V)	Lamp Current (A)	Lamp Weight (g)	DIMENSIONS			
	35	29/33	A				B	C	Lighting Design Lumens	
4W 150mm (6in)	TL4W/*	-	29/33	29	0.17	16.3	136	150	16	140
6W 225mm (9in)	TL6W/*	35	29/33	42	0.16	22	212	226	16	260
8W 300mm (12in)	TL8W/*	35	29/33	56	0.15	29	288	302	16	370
13W 525mm (21in)	TL13W/*	35	29/33	90	0.17	45	517	531	16	855

**Note:** All data are averages, and refer to operation under standard conditions.



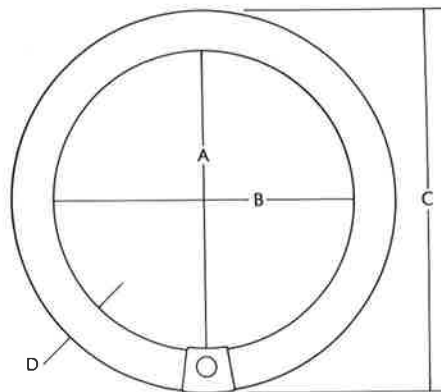
# CIRCULAR FLUORESCENT LAMPS

**PACKING QUANTITY AND ORDERING**

Please order in the form given in the following example, in multiples of the packing quantity:

10 Philips circular fluorescent lamps TLEK 60W/29.

Description	ORDERING		TECHNICAL								
	Ordering Reference	Nom. O.D.	A (min/max)	B (min/max)	C (min/max)	D (min/max)	Lighting Design Lumens	BS Lamp Volts	BS Lamp Current	Weight (g)	Box Quantity
60W Colour 29	TLEK60W/29	410	149.1/347.7	338.9/347.9	400/412.8	29.4/34.1	3400	92	0.75	333	10
40W Colour 29	TLE40W/29	410	236.5/347.7	338.9/347.9	400/412.8	29.4/34.1	2480	110	0.42	333	12
32W Colour 29	TLE32W/29	305	338.1/246.1	239.7/246.1	298.5/311.2	29.4/34.1	1670	81	0.45	250	20
22W Colour 29	TLE22W/29	210	341.3/155.6	147.6/157.2	203.2/215.9	26.2/30.9	840	62	0.4	220	20



For product description please see page 234-235

## FLUORESCENT LAMP CIRCUITS

**Switchstart**  
Starting is accomplished by a glow-switch starter, which is a small discharge tube with two metallic electrodes connected in parallel with the lamp.

The circuit is efficient and reliable, provided that starters are changed on occasional relampings. It is suitable for both for krypton-filled and argon-filled lamps.

### Electronic Start (ES08)

This replaces either the glow-switch starter or starterless circuits with a solid-state component that has no moving parts. Circuit power is the same as for the switchstart circuit.

An added feature is automatic shut-out after about 5 seconds of non-starting of a failed lamp.

## CIRCUIT DIAGRAMS

Standard circuits (A, B, C) for fluorescent lamps. Some luminaires may have variations in these circuits. D is a leading P.F. circuit, with 440V capacitor, mainly used with 125W 400mm lamps.

## OPERATING NOTES

**Storage**  
Unless otherwise stated, Philips fluorescent luminaires are for use in dry interiors. Luminaires must be stored only in dry environments; if packaging is exposed to damp, it must be changed.

### Mains supply

Standard fluorescent luminaires incorporate ballasts designed for supply voltage of 240V 50Hz, subject to statutory tolerances. The supply voltage should be checked by measurement (at the lead terminals), at times of high and low demand.

### Ambient temperature

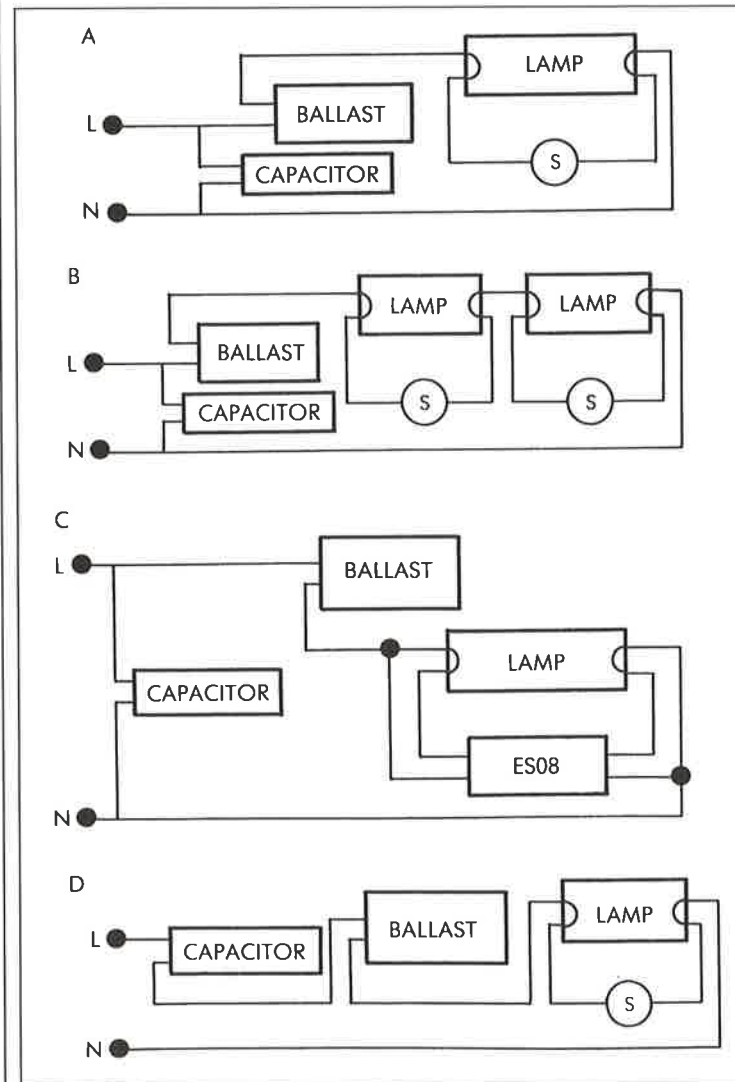
Luminaires give their rated service at ambient temperatures not exceeding 25°C, with occasional increases to not above 35°C. At higher temperatures (for example, in shop windows or on heated ceilings), service will be reduced and operation impaired. To improve heat dissipation, luminaires should be fixed to conducting rather than insulating surfaces, or should be suspended slightly below a ceiling rather than mounted directly on it. Electrical and photometric values refer to operation in a 25°C ambient at 240V, and are averages. At low temperatures, light output and service are normally reduced; with most circuits, starting may not be possible below 5°C.

## ELECTRICAL DATA

Lamp rating and length	Circuit letter	Ballast Cat. No.	PF Capacitor $\mu$ F	Starter Cat. No.	Circuit Watts (W)	Circuit current (A) approx.
<b>Switchstart - single lamp</b>						
100W 2400mm	A	BCS100	8.4	S16	115	0.60
70W 1800mm	A	BT175	8.4	S16	86	0.36
58W 1500mm	A	BTP 65	5.5	S10	70	0.35
36W 1200mm	A	BTP 40	3.5	S10	46	0.25
30W 900mm	A	BTP 30	3.5	S10	40	0.20
18W 600mm	A	BTP 20	5.5	S10 or S2	29	0.15
15W 450mm	A	BTP 20	5.5	S10 or S2	25	0.13
13W 525mm	A	BAS 13	2.0	S10	18	0.10
8W 300mm	A	BAS 8	2.0	S10 or S2	13	0.10
6W 225mm	A	BAS 8	2.0	S10 or S2	11	0.10
4W 150mm	A	BAS 8	2.0	S10 or S2	10	0.10
<b>Switchstart - two lamps in series</b>						
2 x 18W 600mm	B	BTP 40	3.5	2 x S2	46	0.25
2 x 15W 450mm	B	BTP 30	3.5	2 x S2	40	0.20
2 x 8W 300mm	B	BAS 13	2.0	2 x S2	21	0.10
2 x 6W 225mm	B	BAS 13	2.0	2 x S2	17	0.10
2 x 4W 150mm	B	BAS 8	2.0	2 x S2	13	0.10
<b>Electronic Start</b>						
100W 2400mm	C	BCS 100	8.4	ES08	115	0.60

Harmonic Content (3 Phase 4 Wires) less than 3 x 25% all circuits.  
Circuit Power Factor, with capacitors quoted, is above 0.85 lagging.  
For parallel P.F. connection either 10% or 5% tolerance capacitors may be used, 250V rating.  
Values of circuit Watts relate to the ballasts quoted.

## CIRCUIT DIAGRAMS



## OPERATING NOTES (ctd)

**Fuses and circuit breakers**  
Circuit breakers or HRC fuses rather than re-wireable fuses should be employed. The choice of current rating is a compromise between close protection against fault currents and spurious failure due to switching transients. An approximate guide to rating is 2-3 times steady current, with a minimum of 2A for an HRC fuse and 5A for a circuit breaker.

### Operating noise

All 50 Hz fluorescent luminaires emit an operating noise which may be noticeable in situations where the ambient noise level is low, or if the luminaires are attached to resonant structures. Trials should be made before installing the less expensive luminaires in acoustically sensitive situations. Normally, the shorter the luminaire, the lower the operating noise.

### Radio interference

Fluorescent luminaires should not be installed in close proximity to radio sets or similar equipment. Some radio interference is inevitable, but diminishes with distance. AM sets without an external aerial are inherently susceptible to adjacent discharge lamp circuits; adding an external aerial usually gives better results than adding suppressors to the luminaire or to the set. FM sets are less susceptible to interference from electrical equipment.

### Cables and switches

The current ratings of cables for fluorescent luminaires should be determined in accordance with IEE Regulations. In a three-phase four-wire system, a full-size neutral should be employed since harmonic currents are additive in the neutral. All cables entering a luminaire, especially if passing alongside a ballast, must be suitable for the temperatures involved. Ballasts may have surface temperatures up to 95°C. Supply cables should be arranged so that they do not pass alongside a ballast, but if this is not possible then cables with high-temperature PVC insulation should be used, or heat-resistant sleeving should be fitted over each individual supply cable. Switches should be generously rated, and should be suitable for inductive loads. When using M1 cable, observe the cable manufacturer's guidance on surge diverters.

# FLUORESCENT CONTROL GEAR AND ACCESSORIES BALLASTS

## RANGE

**Ballasts for switchstart circuits** – a range of LPF chokes for lamps from 4/6/8W to 125W.

## RANGE OF OPERATION

For nominal supplies of 240V 50Hz. Normal indoor conditions.

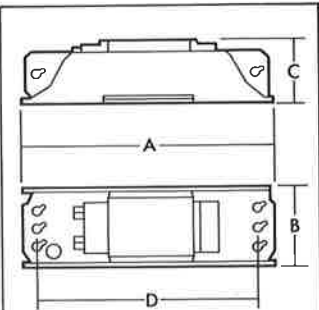
## SPECIFICATION

Type compliance with BS2818.

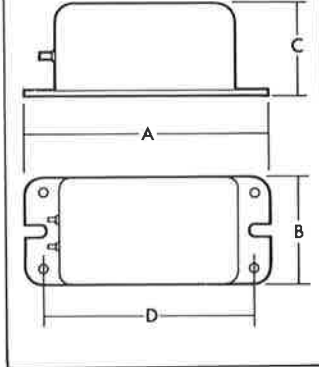
## ORDERING

Please order ballasts in the form given in the following example, in multiples of the packing quantity (5):  
50 Philips ballasts BTP 40.

BTP



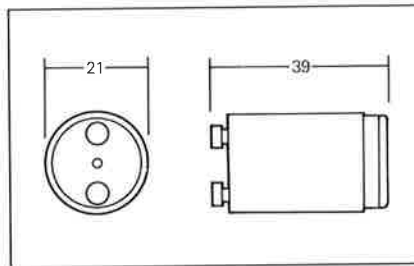
BAS



ORDERING	TECHNICAL					
	Catalogue No	Overall Length A	Overall Width B	Overall Depth C	Fixing Centres D	Weight (g)
Description						
1 x 100W 2400mm (8ft) <sup>1</sup>	BCS 100	232	42	35	220	1600
1 x 75/85W 1800mm (6ft)	BTL75	180	44	37	165	1350
1 x 70W 1800mm (6ft)	BTL75	180	44	37	165	1350
1 x 65/80 1500mm (5ft)	BTP 65	195	45.5	38	180	1150
1 x 58W 1500mm (5ft)	BTP 65	195	45.5	38	180	1150
1 x 60W circ. 410mm (16in)	BTP 65	195	45.5	38	180	1150
1 x 40W 1200mm (4ft)	BTP 40	155	45.5	36.5	140	690
1 x 36W 1200mm (4ft)	BTP 40	155	45.5	36.5	140	690
2 x 18W or 20W 600mm (2ft)	BTP 40	155	45.5	36.5	140	690
1 x 40W circ. 410mm (16in)	BTP 40	155	45.5	36.5	140	690
1 x 30W 900mm (3ft)	BTP 30	155	45.5	36.5	140	690
2 x 15W 450mm (18in)	BTP 30	155	45.5	36.5	140	690
1 x 32W circ. 305mm (12in)	BTP 30	155	45.5	36.5	140	690
1 x 20W 600mm (2ft)	BTP 20	155	45.5	36.5	140	680
1 x 80W 600mm (2ft)	BTP 20	155	45.5	36.5	140	680
1 x 15W 450mm (18in)	BTP 20	155	45.5	36.5	140	680
1 x 22W circ. 210mm (8.25in)	BTP 20	155	45.5	36.5	140	680
1 x 13W 525mm (21in)	BAS 13	99	41	36	85 x 29	460
2 x 8W 300mm (12in)	BAS 13	99	41	36	85 x 29	460
2 x 6W 225mm (9ins)	BAS 13	99	41	36	85 x 29	460
2 x 4W 150mm (6in)	BAS 8	99	41	36	85 x 29	460
<b>PL Ballast</b>						
1 or 2 x PL5/7/9 and 1 x PL11	BP610L23	110	39	32	100	400
<b>Starterless Ballasts</b>						
1 x 75W 1800mm (6ft)	BCX75	168	63	46	152	1700
1 x 65W 1500mm (5ft)	BCX65	168	63	46	152	1700
1 x 40W 1200mm (4ft)	BCX40	147	63	46	127/137	1500

**Note 1:** 125W lamps must **not** be used in the 100W lagging PF circuit.

## STARTERS



## STARTERS

A range of starters for fluorescent lamps, for use as original equipment in new luminaires or as replacement spares. The starters are of the glow-switch type; a capacitor is included.

## FEATURES

■ Philips starters outlast several fluorescent lamp changes.

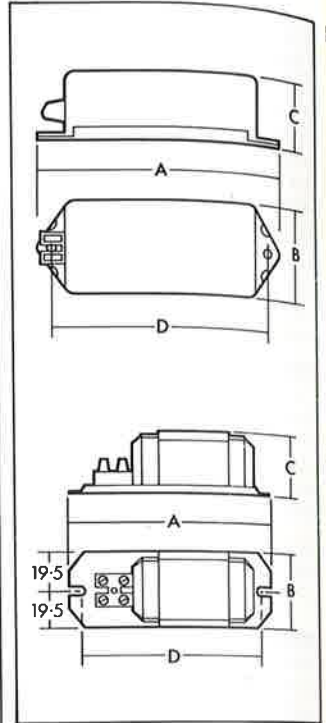
■ Polycarbonate cases.

## MATERIALS AND FINISH

**Canister:**  
Polycarbonate, off-white.  
**Weight:**  
30g.

ORDERING	LIST OF EQUIVALENTS			
For Lamp:	Starter Catalogue No.	Packing Quantity	Philips Type	Replaces
65/80W, 58W, 40W 1200mm (4ft) 36W, 30W, 13W + single short lamp Also Circular 60W, 40W, 32W	S1010W or S10100000	10	S10 (K3001)	155/400 155/500
40W 600mm (2ft), 20W, 18W 15W, 8W, 6W, 4W twin lamps (or single lamp) Also Circular 22W	S210W or S21000W	10	S2 (K3002)	155/100 155/200
100W, 75/85W, 70W	S16	20	S16	155/501
125W (also 100W 75/85W 70W)	S18	50	S18 (K3125)	155/501 155/800
140W 1500mm (5ft) 120W 1500mm (5ft) 85/100W 1800mm (6ft) Operated at 100W	S12	10	S12 (K3012)	—
100W, 75/85W, 85/100W, 65/80W	S8	25	S8 (K3008)	—

For product description please see page 236



## SPECIFICATION

■ Type compliance with BS 3772.

■ In addition, Philips hold a Kitemark license for the manufacture of S10 and S2 starters to BS 3772.

**To specify state:**  
Fluorescent lamp starter, with polycarbonate canister, similar to Philips S10 and S2.

## RANGE OF OPERATION

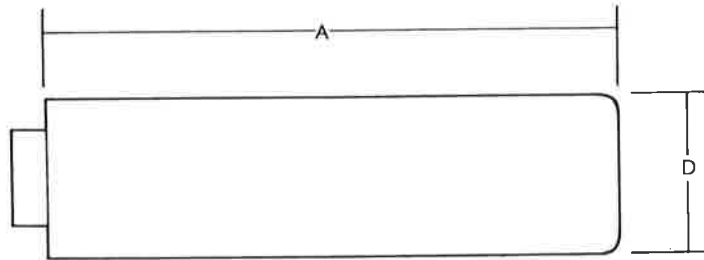
For use in conventional fluorescent lamp luminaires, and similar equipment.

## ORDERING

Please order in the form given in the following example, in multiples of the packing quantity shown in the table:  
1000 Philips starters S10.

## CAPACITORS

ORDERING		TECHNICAL				
Catalogue Number	Length (A)	Diameter (D)	Capacitance (mFg)	Tolerance (%)	Working volts (rms)	Weight (g)
H1635/1	51	38	3.5	10	250	70
H1672	130	35	7.2	5	440	250
H1684/1	77	38	8.4	5	250	100
H1655/1	77	38	5.5	5	250	100



### RANGE OF OPERATION

Voltage as specified in Table, 50 or 60 Hz.

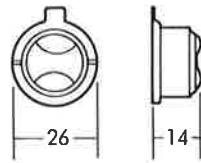
Temperature: Minus 40°C to plus 85°C

### PACKING QUANTITY AND ORDERING

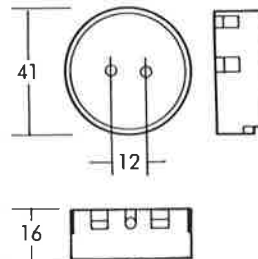
Please order in the form given in the following example, in multiples of the packing quantity (10):

50 Philips capacitors H1672

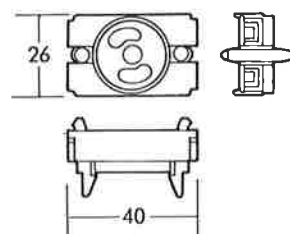
## ACCESSORIES



K7250 Adaptor Bi-Pin to BC. Push-on fit. Material: Brass.



K7265E Bi-Pin Push-on fully shrouded lampholder with earth contact. Material: Urea. Electrical connections: Push-wire terminals. Earth contact: Screw terminals.



K7235 Spring clip for 38mm lamps and PFC capacitors. Material: Spring steel, cadmium plated. K7257 Spring clip for 26mm lamps. Material: Spring steel, cadmium plated.

K7373 Starter Holder clip-in fixing. Material: Polycarbonate. Electrical connections: Push-wire terminals.

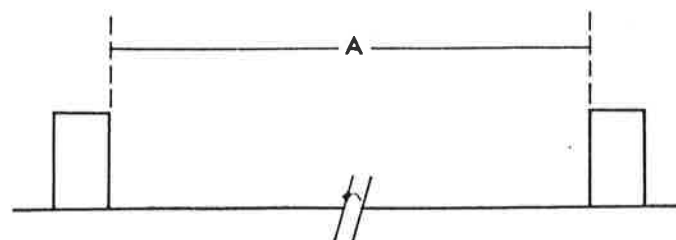
### PACKING QUANTITY AND ORDERING

Catalogue No.	Description
K7221	Fixed bi-pin lampholder
K7202	Fixed bi-pin lampholder
K7265E	Bi-pin lampholder with earth contact
K7229/1	Lampholder for 16mm lamps
K7373	Starter holder, push-wire terminals
K7250	Adaptor, bi-pin to BC
K7235	38mm spring clip
K7257	26mm spring clip

All accessories are packed in 100s. Please order in the form given in the following example, in multiples of the packing quantity:

200 Philips lampholders K7221

## LAMPHOLDER SPACING DISTANCES



Lamp Nom. Length	Face-to-Face spacing (A) mm
2400mm (8ft)	2376
1800mm (6ft)	1785
1500mm (5ft)	1501
1200mm (4ft)	1200
900mm (3ft)	896
600mm (2ft)	591
450mm (18in)	461
525mm (21in)	517
300mm (12in)	288
225mm (9in)	212
150mm (6in)	136

For product description please see page 236

# FLUORESCENT CONTROL GEAR AND ACCESSORIES HIGH FREQUENCY BALLASTS

### FEATURES

■ High frequency operation of lamp (28kHz) raises efficacy, and ballast losses are reduced. With Philips TLD HF Colour 80 Series lamps, energy consumption can be reduced by up to 30 per cent for the same lighting effect, compared with conventional fluorescent luminaires.

■ Mains flicker and mains hum are eliminated, and stroboscopic effects.

■ Preheat start maintains lamp life.

■ Fast, reliable starting, even in cold conditions.

■ Automatic cut-out switches off ballast when lamp fails to start, obviating flickering. Circuit resets automatically when new lamp is fitted.

■ Power factor is near unity.

■ Removable mains socket on non-regulating HF ballasts, for ease of wiring and ease of disconnection for high voltage or insulation resistance tests in luminaire factories or at installation.

■ Regulation between 10 and 100% of full light output (HFR Ballast only) allows manual and automatic control such as Daylight linking. (25-100% for PL36W and TLD 16W HF types.)

### RANGE OF OPERATION

240V 50Hz supplies.

**Note:** Can also be operated on DC.

### SPECIFICATION

■ Radio interference: Philips HF ballasts have exceptional RI suppression, so that luminaires incorporating them will comply with the appropriate requirements.

**To specify state:** - High frequency ballasts for use with Philips TLD HF lamps. Substantially as Philips BHF ballasts.

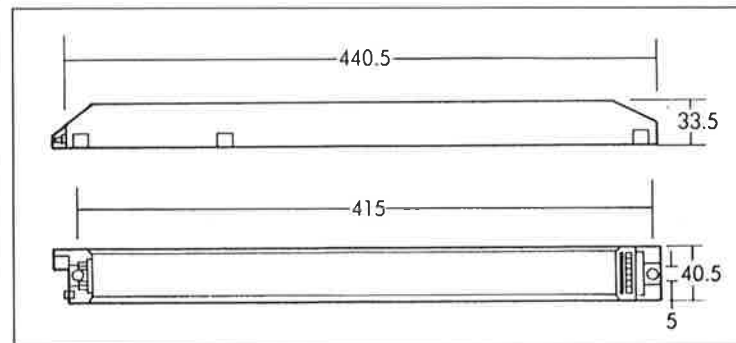
### BALLAST LIMITS

Under normal test conditions of luminaire, ballast temperature at test points must not exceed 65°C (abnormal operation 75°C). Observe manufacturer's instructions on Electric Strength test, use on ELCBs, and separation between lamps and ballast.

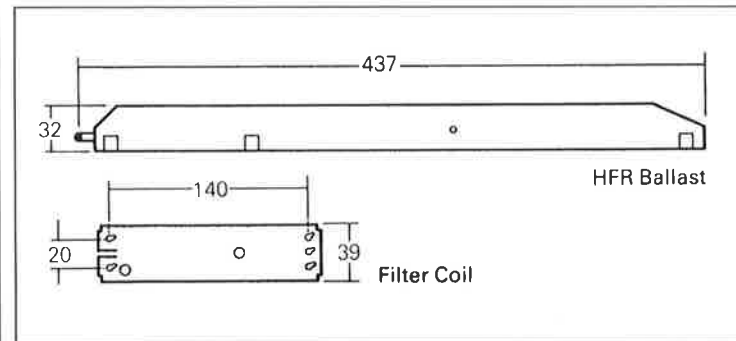
All control wiring on HFR ballasts must be mains rated.

Description	ORDERING				TECHNICAL			
	Catalogue Number	Circuit Current (A)	Circuit Power (W)	Weight (kg)				
2 x 16W TLD HF	BHF216	0.45	36	0.9				
1 x 32W TLD HF	BHF132	0.15	36	0.9				
1 x 50W TLD HF	BHF150	0.24	56	0.9				
2 x 32W TLD HF	BHF232	0.31	72	1.1				
2 x 50W TLD HF	BHF250	0.48	111	1.1				
2 x 60W TLD HF	BHF260	0.60	131	0.9				
1 x 32W PLHF*	BPL132	0.16	37	0.9				
2 x 32W PLHF*	BPL232	0.31	73	1.1				

\*For use with PL36W lamps.



HF Ballast



HFR Ballast and filter coil

Description	ORDERING				TECHNICAL			
	Catalogue Number	Circuit Current (A)	Circuit Power (W)	Weight (kg) (incl. filter)				
Regulation								
2 x 16W TLD HFR	BHF 216R	0.17	39	1				
1 x 32W TLD HFR	BHF 132R	0.16	36	1				
2 x 32W TLD HFR	BHF 232R	0.31	72	1				
1 x 50W TLD HFR	BHF 150R	0.24	56	1				
2 x 50W TLD HFR	BHF 250R	0.48	112	1				
1 x 32W PL HFR*	BPL 132R	0.16	38	1				
2 x 32W PL HFR*	*BPL 232R	0.32	75	1				

\*For use with PL 36W lamps.

**MATERIALS AND FINISH**  
Case: Aluminium.

**Terminations:**  
Non-regulating HF ballasts  
Removable push-in grab terminals to lamp and mains connections for solid wire 0.5 to 1 mm<sup>2</sup>.

Regulating HF ballasts  
Removable push-in grab terminals to lamp connections for solid wire 0.5 to 1 mm<sup>2</sup>.

Tool (screwdriver) operated grab terminals to filter/mains connections for solid wire up to 1 mm<sup>2</sup>.

### PACKING QUANTITY AND ORDERING

HF ballasts are individually packed.

Please order ballasts in the form given in the following example 50 Philips high-frequency ballasts BHF 250.

For HFR controls see page 458.

# SOX-E LOW PRESSURE SODIUM LAMPS

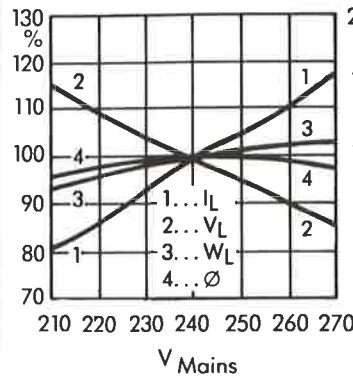
### FEATURES

- Extremely high efficacy – up to 200 lumens/watt – conserves energy in many applications.
- Indium oxide layer on internal surface of outer glass envelope reflects infra-red radiation; keeps the discharge tube at the optimum temperature for maximum efficacy.
- Improved bend insulation to help stabilise temperature.
- Dimples formed in discharge tube form cool spots to retain sodium; preventing mirroring and consequent loss of efficacy.
- Fully interchangeable mechanically and electrically by their equivalent SOX rating.
- Single BC cap ensures correct alignment within optical systems.
- Triple-coil cathodes and non-staining discharge tube ensure long life and low depreciation during use.
- All SOX-E lamps can be operated at up to 20° above or below the horizontal, and the three smaller sizes can be operated in any 'cap up' position.
- A black cap differentiates SOX-E from SOX lamps.

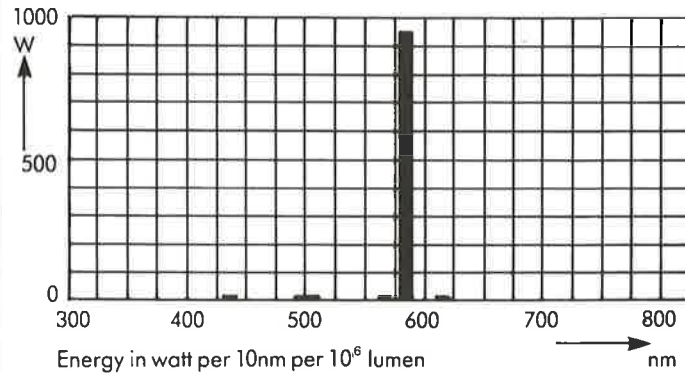
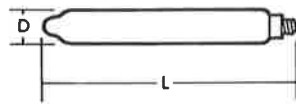
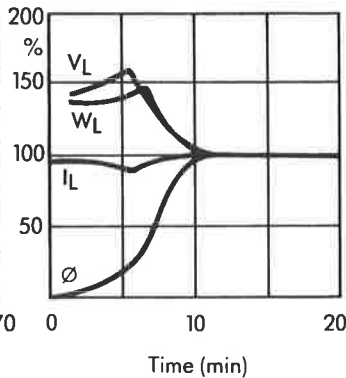
### RANGE OF OPERATION

Lamps operate reliably from -18°C.

Lamp Performance on Mains Voltage Fluctuations



Lamp Performance During Starting Period



### MATERIALS AND FINISH

**Envelope:** Clear tubular glass containing discharge tube with BC cap.

### LAMP COMPATIBILITY

- SOX-E 26 replaces 35W SOX
- SOX-E 36 replaces 55W SOX
- SOX-E 66 replaces 90W SOX
- SOX-E 91 replaces 135W SOX
- SOX-E 131 replaces 180W SOX

### ELECTRICAL COMPATIBILITY

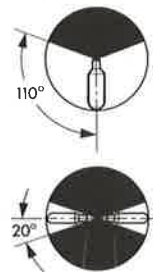
SOX-E lamps are designed to operate on all existing SOX type circuits. However, as they run with a lower lamp current, optimum efficacy will only be achieved on optimum control gear specially designed for SOX-E lamps. When run on other circuits a lower efficacy will be achieved, however this will still be greater than the equivalent SOX lamp on the same circuit. A summary is given in the table based on Philips circuits. SOX-E lamps operated on Philips circuits will comply with electricity board power factor correction requirements.

### PACKING QUANTITY AND ORDERING

Please order in multiples of the packing quantity, as shown in the table, in the form given in the following example:

18 Philips lamps SOX-E 66

Operating positions



Unshaded area shows recommended operating positions.

### COMPARISON OF SOX-E CIRCUITS

Commercial Watts	Autoleak				Hybrid-Constant Watts				Hybrid-Choke Ignitor				Optimum Hybrid Constant Watts			
	True Lamp Watts	Total Circuit Watts	Light Output 100 Hr	Light Output 2000 Hr	True Lamp Watts	Total Circuit Watts	Light Output 100 Hr	Light Output 2000 Hr	True Lamp Watts	Total Circuit Watts	Light Output 100 Hr	Light Output 2000 Hr	True Lamp Watts	Total Circuit Watts	Light Output 100 Hr	Light Output 2000 Hr
18	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
26	31	56	4060	3980	—	—	—	—	*30	41	3800	3720	*18	25	1760	1710
36	41	62	6400	6270	—	—	—	—	*39	51	5700	5580	25	32	3430	3320
66	70	99	10,800	10,580	68	95	10,500	10,290	*70	83	10,100	9900	35	43	5580	5410
91	*97	137	16,800	16,460	*96	129	16,300	15,970	—	—	—	—	65	79	10,480	10,160
131	*142	176	26,500	25,970	—	—	—	—	—	—	—	—	90	106	17,150	16,620
													130	151	25,480	24,700

These are the present Philips SOX control gear circuits. See page 508.

All lamps must be operated with appropriate control gear. For control gear information please see page 507.

### ORDERING

### TECHNICAL

SOX-E Rating	Equivalent SOX	Catalogue No.	Packing Quantity	Cap	Correlated Colour Temperature (K)	Run-up Time (mins)	Operating Position (see diagram)	Overall Length	Diameter
18	—	SOX-E18	20	BY22d	2000	7	1	216	54
26	35W	SOX-E26	9	BY22d	2000	7	1	310	54
36	55W	SOX-E36	9	BY22d	2000	7	1	425	54
66	90W	SOX-E66	9	BY22d	1800	9	2	528	68
91	135W	SOX-E91	9	BY22d	1800	10	2	775	68
131	180W	SOX-E131	9	BY22d	1750	12	2	1120	68

For product description please see page 242

# SOX LOW PRESSURE SODIUM LAMPS

### FEATURES

- Extremely high efficacy – up to 183 lumens/watt – conserves energy in many applications.
- Indium oxide layer on internal surface of outer glass envelope reflects infra-red radiation; keeps the discharge tube at optimum temperature for high efficacies.
- Dimples formed in discharge tube form cool spots to retain sodium; prevent mirroring and consequent loss of efficiency.
- Single BC cap for strength and simplicity.
- Triple-coil cathodes and non-staining discharge tube ensure long life and low depreciation during use.
- All SOX lamps can be operated up to 20° above or below the horizontal, and 18W–55W can be operated in any 'cap up' position.
- Lamps are manufactured to BS 3767 and IEC 192.
- 35W to 135W versions are available in SOX BOX – special packing designed to make relamping quicker and easier.

### RANGE OF OPERATION

Lamps operate reliably from –18°C.

### MATERIALS AND FINISH

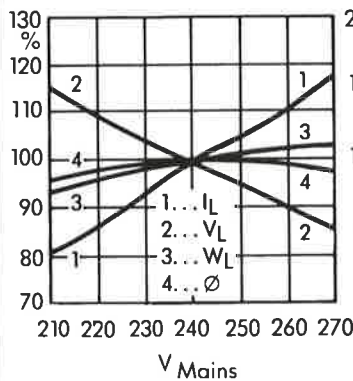
**Envelope:** Clear tubular glass containing discharge tube with BC cap.

### PACKING QUANTITIES AND ORDERING

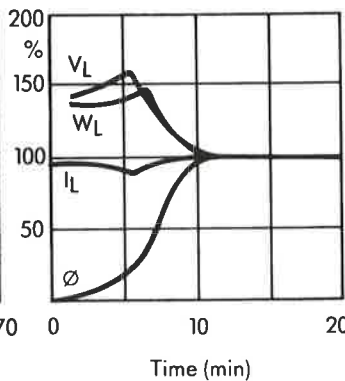
Please order in multiples of the packing quantity, as shown in the table, in the form given in the following example:

18 Philips lamps SOX 55

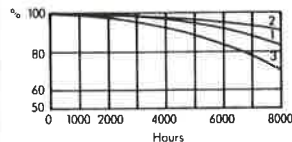
Lamp Performance on Mains Voltage Fluctuations



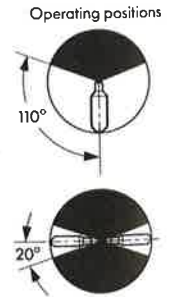
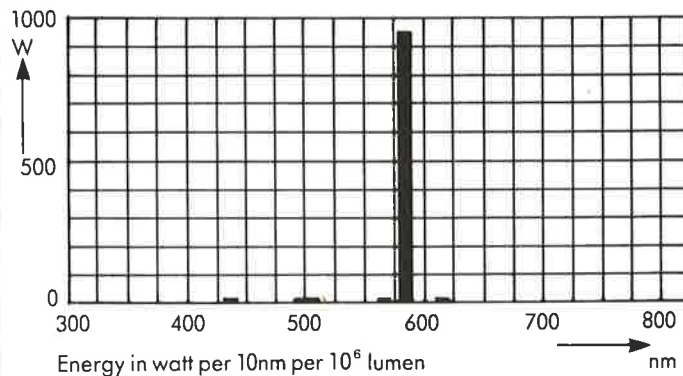
Lamp Performance During Starting Period



### LIFE EXPECTANCY AND LUMEN DEPRECIATION



For explanation of life and lumen curves, please see page 241



Unshaded area shows recommended operating positions.

ORDERING				TECHNICAL								
Description	Catalogue No	Packing Quantity (Note 1)	Cap	Average Lumen Output (100 hrs)	Average Lumen Output (2000 hrs)	Correlated Colour Temperature (K)	Lamp Voits (M)	Lamp Current (A)	Run-up Time (mins)	Operating Position (see diagram)	Overall Length	Diameter
35W SOX Lamp	35 SOX	9	BY22d	4500	4300	2000	70	0.60	7	1	310	54
55W SOX Lamp	55 SOX	9	BY22d	7400	7150	2000	109	0.60	7	1	425	54
90W SOX Lamp	90 SOX	9	BY22d	13,000	12,250	1800	112	0.94	9	2	528	68
135W SOX Lamp	135 SOX	9	BY22d	22,500	21,200	1800	164	0.95	10	2	775	68
180W SOX Lamp	180 SOX	9	BY22d	33,000	31,500	1750	240	0.91	12	2	1120	68

Note 1: 35W, 55W, 90W and 135W SOX BOX lamps are packed in 12s.

For product description please see page 242



# SON/SO-N-T SON/SO-N-T COMFORT HIGH PRESSURE SODIUM LAMPS

## HIGH PRESSURE SODIUM DISCHARGE LAMPS

High-pressure sodium lamps combine extremely high initial efficacies (up to 112 lm/W) with good colour rendering, and are therefore suitable for many applications where a golden white light and long lamp life are important factors. The discharge tube is made of sintered aluminium oxide, containing a mixture of mercury and sodium at high pressure. The effect of high pressure is to broaden the sodium spectrum, so that the lamp gives an output throughout the entire visible spectrum.

### RANGE

**SON** (elliptical outer envelope, with white internal diffusive coating):

Available in ratings of 50W, 70W, 100W, 150W, 250W, 400W and 1000W.

**SON/T** (tubular outer envelope of clear glass):

Available in ratings of 50W, 70W, 100W, 150W, 250W, 400W and 1000W.

### SON and SON-T COMFORT

with envelopes as above in elliptical and tubular 150, 250 and 400W form.

### FEATURES

Short run-up time – 80% of full light output is achieved after only 3½ minutes.

Solid state ignitor ensures reliable and quick starting – even when hot or at temperatures down to –40°C. Solid state ignitors are needed for all tubular lamps and all elliptical lamps above 100W. For 50W and 70W elliptical first choice lamps have internal ignitors but external ignitor option is available for 100W.

Reliability, stable operation and long life permits lamps to be used in situations where 'lamp outage' could create a hazard.

Excellent lumen maintenance.

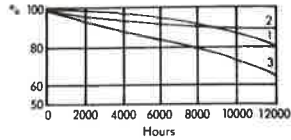
Isothermal hard glass outer envelope guards against breakage due to thermal shock.

Golden white light, with colour rendering capable of producing blue surfaces clearly, and enhancing red or yellow surfaces. Complexions and skin tones are flattered by the light. Improved colour rendering is obtained using SON COMFORT lamps.

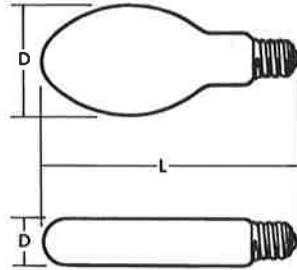
Universal burning position for all lamps in the range.

Lamps are manufactured to BS EN 60622.

## LIFE EXPECTANCY AND LUMEN DEPRECIATION



For explanation of life and lumen curves, please see page 241.



## Marking

Lamps which contain an *internal* ignitor are marked with the international symbol



Lamps for use with an *external* ignitor are marked with the international symbol



## RANGE OF OPERATION

Lamps start reliably down to –40°C.

## PACKING QUANTITIES AND ORDERING

Please order in multiples of the packing quantity, as shown in the table, in the form given in the following example:

12 Philips lamps 100W SON

## SON VOLTAGE REQUIREMENTS

High pressure sodium lamp ballasts are designed to give the correct lamp operating conditions at the nominated supply voltage. Short term variations of ±6% are permissible without any significant effect on lamp life. However, the lamps should not be run continuously on a mean supply voltage of 10V or more above nominal.

Description	ORDERING			TECHNICAL							
	Catalogue Number	Packing Quantity	Cap	Rating (Watts)	Lighting Design Lumens	Correlated Colour Temp (K)	Lamp Volts (V)	Lamp Current (I)	Run-up Time (Mins)	Overall Length (L)	Diameter (D)
Elliptical lamp with white internal coating + internal ignitor	50W SON-I	24	ES	50	3100	1900	85	0.76	5	156	72
Tubular lamp with clear envelope	50W SON/T	24	ES	50	3800	1900	88	0.74	5	156	38
Elliptical lamp with white internal coating + internal ignitor	70W SON-I	24	ES	70	5510	1900	90	1.0	5	156	72
Elliptical lamp with white internal coating + needing an external ignitor	70W SON-E	24	ES	70	5570	1900	90	1.0	5	156	72
Tubular lamp with clear envelope	70W SON/T	12	GES	100	5850	1900	100	1.2	5	156	38
Elliptical lamp with white internal coating	100W SON	12	GES	100	9000	1900	100	1.2	5	186	77
Tubular lamp with clear envelope	100W SON/T	12	GES	150	9500	1900	100	1.8	5	211	48
Elliptical lamp with white internal coating	150W SON	12	GES	150	13,500	1900	100	1.8	5	227	92
Tubular lamp with clear envelope	150W SON/T	12	GES	150	14,000	1900	100	1.8	5	211	47
Tubular lamp with clear envelope	150W SON/ST	12	GES	150	15,500	1900	100	1.8	5	211	47
Elliptical lamp with white internal coating and improved colour rendering	150W SON COMFORT	12	GES	150	11,000	2150	100	1.8	5	227	92
Tubular lamp with clear envelope and improved colour rendering	150W SON-T COMFORT	12	GES	150	11,500	2150	100	1.8	5	211	48
Elliptical lamp with white internal coating	250W SON	12	GES	250	24,000	2000	100	3.0	5	227	92
Tubular lamp with clear envelope	250W SON/T	12	GES	250	25,000	2000	100	3.0	5	257	48
Elliptical lamp with white internal coating and improved colour rendering	250W SON COMFORT	12	GES	250	20,000	2150	100	3.0	5	227	92
Tubular lamp with clear envelope and improved colour rendering	250W SON-T COMFORT	12	GES	250	20,800	2150	100	3.0	5	257	48
Elliptical lamp with white internal coating	400W SON	6	GES	400	45,000	2000	105	4.45	5	292	122
Tubular lamp with clear envelope	400W SON/T	12	GES	400	46,500	2000	100	4.6	5	283	47
Elliptical lamp with white internal coating and improved colour rendering	400W SON COMFORT	6	GES	400	33,000	2150	105	4.45	5	283	48
Tubular lamp with clear envelope and improved colour rendering	400W SON-T COMFORT	12	GES	400	34,000	2150	100	4.6	5	292	122
Elliptical lamp with white internal coating	1000W SON	6	GES	1000	110,000	2000	110	10.3	10	400	170
Tubular lamp with clear envelope	1000W SON/T	4	GES	1000	123,000	2000	100	10.6	10	390	67

### Notes:

Operating position universal.

All lamps must be operated with appropriate control gear.

For control gear information refer to page 509.

SON lamps are temperature sensitive and care must be taken when selecting luminaires for SON lamps. If in doubt consult Philips Lighting.

**For product description please see page 243**

# SON PLUS/SO-N-T PLUS HIGH PRESSURE SODIUM LAMPS

## HIGH PRESSURE SODIUM DISCHARGE LAMPS

High-pressure sodium lamps combine extremely high initial efficacies (up to 112 lm/W) with good colour rendering, and are therefore suitable for many applications where a golden white light and long lamp life are important factors. The discharge tube is made of sintered aluminium oxide, containing a mixture of mercury and sodium at high pressure. The effect of high pressure is to broaden the sodium spectrum, so that the lamp gives an output throughout the entire visible spectrum.

### RANGE

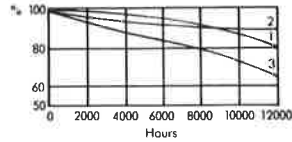
**SON Plus** (elliptical outer envelope, with white internal diffusive coating): Available in 150W rating.

**SON-T Plus** (tubular outer envelope of clear glass): Available in ratings of 70W and 150W.

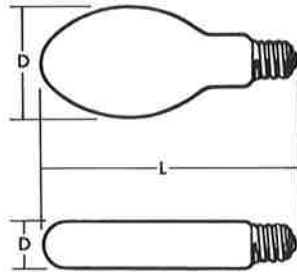
### FEATURES

- Short run-up time – 80% of full light output is achieved after only 3½ minutes.
- Solid state ignitor ensures reliable and quick starting – even when hot or at temperatures down to – 40°C. Solid state ignitors are needed for all tubular lamps and all elliptical lamps above 100W. For 50W and 70W elliptical first choice lamps have internal ignitors but external ignitor option is available for 70W.
- Reliability, stable operation and long life permits lamps to be used in situations where 'lamp outage' could create a hazard.
- Excellent lumen maintenance.
- Isothermal hard glass outer envelope guards against breakage due to thermal shock.
- Golden white light, with colour rendering capable of reproducing blue surfaces clearly, and enhancing red or yellow surfaces. Complexions and skin tones are flattered by the light.
- Universal burning position for all lamps in the range.
- Lamps are manufactured to IEC 662.

## LIFE EXPECTANCY AND LUMEN DEPRECIATION



For explanation of life and lumen curves, please see page 241.



Description	ORDERING			TECHNICAL						SPARES	
	Catalogue Number	Packing Quantity	Cap	Rating (Watts)	Lighting Design Lumens	Correlated Colour Temperature (K)	Lamp Volts (V)	Lamp Current (A)	Run-up Time (Mins)	Overall length (L)	Diameter (D)
Tubular lamp with clear envelope	70W SON/T Plus	12	ES	100	6500	2000	100	1.2	5	156	38
Elliptical lamp with white internal coating	150W SON Plus	12	GES	150	15000	2000	100	1.8	5	227	92
Tubular lamp with clear envelope	150W SON/T Plus	12	GES	150	16000	2000	100	1.8	5	211	47

### Notes:

Operating position universal.  
All lamps must be operated with appropriate control gear.  
For control gear information refer to page 509.  
SON lamps are temperature sensitive and care must be taken when selecting luminaires for SON lamps. If in doubt consult Philips Lighting.

### Marking

Lamps which contain an *internal* ignitor are marked with the international symbol



Lamps for use with an *external* ignitor are marked with the international symbol



### RANGE OF OPERATION

Lamps start reliably down to – 40°C.

### PACKING QUANTITIES AND ORDERING

Please order in multiples of the packing quantity, as shown in the table, in the form given in the following example:

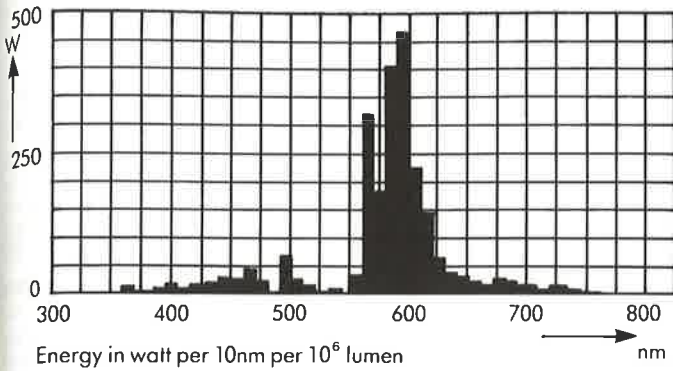
12 Philips lamps 100W SON Plus

### SON VOLTAGE REQUIREMENTS

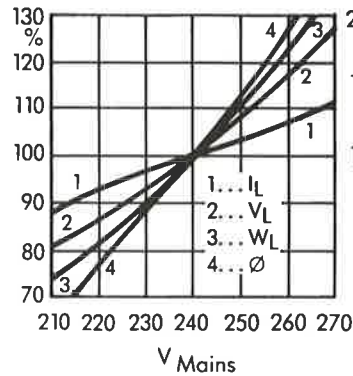
High pressure sodium lamp ballasts are designed to give the correct lamp operating conditions at the nominated supply voltage. Short term variations of ± 6% are permissible without any significant effect on lamp life. However, the lamps should not be run continuously on a mean supply voltage of 10V or more above nominal.

# SON HIGH PRESSURE SODIUM LAMPS

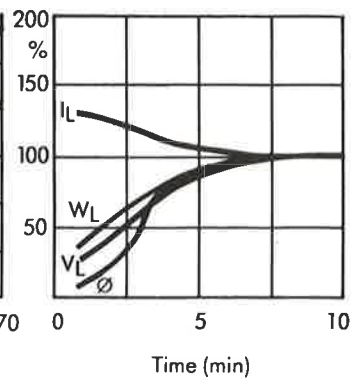
ABSOLUTE SPECTRAL ENERGY DISTRIBUTION



Lamp Performance on Mains Voltage Fluctuations



Lamp Performance During Starting Period



## SDW-T WHITE SON LAMPS

**FEATURES**

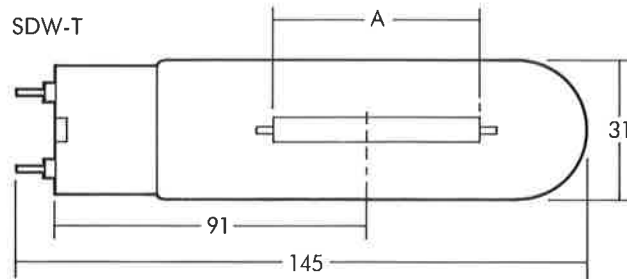
- Colour temperature (2500K) closely matches tungsten filament providing a warm light suitable for display purposes.
- Deluxe colour rendering (Ra8 = 80) renders coloured objects in their natural hues.
- Small light source allows tight optical control, permitting use in narrow-beam spotlights.
- Efficiency is four times that of tungsten GLS, providing potential for 75% energy savings.
- Cool beam.
- Lamp life is 3–5 times that of tungsten display lamps, reducing relamping maintenance by up to 80%.
- Colour remains stable throughout life, even with fluctuating supplies.
- Prefocus lamp cap for simple relamping.
- Short re-strike after switch-off (less than 30s).

**RANGE OF OPERATION**

- Operating position – universal.
- Base temperature – 120°C max.
- Bulb temperature – 350°C max.
- For normal interior environments.

Description	ORDERING			TECHNICAL						GEAR			
	Catalogue No.	Base	Lamp Voltage	Lamp Current, mA	Luminous Flux	Mains Voltage (nominal)	Operating Position	Dimension A	Colour Temperature	CRI (Ra 8)	Ballast	Controller	Power Factor Correction Capacitor
35W Lamp	35 SDWT	PG12	96	490	1300	240	Universal	14	2500	≥ 80	BSL35L32	CSL35	L4008
50W Lamp	50 SDWT	PG12	92	750	2300	240	Universal	17	2500	≥ 80	BSL50L32	CSL50	L4010
*100W Lamp	100 SDWT	PG12	90	1470	4800	240	Universal	19	2500	≥ 80	BSL100L32	CSL100	L4016

\* PROVISIONAL DATA



Length discharge tube A (35W) = 14mm  
 Length discharge tube A (50W) = 17mm  
 Length discharge tube A (100W) = 17mm

**INSTALLATION**

SDW-T lamps must be used in conjunction with a current-limiting ballast, and a control unit with integral ignitor which stabilises the lamp against fluctuations in mains voltage.

The cable length between the lamp and the control unit must not exceed 300mm (cable capacitance 50pF max).

Wiring is shown in the 'Gear' section: please see page 510.

**PACKING QUANTITIES AND ORDERING**

Please order in multiples of the packing quantity, in the form given in the following example:

- 12 Philips lamps SDW-T 35W
- 12 Philips ballasts BSL 35L42
- 12 Philips control units CSL35

Lamps, ballasts and control units are each packed in 12s.

# PLUG-IN SON-H HIGH PRESSURE SODIUM LAMPS

### FEATURES

- The isothermal outer envelope is internally coated for compatibility with most optical systems.
- Reliable ignition, even at low temperatures ( $-30^{\circ}\text{C}$ ).
- Re-ignition in only 3 minutes.

### RANGE OF OPERATION

240V 50Hz nominal supply,  $-30^{\circ}\text{C}$  to  $50^{\circ}\text{C}$ , depending on other circuit limiting factors.

### MATERIALS AND FINISH

Hard glass envelope, internally coated; GES cap.

### SPECIFICATION

- High pressure sodium lamp rated at 210W or 350W.
- Auxiliary electrode starting device.
- Similar in overall size to 250W and 400W mercury HPL-N lamps, and capable of operating on standard mercury HPL-N control gear of comparable wattage.

### To specify state:

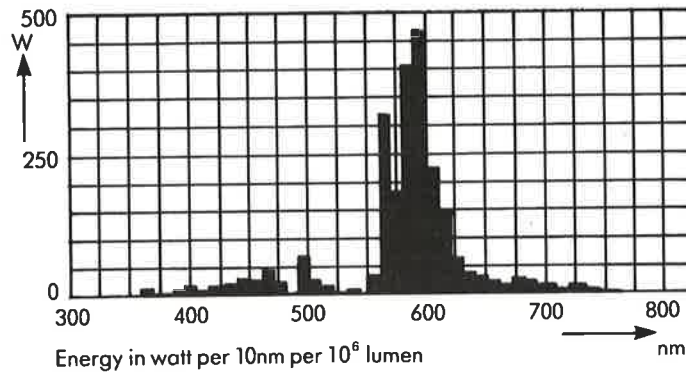
High-pressure sodium lamp with hard glass envelope internally coated, GES cap, similar in size to 250W (400W) mercury lamp and capable of operation from standard mercury control gear, substantially as Philips 210W SON-H (350W SON-H).

### PACKING QUANTITIES AND ORDERING

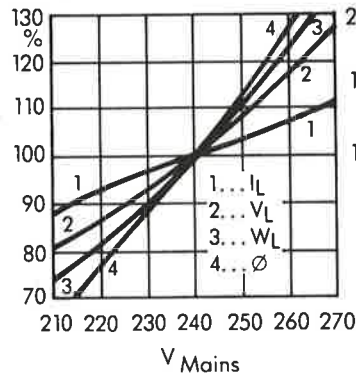
Please order in multiples of the packing quantity, as shown in the table, in the form given in the following example:

12 Philips lamps 210W SON-H.

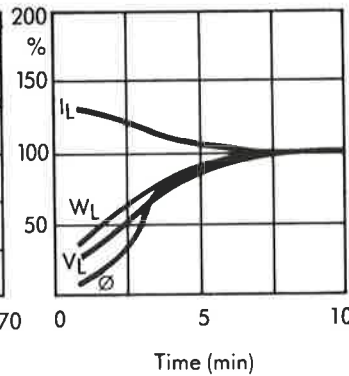
ABSOLUTE SPECTRAL ENERGY DISTRIBUTION



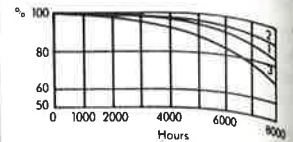
Lamp Performance on Mains Voltage Fluctuations



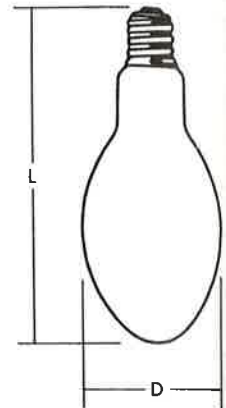
Lamp Performance During Starting Period



### LIFE EXPECTANCY AND LUMEN DEPRECIATION



For explanation of life and lumen curves, please see page 241.



ORDERING			TECHNICAL								
Catalogue Number	Packing Quantity	Cap	Rating (watts)	Average Lumen Output (100 hrs)	Average Lumen Output (2000 hrs)	Correlated Colour Temperature	Lamp Volts (V)	Lamp Current (A)	Run-up Time (mins)	Overall Length	Diameter
210W SON-H	12	GES	210	18,000	17,250	2000	104	2.5	5	227	92
350W SON-H	6	GES	350	34,500	32,600	2100	117	3.6	5	292	122

NOTES:  
These lamps must be operated with appropriate control gear.  
For information on control gear please see page 511.  
Operating position: universal.

For product description please see page 246

# HPL/HPL COMFORT MERCURY FLUORESCENT LAMPS

**HPL-N** lamps are elliptical shaped and have coated inside surfaces of europium-activated yttrium vanadate phosphor which is activated by UV from the discharge tube adding red to the mercury arc visible emissions.

**HPL-R** lamps have a spotlight shape with an additional reflecting layer of titanium dioxide between the phosphor and the glass to direct light downwards.

**HPL Comfort** lamps have elliptical shapes and a special phosphor to give light of improved colour rendering, being on the black body locus, and improved efficacy.

## RANGE HPL-N

60W	240V	ES
80W	240V	ES or 3 pin BC
125W	240V	ES, GES or 3 pin BC
250, 400, 700 or 1000W	240V	GES
2000W	415V	GES

## HPL-R

125W	240V	ES
250, 400, 700 or 1000W	240V	GES

## HPL Comfort

60, 80 or 125W	240V	ES
250 or 400W	240V	GES

## FEATURES

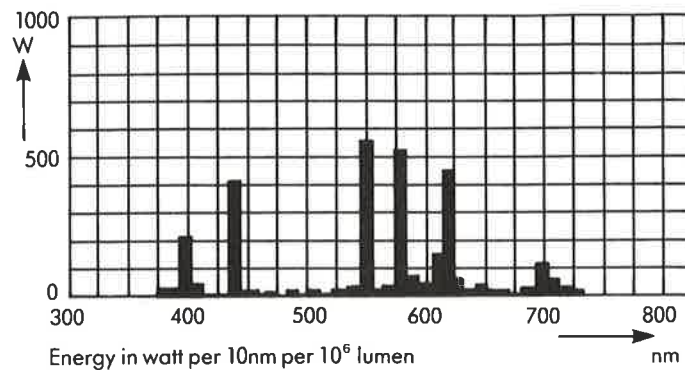
■ Short run-up time—80% of full light output is achieved after only 3½ minutes.

■ Reliable starting, even at temperatures down to -20°C.

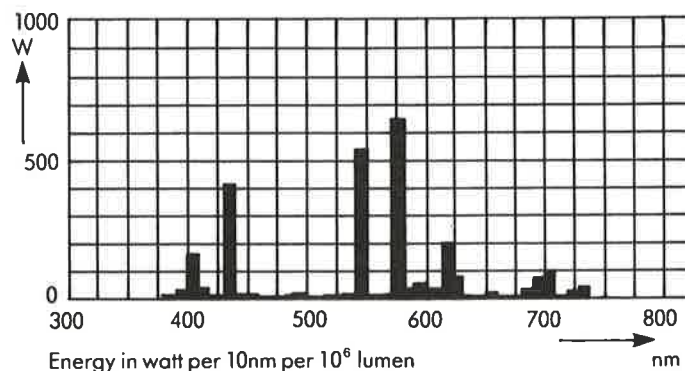
■ Isothermal hard glass outer envelope on sizes from 125W HPL-N and 250W HPL Comfort and HPL-R upwards permit use in exposed positions (if weatherproof connections are used).

■ Reasonable colour rendering. Colour point on black body locus for Comfort coupled with high efficacy (around 60 lm/W) permits economical use in many industrial and floodlighting applications.

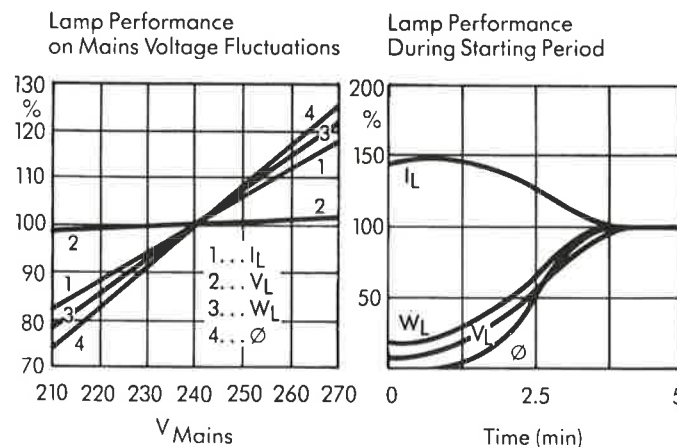
## ABSOLUTE SPECTRAL ENERGY DISTRIBUTION: HPL Comfort



## ABSOLUTE SPECTRAL ENERGY DISTRIBUTION: HPL-N and HPL-R



## LAMP PERFORMANCE DATA: HPL-N



■ Good colour rendering of Comfort lamps permits use in offices and other commercial environments, and is also suitable for departmental store lighting.

■ Larger versions have GES caps which screw on to preformed outer envelopes, eliminating the danger of the cap becoming loose.

■ Reflector versions give preferential light distribution downwards, and are immune from degradation in use due to dust settling on the upper surfaces. Some upwards light is permitted, to avoid a tunnel effect.

■ Lamps are manufactured to BS 3677 and IEC 188.

## RANGE OF OPERATION

Reliable starting at -20°C.

## MATERIALS AND FINISH

**Hard glass lamp envelope:** for ratings of 250W and above.

**HPL-N lamps:** internally coated with europium-activated yttrium vanadate phosphor.

**HPL Comfort lamps:** internally coated with Comfort phosphor.

**HPL-R lamps:** with internal reflecting titanium dioxide layer.

**Screw caps:** nickel plated.

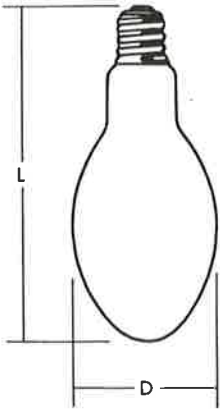
## PACKING QUANTITIES AND ORDERING

Please order in multiples of the packing quantity, as shown in the table, in the form given in the following example:

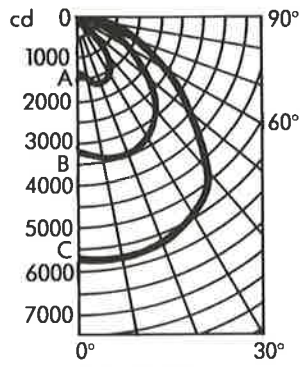
12 Philips lamps 250W HPL Comfort

# HPL/HPL COMFORT MERCURY FLUORESCENT LAMPS

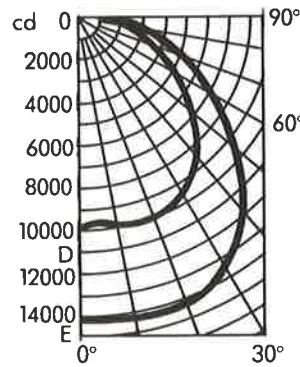
## HPL-N HPL Comfort



## POLAR LIGHT DISTRIBUTION DIAGRAMS: HPL-R

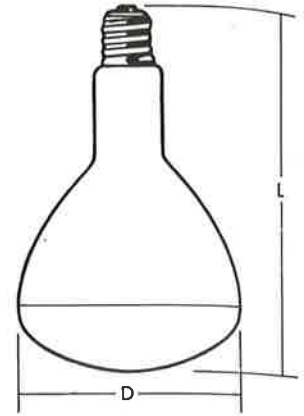


A = HPL-R 125W  
B = HPL-R 250W  
C = HPL-R 400W

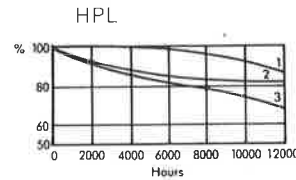
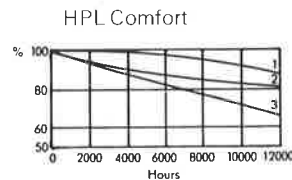


D = HPL-R 700W  
E = HPL-R 1000W

## HPL-R



## LIFE EXPECTANCY AND LUMEN DEPRECIATION



For explanation of life and lumen curves, please see page 241.

Description	ORDERING			TECHNICAL								
	Catalogue Number	Cap	Packing Quantity	Rating (Watts)	Average Lumen Output (100 hours)	Average Lumen Output (2000 hours)	Correlated colour Temperature (K)	Lamp Volts (V)	Lamp Current (A)	Run-up Time (A)	Overall Length (L)	Diameter (D)
HPL-N lamps	50W HPL-N	ES	40	50	1800	1700	4300	95	0.61	4	129	56
	80W HPL-N	ES	40	80	3700	3550	4050	115	0.80	4	156	72
	80W HPL-N	3-Pin BC	40	80	3700	3550	4050	115	0.80	4	152	72
	125W HPL-N	ES/GES	24	125	6300	5800	3850	125	1.15	4	177	77
	125W HPL-N	3-Pin BC	24	125	6300	5800	3850	125	1.15	4	177	77
	250W HPL-N	GES	12	250	13,000	12,000	3700	135	2.13	4	227	92
	400W HPL-N	GES	6	400	22,000	20,400	3800	140	3.25	4	292	122
	700W HPL-N	GES	6	700	40,000	38,100	3900	140	5.40	4	329	142
HPL-N lamp (for cross phase supply)	1000W HPL-N	GES	6	1000	58,000	50,500	3750	145	7.50	4	400	168
HPL Comfort	2000W HPL-N	GES	4	2000	125,000	110,000	3750	270	8.00	4	445	185
	50W HPL Comfort	ES	40	50	2000	1890	3300	95	0.61	4	129	56
	80W HPL Comfort	ES	40	80	3850	3690	3300	115	0.80	4	156	72
	125W HPL Comfort	ES	24	125	6500	6200	3300	125	1.15	4	177	77
	250W HPL Comfort	GES	12	250	14,000	13,250	3300	135	2.13	4	227	92
HPL-R lamps	400W HPL Comfort	GES	6	400	24,000	22,800	3300	140	3.23	4	292	122
	125W HPL-R	ES	12	125	5700	4900	4500	125	1.15	4	190	127
	250W HPL-R	GES	5	250	12,000	10,800	4200	135	2.13	4	260	168
	400W HPL-R	GES	5	400	20,000	18,000	4100	140	3.25	4	300	184
	700W HPL-R	GES	4	700	40,000	38,000	4100	140	5.40	4	328	204
1000W HPL-R	GES	4	1000	56,000	49,800	4000	145	7.50	4	380	224	

Note 1. Operating position universal.  
Note 2. All lamps must be operated with appropriate control gear. For control gear information see page 511.

For product description please see page 247

# HPI METAL HALIDE LAMPS

Metal halide lamps contain selected metal halides in the quartz discharge tube. These have the effect of subduing the mercury spectrum and giving a considerable increase in the required colour bands. They also increase efficacy over conventional mercury lamps since the energy levels of the added metals are lower than those of mercury.

The result is a crisp white light with good colour rendering and an initial efficacy that can be as high as 90 lm/W.

### RANGE

HPI/T clear tubular metal halide lamps available in 250W, 400W, 1kW, 2kW, 240V versions and 2kW 415V.

Also 400W HPI/BUS isothermal lamp with internal diffusing coating.

### FEATURES

- Short run-up time – 80% of full light output is achieved after 3 to 5 minutes.
- Thyristor ignitor device starts the lamp reliably at temperatures down to -18°C.
- HPI/BUS lamp requires no external ignitor.
- Good colour rendering suitable for colour TV transmission.
- GES cap is screwed on to a preformed thread on the glass bulb, eliminating the danger of loose caps due to cement failure.

### RANGE OF OPERATION

Lamps operate reliably down to -18°C.

### MATERIALS AND FINISH

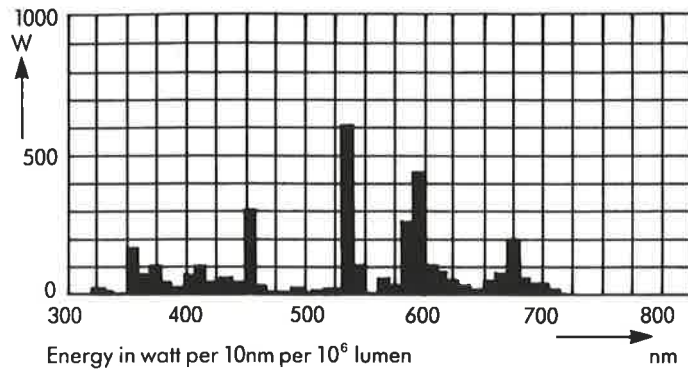
- Hard glass envelope.
- Internally coated finish for BUS lamp.
- Clear finish for tubular lamps.
- Nickel plated GES caps.

### PACKING QUANTITIES AND ORDERING

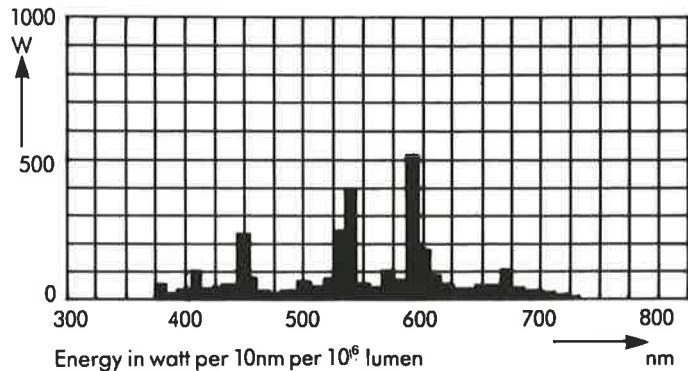
Please order in multiples of the packing quantity, as shown in the table, in the form given in the following example:

12 Philips lamps 2kW HPI/T (415V)

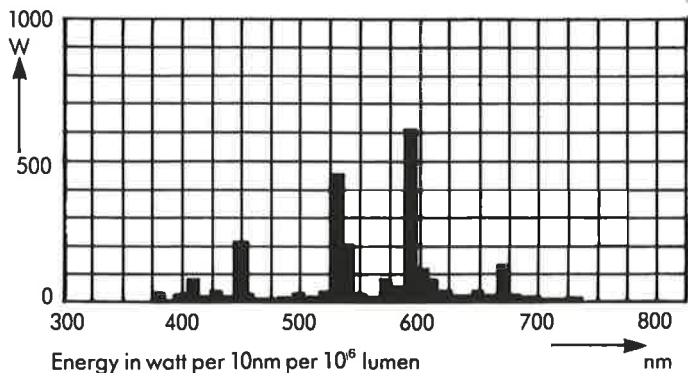
**HPI/T 250-400W**  
ABSOLUTE SPECTRAL ENERGY DISTRIBUTION



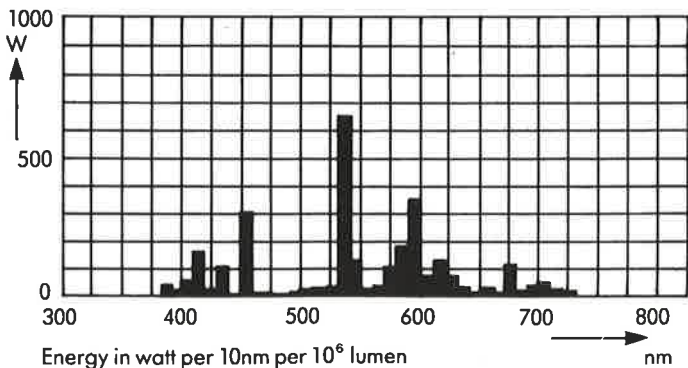
**HPI/T 2000W, 240V**  
ABSOLUTE SPECTRAL ENERGY DISTRIBUTION



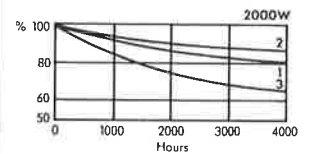
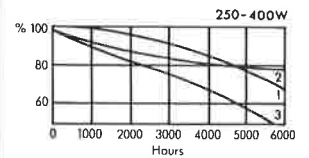
**HPI/T 2000W, 415V**  
ABSOLUTE SPECTRAL ENERGY DISTRIBUTION



**HPI/BUS 400W**  
ABSOLUTE SPECTRAL ENERGY DISTRIBUTION



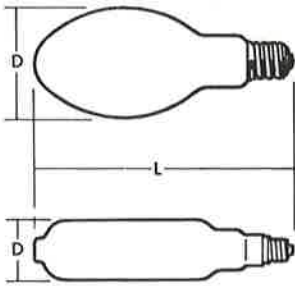
### LIFE EXPECTANCY AND LUMEN DEPRECIATION



For explanation of life and lumen curves, please see page 241.

# HPI METAL HALIDE LAMPS

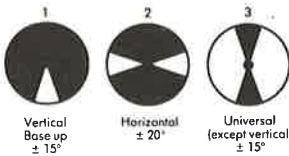
## HPI/BUS



## HPI/T



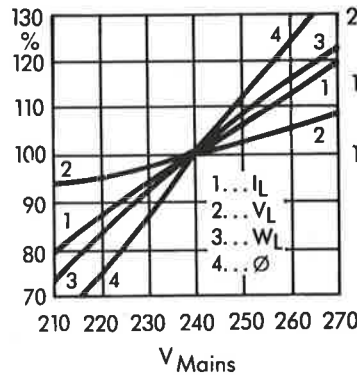
## OPERATING POSITIONS



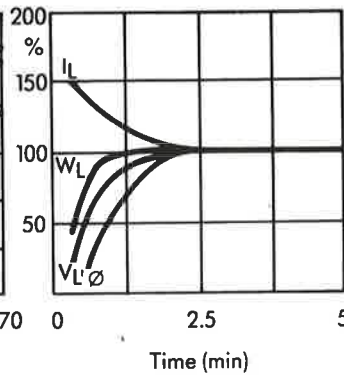
Unshaded area shows recommended operating positions

## 250W/2kW, 240V

Lamp Performance on Mains Voltage Fluctuations

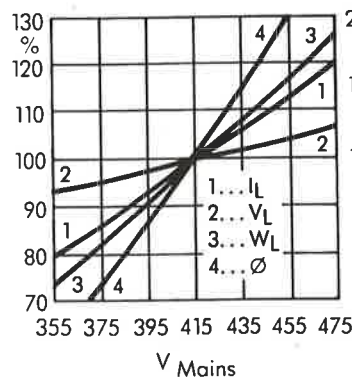


Lamp Performance During Starting Period

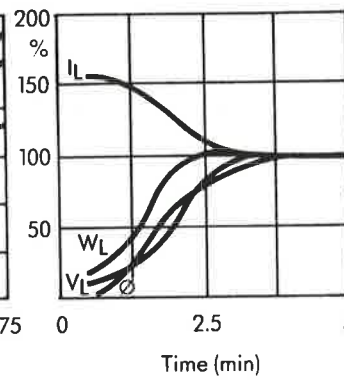


## LAMP PERFORMANCE DATA 2kW, 415V

Lamp Performance on Mains Voltage Fluctuations



Lamp Performance During Starting Period



## ORDERING

## TECHNICAL

Description	Catalogue Number	Cap	Packing Quantity	Rating (W)	Average Lumen Output (100 hours)	Average Lumen Output (2000 hours)	Correlated Colour Temperature (K)	Operating Position	Lamp Volts (V)	Lamp Current (A)	Run-up Time (mins)	Overall Length	Diameter
Tubular horizontal burning lamp with clear envelope	250W HPI/T	GES	12	250	17,000	13,600	4000	2	125	2.1	4	257	47
Tubular horizontal burning lamp with clear envelope	400W HPI/T	GES	12	400	31,500	29,200	4000	2	125	3.4	4	283	47
Self-starting isothermal vertical burning lamp with diffusing coating	400W HPI/BUS (Note 2)	GES	6	400	31,500	28,300	4000	1	125	3.4	4	292	122
Tubular horizontal burning lamp for use on single phase supplies	1000W HPI/T	GES	4	1000	81,000	70,000	4000	2	130	8.25	4	382	67
Tubular near-universal horizontal burning lamp for use on single phase supplies (Note 3)	2000W HPI/T (240V)	GES	4	2000	189,000	166,320	4000	3	135	16.5	5	430	103
Tubular horizontal burning lamp for use on cross phase supplies (Notes 3 and 4)	2000W HPI/T (415V)	GES	4	2000	183,000	166,530	4000	2	240	8.6	5	430	103

### Notes:

- All lamps must be operated with appropriate control gear. For information on control gear please see page 511.
- BUS = Base Up Self-starting, Isothermal lamp.
- The cross phase and single phase 2kW HPI/T lamps may be distinguished by the following marks etched on the outer envelope:  
G/92/2 Single phase lamp (2 signifies 220/240V supply);  
G/92/3 Cross phase lamp (3 signifies 380/415V supply).
- For cross phase supplies only.

For product description please see page 248



# MHW-TD AND MHN-TD DOUBLE-ENDED METAL HALIDE LAMPS

## FEATURES

■ Up to four times the efficacy of tungsten halogen equivalents, with three times the life.

■ Double-ended construction with slimline envelope permits use in a new generation of small, high-performance luminaires.

■ Double construction with quartz heat-resistant outer envelope.

■ Colour temperature of MHW lamp similar to tungsten for use in mixed installations.

## RANGE OF OPERATION

Lamps operate reliably on normal 240V 50Hz supplies.

Maximum permissible pinch temperature 250°C.

Maximum permissible bulb temperature 650°C.

## CAUTION

These lamps should only be used in enclosed luminaires.

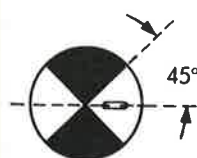
All metal halide lamps emit some UV radiation. UV filters should be used to protect light-sensitive materials.

## PACKING QUANTITIES AND ORDERING

Please order in multiples of the packing quantity shown in the table, in the form given in the following example:

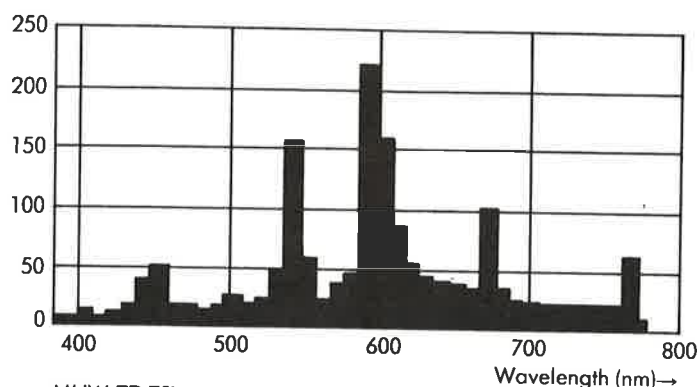
12 Philips lamps MHW-TD 70W

## OPERATING POSITION

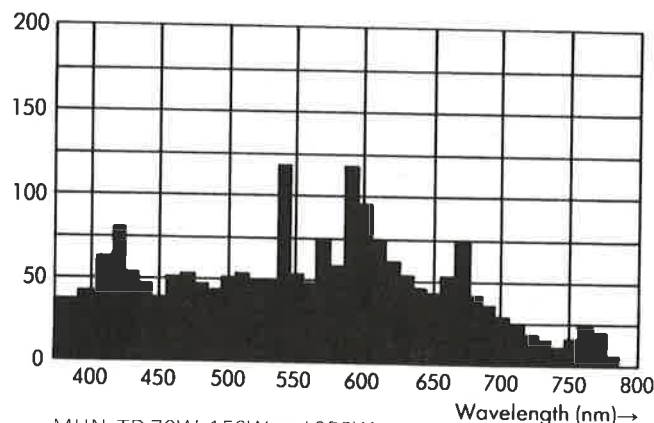


Unshaded area shows recommended operating positions

NORMALIZED SPECTRAL POWER DISTRIBUTIONS  
μW per 10nm per lumen

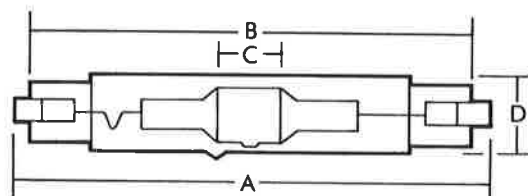


MHW-TD 70W

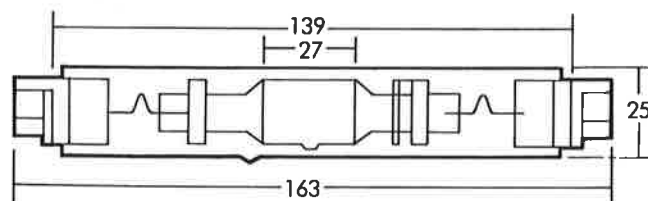


MHN-TD 70W, 150W and 250W

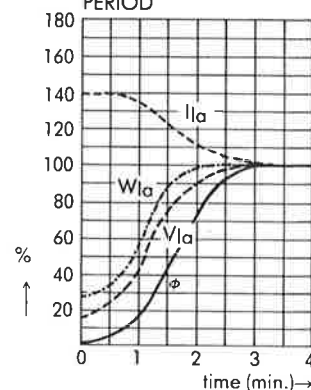
MHW-TD 70W  
MHN-TD 70W      MHN-TD 150W



MHN-TD 250W



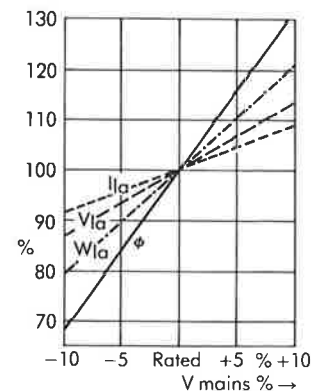
LAMP PERFORMANCE DURING STARTING PERIOD



### Typical curves:

- W<sub>la</sub> = lamp wattage
- V<sub>la</sub> = lamp voltage
- I<sub>la</sub> = lamp current
- Φ = luminous flux

EFFECTS OF MAIN VOLTAGE VARIATIONS



ORDERING		TECHNICAL										DIMENSIONS				GEAR		
Description	Catalogue No.	Base	Packing Quantity	Minimum Supply Voltage for Ignition	Average Lamp Voltage	Maximum Starting Current (A)	Run Up Time (minutes)	Average Luminous Flux lm	Average Luminance cd/cm <sup>2</sup>	CRI Ra	Weight (g)	Dimension A	Dimension B	Dimension C	Dimension D	Ballast	Ignitor	Capacitor
MHW-TD 70W	70 MHW-TD	R7s	12	200	95	1.60	4	5000	1500	74	20	114	115	7	20	BSN70L34	SN57	L4010
MHN-TD 70W	70-MHN-TD	R7s	12	200	95	1.60	4	5000	1500	84	20	114	115	7	20	BSN70L34	SN57	L4010
MHN-TD 150W	150 MHN-TD	R7s	12	200	90	2.85	4	11,250	1500	86	32	132	125	18	23	BSN150L34	SN58	L4016
MHN-TD 250W	250 MHN-TD	FC2	12	200	100	4.75	4	20,000	1600	90	55	163	139	27	25	BSN250L34	SN58	2 × L4016

For product description please see page 249

# ML AND MLR MERCURY BLENDED DISCHARGE LAMPS

Mercury blended lamps are ballasted by means of a tungsten filament within the outer envelope. They therefore need no control gear, and plug into existing lighting points at low installation cost.

ML lamps have europium-activated yttrium vanadate phosphor coatings on the inner surface of the envelope to give good colour rendering, with up to 17% red content. A hard glass outer envelope is fitted to the 500W rating.

### APPLICATIONS

Can directly replace GLS lamps in most situations.

In addition, the MLR reflector lamp is suitable for use in display and plant lighting.

### FEATURES

- Instant light output after switch-on, and re-ignition after only 3-4 minutes.
- Greater efficacy than GLS lamp either increases light output or enables lamp rating to be reduced, so conserving energy.

### RANGE OF OPERATION

Lamps operate reliably from -18°C.

### MATERIALS AND FINISH

**Envelopes:** Hard glass for 500W rating. Other ratings are normal glass.

**ML lamps:** Internal phosphor coating.

**MLR lamps:** Titanium dioxide reflecting layer.

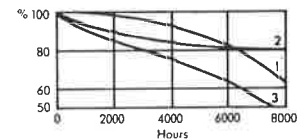
**Screw caps:** Nickel plated.

### PACKING QUANTITIES AND ORDERING

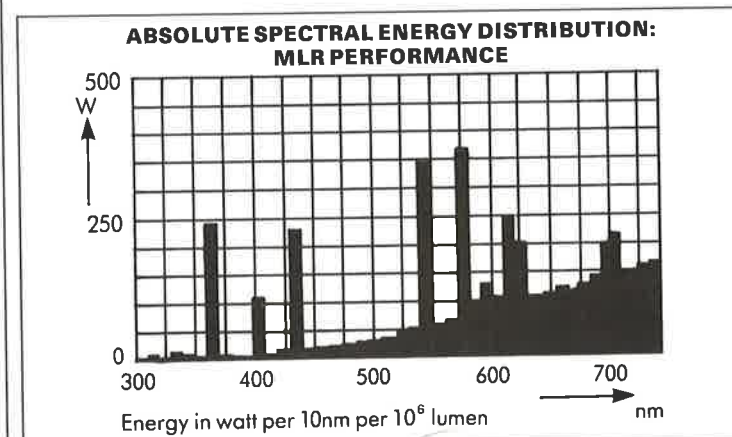
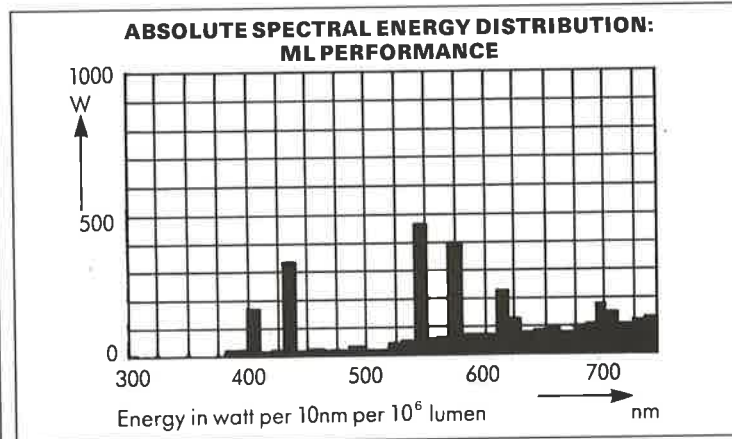
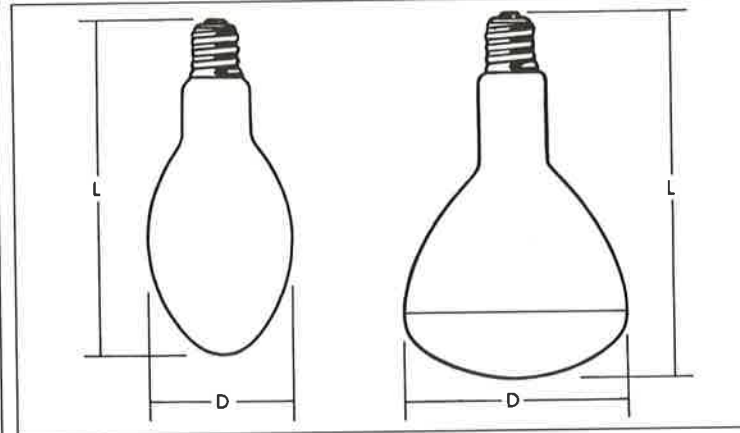
Please order in multiples of the packing quantity as shown in the table, in the form given in the following example. Please specify cap required for 100W and 160W ratings:

40 Philips 100W BC ML lamps.

### LIFE EXPECTANCY AND LUMEN DEPRECIATION

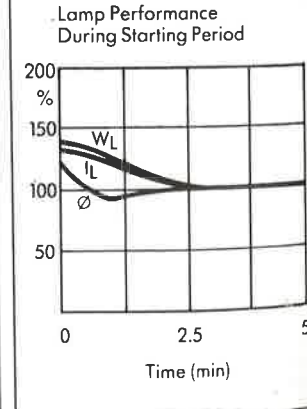
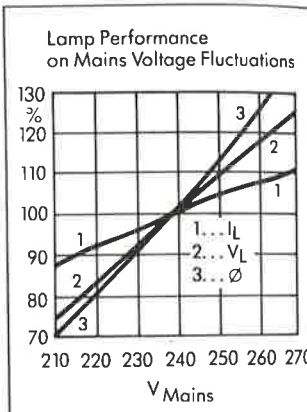
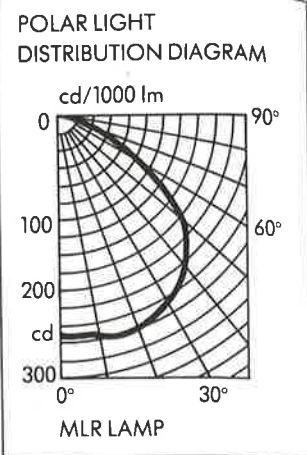


For explanation of life and lumen curves, please see page 241.

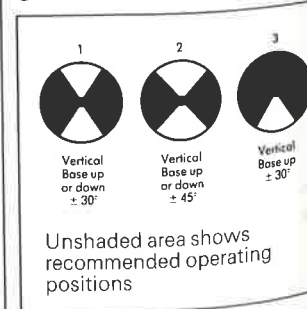


ORDERING			TECHNICAL									
Description and Catalogue Number	Cap	Packing Quantity	Rating (Watts)	Average Lumens (100 hours)	Average Lumens (2000 hours)	Correlated Colour Temperature (K)	Lamp Volts	Lamp Current (A)	Run-up Time (Mins)	Operating Position	Overall Length (L)	Diameter (D)
100W BC ML	BC	40	100	1100	1000	3400	240	0.45	5	1	156	72
100W ES ML	ES	40	100	1100	1000	3400	240	0.45	5	1	156	72
160W BC ML	BC	40	160	3150	3000	3600	240	0.69	5	1	177	77
160W ES ML	ES	40	160	3150	3000	3600	240	0.69	5	1	177	77
250W ML	GES	12	250	5700	5700	3500	240	1.10	5	2	227	92
500W ML	GES	6	500	14,000	14,000	3700	240	2.20	5	2	292	122
160W MLR	ES	12	160	2750	2750	3600	240	0.69	5	3	190	127

Note: All lamps have a power factor greater than 0.95.



### OPERATING POSITIONS



Unshaded area shows recommended operating positions

For product description please see page 250

# SOX/SOX-E LAMP GEAR BALLASTS

## DISCHARGE BALLASTS (BSX)

### Features

- All ballasts are suitable for mounting in columns with the terminal block downwards.
- All hystack ballasts have terminal block connectors for easy fixing.
- Non-track terminal blocks; and a separate earth terminal which is easily accessible and mounted so as to ensure good electrical connection between cable and base-plate.
- Screen-printed labels include circuit diagrams which cannot peel off in damp or humid conditions.
- Low wattage losses ensure economical operation and conservation of energy.

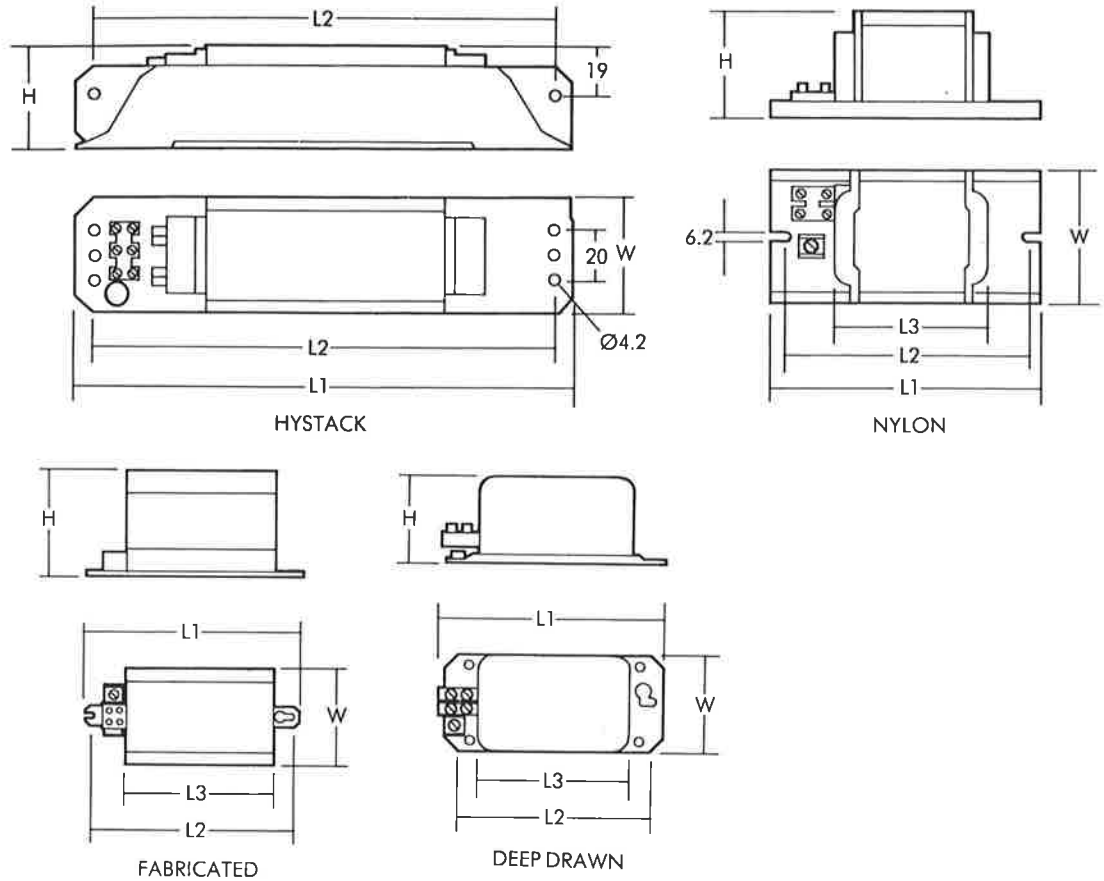
## PACKING QUANTITIES AND ORDERING

Please order gear components in multiples of the packing quantities shown in the table, in the form given in the following example:

- 24 Philips ballasts BSX355 L16.
- 50 Philips PF capacitors L4008.
- 40 Philips ignitors SX72.

Control gear ordered with luminaires can be supplied in the exact quantity required.

## BALLAST DIMENSIONS



Lamp type	ORDERING		TECHNICAL								DIMENSIONS								
	Catalogue No.	(Packing quantity)	Mains Current Start (A)	Mains Current Run (A)	Total Circuit Watts	T <sub>w</sub> °C	Voltage Range	Can Type (Note 2)	% Total Third Harmonic (Note 2)	Δp (Note 1)	Circuit Diagram No.	Weight	L1 Overall Length	L2 Fixing Centres	L3 Winding Length	W Width	H Height	Essential Capacitor (Note 3)	(Packing quantity)
SOX-E 18	BSX18 H16	(36)	0.15	0.14	25	130	240	H1	13.7	70	1	0.58	-	-	-	45.5	36.5	L4005	(160)
15W & 55W SOX	BSX355 L16	(24)	0.2/0.3	0.22/0.3	48/68	130	240	H	14/14	70	2	1.0	195	180	-	45.5	38	L4008*	(50)
SOX-E26	BSX26 L16	(12)	0.23	0.17	35	130	240	H	14	70	2	1.1	195	180	-	45.5	38	L4005*	(160)
SOX-E36	BSX36 H66	(13)	0.29	0.21	47	120	240	D	18	45	3	2.3	173	157	147	64	44	L5004	(50)
15W SOX	BSX90 L32	(12)	0.3	0.5	104	130	240	N	18	55	2	1.3	117	102	77	64	53	L4010*	(50)
SOX-E 66	BSX66 H66	(10)	0.45	0.35	84	120	240	D	18	55	3	2.3	173	157	147	64	52	L5008	(50)
15W SOX	BSX135 H66	(8)	0.6	0.7	159	120	240	D	8.2	60	3	2.9	149	134	120	80	67	L5007	(35)
SOX-E91	BSX91 H66	(4)	0.6	0.44	105	120	240	D	8.2	60	3	2.9	149	137	120	80	67	L5005	(80)
15W SOX	L4135	(4)	0.6/0.7	0.9/1.0	175/220	120	220/240	F	41/79	75	4	7.0	189	177	147	106	108	L5020	(35)
SOX-E131	BSX131 H66	(4)	0.95	0.67	152	120	240	D	79	60	5	2.9	178	163	145	100	74	L5003	(50)

Note 1: Total Third Harmonic values relate to measurements in the neutral of a balanced four wire, three phase supply. These values are divided by three to obtain values in single phase supplies.

Note 2: Can types: N - Nylon, D - Deep drawn, F - Fabricated, H - Hystack, H1 - Hystack (without baseplate)

Note 3: Power Factor correction capacitors marked \*

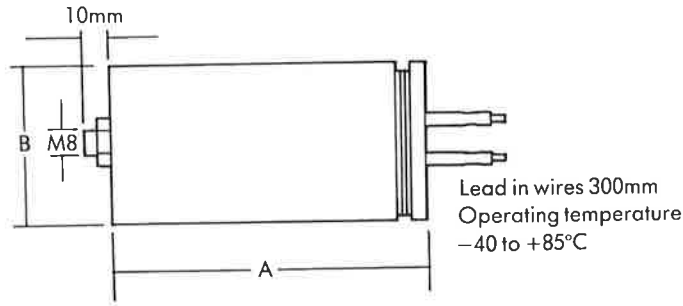
# SOX/SOX-E LAMP GEAR IGNITORS, CAPACITORS AND CIRCUIT DIAGRAMS

## CAPACITORS

### Features

- Wound from metallised polypropylene film which has 'self healing' characteristics after electrical breakdown.
- 'Dry' construction eliminates the possibility of leakage.
- Internal resistor eliminates the danger of shock from a capacitor charged by the inductive kick-back of the ballast.
- Pin terminations with push-on leads 300mm long. (8, 10 and 20µF) Terminal blocks on other value capacitors.
- Canister of circular cross-section with fixing stud.
- Operating temperature range -40°C to +85°C.

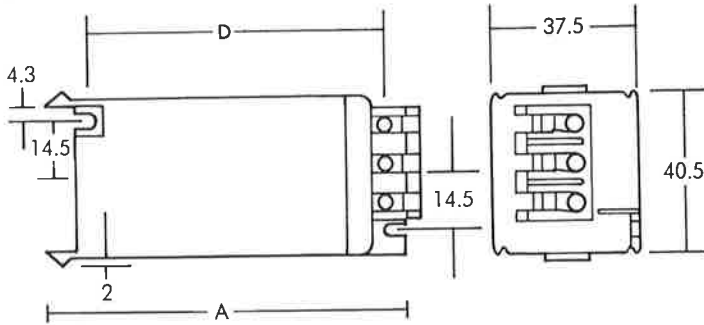
## CAPACITOR DIMENSIONS, WEIGHTS AND ELECTRICAL DATA



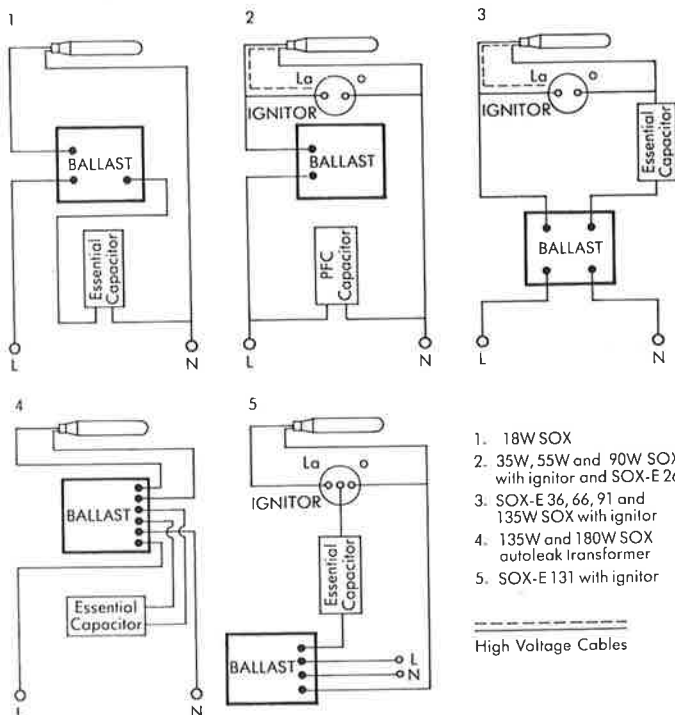
Catalogue No.	Max. Working Voltage RMS	Capacitance µF	Diameter mm (B)	Length mm (A)	Approx. Weight kg.
L4005	250	5 ± 10%	38	59	0.03
L4008	250	8 ± 10%	38	75	0.10
L4010	250	10 ± 10%	38	96	0.08
L5007	420	6.8 ± 4%	45	74	0.10
L5020	300	20 ± 10%	45	95	0.12
L5003	650	3.4 ± 4%	-	-	-
L5005	420	5.2 ± 4%	-	-	-
L5004	300	4.4 ± 4%	-	-	-
L5008	300	7.6 ± 4%	-	-	-

## IGNITOR DIMENSIONS

### SOX-E/SOX



## CIRCUIT DIAGRAMS



1. 18W SOX
2. 35W, 55W and 90W SOX with ignitor and SOX-E 26
3. SOX-E 36, 66, 91 and 135W SOX with ignitor
4. 135W and 180W SOX autoleak transformer
5. SOX-E 131 with ignitor

High Voltage Cables

## IGNITORS

### Features

- Reliable solid-state circuit provides high-voltage pulses to achieve virtually instantaneous ignition of lamp.
- Low energy content of pulses present an electrical hazard to safety no greater than that of any mains voltage installation.
- Ignitor is switched out of circuit after ignition; has zero watts loss during lamp operation.
- Re-ignition of a hot lamp after mains interruption usually occurs in less than one minute.
- Ignitor detects a lamp fault condition and automatically switches off, thus eliminating radio interference problems.
- Corrosion-proof polyamide casings with two slots the length of each side, two flexible lugs and two screw holes offering a choice of methods of attachment.
- Operates reliably at temperatures up to 80°C.

### Wiring

Certain cables in the ignition circuit should be rated at 450/750V (600/1000V) AC (see circuit diagram), and must be capable of withstanding any temperature encountered. They should be protected against mechanical damage.

The following recommendations are for guidance only; the cable manufacturers' published data should be consulted for fuller cable specifications with regard to temperature:

- Conductor temperatures up to 70°C: PVC-insulated cable.
- Conductor temperatures up to 90°C: HT PVC-insulated cable.
- Conductor temperatures up to 200°C: Silicone rubber insulated cable with glass fibre sheath for mechanical protection.

## ELECTRICAL DATA, WEIGHTS AND DIMENSIONS

Cat. No.	Mains Voltage	Weight kg	A mm	D mm
SX 26	220/240	0.10	113.5	94
SX 70	220/240	0.10	113.5	94
SX 72	220/240	0.10	113.5	94
SX 74	220/240	0.10	113.5	94
SX 76	220/240	0.10	113.5	94
SX 131	220/240	0.10	83.5	64

# SON/SO PLUS/SO COMFORT/ SDW-T LAMP GEAR BALLASTS AND CAPACITORS

## BALLASTS

### Features

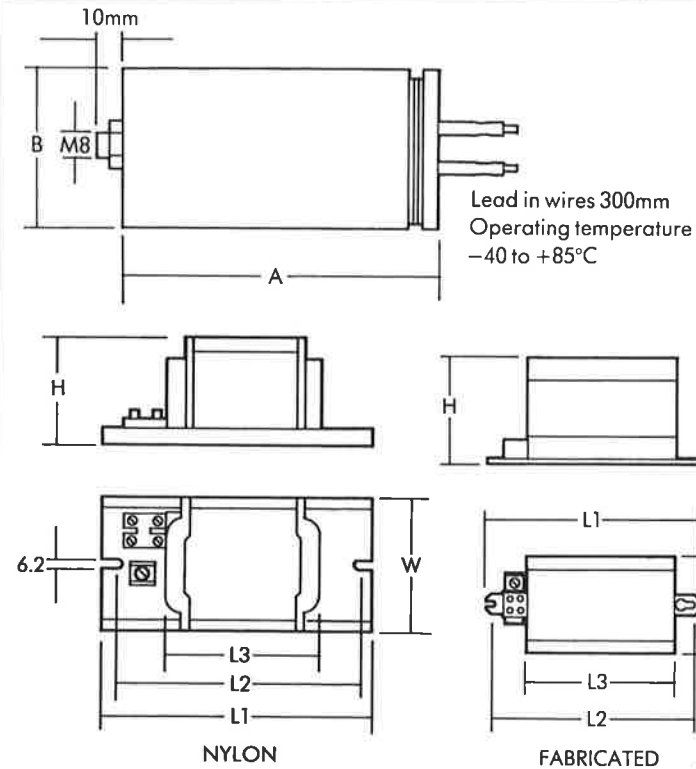
- Non-track terminal blocks; and a separate earth terminal which is easily accessible and mounted so as to ensure good electrical connection between cable and baseplate.
- Screen-printed labels include circuit diagrams which cannot peel off in damp or humid conditions.
- Simply fixed with a keyhole at one end and a slot at the other, necessitating only two pre-mounted screws (fabricated ballasts are provided with two slots).
- Low wattage losses ensure economical operation and conservation of energy.
- All ballasts are suitable for mounting in columns with the terminal block downwards.

## CONTROLLER FOR SDW-T LAMPS

SDW-T lamps are used in conjunction with a current-limiting ballast and a control unit with integral ignitor which stabilises the lamp against fluctuations in mains voltage. The cable length between the lamp and control unit must not exceed 300mm (cable capacitance 50pF max).

## CAPACITOR DIMENSIONS, WEIGHTS AND ELECTRICAL DATA

Catalogue No.	Max Working Voltage RMS	Capacitance $\mu\text{F}$	Diameter mm (B)	Length mm (A)	Approx. Weight kg
L4008	250	$8 \pm 10\%$	38	75	0.10
L4010	250	$10 \pm 10\%$	38	96	0.08
L4016	250	$16 \pm 10\%$	45	70	0.10
L4020	250	$20 \pm 10\%$	45	95	0.12
L4025	250	$25 \pm 10\%$	45	95	0.14



## CAPACITORS

For power factor correction.

### Features

- Wound from metallised polypropylene film which has 'self-healing' characteristics after electrical breakdown.
- 'Dry' construction eliminates the possibility of leakage.
- Internal resistor eliminates the danger of shock from a capacitor charged by the inductive kick-back of the ballast.
- Pin terminations with push-on leads 300mm long.
- Canister of circular cross-section with an M8 earthing and fixing stud.
- Operating temperature range -40°C to +85°C.

	ORDERING			TECHNICAL								DIMENSIONS						
	Lamp Type	Packing quantity	Main Current Start (A)	Mains Current Run (A)	Total Circuit Watts	Weight	T <sub>w</sub> °C	$\Delta r$	Voltage Range	% Total Third Harmonic	Circuit Diagram No.	Can Type	L1 Overall Length	L2 Fixing Centres	L3 Winding Length	W Width	H Height	Capacitor
50W SON-I	BSN50 L32	12	0.45	0.3	60	1.0	130	50	240	25	1	N	117	102	65	64	53	L4008
50W SON/T, SON-I	BSN50 L34	12	0.45	0.3	60	1.0	130	50	240	25	3	N	117	102	65	64	53	L4008
70W SON-I	BSN70 L32	12	0.6	0.45	81	1.3	130	50	240	30	1	N	117	102	77	64	53	L4010
70W SON/T, SON-E, SON-I, SON/ST	BSN70 L34	12	0.6	0.45	81	1.3	130	50	240	30	3	N	117	102	77	64	53	L4010
100W SON, SON/T	BSN100 L34	12	1.0	0.65	114	1.5	130	60	240	30	3	N	122	107	82	64	53	L4010
150W SON, SON/T, SON/ST	BSN150 L34	8	1.20	0.85	170	2.1	130	70	240	27	3	N	132.5	117	88.5	79	65	L4016
250W SON, SON/T	BSN250 L34	8	2.3	1.4	276	3.05	130	80	240	73	3	N	159	144	115	79	65	2 x L4016
400W SON, SON/T	BSN400 L34	4	3.6	2.2	431	4.5	130	80	240	59	3	N	165	150	113	101	83.5	2 x L4016
100W (1kW) SON, SON/T	BSN100 L66	1	7.3	5.6	1060	20.0	120	70	240	69	2	F	255	240X 65	215	140	169	4 x L4025
35W SDW-T	BSL35 L32	12	1.0	0.5	39	0.9	130	40	240	-	4	N	117	102	61	64	53	L4008
50W SDW-T	BSL50 L32	12	1.2	0.75	62	1.0	130	40	240	-	4	N	117	102	65	64	53	L4010
100W SDW-T	BSL100 L32	12	2.3	1.36	114	1.5	130	40	240	-	4	N	117	102	67	64	53	L4016

(Nylon  
Fabricated  
Provisional Data

# SON/SON PLUS/SON COMFORT/ SDW-T LAMP GEAR IGNITORS AND CIRCUIT DIAGRAMS

## IGNITORS

For SON and SON/T high pressure sodium lamps.

### Features

- Low energy content of pulses present an electrical hazard to safety no greater than that of any mains voltage installation.

- Re-ignition of a hot lamp after mains interruption usually occurs in less than one minute, even in high ambient temperatures such as occur in multi-lamp luminaires. This is an important feature where lamp outage can present a hazard to safety.

- Corrosion proof polyamide casing with two slots the length of each side, two flexible lugs and two screw-holes offering a choice of methods of attachment.

- Operates reliably at temperatures up to 80°C.

### Wiring

Certain cables in the ignition circuit should be rated at 450/750V (600/1000V)AC (see circuit diagram), and must be capable of withstanding the ignition pulses in humid conditions. All cables should be capable of withstanding any temperature encountered, and should be protected against mechanical damage.

The following recommendations are for guidance only; the cable manufacturers' published data should be consulted for fuller cable specifications with regard to temperature.

Conductor temperatures up to 70°C: PVC-insulated cable.

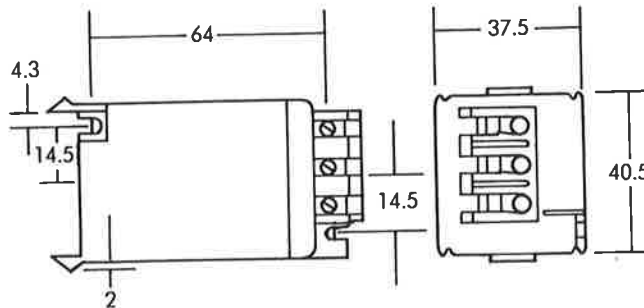
Conductor temperatures up to 90°C: HT PVC-insulated cable.

Conductor temperatures up to 200°C: Silicone rubber insulated cable with glass fibre sheath for mechanical protection.

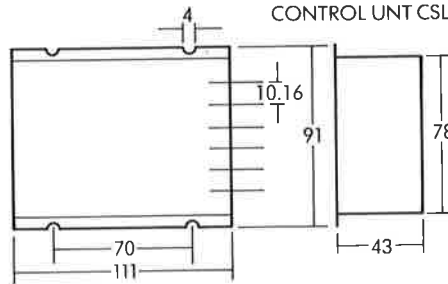
## IGNITOR WEIGHTS AND ELECTRICAL DATA

Catalogue No.	For Lamp	Voltage range	Circuit Diagram	Weight kg
SN57	50W, 70W SON/T, SON-E, SON-I	220/240	3	0.10
SN50	150W SON, SON/T, SON/ST, 250W/400W SON and SON/T	220/240	2	0.10
SN53	1000W SON and SON/T	220/240	2	0.10
SN58	100-400W SON and SON/T	220/240	3	0.10
CSL35	35W SDW-T	220/240	4	0.30
CSL50	50W SDW-T	220/240	4	0.30
CSL100	100W SDW-T	220/240	5	0.30

SN53/SN57/SN58



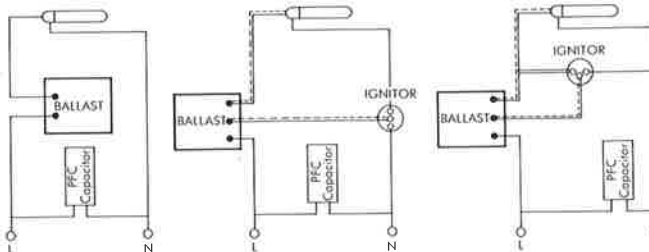
CONTROL UNIT CSL



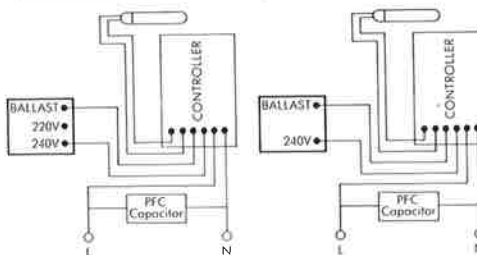
## CIRCUIT DIAGRAMS

IGNITOR CIRCUIT DIAGRAMS

- 50W and 70W SON-I
- 1kW SON and SON/T
- 50W SON/T, SON-I, 70W SON/T, SON-E and SON-I, 100-400W SON and SON/T



- 35W and 50W SDW-T
- 100W SDW-T



High Voltage Cables

Mineral-insulated cables are not recommended for use in these parts of the ignition circuit.

### Cable length limitations

In circuits using ignitors, the maximum cable length between lamp and control gear is limited by the capacitance of the cable. This is obtained by adding together two values obtained in test:

The capacitance of the 'high' conductor (i.e. the conductor connecting the ballast to the lamp centre contact) and all other conductors bonded together.

The capacitance between the 'high' conductor and earth (usually the protective housing of the cable).

The maximum capacitances acceptable to the ignitors are as follows:-

- SN58: 3000pF
- SN53: 3500pF
- SN57: 2500pF

Tables giving maximum permissible cable lengths using typical cables in common applications are contained in Customer Information Sheet No. 80.

An alternative to ignitors SN53, SN57 and SN58, for applications where the cable capacitance limitations cannot be met are the MZN series of ignitors. These ignitors are intended to be located adjacent to the lamp.

### PACKING QUANTITIES AND ORDERING

Please order gear components in multiples of the packing quantities shown in the table, in the form given in the following example:

- 48 Philips ballasts BSN100 L34.
- 50 Philips capacitors L4010.
- 48 Philips ignitors SN58.

Control gear ordered with luminaires can be supplied in the exact quantity required.

# HPL AND HPI LAMP GEAR BALLASTS AND CAPACITORS

## BALLASTS - HPL/HPI

### Features

All ballasts are suitable for mounting in columns with the terminal block downwards.

Non-track terminal blocks; and a separate earth terminal which is easily accessible and mounted so as to ensure good electrical connection between cable and base-plate.

Screen-printed labels include circuit diagrams which cannot peel off in damp or humid conditions.

Low wattage losses ensure economical operation and conservation of energy.

## CAPACITORS

For power factor correction.

### Features

Wound from metallised polypropylene film which has 'self-healing' characteristics after electrical breakdown.

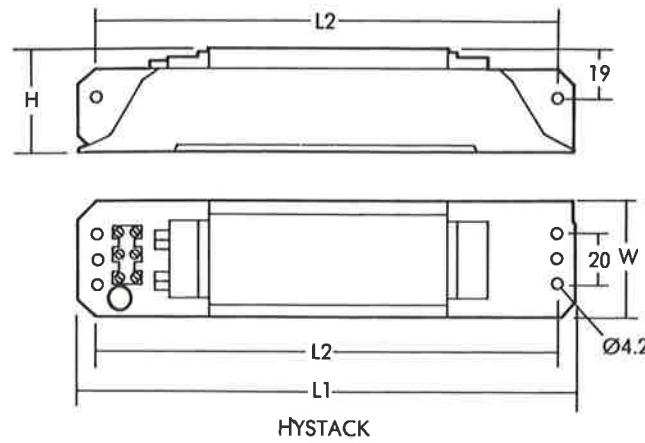
'Dry' construction eliminates the possibility of leakage.

Internal resistor eliminates the danger of shock from a capacitor charged by the inductive kick-back of the ballast.

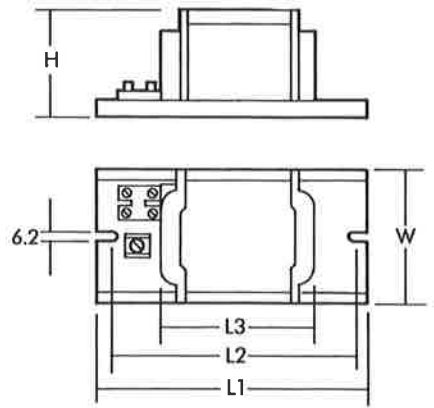
Pin terminations with push-on leads 300mm long.

Canister of circular cross-section with an M8 earthing and fixing stud.

Operating temperature range -40°C to +85°C.



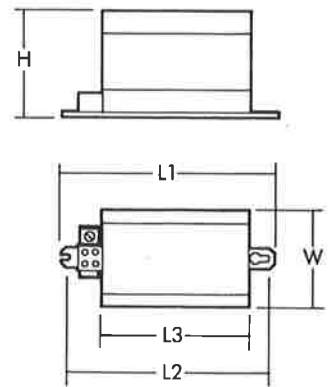
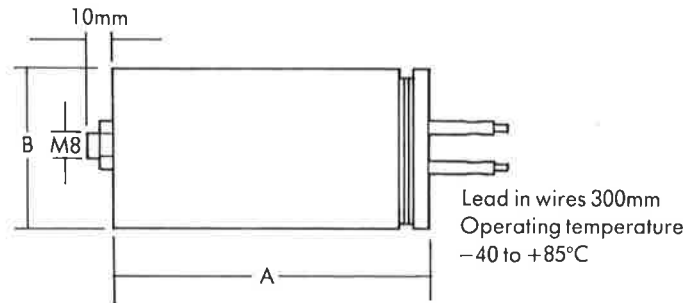
HYSTACK



NYLON

## BALLAST DIMENSIONS

## CAPACITOR DIMENSIONS, WEIGHTS AND ELECTRICAL DATA



FABRICATED

Catalogue No.	Max Working Voltage RMS	Capacitance µF	Diameter mm (B)	Length mm (A)	Approx. Weight kg
L4008	250	8 ± 10%	38	75	0.10
L4016	250	16 ± 10%	45	70	0.10
L4020	250	20 ± 10%	45	95	0.12
L4025	250	25 ± 10%	45	95	0.14

Lamp Type	TECHNICAL										DIMENSIONS						
	Catalogue No.	Mains Current Start (A)	Mains Current Run (A)	Total Circuit Watts	Weight	T <sub>w</sub> °C	Δε	Voltage Range	% Total Third Harmonic	Circuit Diagram No.	Can Type (Note 1)	L1 Overall Length	L2 Fixing Centres	L3 Winding Length	W Width	H Height	Capacitor
50W HPL-N	BHL50L16	0.40	0.3	60	1.0	130	50	240	21	1	H	195	180	-	45.5	38	L4008
50W HPL-N	BHL50L32	0.4	0.27	57	1.0	130	40	240	21	1	N	117	102	65	64	53	L4008
80W HPL-N	BHL80L16	0.65	0.45	93	1.13	130	70	240	25	1	H	195	180	-	45.5	38	L4008
80W HPL-N	BHL80L32	0.65	0.43	90	1.0	130	55	240	25	1	N	117	102	65	64	53	L4008
125W HPL-N and HPL-R	BHL125L32	1.10	0.7	137	1.26	130	55	240	29	1	N	117	102	77	64	53	L4010
250W HPL-N and HPL-R	BHL250L32	2.2	1.35	271	2.1	130	80	240	25	1	N	132.5	117.5	88.5	79	65	L4016
400W HPL-N and HPL-R	BHL400L32	3.9	2.15	424	3.05	130	75	240	25	1	N	159	144	115	79	65	L4025
700W HPL-N and HPL-R	BHL700L66	6.0	3.7	730	10.2	120	70	240	44	1	F	235	220	170	114	133	2 × L4016
1000W (1kW) HPL-N and HPL-R	BHL1000L66	8.3	5.3	1040	11.3	120	70	240	44	1	F	235	220	170	114	133	2 × L4025
2000W (2kW) HPL-N and HPL-R (415V)	415 BHL2000	9.30	5.80	2085	19.0	130	65	415	48	2	F	200	180 × 125	-	160	175	4 × L4020
250W HPI/T	BHL250L32	1.90	1.30	268	2.1	130	80	240	25	3	N	132.5	117.5	88.5	79	65	L4016
400W HPI/T	BHL400L32	3.30	1.90	427	3.05	130	75	240	25	3	N	159	144	115	79	65	L4025
1000W (1kW) HPI/T	BHL1000L66	8.00	5.00	1040	11.3	120	70	240	44	3	F	235	220	170	114	133	2 × L4025
2000W (2kW) HPI/T	240 BHL2000	18.00	10.20	2105	19.0	130	75	240	48	5	F	200	180 × 125	-	160	175	4 × L4025
2000W (2kW) HPI/T (415V)	415 BHL2000	10.00	5.90	2085	19.0	130	65	415	48	4	F	200	180 × 125	-	160	175	4 × L4020
70W MHW-TD	BSN70L34	1.0	0.65	81	1.3	130	50	240	30	6	N	117	102	77	64	53	L4010
150W MHN-TD	BSN150L34	1.2	0.85	170	2.1	130	70	240	27	6	N	132.5	117	88.5	79	65	L4016
250W MHN-TD	BSN250L34	2.3	1.4	276	3.05	130	80	240	73	6	N	159	144	115	79	65	2 × L4016

Note 1: Can type - H Hystack - N Nylon - F Fabricated

# HPL AND HPI LAMP GEAR IGNITORS AND CIRCUIT DIAGRAMS

## IGNITORS

for metal halide lamps.

### Features

■ Reliable solid-state circuit provides high-voltage pulses to achieve virtually instantaneous ignition of lamp.

■ Low energy content of pulses present an electrical hazard to safety no greater than that of any mains voltage installation.

■ Corrosion-proof polyamide casing with two slots the length of each side, two flexible lugs and two screw-holes offering a choice of methods of attachment.

■ Operates reliably at temperatures up to 80°C.

### Wiring

Certain cables in the ignition circuit should be rated at 450/750V (600/1000V)AC (see circuit diagram), and must be capable of withstanding the ignition pulses in humid conditions. All cables should be capable of withstanding any temperature encountered and should be protected against mechanical damage.

The following recommendations are for guidance only; the cable manufacturers' published data should be consulted for fuller cable specifications with regard to temperature:

Conductor temperatures up to 70°C: PVC-insulated cable.

Conductor temperatures up to 90°C: HT PVC-insulated cable.

Conductor temperatures up to 200°C: Silicone rubber insulated cable with glass fibre sheath for mechanical protection.

*Mineral-insulated cables are not recommended for use in these parts of the ignition circuit.*

### Cable length limitations

In circuits using ignitors, the maximum cable length between lamp and control gear is limited by the capacitance of the cable. This is obtained by adding together two values obtained in test:

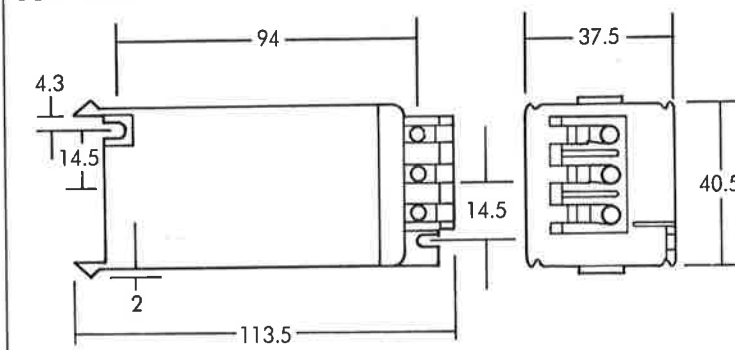
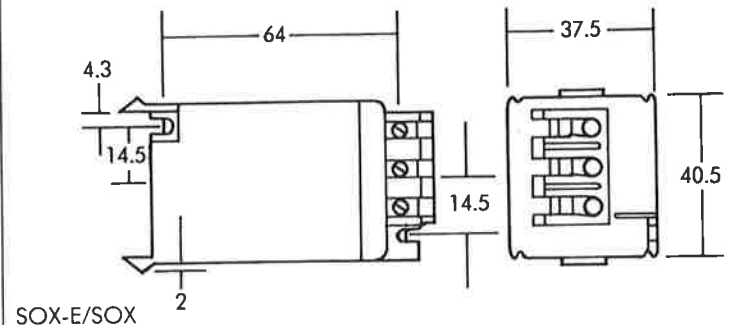
(a) The capacitance of the 'high' conductor (i.e. the conductor connecting the ballast to the lamp centre contact) and all other conductors bonded together.

(b) The capacitance between the 'high' conductor and earth (usually the protective housing of the cable).

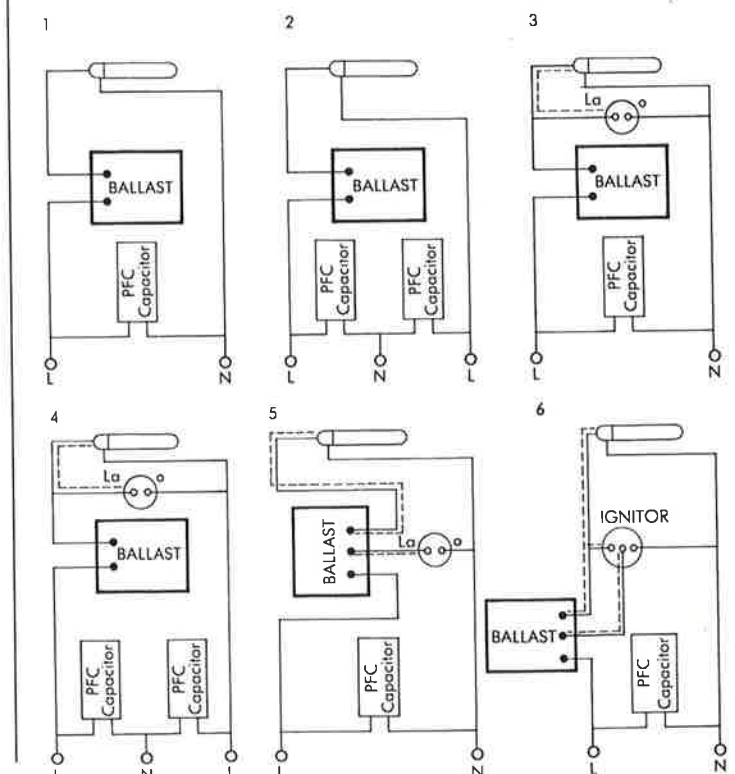
Tables giving maximum permissible cable lengths using typical cables in common applications are contained in Customer Information Sheet No. 80.

Lamp type	IGNITOR ORDERING		TECHNICAL		
	Catalogue Number	Packing Quantity	Voltage Range	Circuit Diagram	Weight (kg)
250W, 400W HPI/T	SI51	48	220/240	3	0.07
1kW and 2kW HPI/T (240V)	SI52	48	220/240	5	0.07
2kW HPI/T (415V)	SI54	6	380/415	4	0.10
250W/150W MHN-TD	SN58	48	220/240	6	0.10
70W MHW-TD, MHN-TD	SN57	48	220/240	6	0.1

## IGNITOR DIMENSIONS SI51, SI52, SN57 and SN58 Ignitors



## CIRCUIT DIAGRAMS



## IMPORTANT NOTE:

With the exception of certain special types, such as the PowerBlend mercury/blended range of lamps with built-in control gear, all mercury and metal halide discharge lamps MUST be operated with a current-limiting device (ballast) in the lamp circuit. Power Factor correction capacitors should be used in accordance with the circuit diagrams and data in this section to ensure that the power factor presented to the supply is in accordance with the requirements of the Electricity Authority and to reduce currents in the circuit supply cables.

## PACKING QUANTITIES AND ORDERING

Please order gear components in multiples of the packing quantities shown in the table, in the form given in the following example:

40 Philips ballasts BHL250 L32  
35 Philips PF capacitors L4020  
48 Philips ignitors SI51.

Control gear ordered with luminaires can be supplied in the exact quantity required.

## Key to circuit diagrams

- HPL-N 50-1kW, HPL-R 125-1kW, HPI/BUS 400W
- HPL-N 2kW.
- HPI/T 250W, 400W, 1000W
- HPI/T 2kW (415V)
- HPI/T 1kW and 2kW (240V)
- MHW/MHN-TD 70-250W

----- High Voltage cables

For product description please see page 253



# HERMES 2 PRE-WIRED GEARBOX

**Features**

- Pre-wired and factory tested for easy, labour-saving installation.
- Low wattage losses from high-quality components reduce energy waste.
- Rated for ambient temperatures up to 45°C.

**MATERIALS AND FINISH**

**Gear box housing:** Aluminium alloy casting with integral cooling fins.

**Components:** Pre-wired, with potted ballast and high-quality components.

**SPECIFICATION**

Degree of Protection designed to IP54.

**RANGE OF OPERATION**

240V 50Hz supplies.  
Normal indoor and outdoor applications.

**APPLICATIONS**

For use with remote-gear luminaires in a wide range of applications, including:

- Area floodlighting (with HNF001, HNF003 and NNF010 luminaires)
- Stadia floodlighting (with HNF001, HNF003 and NNF010 luminaires)
- Security lighting (with HNF001, HNF003 and NNF010 luminaires)

**Cable length limitations**

In circuits using ignitors, the maximum cable length between lamp and control gear is limited by the capacitance of the cable. This is obtained by adding together two values obtained in test:

(a) The capacitance of the 'high' conductor (i.e. the conductor connecting the ballast to the lamp centre contact) and all other conductors bonded together.

(b) The capacitance between the 'high' conductor and earth (usually the protective housing of the cable).

Tables giving maximum permissible cable lengths using typical cables in common applications are contained in Customer Information Sheet No. 80.

**N.B.** Mineral-insulated cables are not recommended for use between gearbox and lamp.

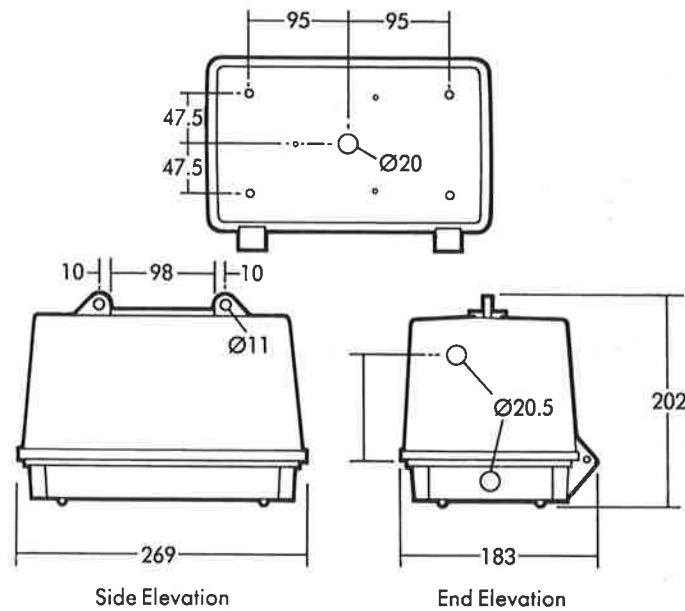
ORDERING	TECHNICAL							
	Description	Catalogue Number	Lamp Voltage (V)	Lamp Current (A)	Circuit Current Start	Circuit Current Run	Total Circuit Watts	Weight
	For 150W SON, SON/T + SON/ST	S1500	100	1.8	1.2	0.9	174	5.5
	For 250W SON, SON/T	S2500	100	3.0	1.8	1.3	280	6.4
	For 400W SON, SON/T	S4000	105	4.4	3.0	2.2	440	8.7
	For 250W HPL-N, HPL-R + HPL Comfort	H2500	135	2.0	1.9	1.2	268	5.2
	For 400W HPL-N, HPL-R + HPL Comfort	H4000	140	3.2	3.0	1.8	427	6.0
	For 400W HPI/BUS	H4000	125	3.4	3.3	1.9	427	6.1
	For 250W HPI/T	H2500 + ignitor kit P.0000/2	125	2.1	1.9	1.3	268	5.2
	For 400W HPI/T	H4000 + ignitor kit P.0000/2	125	3.4	3.3	1.9	427	6.2

**PACKING QUANTITIES AND ORDERING**

Gear boxes are individually packed and should be ordered in the form given in the following example, with reference to the ordering table provided:

6 Philips pre-wired gear boxes S.1500

Gearbox Plan Underside



**FEATURES**

- Pre-wired and factory tested for easy, labour saving installation.
- Low wattage dissipation from high-quality components reduces energy waste.
- Can be recessed.
- Rated for ambient temperatures up to 40°C (35°C for 250W gear).
- Accepts standard 20mm conduit or cable glands (supplied).
- Fused terminal block for 2 x 2.5mm conductors.
- Can be through-wired.

**MATERIALS AND FINISH**

**Gear box housing:** Zintec with black polyester powder coating.

**Components:** Pre-wired with high quality components.

**SPECIFICATION**

Type compliance with BS4533 section 102.2 Class I (requires an earth connection).

▽ Marked – may be mounted on normally flammable surfaces. To specify state: Pre-wired indoor gear box for use with remote control gear discharge luminaires. Body in black powder-coated Zintec. With cable glands and fused terminal block suitable for through wiring. Suitable for conduit wiring. Substantially as Philips Indoor Gear Box, Range YGB.

**RANGE OF OPERATION**

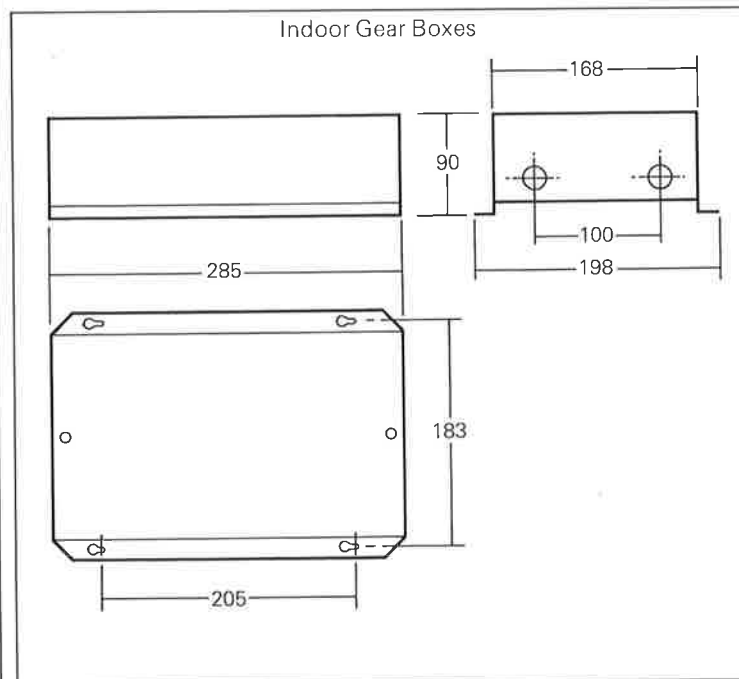
240V 50Hz supplies  
 Suitable for normal indoor use in ambient temperatures up to 40°C (35°C for 250W gear).  
 Can be recessed (allow an airspace of at least 10cm in all directions, except the mounting surface, around the gear box).  
 Suitable for universal mounting.  
 Can be mounted on normally flammable surfaces: ▽ marked.

**APPLICATIONS**

For use with remote gear interior luminaires in a wide range of applications, including:

- Downlighting
- Display lighting
- Architectural lighting

	ORDERING		TECHNICAL				
	Catalogue No.	Lamp Voltage (V)	Lamp Current (A)	Starting Current (A)	Running Current (A)	Total Circuit Watts (W)	Weight (Kg)
For 50W HPL-N, HPL Comfort	YGB 50M	95	0.6	0.4	0.29	60	2.6
For 80W HPL-N, HPL Comfort	YGB 80M	115	0.8	0.65	0.45	93	2.7
For 125W, HPL-N, HPL-R, HPL Comfort	YGB 125M	125	1.15	1.1	0.67	138	2.8
For 70W MHN-TD, MHW-TD, SON/T, SON-E	YGB 70H	95	1.0	0.6	0.39	81	3.0
For 150W MHN-TD, SON, SON/T	YGB 150H	100	1.8	1.2	0.83	170	3.8
For 250W MHN-TD, SON, SON/T	YGB 250H	100	3.0	2.3	1.35	276	4.9
For 50W SDW-T WHITE SON	YGB 50W	92	0.75	0.9	0.35	62	2.8
For 50W SON-I (internal ignitor)	YGB 50S	85	0.76	0.45	0.29	60	2.6
For 70W SON-I (internal ignitor)	YGB 70S	90	1.0	0.6	0.39	81	2.9



**Cable length limitations**

In circuits using ignitors, the maximum cable length between lamp and control gear is limited by the capacitance of the cable. This is obtained by adding together two values obtained in test:

(a) The capacitance of the 'high' conductor (i.e. the conductor connecting the ballast to the lamp centre contact) and all other conductors bonded together.

(b) The capacitance between the 'high' conductor and earth (usually the protective housing of the cable).

The cable between the lamp and the control gear for the WHITE SON (SDW-T) gear box must not exceed 0.3m.

Tables giving maximum permissible cable lengths using typical cables in common applications are contained in Customer Information Sheet No. 80.

**N.B.** Mineral-insulated cables must not be used between gearbox and lamp.

**PACKING QUANTITY AND ORDERING**

Gear boxes are individually packed and should be ordered in the form given in the following example, with reference to the ordering table provided:

6 Philips pre-wired indoor gear boxes YGB 150H.

# HARD GLASS MINIATURE HALOGEN LAMPS

range of low voltage lamps of relatively low wattage, with hard glass envelopes and using the halogen cycle for high efficiency, long life and minimum lumen depreciation.

The specially designed W4 x 9d capless wedge base gives simple and firm fixing and positions filaments accurately and reliably.

### RANGE

Hard glass miniature halogen lamps - range)

HMP 02	- 6V	3W
HM 03	- 6V	4W
HMP 03	- 6V	4W
HMP 14	- 3.75V	2.8W
HMP 15	- 4.8V	5.5W
HMP 16	- 2.75V	2.75W
HMP 20	- 4.8V	2.4W
HM 04	- 6V	4W
HMB 04	- 6V	4W
HMP 04	- 6V	4W
HMP 09M	- 4V	4W
HMP 18	- 4.8V	4.8W
HMP 08	- 6V	2.4W
HMB 12s	- 6V	12W

### APPLICATIONS

For use in situations where as much light as possible is required from a small source, or where limited supply energy is available.

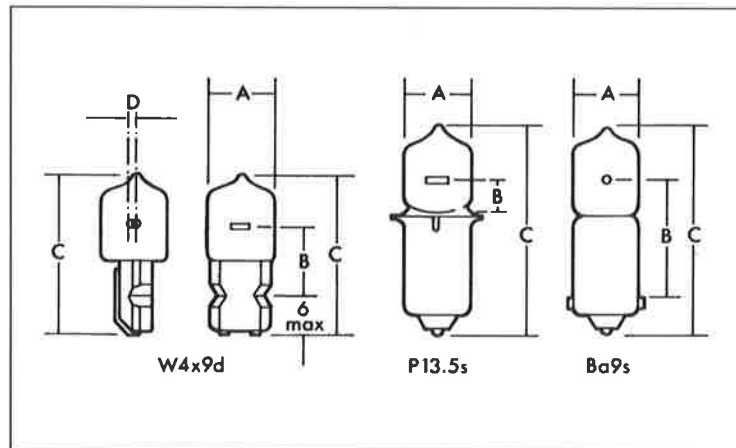
### PACKING QUANTITY AND ORDERING

Lamps are supplied packed in multiples of 100 or 1000.

Please order in the form given in the following example, in multiples of the packing quantity:

100 Philips miniature halogen lamps HM 04.

Type Number	TECHNICAL								
	Wattage (W)	Voltage (V)	Luminous Flux (lm)	Rated Life (h)	Base	Dimension A Diameter	Dimension B Light Centre Length	Dimension C Overall Length	Dimension D Lateral Deviation
<b>Torch Lamps</b>									
HMP 02	3	6	53	20	P13.5s	MAX 10	6.35±0.25	MAX 31	±0.6
HM 03	4	6	76	50	W4 x 9d	MAX 10	8.5±0.5	MAX 25	±0.6
HMP 03	4	6	72	40	P13.5s	MAX 10	6.35±0.25	MAX 31	±0.6
HMP 14	2.8	3.75	37	100	P13.5s	MAX 10	6.35±0.25	MAX 31	±0.6
HMP 15	5.5	5.5	100	40	P13.5s	MAX 10	6.35±0.25	MAX 31	±0.6
HMP 16	2.75	2.75	33	40	P13.5s	MAX 10	6.35±0.25	MAX 31	±1.0
HMP 20	2.4	4.8	39	20	P13.5s	MAX 10	6.35±0.25	MAX 31	±0.6
<b>Miners' Lamps</b>									
HM 04	4	6	58	300	W4 x 9d	MAX 10	8.5±0.5	MAX 25	±0.6
HMB 04	4	6	55	300	BA9s/13	MAX 10	15±1	MAX 31	±1.0
HMP 04	4	6	52	300	P13.5s	MAX 10	6.55±0.25	MAX 31	±0.6
HMP 09M	4	4	50	600	P13.5s	MAX 10	6.55±0.25	MAX 31	±0.6
HMP 18	4.8	4	58	600	P13.5s	MAX 10	6.55±0.25	MAX 31	±0.6
<b>Bicycle Lamps</b>									
HMP 08	2.4	6	36	100	PX13.5s	MAX 10	6.55±0.25	MAX 31	±0.6
<b>Reading Lamps</b>									
HMB 12s	12	6	170	2000	BA9s/13	MAX 10	15±1	MAX 31	±1.0



# REFLECTOR HEAT LAMPS

## RANGE

### Blown Bulb Types

Four alternative wattage ratings from 150W to 375W all with ES screw caps for interchangeability.

Available with red front glass.

### Pressed Glass IR-PAR types

100W and 175W ratings, introduced as energy-saving alternatives to 150W and 250W blown bulb lamps for livestock rearing.

Available with red front glass. Extra tough hard glass bulbs.

## FEATURES

- Highly efficient conversion of electrical energy into radiant heat.

- Instant response – no warm up or cool down delay.

- Mechanically fixed ES cap will not detach during long lifetime.

- 5000 hours average rated life expectancy.

- Simple to replace.

- Red fronted versions reduce visible light; particularly suitable for open sided process heating tunnels and for livestock rearing.

## GLASS BULBS AND FINISHES

Bulbs are obtainable blown from normal 'soft' glass or from heat-resistant 'hard' glass. Soft glass lamps are marked 'For industrial use only', and must not be used where there is any chance of splashing, as the resultant thermal shock is likely to fracture the bulb.

Hard glass lamps have a much greater resistance to thermal shock, and are suitable for all applications.

## PACKING QUANTITIES AND ORDERING

Please order in the form given in the following example, in multiples of the packing quantity (as shown in the table); quoting catalogue number, voltage and wattage:

36 Philips heat lamps IR250WS 110/120V 250W

## BLOWN BULB RANGE

### Special Features

Built-in reflector maintains installation long-term efficiency.

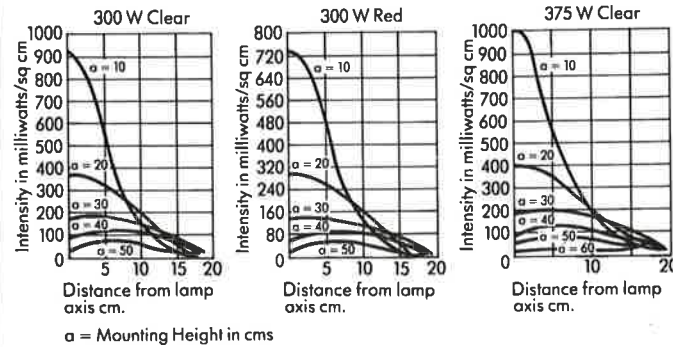
### Notes:

Colour temperature of filament approximately 2400K. Average life is 5000 hours at rated voltage, but this may be affected by actual working conditions (vibration, switching frequency, etc.) These lamps may be operated in any position.

### Catalogue suffixes

S – Soft glass.  
H – Hard glass.  
C – Clear finish.  
R – Red finish.

### RADIATION INTENSITY AT DIFFERENT DISTANCES FROM THE SUBJECT (Blown-Bulb)



## PRESSED GLASS ECONOMY RANGE

### Special Features

- All-round internal reflector directs more heat into the beam, eliminating losses to the rear.

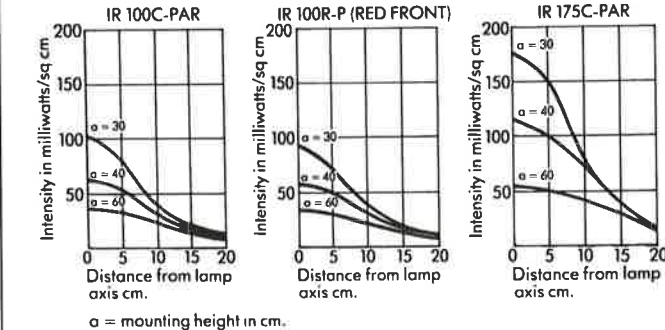
- Extra efficiency enables these IR-PAR lamps to replace higher wattage blown bulb types – with energy cost savings.

### Notes:

These IR-PAR lamps are similar in appearance to 'Infraphil' heat therapy lamps but should not be interchanged. 'Infraphil' lamps are distributed by the Electrical Appliances division of Philips.

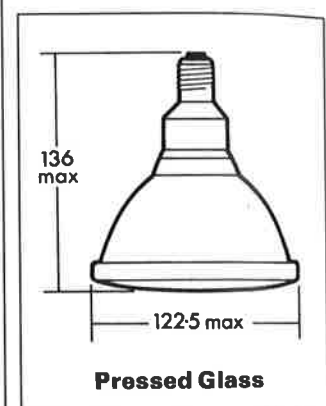
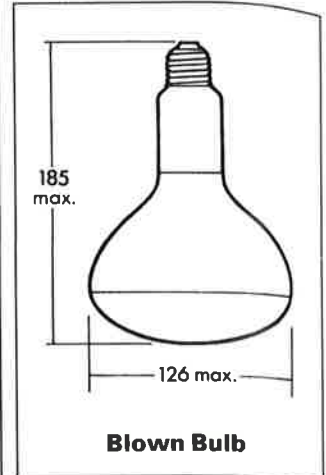
IR-PAR lamps are physically robust but, like all filament lamps, their tungsten filaments can be damaged by shocks and vibration.

### RADIATION INTENSITY AT DIFFERENT DISTANCES FROM THE SUBJECT (IR-PAR Lamps)



## ORDERING

	Catalogue number	Packing quantity	Cap	TECHNICAL			
				Wattage	Voltage	Glass	Finish
Blown bulb heat lamps	IR150S	Special order only	ES	150	240/250	Frosted	Normal
Blown bulb heat lamps	IR150R	Special order only	ES	150	240/250	Red	Normal
Blown bulb heat lamps	IR250S 110 IR250S	9	ES	250	110/120 240/250	Frosted	Normal
Blown bulb heat lamp	IR250CH	9	ES	250	240/250	Clear	Hard
Blown bulb heat lamps	IR250CHB	9	BC	250	240/250	Clear	Hard
Blown bulb heat lamps	IR300CH	9	ES	300	240/250	Clear	Hard
Blown bulb heat lamps	IR300RH	9	ES	300	240/250	Red	Hard
Blown bulb heat lamps	IR375CH	9	ES	375	110/120 240/250	Clear	Hard
Pressed glass heat lamps	IR100C	15	ES	100	240/250	Clear	Hard
Pressed glass heat lamps	IR100R	15	ES	100	240/250	Red	Hard
Pressed glass heat lamps	IR175	15	ES	175	240/250	Clear	Hard
Pressed glass heat lamps	IR175R	15	ES	175	240/250	Red	Hard



## APPLICATION NOTES

Shortwave infra-red penetrates translucent materials, unlike the long-wave infra-red from dull or 'black' emitters, which is absorbed at most surfaces.

The virtually instant response to switching or dimming has important safety and energy-saving connotations, with flammable products and in batch control applications.

Infra-red output is unaffected by draughts, and if used on reduced voltage the life expectancy is increased while the output remains shortwave.

These lamps are for applications requiring intensities up to 10kW/m² installed. For higher intensities, use Philips Type IRK linear heat lamps.

Lamps must not be enclosed in insulated ovens. They heat by direct radiation and require adequate ventilation around lampholders and wiring. For enhanced efficiency on reflective or openwork products, highly reflective aluminium tunnel sides should be used with recessed heat lamps.

# IRK LINEAR QUARTZ HEAT LAMPS

### FEATURES

Fast response; full heat output achieved within 1 second, and the lamps may be dimmed for process control.

Lamp output is reduced by 50% within 1 second of switching off, greatly enhancing safety.

Provides a highly efficient, energy effective source of infrared radiation.

Produces product temperatures up to 1350°C.

Easily focused for extra intensity.

Options with ruby glass sleeves (suffix 876) reduce glare or zone heating and have gas filling below 1 atmosphere pressure.

Reflectorised versions are available (suffix 98).

Permit clean, lightweight, simple installations.

### SPECIFICATION

Standard types are designed to conform with the International Standard IEC 240.

### PACKING QUANTITY AND ORDERING

Please order in the form given in the following example, in multiples of the packing quantity (10); quoting catalogue number, voltage and wattage:

10 Philips IRK heat lamps  
3195Y 220/250V 1kW.

ORDERING				TECHNICAL							
Cat. No.	kW	V	Cap	Tube	L1 heater length	L2	L3	Fig.	Operating position	Life hrs (1000)	
13908R	0.3	220/240	R7S	Clear	60±5	117.6±16	—	4	H*	—	
13169X	0.5	110/130	Strip	Clear	140±5	241±5	165	1	H	5	
13169X/98	0.5	110/130	Strip	Reflector	140±5	241±5	165	1	H	5	
13169Y	0.5	110/130	Wire	Clear	165±5	218±3	165	2	H	5	
13169Z/98	0.5	220/250	SK15s	Reflector	165±5	227.5 max.	180	3	H	5	
13206Z/98	0.5	220/250	SK15s	Reflector	165±5	227.5 max.	180	3	V	5	
13906/R	0.6	110/120	R7S	Clear	63	117.6 max.	—	4	H	5	
13195X	1.0	220/250	Strip	Clear	272±5	370±5	295	1	H	5	
13195X/98	1.0	220/250	Strip	Reflector	272±5	370±5	295	1	H	5	
13713X	1.0	220/250	Strip	Clear	272±5	370±5	295	1	V	5	
13195Y	1.0	220/250	Wire	Clear	272±3	348±3	295	2	H	5	
13195Z/98	1.0	220/250	SK15s	Reflector	272±5	357.5 max.	307	3	H	7	
13195Z/876	1.0	220/250	SK15s	Red	280±5	357.5 max.	300	5	H	5	
13713Z	1.0	220/250	SK15s	Clear	272±5	357.5 max.	307	3	V	5	
13713Z/98	1.0	220/250	SK15s	Reflector	272±5	357.5 max.	307	3	V	5	
13561Y/00	1.2	220/250	Insulated	Clear	155±10	228	181	2	H	5	
13393Z	1.3	220/250	SK15s	Clear	700±5	787.5	740±3	3	H	5	
13123Z	1.5	220/250	SK15s	Clear	272±5	357.5	307	3	H	5	
13123Z/876	1.5	220/250	SK15s	Red	280±5	357.5	307	5	H	7	
13123Z/876L*	1.5	220/250	SK15s	Red	280±5	357.5	307	5	H	7	
13568/00	1.6	144	Wire	Clear	225±3	174	150±5	2	H	5	
13386/99	1.7	220	Wire	Clear	259±5	—	—	—	H*	5	
13245X/98	2.0	220/250	Strip	Reflector	410±5	508±5	435	1	H	5	
13765X	2.0	220/250	Strip	Clear	410±5	508±5	435	1	V	5	
13168X	2.0	220/250	Strip	Clear	280±5	370±5	295	1	V	5	
13213Z/98	2.0	220/250	SK15s	Reflector	280±5	357.5 max.	307	3	H	5	
13168Z	2.0	220/250	SK15s	Clear	280±5	357.5 max.	307	3	V	5	
13168Z/98	2.0	220/250	SK15s	Reflector	280±5	357.5 max.	307	3	V	5	
13213Y/00	2.0	220/250	Wire	Clear	280±5	348±3	295	2	H	5	
13168V	2.0	220/250	Leads	Clear	280±5	350±3	307	—	V	5	
139342/876	2.0	240	SK15s	Red	280±5	357.5	300	5	H	7	
13934Z	2.0	240	SK15s	Clear	280±5	357.5	307	3	H	5	
13230X	3.0	380/420	Strips	Clear	700±5	798±5	725	1	V	5	
13230X/98	3.0	380/420	Strips	Reflector	700±5	798±5	725	1	V	5	
13136V	4.8	400	Special	Clear	236.7	298±3	250±2	—	H	1	

Notes: 1. Operating position H = Horizontal ± 15° (not to be operated vertically)  
 H\* = Horizontal ± 4° (not to be operated vertically)  
 V = Vertical ± 75°  
 \* = Fitted longer (290±5mm) leads with AMP terminations.

Fig. 1

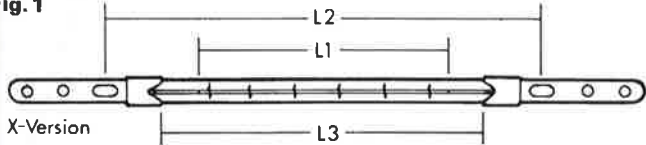
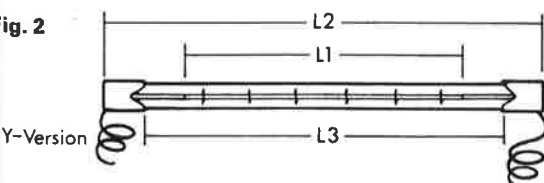
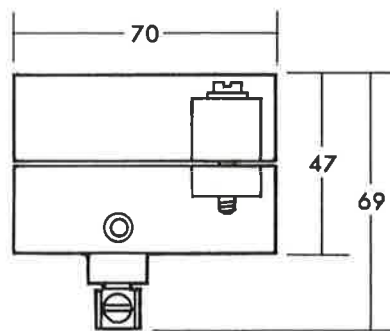


Fig. 2



Fixing centres 50mm Ø4.5mm  
 Fixing spacing L2 50mm



Z 9570 Lampholder for X-Version  
 Packing quantity 50

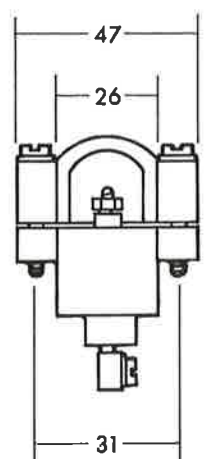


Fig. 3

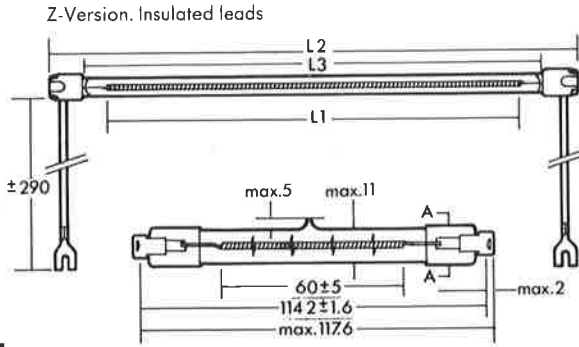


Fig. 4

Z-Version with ruby glass sleeve

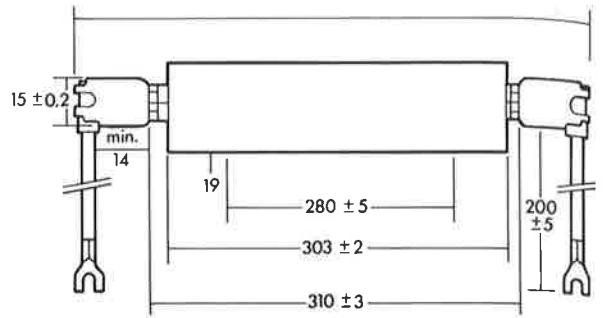


Fig. 5

Double insulated leads (zone heating)

**NOTES FOR USERS**

Short-wave infra red radiation behaves in a manner similar to red light, and penetrates translucent materials, unlike long-wave infra red from 'dull' or 'black' emitters which is substantially absorbed at many surfaces. It is advisable to conduct small-scale feasibility tests before designing a new installation. IRK lamps should be mounted flexibly to accommodate differential expansion, and ventilation and/or

heat sinks provided for end seals as necessary.

Maximum permissible pinch (quartz/metal end seal) temperature of 350°C. Maximum permissible quartz tube temperature of 900°C.

Maximum permissible cable temperature 260°C.

The danger of exceeding these temperatures occurs in high-intensity ovens where considerable re-radiation is taking

place (e.g. heating metal sheet or billets to temperatures above 1000°C), where forced cooling of the envelopes may be required. Aluminium reflectors will normally require forced-air or water cooling for continuous operation in high-intensity applications.

Lamp types with suffix Z have SK15s endcaps which may be clipped to an earthed frame, and are equipped with insulated flying

leads. A special lampholder, Type Z9570, is available for use with strip terminated types, suffix X.

The lamps should not be subjected to vibration or mechanical shock.

**General characteristics All types:**

- Filament colour temperature: about 2400K.
- Average life: Measured at midpoint of voltage range.
- Peak wavelength: about 1.2 µm.

**IRZ LINEAR HEAT LAMP FITTING**

**RANGE**

Easily-installed fittings for Philips linear quartz heat lamps with SK15s end connections.

IRZ 500: - for use with Philips 13169Z/98 1kW lamps.

IRZ 1000: - for use with Philips 357.5 mm lamps.

**APPLICATIONS**

IRZ heat lamp fittings offer a convenient means of mounting IRK heat lamps into canopies or, with reflector removed, within flat reflector modular panels, etc. They accept clear, reflectorised or red overtube Z version heat lamps. The reflectorised (suffix 98) lamps are recommended for general purposes. Electrical connection is made directly to the heat lamp cables, away from the heated zone.

**FEATURES**

- Simple two-screw fixing on to metal structures.
- Fast response: full heat output is achieved within 1s, and the lamp may be dimmed for process temperature control.
- Heat output is reduced by 80% within 1s of switching off, greatly

enhancing safety.

- Product temperatures up to 700°C are possible.
- Lamp clips on to heat sink with remote electrical connection.
- Reflector shields lamp from mechanical damage; also improves overall efficiency by redirecting radiant energy from workpiece.
- Lamp filament is 20 mm from spine surface.

**MATERIALS AND FINISH**

**Body:** Brushed aluminium extrusion.

**Reflector:** Super-purity aluminium, anodised.

**SPECIFICATION**

Designed to comply with BS 4533 Class I (electrical) earth required.

**To specify state:**

Short-wave infra red fittings for industrial processing, for Philips

linear Z quartz heat lamp. To be supplied with fixing accessories. Similar to Philips IRZ 500/1000.

**RANGE OF OPERATION**

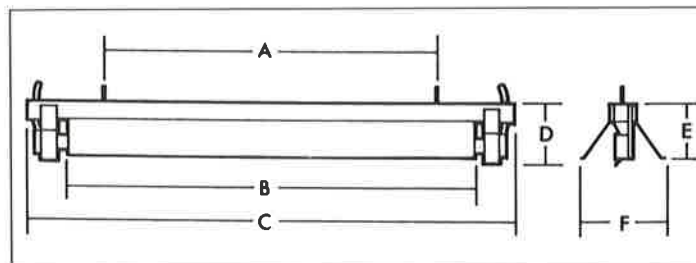
220/250V supplies. Normal dry indoor conditions.

Burning position: Universal. **Note:** In many cases, the metal structure on which the fitting is mounted will act as an adequate heat sink, but low-pressure forced-air cooling may be needed to ensure that the maximum pinch temperature of the lamp is not exceeded. Housings should be designed to accommodate differential expansion, with guards as necessary to comply with BS3456.

**PACKING QUANTITY AND ORDERING**

Fittings are individually packed. Please order in the form given in the following example: 20 Philips IRZ 1000 heat lamp fittings. Lamps must be ordered separately.

ORDERING			DIMENSIONS					
Description	Catalogue number	Lamp	A	B	C	D	E	F
IRZ Fitting	IRZ 500	218 mm	120	170	229.5	45	37	58
IRZ Fitting	IRZ 1000	357.5 mm	250	300	359.5	45	37	58



For product description please see page 260-261

Long-wave UV sources for activation of fluorescent materials.

**RANGE**

Tubular fluorescent lamps with cobalt filter glass envelopes, in six ratings:

- 4W 150mm
- 6W 225mm
- 8W 300mm
- 15W 450mm
- 18W 600mm
- 36W 1200mm

160W ovoid mercury/tungsten blended lamp with Woods glass envelope and integral stabilising filament (no ballast required: operates direct from mains).

125W ovoid mercury lamp with Woods glass envelope.

**Caution: These lamps emit UV radiation.**

All equipment manufacturers incorporating this lamp should provide instructions to users with warnings for avoidance or limitation of UV exposure as appropriate.

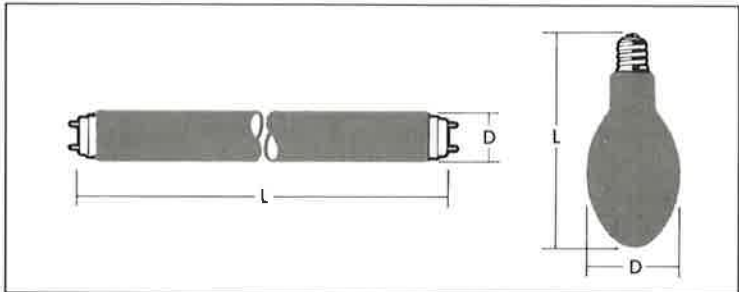
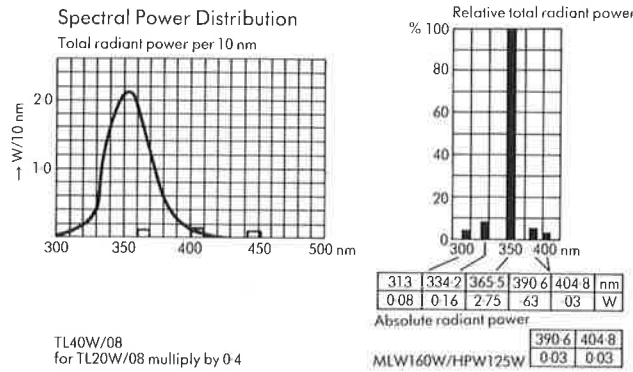
Users of UV equipment should carefully observe instructions for use provided by equipment manufacturers.

**FEATURES**

- Output is mainly in the long-wave UV region for response from common fluorescent materials.
- Filter envelopes reduce radiation in the visible spectrum.
- Tubular fluorescent lamps run from same control gear as standard white lamps.
- Integral stabilising filament of MLW lamp eliminates the need for a ballast; enables lamp to run directly from the mains.
- Ovoid mercury lamps provide compact, easily directed UV source; tubular fluorescent lamps are more suitable for general UV irradiation.

**RANGE OF OPERATION**

240V 50Hz supplies (all types except MLW 160W require suitable control gear).



**REPLACEMENT PERIOD**

It is recommended that UV lamps should be group replaced and with a shorter period than for white lamps. A guide to UV depreciation is shown in the table.

**CONTROL GEAR**

Note: Type MLW is stabilised by its tungsten filament, and requires no control gear. Other types MUST be operated in conjunction with suitable current-limiting control gear (ballast), see ordering table.

**OPERATING POSITION**

Note: All lamps any operating position except MLW 160W – vertical cap up or down ± 75°.

**PACKING QUANTITIES AND ORDERING**

Please order in the form given in the following example, in multiples of the packing quantities (as shown in the table); quoting catalogue number and (for HPW 125W) cap required:

50 Philips blacklight lamps TL6W/08.

ORDERING			TECHNICAL								
Length and Wattage	Catalogue No.	Cap	Packing Quantity	Lamp Voltage (V)	Lamp Current (A)	U.V. Depreciation % per thousand hours	Length L (max)	Diameter D <sub>i</sub> (max)	Lamp Circuit	Ballast	Starter
<b>Tubular Fluorescent</b>											
4W 150mm (6in)*	TL4W/08	Mini-Bi-Pin	25	30	0.15	5	136	16	—	—	—
6W 225mm (9in)	TL6W/08	Mini-Bi-Pin	25	45	0.16	5	212	16	1 × TL6W/08 2 × TL6W/08	BAS8 BAS13	S2 or S10 2 × S2
8W 300mm (12in)	TL8W/08	Mini-Bi-Pin	25	58	0.17	5	288	16	1 × TL8W/08 2 × TL8W/08	BAS8 BAS13	S2 or S10 2 × S2
18W 600mm (2ft)	TL18W/08	Bi-Pin	6	57	0.37	5	590	26	2 × TL18W/08	BTP40 L25	2 × S2
36W 1200mm (4ft)	TL36W/08	Bi-Pin	6	103	0.43	5	1200	26	TL36W/08	BTP40 L25	S10
<b>Ovoid Mercury Lamps</b>											
125W Mercury	HPW125W	3 Pin BC, ES	12	125	1.20	15	177	75	HPW125W	BHL125 L32	—
160W Mercury/Tungsten	MLW160W	ES	12	—	0.67	15	172	75	—	—	—

\* Note: to special order only.

**CAUTION: These lamps emit harmful UV radiation.**

Precautions *must* be taken in the design of process installations to prevent exposure for operatives and users (especially to skin and eyes).

Only for use in equipment having shields to prevent direct view of the lamp.

All equipment manufacturers incorporating this lamp should provide instructions to users with warnings for avoidance or limitation of UV exposure as appropriate.

Users of UV equipment should carefully observe instructions for use provided by equipment manufacturers.

**FEATURES**

■ Majority of output occurs at 253.7 nm line, making the lamps an efficient source of germicidal radiation.

■ Type TUV 6W operates on normal ac power supplies (ballast internal) and provides an inexpensive and convenient source of UV radiation.

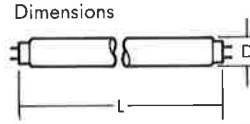
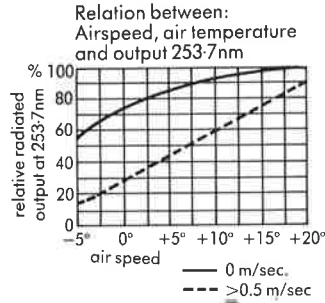
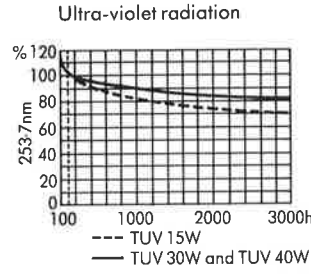
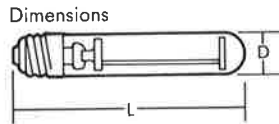
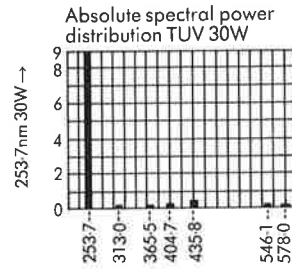
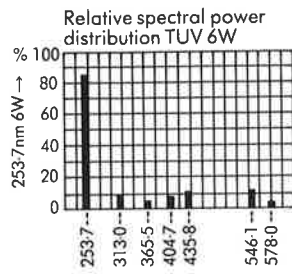
■ Linear lamps can be used in conventional fluorescent switch start circuits.

■ Negligible ozone formation.

**PACKING QUANTITIES AND ORDERING**

Please order in multiples of the packing quantity (as shown in table), in the form given in the following example:

12 Philips germicidal lamps TUV 30W.



ORDERING				TECHNICAL						
Type	Catalogue No.	Packing quantity	Cap.	Lamp voltage (V)	Lamp current (A)	UV 253.7nm W (total output)	UV 253.7nm $\mu$ W/cm <sup>2</sup> (note 1)	L (max)	D (nominal)	Weight (g)
Single ended	TUV 6W	25	ES	220/240	0.027	0.085	0.85	150.0	26	40
Linear	TUV 15W	6	Bi-pin	56	0.31	3.5	37	437.4	26	75
Linear	TUV 30W	6	Bi-pin	96	0.36	9.0	83	894.6	26	140
Linear	TUV 40W	6	Bi-pin	103	0.43	12.6	94	1199.4	38	292

Note 1: At 1 m from centre.

**USING GERMICIDAL LAMPS**

The special clear glass transmits the most effective 253.7 nm UV line for inhibiting reproduction of bacteria, viruses, moulds etc.

The dose required (irradiation × time) varies according to the organism and the medium. Only directly exposed organisms are affected, thus disinfection of air and UV-transmitting liquids is easily achieved.

Reflectors, e.g. for upper air irradiation, should be of high purity aluminium. Optimum tube wall temperature is 40°C.

Further information available on request.



# XOP PULSED XENON LAMPS

pulsed discharge lamps with spectral characteristics approximating those of normal daylight.

**Caution: These lamps emit UV radiation.** Precautions must be taken in the design of process installations to avoid exposure for operatives and users (especially to skin and eyes).

Equipment manufacturers incorporating this lamp should provide instructions to users with warnings for avoidance or limitation of UV exposure as appropriate.

Users of UV equipment should carefully observe instructions for use provided by equipment manufacturers.

### FEATURES

- Immediate start and re-start - no warm-up time required.
- Full light output is obtained immediately.
- Colour temperature remains constant throughout working life.
- Small diameter simplifies the design of efficient reflector systems.
- High efficacy.
- Spectral characteristics approximate to daylight; the lamps are suitable for both colour and black-and-white production.

Ozone-free quartz envelopes.

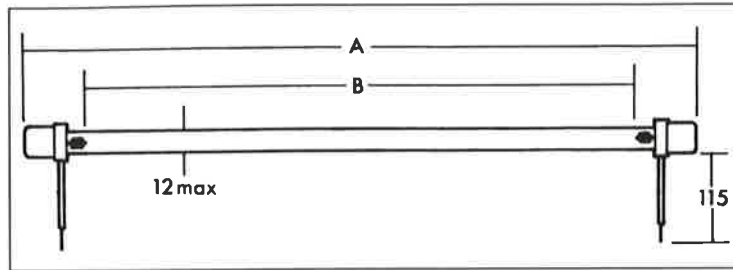
### OPERATING DATA

- Maximum temperatures:
  - base 750°C
  - envelope 400°C
- average life: 300 hours.

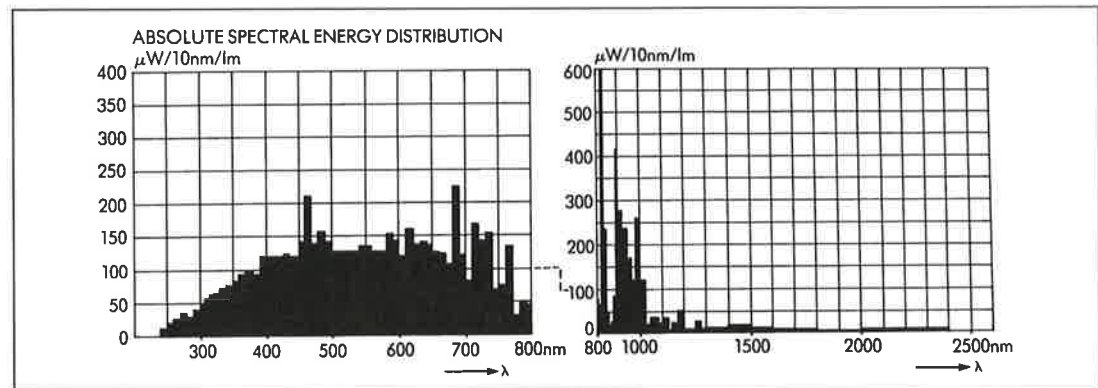
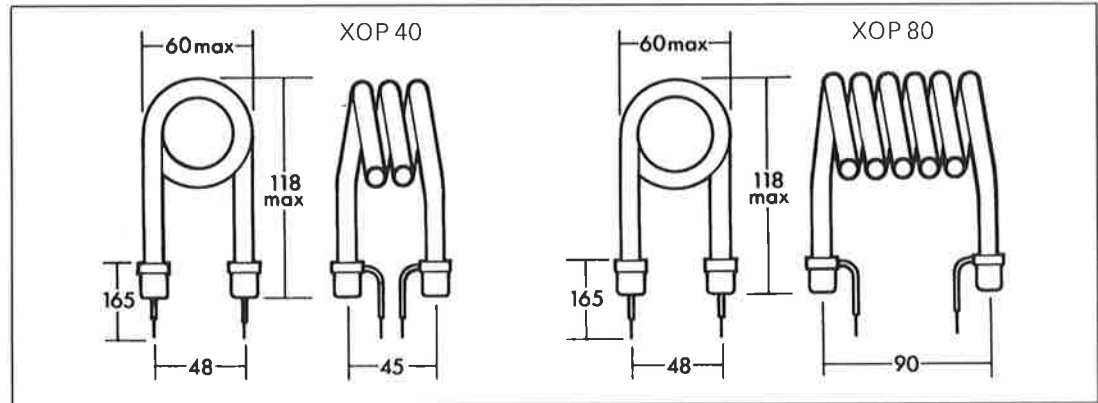
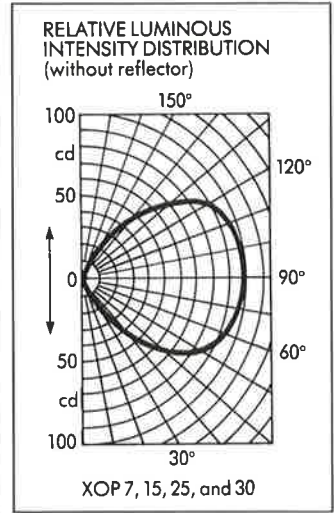
### PACKAGING QUANTITY AND ORDERING

Please order in multiples of the packing quantity (as shown in the table), in the form given in the following example:

3 Philips xenon lamps XOP25.



XOPY, 15, 25 and 30



Catalogue No.	ORDERING			TECHNICAL						
	Packing quantity	Lamp watts	Lamp volts	Lamp current (A)	Luminous efficacy (lm/W)	Colour Temp °K	Pulse frequency c/s	Light depreciation % After 250 hours	Dimension A (overall length)	Dimension B
XOP7	6	750	52 ± 3	18	20-25	5600	100-120	Approx 20	238 ± 3	158 ± 3
XOP15	6	1500	105 ± 5	18	20-25	5600	100-120	Approx 20	392 ± 3	312 ± 3
XOP25	6	2000	115 ± 5	18	20-25	5600	100-120	Approx 20	537 ± 3	457 ± 3
XOP30	6	3000	210 ± 10	18	20-25	5600	100-120	Approx 20	695 ± 3	615 ± 3
XOP40	4	4000	210 ± 10	19	20-25	5600	100-120	Approx 20	-	-
XOP80	4	8000	420 ± 15	19	20-25	5600	100-120	Approx 20	-	-

For product description please see page 264

# CSX XENON PROJECTION LAMPS

**Caution: These lamps emit UV radiation.**

All equipment manufacturers incorporating this lamp should provide instructions to users with warnings for avoidance or limitation of UV exposure as appropriate.

Users of UV equipment should carefully observe instructions for use provided by equipment manufacturers.

**Pressure filled: Observe safety instructions packed with each lamp.**

**CONTROL GEAR**

Supplied by equipment manufacturers.

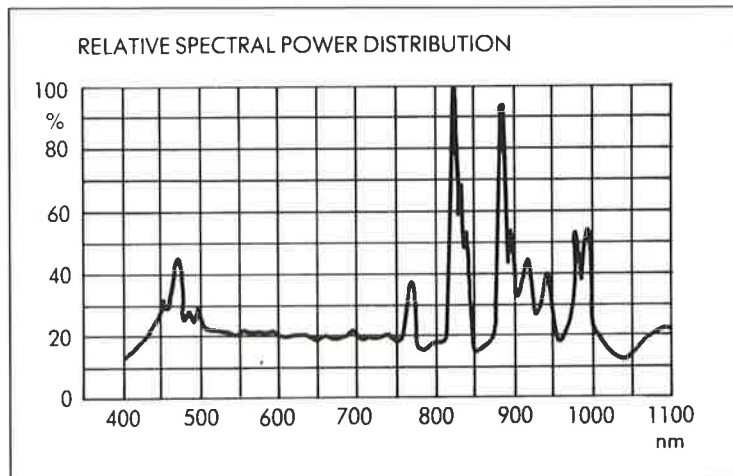
**PACKING QUANTITY AND ORDERING**

Vertical burning lamps rated at 75W and 150W are packed in 4s.

All other types are individually packed.

Please order by catalogue number in the form given in the following example, in multiples of the packing quantity:

3 Philips xenon projector lamps CSX 1600W-HSC-OF.

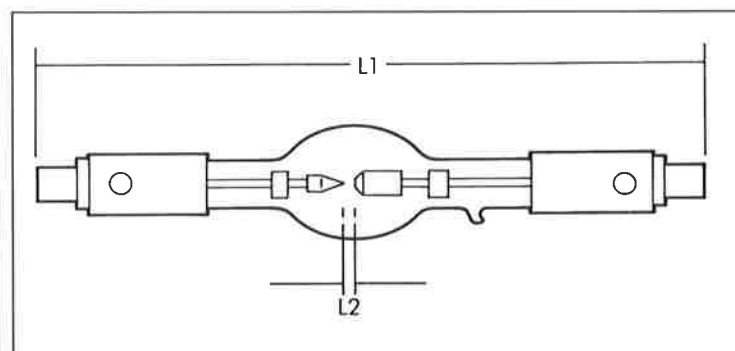


The radiation from CSX lamps is defined by a continuum in the visible region in the presence of weak spectral lines. The infra red region contains a pronounced line spectrum. Depending on requirements, this infra red structure can be either isolated for IR applications or entirely suppressed if desired.

ORDERING	TECHNICAL				
	Wattage (W)	Supply voltage V (dc)	Luminous flux (lm)	Arc length (mm)	Length (mm)
Catalogue No.					
<b>Vertical Burning (Note 1)</b>					
CSX 75W-2 OF	75	50	1000	0.6	90
CSX 450W-OF	450	70	12000	2.4	250
CSX 900W-OF	900	70	30000	3.3	325
CSX 1600W-OF	1600	70	60000	4.2	370
CSX 2500W-OF	2500	85	100000	6.0	428
<b>Horizontal Burning (<math>\pm 20^\circ</math>)</b>					
CSX 500W-HC-OF	500	65	14500	2.5	170
CSX 500W-H-OF	500	65	14500	2.5	190
CSX 700W-HSC-OF	700	70	20000	2.9	233
CSX 1000W-HSC-OF	1000	70	33000	2.8	233
CSX 1600W-HSC-OF	1600	70	60000	3.3	233
CSX 700W-HS-OF	700	70	20000	2.9	233
CSX 1000W-HS-OF	1000	70	33000	2.8	233
CSX 1600W-HS-OF	1600	70	60000	3.3	233
CSX 2000W-HC-OF	2000	85	80000	4.5	365
CSX 3000W-HC-OF	3000	85	130000	5.5	428
CSX 2000W-HTP-OF	2000	85	80000	4.5	365
CSX 2500W-HC-OF	2500	85	100000	4.5	340
CSX 3000W-HTP-OF	3000	85	130000	5.5	400
CSX 4000W-HTP-OF	4000	100	180000	6.0	423
CSX 4000W-HSC-OF	4000	100	180000	6.0	408

**Note 1:** Operating position vertical cathode down:

- CSX 75W - 2 OF  $\pm 90^\circ$
- CSX 450W - OF  $\pm 15^\circ$
- CSX 900W - OF  $\pm 30^\circ$
- CSX 1600W - OF  $\pm 30^\circ$
- CSX 2500W - OF  $\pm 30^\circ$



**For product description please see page 265**

**Caution: UV radiation.**  
All equipment manufacturers incorporating this lamp should provide instructions to users with warnings for avoidance or limitation of UV exposure as appropriate. Users of UV equipment should carefully observe instructions for use provided by equipment manufacturers.

**FEATURES:**  
■ Gr...  
flu...  
pr...  
wi...  
■ St...  
me...  
■ Re...  
ap...  
**PAC...  
ORD...  
Plea...  
the f...  
multi...  
(16)...  
32 P...  
HPR...**

# HPR 125W MERCURY DISCHARGE REPROGRAPHIC LAMP

**Caution: These lamps emit UV radiation**

All equipment manufacturers incorporating this lamp should provide instructions to users with warnings for avoidance or limitation of UV exposure as appropriate.

Users of UV equipment should carefully observe instructions for use provided by equipment manufacturers

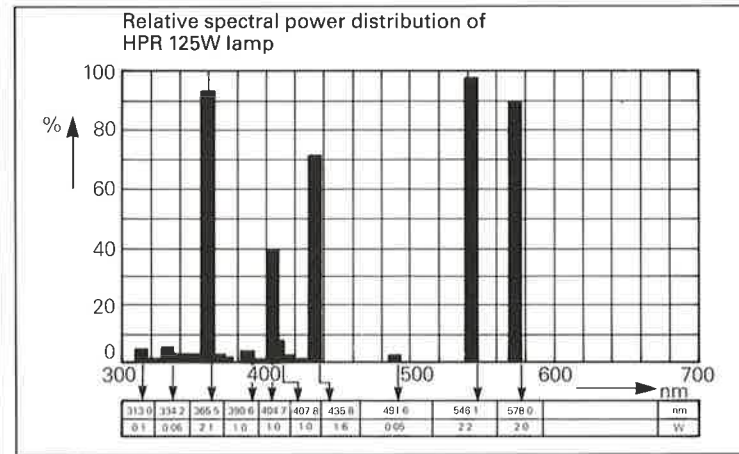
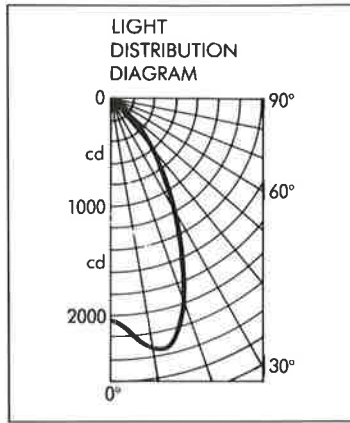
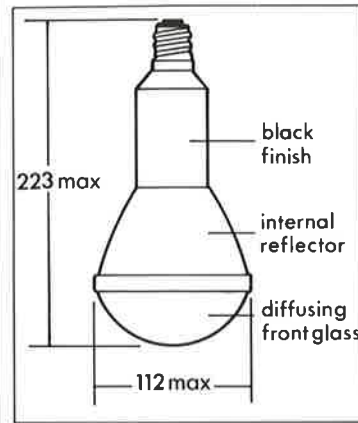
**FEATURES**

- Granulated glass front and fluted internal reflector provide an ideal beam pattern within a useful 40° angle.
- Strong actinic output matches most photo-resists.
- Reaches full output after approximately 4 minutes.

**PACKING QUANTITY AND ORDERING**

Please order in the form given in the following example, in multiples of the packing quantity (16):

32 Philips reprographic lamps HPR 125W.



ORDERING	LAMP DATA				TECHNICAL					
Catalogue No.	Minimum Start Volts	Lamp Volts	Lamp Current Amps	Light energy depreciation (%) see note 1	Cap	Operating position	Ballast	PFC Capacitor	Life (hrs)	Weight (g)
HPR 125W	180	120	1.15	20	ES	Any	BHL125	L4008	2000	200

**Note 1.** The percentage by which the radiation decreases with respect to the nominal value, after 2000 hours.

**Control Gear**

Must be connected in series with a 125 Watt HPL lamp ballast. PFC capacitor is optional.

# HPM METAL HALIDE PRINTING LAMPS

## Caution: These lamps emit UV radiation.

Precautions must be taken in the design of process installations to avoid exposure for operatives and users (especially to skin and eyes).

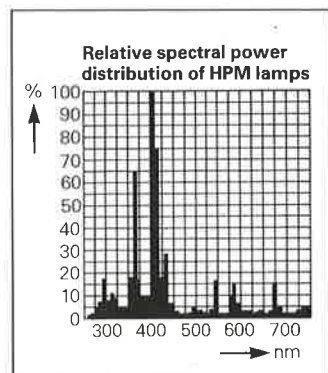
All equipment manufacturers incorporating this lamp should provide instructions to users with warnings for avoidance or limitation of UV exposure as appropriate.

Users of UV equipment should carefully observe instructions for use provided by equipment manufacturers.

## CONTROL GEAR

Supplied by equipment manufacturers – details on request.

Principal UV emission is in the 400–420 nm wavelength band.



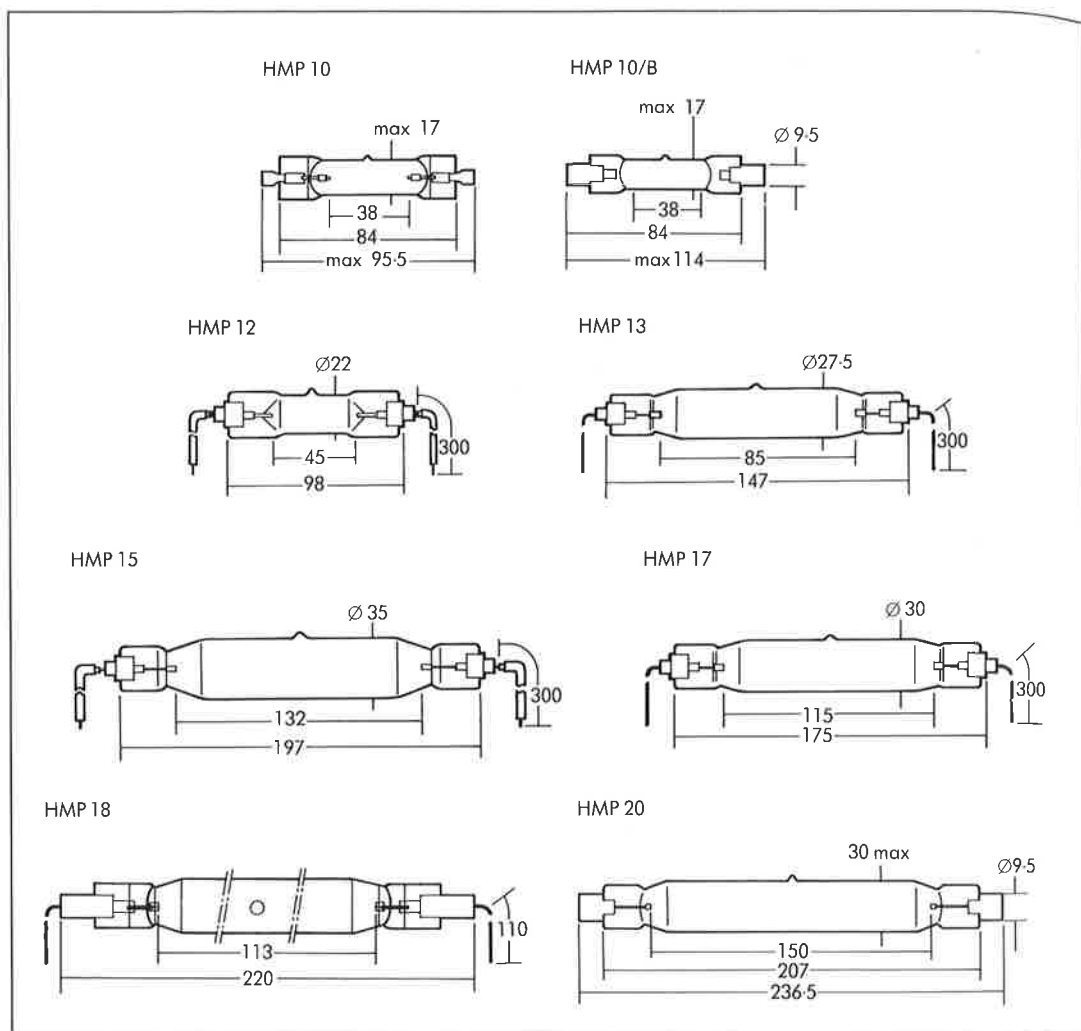
## OPERATING CONDITIONS

For horizontal operation  $\pm 10^\circ$   
 Min/max bulb temperature  
 750/900°C  
 Max pinch temperature 350°C  
 Forced cooling may be needed to achieve these temperatures.  
 Lamp life may be reduced by operation at higher than nominal Wattages.

## PACKING QUANTITY AND ORDERING

Please order in the form given in the following example, in multiples of the packing quantity (4):

4 Philips metal halide lamps  
 HPM 15.



## Additional types

For variants of the types illustrated and other types and ratings, please request special literature.

Catalogue No.	Base	Lamp Wattage (W)	TECHNICAL					
			Lamp Voltage (V)	Starting Voltage (kV)	Run-up time (minutes)	Output between 330 & 440 nm at 1 m distance $\mu\text{W}/\text{cm}^2$	Light/energy depreciation (%) Note 1	Average life (H)
HPM 10	R7S	400	125 $\pm$ 10	3	3	910 (400W)	15	750
HPM 10B	Barrel	400	125 $\pm$ 10	3	3	900	15	750
HPM 12	Leads	460	120 $\pm$ 10	3	5	1000 (400W)	20	750
HPM 13	Leads	1000	135 $\pm$ 10	1	3	2300 (1kW)	25	750
HPM 15	Leads	1000-4000	240 $\pm$ 20 Note 2	5	3	4200 (2kW)	15	750
HPM 17	Leads	1000-4000	220 $\pm$ 15 Note 2	1	3	4500 (2kW)	15	750
HPM 18	Leads	3850	400 $\pm$ 30	10.4	3	9000	25	750
HPM 20	Barrel	3000	350 $\pm$ 15	9.7	2	7500	10	750

Note 1: After 500 hours' burning

Note 2: Measured at 2000W

Note 3: Due to a constant development programme, other types and ratings will become available. Details available on request.

For product description please see page 267

# HPA METAL HALIDE LAMPS (IRON/COBALT)

## METAL HALIDE LAMPS FOR ULTRAVIOLET APPLICATIONS

**Caution: These lamps emit UV radiation.**

Precautions must be taken in the design of process installations to avoid exposure for operatives and users (especially to skin and eyes). All equipment manufacturers incorporating these lamps should provide instructions to users with warning for avoidance or limitation of UV exposure as appropriate.

Users of UV equipment should carefully observe instructions for use provided by equipment manufacturers.

These lamps should on no account be used in solaria unless fitted with filters to remove all UVB radiation at wavelengths shorter than 315nm.

Operatives should be protected against lamp breakage in operation.

## CONTROL GEAR

Ballast choke and high-voltage ignitor - details on request.

## PACKING QUANTITY AND ORDERING

Please order lamps in the form given in the following example, in multiples of the packing quantity (4):

10 Philips metal halide lamps HPA400/30

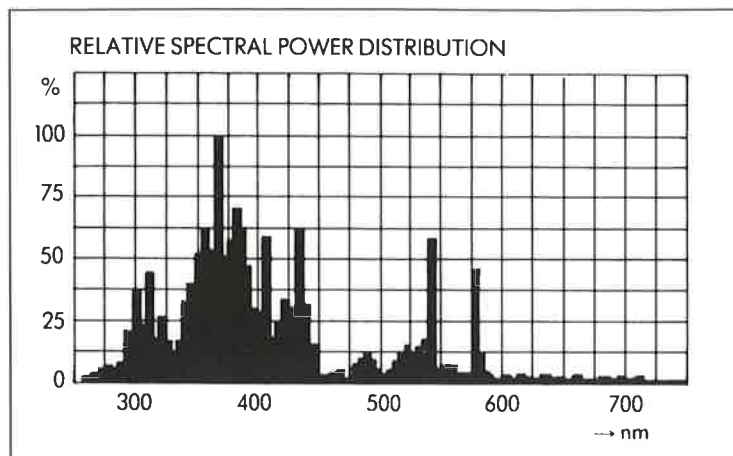
## OPERATING CONDITIONS

The operating position for all lamps is  $\pm 10^\circ$ , with pinches vertical.

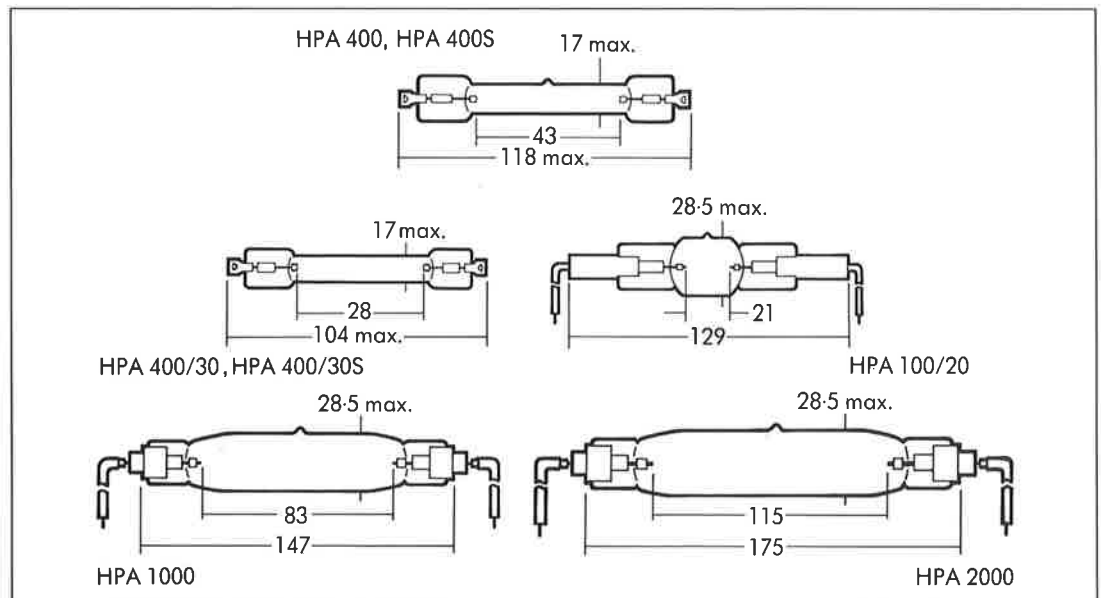
Min/max bulb temperature 50/900°C.

Max pinch temperature 350°C.

Forced cooling may be needed to achieve these temperatures.



Wide band UV-A emission suits many applications. Types with suffix 'S' have relatively reduced UV-B emission and improved UV-A output maintenance.



ORDERING		TECHNICAL							
Catalogue Number	Base	Lamp Wattage (W)	Lamp Voltage (V)	Lamp Current (A)	Min. Voltage Supply (V)	Run-up Time Min.	Output at 1m distance, $\mu\text{W}/\text{cm}^2$ (UVA, UVB, UVC)	UV/Depreciation (Note 1) %	Life (h) (Note 2)
HPA400S	R7s	400	126 ± 15	3.7	198	4	1000 320 50	15	750
HPA400/30S	R7s	380	133 ± 15	3.3	198	4	900 320 50	15	750
HPA1000	Leads	930	133 ± 15	8	198	3	2500 900 230	15	750
HPA1000/20	Leads	1100	120 ± 10	10.5	198	3	2700 1100 250	15	750
HPA2000	Leads	1750	265 ± 15	7.8	342	3	4800 900 450	15	750

Note 1 - At end of life.

Note 2 - At 5% failures.

Note 3 - Due to a constant development programme, other types and ratings will become available. Details available on request.

**For product description please see page 268**

# HTQ PHOTOCHEMICAL LAMPS

## HTQ PHOTOCHEMICAL LAMPS

**Caution: These lamps emit UV radiation.**

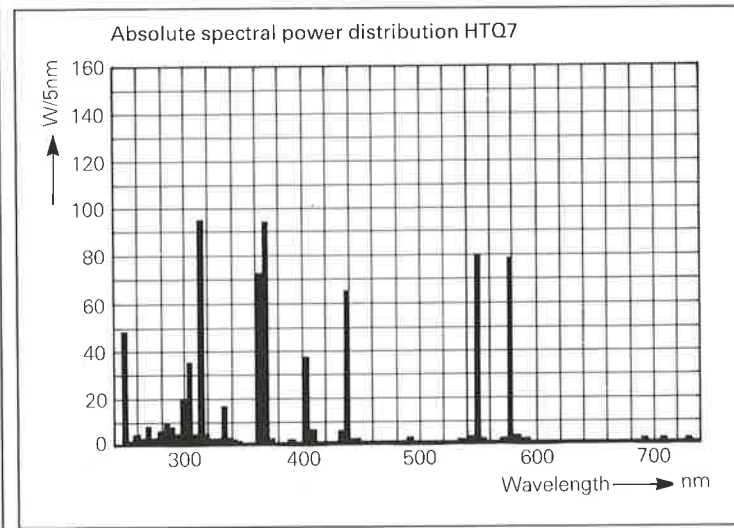
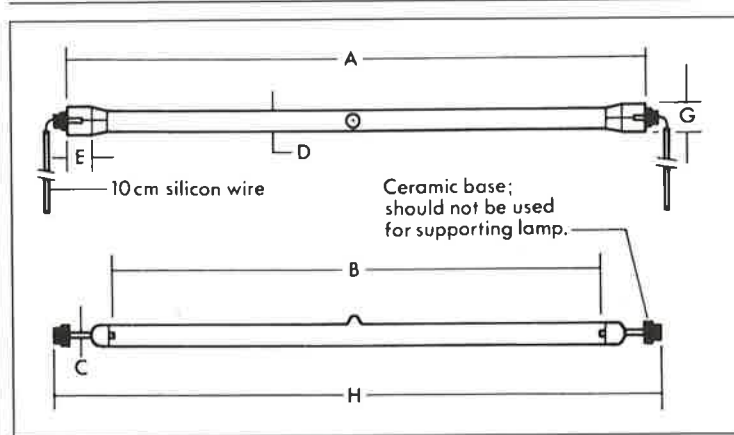
Precautions must be taken in the design of process installations to avoid exposure for operatives and users (especially to skin and eyes).

All equipment manufacturers incorporating this lamp should provide instructions to users with warnings for avoidance or limitation of UV exposure as appropriate.

Users of UV equipment should carefully observe instructions for use provided by equipment manufacturers.

## PACKING QUANTITY AND ORDERING

Please order in the form given in the following example, in multiples of the packing quantity (4):  
12 Philips mercury discharge lamps HTQ 14.



## OPERATING CONDITIONS

The lamp should be supported on the pinch edges, the tube remaining free with the pinches vertical.  
The lamp produces no ozone.

ORDERING		TECHNICAL							DIMENSIONS							GEAR	
Catalogue Number	Lamp Wattage (W)	Lamp Voltage (V)	Minimum Starting Voltage (V)	Lamp Starting Current (A)	Lamp Operating Current (A) after 1000 hours	Permissible Load (W)	Run-up Time (in free-air mins)	Average Life (Hours) Note 1	Weight (g)	Dimension A	Dimension B	Dimension C max	Dimension D	Dimension E	Dimension G	Dimension H	Ballast
HTQ 7	2000	1400 ± 50	1700	2.4	1.63	1500 - 2600	5	1000	85	755 ± 2	700 ± 2	3.4	12.5 ± 1	18 ± 1	15 ± 1	762.5 ± 3	139.1095 (2 off)
HTQ 14	4000	1400 ± 50	1500	4.6	3.35	3000 - 5000	5	1000	158	1460 ± 2	1400 ± 2	4.0	24 max	17 ± 1	23 ± 1	1485.0 ± 3	139.1095 (4 off)

**Note 1:** At 4 burning hours per switching.  
**Note 2:** Maximum pinch temperature 300°C  
**Note 3:** Operating position horizontal

# ACTINIC FLUORESCENT LAMPS

Actinic fluorescent tubes are available in three families having phosphors selected to produce strong emissions in different parts of the UV-A and violet spectrum. They require normal control gear; pre-heat transformers may be used for instant starting. All produce some visible blue light.

### ACTINIC 03 RANGE

A narrow band emission peaking at 420nm specially developed as an exposing lamp for diazo copiers and for medical treatment.

### ACTINIC 05 RANGE

A broad band emission encompassing the entire UV-A spectrum, peaking at 370nm. Many uses include photo-resists, diazo copying and insect traps.

### ACTINIC 09 RANGE

A narrow band emission peaking at 350nm and carefully controlled trace emission below 200nm. Principal use is for various photo-chemical applications. (See also fluorescent Sunlamps).

### CAUTION

**These lamps emit UV radiation.**

Precautions must be taken in the design of process installations to avoid exposure for operatives and users (especially to skin and eyes).

All equipment manufacturers incorporating Actinic lamps should provide instructions to users with warnings for avoidance or limitation of UV exposure as appropriate.

Users of UV equipment should carefully observe instructions for use provided by equipment manufacturers.

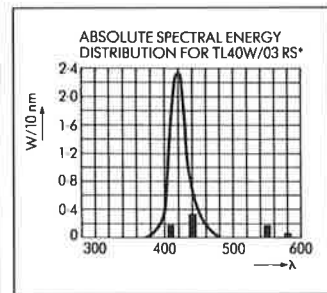
### PACKING QUANTITIES AND ORDERING

Actinic lamps are packed in 25s.

Please order by short code in the form given in the following example, in multiples of the packing quantity: 25

25 Philips fluorescent lamps 009.

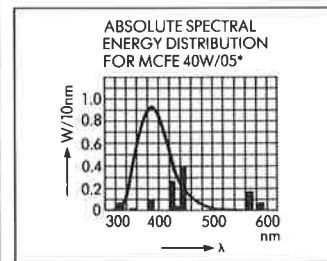
ORDERING		TECHNICAL								
Catalogue No.	Order short code	Length	Lamp voltage (V)	Lamp current (A)	For circuits	Depreciation (%) (Note 1)	Dimension L (mm) max	Diameter D (mm) nom.	Weight (g)	
Actinic 03	TL 20W/03T	2003	2ft	57	0.37	Switchstart + 10V XS	15	589.8	38	156
	TLADK 30W/03	3003	18in	44	0.84	Special circuit	30	437.4	26	76
	TL 40W/03RS	4003	4ft	103	0.43	Switchstart + 3V XS	15	1199.4	38	292
	TLK 40W/03	40032	2ft	47	0.88	Switchstart	30	589.8	38	156
	TLM 120W/03RS	12003	5ft	100	1.50	Special circuit	40	1500.0	38	380
	TL 140W/03	14003	5ft	125	1.40	Special circuit	40	1500.0	38	402
Actinic 05	TL 4W/05	405	6in	44	0.16	Switchstart	25	136	16	22
	TL 6W/05	605	8in	56	0.31	Switchstart	15	212	16	22
	TL 8W/05	805	12in	56	0.17	Switchstart	25	288	16	31
	TLD 15W/05	1505	18in	57	0.37	Switchstart + 10V XS	15	437	26	76
	TL 20W/05	2005	2ft	44	0.84	Special circuit	25	590	38	156
	TLADK 30W/05	3005	18in	47	0.88	Switchstart + 10V XS	25	437	26	76
	TLK 40W/05	40052	2ft	103	0.43	Switchstart + 10V XS	15	590	38	156
	TL 40W/05	4005	4ft	109	0.42	Special circuit	15	1200	38	292
	TL 65/80 W/05 (Note 2)	658005	5ft	110	0.67	Switchstart + 10V XS	20	1500	38	360
	TLM 120W/05RS	12005	5ft	100	1.50	Special circuit	30	1500	36	380
Actinic 09	TLD 15W/09	1509	18in	56	0.31	Switchstart	30	437	26	76
	TLD 20W/09	2009	2ft	57	0.37	Switchstart	25	590	38	156
	TLK 40W/09	40092	2ft	47	0.88	Switchstart	30	590	38	156
	TL 40W/09	4009	4ft	103	0.43	Switchstart	25	1200	38	292
	TL 80W/09 (Note 2)	6580099	5ft	102	0.87	Switchstart	35	1500	38	360
	TL 100W/09 (Note 3)	850919	6ft	110	1.00	Switchstart	30	1764	38	451



### ACTINIC 03

\*W/10nm applies to TL 40W/03RS, and must be multiplied by the following factors for the other ratings.

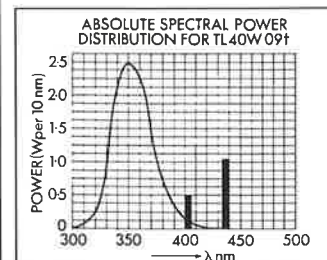
Catalogue No.	Factor
TL 20W/03T	0.4
TLADK 30W/03	0.45
TLK 40W/03	0.6
TLM 120W/03RS	2.2
TL 140W/03	2.5



### ACTINIC 05

\*W/10nm applies to MCFE 40W/05, and must be multiplied by the following factors for the other ratings.

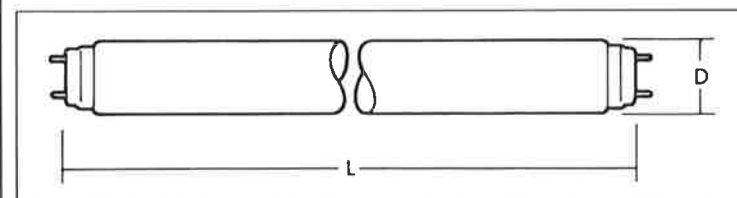
Catalogue No.	Factor
TL 4W/05	0.1
TL 6W/05	0.1
TLD 15W/05	0.3
TL 20W/05	0.4
TLADK 30W/05	0.45
TLK 40W/05	0.6
TL 65/80W/05	1.6 (65W circuit)
TLM 120W/05RS	2.2



### ACTINIC 09

\*W/10nm applies to TL 40W/09 and the following factors should be applied for other ratings.

Catalogue No.	Factor
TLD 15W/09	0.25
TL 20W/09	0.4
TLK 40W/09	0.6
TL 65/80W/09	1.9
TL 85/100W/09N	2.2



All data are averages, measured under standard conditions.

- Note 1 Measured after 2000 hours operation compared with output at 100 hours.
- Note 2 Measured in 80W circuit.
- Note 3 Measured in 100W circuit.
- Note 4 TLM...RS lamps—with 3V electrodes and internally-connected external strip, not to be earthed.

### TEMPERATURE DEPENDENCE

The output of these lamps is at a maximum when the temperature of the coldest part of the glass (usually central, underneath) is 40-50°C. In enclosed machines, it is usually necessary to employ forced-air cooling. This applies especially to the following high-loaded lamps:

#### 03 series

- TLADK 30W
- TLK 40W
- TLK 120/140W

#### 05 series

- TLADK 30W
- TLK 40W
- TLM 120W

#### 09 series

- TLK 40W/09

These ratings require special purpose ballasts for correct operation.

### Fluorescent UVA lamps with and without internal reflector.

Two families of UV-A lamps, primarily for cosmetic suntanning equipment, also suitable for photo-chemical processes (see also Actinic fluorescent lamps).

TYPE '10 have limited erythema effect and are used at higher intensities by more closely spacing in suntanning equipment than the '09 type.

'10 and '09 lamps should not be interchanged in equipment.

### '09, '09 Pink and '09 R-UVA Reflectorised

Emission is principally between 320 and 390 nm, in proportion 99.5% UV-A, 0.5% UV-B. The Pink versions have an equal effect.

Lamp spacing for suntanning equipment 60-85 mm.

### '10 R-UVA Reflectorised

Sharply peaked emission between 350 and 400 nm, in proportion 99.9% UV-A, 0.1% UV-B.

Lamp spacing for suntanning equipment 42-50 mm.

### Suntanning Exposure Monitoring

Excessive cumulative exposure to ultra-violet from the sun and from artificial sources can increase the risk of skin disorders. Whilst these lamps are designed to minimize the erythema (burning) effect of UV-B rays, users are nevertheless advised not to exceed the limits recommended for their particular equipment.

#### Note:

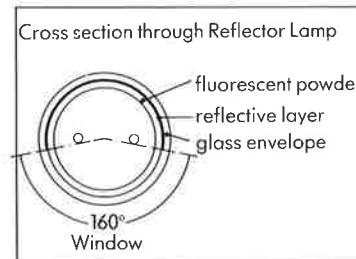
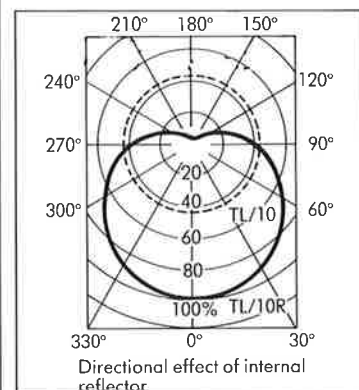
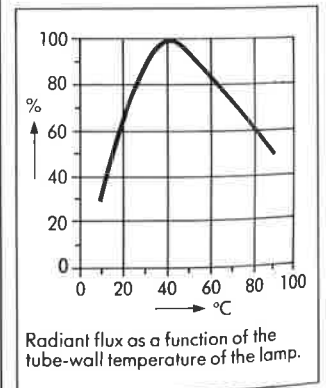
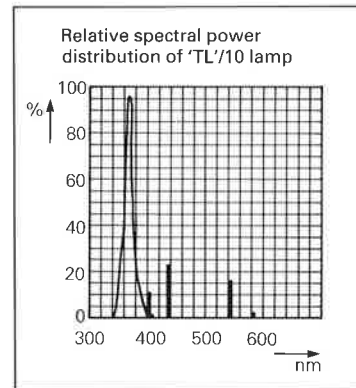
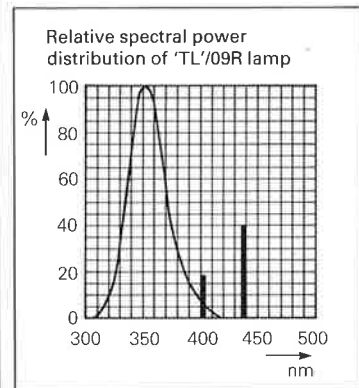
To comply with safety requirements it is recommended that a UV transmitting sheet, wire grid or louvre, be fitted to canopies.

### IMPORTANT: LAMP REPLACEMENT

The u.v. output from these lamps depreciates steadily through their life, but more noticeably during the first 100 hours of use. Recommended replacement times  
 '09 types ... 600 hours  
 '10 types ... 1000 hours  
 Suntanning equipment users should be advised to reduce exposure times by 30% immediately after replacement lamps are installed in their equipment.

ORDERING				TECHNICAL
	Order Short Code	Length	Type	UV Energy W (initial)
<b>Type 09</b> 38mm (1½") dia. '09				
TLW20W/09N	2009	2ft.		3.8
TL40W/09N	4009	4ft.		8.5
TLK40/09N	40092	2ft.		6.5
TL65-80W/09N	658009A	5ft.		20
TL65-80W/09W	658009P	5ft.	Pink	20
TL85-100W/09N	85109A	6ft.		23
TL85-100W/09W	8509PA	6ft.	Pink	23
38 mm R-UVA '09 Reflectorised				
TLK40W/09R	40092RA	2ft.	Ref.	6.0
TLK40W/09RW	40092RAP	2ft.	Ref./Pink	6.0
TL80W/09R	8009RA	5ft.	Ref.	16
TL80W/09RW	8009RAP	5ft.	Ref./Pink	16
TL100W/09R	10009RA	6ft.	Ref.	21
TL100W/09RW	10009RP	6ft.	Ref./Pink	21
26mm (1") dia. '09				
TLD15W/09N	1509	18in.		2.6
TL44D25/09N	200944	18in.		3.2
16mm dia. '09				
TL29D16/09N	1409	12in.		2.1
<b>TYPE 10</b> 38mm (1½") dia. '10				
TL140W/10	14010	5ft.		30
38mm dia. R-UVA '10 Reflectorised				
TLK40W/10R	40102RA	2ft.	Ref.	6.8
TL80W/10R	658010RA	5ft.	Ref.	18
TL100W/10R	10010RA	6ft.	Ref.	25

**Note 1:** All data are averages, measured under standard conditions.



**Temperature dependence**  
 For maximum u.v. output the coldest part on the tube wall should be at 40°C when tube temperature has stabilized in operation.

**PACKING QUANTITY AND ORDERING**  
 Sunlamps are packed in 25s. Please order in the form given in the following example:

50 Philips sunlamps  
 10009RP.



**CAUTION**

Certain lamps emit UV radiation and some may generate ozone.

Precautions must be taken in the design of process installations to avoid exposure for operatives and users (especially to skin and eyes).

All equipment manufacturers incorporating this lamp should provide instructions to users with warnings for avoidance or limitation of UV exposure as appropriate.

Users of UV equipment should carefully observe instructions for use provided by equipment manufacturers.

**CONTROL GEAR**

Spectral lamp ballast Type S9000 is required for all lamps in this range.

**PACKING QUANTITY AND ORDERING**

Please order lamps in the form given in the following example, in multiples of the packing quantity (4): 4 Philips spectral lamps 93104.

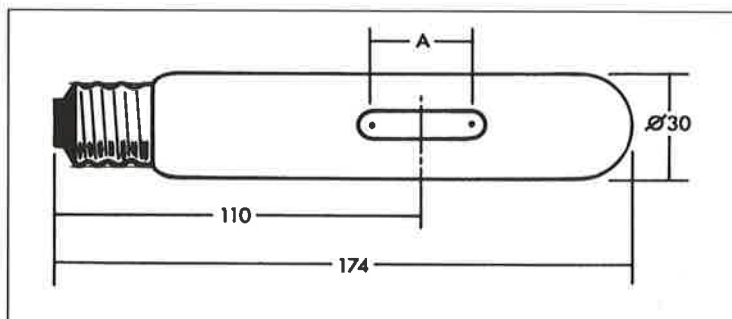
ORDERING	TECHNICAL				
Catalogue No.	Gas or vapour filling	Outer bulb	Wattage (W)	Useful arc length A (mm)	Main use (see below)
93123	Hg (low pressure)	Glass	12	38	1
93136	Hg (high pressure)	Glass	90	25	1
93162	Cd	Glass	16	24	1
103137	Zn	Glass	16	24	1
93145	Hg, Cd, Zn	Glass	75	24	1
93098	He	Glass	60	32	1
93099	Ne	Glass	20	27	1
93100	A	Glass	16	27	1
93101	Kr	Glass	11	27	1
93102	Xe	Glass	07	27	1
93122	Na	Glass	14	19	1
93104	Rb	Glass	08	33	1
93105	Cs	Glass	08	33	1
93103	K	Glass	10	33	1
93109	Hg (low pressure)	Quartz	12	40	2
93110	Hg (high pressure)	Quartz	90	25	2
93107	Cd	Quartz	16	24	2
93106	Zn	Quartz	16	24	2
93146	Hg, Cd, Zn	Quartz	75	24	2

**Main uses**

1. Primarily for investigations of visible spectra.
2. Primarily for investigations of UV spectra.

**Common characteristics**

Cap: ES  
 Lamp current: approx. 0.9A  
 Weight: 60g  
 Operating position: Any



# HLRG 400W HORTICULTURAL LAMP

**Caution: These lamps emit UV radiation**

All equipment manufacturers incorporating this lamp should provide instructions to users with warnings for limitation of UV exposure as appropriate.

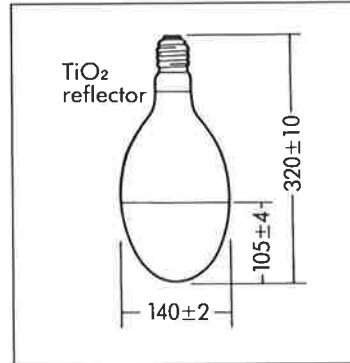
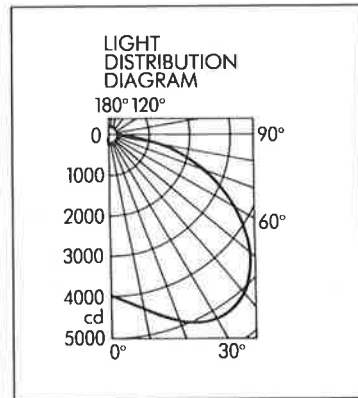
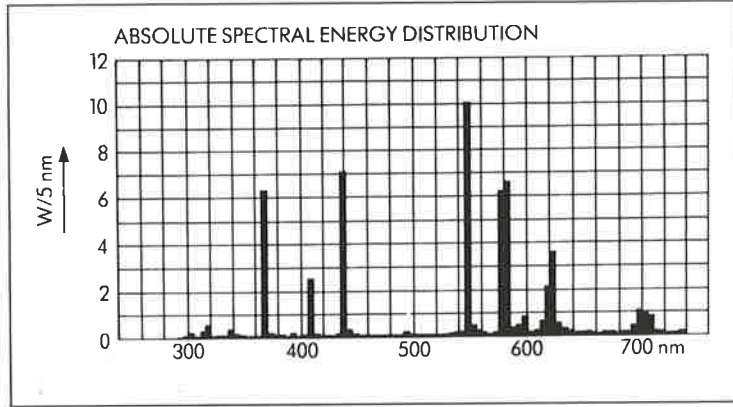
**PACKING QUANTITY AND ORDERING**

Please order lamps in the form given in the following example, in multiples of the packing quantity (6):

36 Philips horticultural lamps  
HLRG 400W.

ORDERING		TECHNICAL						
Catalogue No.	Luminous flux (Lm)* Note 1	Lamp Volts	Lamp Current (A)	Cap	Ballast	PFC Capacitor	Weight (g)	Depreciation Note 2
HLRG 400W	20,000	140 ± 10	3.2	GES	BHL400	L4025	380	15%

Note: (1) After 100 burning hours.  
Note: (2) After 5000 burning hours.



### FEATURES

Close tolerance assembly allows lamp replacement without disturbing optical performance.

High quality to provide maximum light output and life.

### Heavy Duty Range

Constructed to give greater resistance against vibration on heavy vehicles.

Service life expectancy 3 times more than standard lamps.

### RANGE

Headlight: 12V 45/40W, Duplo-D clear or cadmium yellow finish.

Side or tail: 12V, with wedge or MCC base.

Indicator: 12V, 3W or 1.2W with wedge base.

Auxiliary: 6V, 12V or 24V, with BA7s or MCC base.

Festoon: 6V, 12V or 24V, in ratings from 3W to 21W.

### STANDARDISATION

Philips vehicle lamps are manufactured and tested in accordance with:  
 BS6737: Dimensions, electrical and luminous requirements (IEC809)  
 BS6797: Performance requirements (IEC810) and their related Standards.

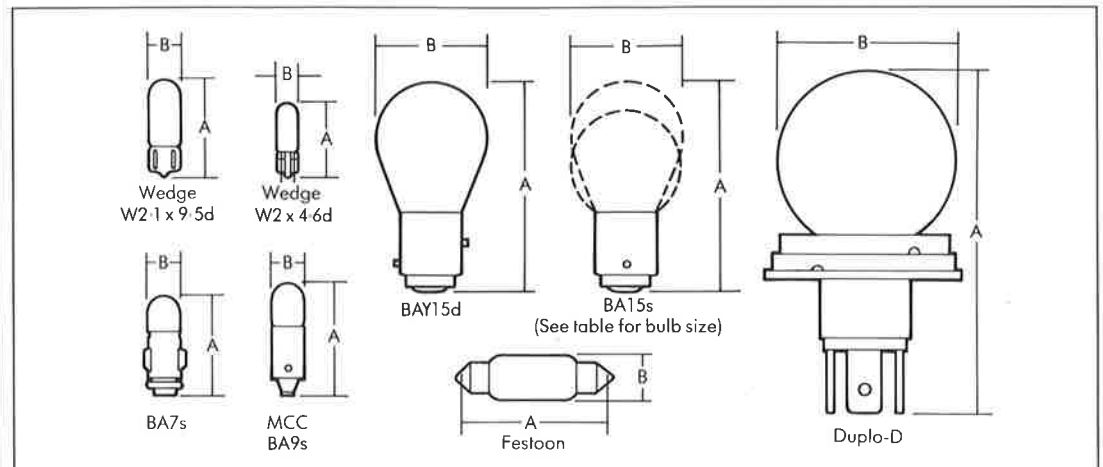
Lamp types which comply with ECE Regulation 37 are E-marked accordingly.

### PACKING QUANTITIES AND ORDERING

Please order in form given in the example, in multiples of the packing quantity.

200 Philips headlight lamps 12V 45/50W No. 411.

10 Philips auxiliary lamps 6V 0.6W No. 282.



## STANDARD RANGE

ORDERING				TECHNICAL				
U.K. Bulb No.	Catalogue No.	International Reference	Cap	Volts	Watts	Length A (Max) mm	Bulb Diameter $\phi$ (Max) mm	Average Life hours*
<b>Duplo-D Lamps</b>								
423	6620	R2	P45t	6	45/40	82	41.5	75/150
410	12620	R2	P45t	12	45/50	82	41.5	75/150
411	12620/865	R2	P45t	12	45/50	82	41.5	75/150
429	13620	R2	P45t	24	55/50	82	41.5	75/150
<b>Side or Tail Bulbs</b>								
501	12961	W5W	Wedge W2.1 x 9.5d	12	5	26.8	10.29	300
233	12929	T4W	MCC BA9S	12	4	27.4	8.8	300
380	12499	P21/5W	BAY 15d	12	21/5	46.5	26.5	150/1500
382	12498	P21W	BA 15s	12	21	46.5	26.5	150
207	12821	R5W	BA 15s	12	5	37.5	19	200
<b>Indicator Lamps</b>								
504	12256	W3W	Wedge W2.1 x 9.5d	12	3	26.8	10.29	1000
286	12516	—	Wedge W2 x 4.6d	12	1.2	20.0	5	1000
<b>Auxiliary Lamps</b>								
282	6828	—	BA 7s	6	0.6	20.7	6.8	200
28†	12829	—	BA 7s	12	2	20.7	6.8	200
287	6913	—	MCC BA9s	6	2	23.9	8.8	200
288	12913	—	MCC BA9s	12	2	23.9	8.8	200
289	13913	—	MCC BA9s	24	2	23.9	8.8	200
<b>Festoon Lamps</b>								
253	6844	C5W	Festoon SV8 5	6	5	36	11	200
256	12849	—	Festoon SV6	12	3	33	6.3	200
239	12844	C5W	Festoon SV8 5	12	5	36	11	200
272	12854	—	Festoon SV8 5	12	10	36	11	200
265	12866	—	Festoon SV8 5	12	10	41	11	200
267	12850	—	Festoon SV8 5	12	15	42	15.0	300
270	12807	—	Festoon SV8 5	12	18	42	15.0	75
273	12803	C21W	Festoon SV8 5	12	21	42	15.0	200
653	13844	C5W	Festoon SV8 5	24	5	36	11	300
<b>HEAVY DUTY RANGE</b>								
—	13342 HD	H4	P43t	24	75/70	60	—	†
—	13498 HD	P21W	BA 15s	24	21	45	26.5	†
—	13821 HD	R5W	BA 15s	24	5	30	19	†
—	13929 HD	T4W	BA 9s	24	4	27.4	8.8	†

\* Design voltages are 6.75, 13.5 and 28V.  
 † Service life expectancy 3 times more than Standard Lamps.  
 ‡ 5/86 indicates Cadmium Yellow finish.

For product description please see page 276

# HALOGEN AUTOBULBS

**RANGE**

**Single filament:** Types H1 (axial filament) and H3 (transverse filament), in 6V 55W, 12V 55W and 24V 70W versions.

**Double filament:** Types H4 12V 60/55W and 24V 75/70W, in clear or dichroic yellow versions.

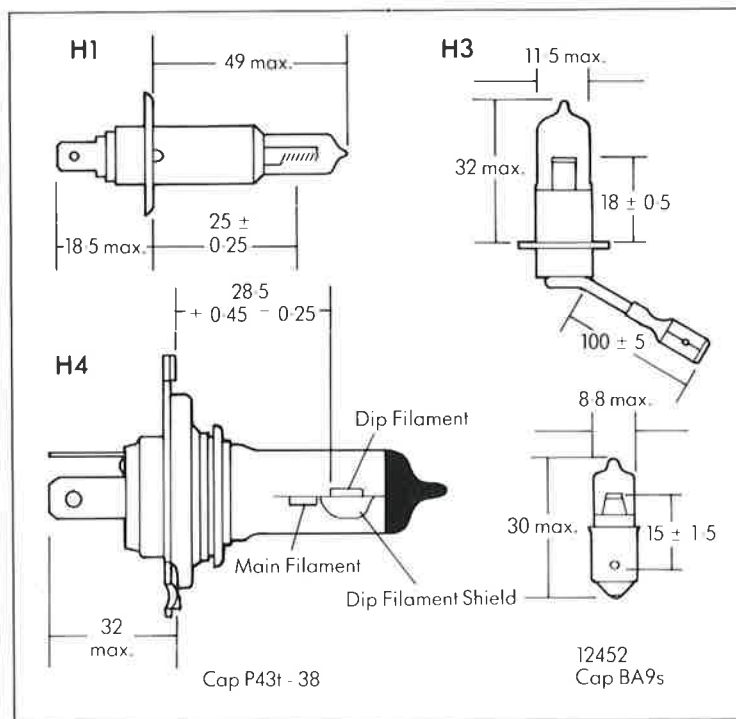
**Rally:** High power versions for use on closed circuits only.

**Miniature:** Type 12452, 12V 20W.

Type 12452 is suitable for any application where a miniature lamp with relatively high output is appropriate, including:  
 Reversing lights.  
 Fog rear warning lights.  
 Inspection lamps.  
 Moped headlights.  
 Portable lamps for camping.  
 Heavy-duty torches.  
 Instrument illumination in scientific instruments.

**FEATURES**

- Tungsten halogen regenerative cycle maintains high light output throughout rated life of lamp.
- Headlamp types are 'E' marked signifying approval for use in new vehicles, and assuring high standards of performance when used for service replacement purposes.
- Accurately constructed, with precise positioning of the filaments and dip shield, where appropriate, to ensure correct focus and beam control.



■ All products are of proven reliability.

■ Manufactured to International and EEC standards.

Miniature type 12452 is not internationally standardised.

**PACKING QUANTITY AND ORDERING**

Please order in the form given in the following example, in multiples of the packing quantity (10):

10 Philips H1 halogen autobulbs 6258.

**NOTES**

The test voltages chosen relate to the circuit volts of a lead-acid battery under full charge. Wattage, luminous flux and average life are measured at the test voltage.

**HANDLING:** If the quartz bulb has been handled, it should be cleaned with a solvent such as methylated spirits to remove traces of grease before lighting.

**SEAL TEMPERATURE:**

Precautions must be taken to ensure that the temperature of the quartz-metal seal does not exceed 350°C, though the bulb temperature must be greater than 250°C.

ORDERING								TECHNICAL			
	Description	Catalogue No.	Cap	Volts	Watts	Filament axis	Finish	Test Voltage*	Maximum Wattage*	Nominal luminous flux (lumens)*	Average life (hours)*
Standard	H1	12258	P14.5s	12	55	Axial	clear	13.2	68	1550	225
	H1	13258	P14.5s	24	70	Axial	clear	28	84	1900	225
	H3	6336	PK22s	6	55	Transverse	clear	6.3	63	1050	150
	H3	12336	PK22s	12	55	Transverse	clear	13.2	68	1450	225
	H3	13336	PK22s	24	70	Transverse	clear	28	84	1750	225
	H4	12342	P43t	12	60/55	Twin	clear	13.2	68/62	1650/1000	300/150
	H4	12342/86	P43t	12	60/55	Twin	Cadmium yellow	13.2	68/62	1650/1000	300/150
	H4	13342	P43t	24	75/70	Twin	clear	28	80/75	1900/1200	300/150
	H4	13342/86	P43t	24	75/70	Twin	yellow	28	80/75	1900/1200	300/150
Rally	-	12452	BA9s	12	20	Transverse	clear	13.2	20	400	100
	H1	12454	P14.5s	12	100	Axial	clear	13.2	-	-	100
	H2	12507	X511	12	100	Axial	clear	13.2	-	-	100
	H3	12455	PKY22s	12	100	Axial	clear	13.2	-	-	50
	H4	12569	P43T	12	100/90	Twin	clear	13.2	-	-	100/200
H4	12593	P43T	12	100/55	Twin	clear	13.2	-	-	100/200	

For product description please see page 277

# PHOTOGRAPHIC AND DARKROOM LAMPS CLASSES P1, P2 AND P3

## FEATURES

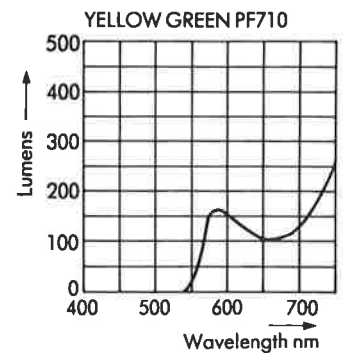
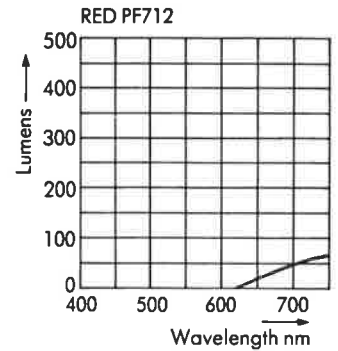
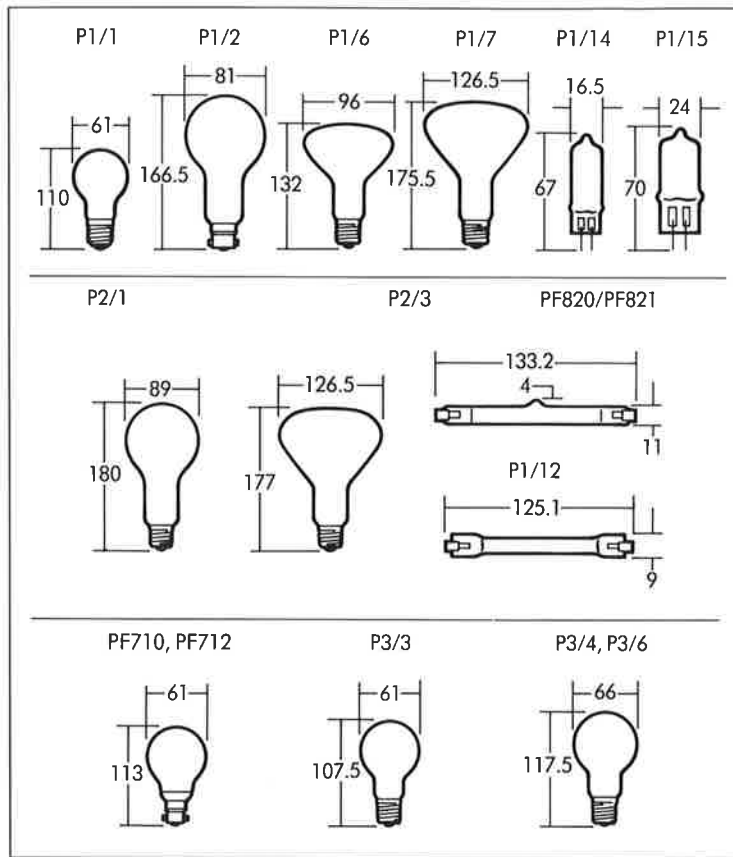
■ Photoflood (Photolita) and Photoparl (Argaphoto) lamps are available in pearl or reflector versions; the latter provide an efficient forward illumination without external reflector housings.

■ Tungsten halogen lamps maintain constant light output throughout their life.

■ The revolutionary PF820 and PF821 halogen lamps for cine and video lights operating with atmospheric pressure internally, to remove the risk of explosion in use.

■ Special opalising process for enlarger lamps ensures even illumination on the baseboard.

■ Darkroom safelight lamps PF710 and PF712 give no stray white light, also safe with variable-contrast paper.



Spectral output of darkroom lamps.

## NOTES FOR USER

**General:** Photographic lamp filaments are particularly brittle. Handle gently, and avoid vibration and jolts when alight. Lamps may be operated via dimmers or series/parallel switching while setting-up, to extend useful life.

If using Photoflood 3400K lamps with still colour film balanced for 3200K lighting it is advisable to fit a Kodak 81A filter or equivalent over the camera lens. For daylight colour film fit a Kodak 80B filter.

## PACKING QUANTITIES AND ORDERING

Please order in multiples of the packing quantity as shown in the table, in the form given in the following example:

25 Philips lamps Photolita P1/1 catalogue number PF207.

Description	ORDERING						TECHNICAL			
	L/F Number	Catalogue Number	Packing quantity	Cap	Watts	Volts	Film rating K	Finish	Average Life hours	Nominal Light output
Photoflood (Photolita)	P1/1	PF207	25	B22c/E27	275	240/250	3400	Pearl	3	7500lm
	P1/2	PF208	25	B22d/E27	500	240	3400	Pearl	6	1500lm
	P1/6	PF215	25	E27	375	240	3400	Reflector	4	1300*
	P1/7	PF218	9	E27	500	240	3400	Reflector	6	8000*
	Photoparl (Argaphoto)	P2/1	PF308	32	E27	500	240	3200	Pearl	100
P2/3		PF318	9	E27	500	240	3200	Reflector	100	3000*
Tungsten halogen	P1/12	PF801	72	R7s	1000	240/250	3400	Clear	10	33000lm
	P1/14	PF810	10/100	G6.35	650	240/250	3400	Clear	15	20000lm
	P1/15	PF811	10/100	G6.35	1000	240/250	3400	Clear	15	32000lm
	Movie	PF820	72	R7s	1000	240/250	3400	Clear	6	32000lm
	Video	PF821	72	R7s	500	240/250	3200	Clear	75	11000lm
Darkroom safelight	Yellow-green	PF710	50	B22d	15	240/250	N/A	Yellow-green	1000	N/A
	Dark red	PF712	50	B22d	15	240/250	N/A	Dark red	1000	N/A
Enlarger (Photocrescenta)	P3/3	PF603	50	B22d/E27	75	240	3200	Opalized	100	1150lm
	P3/4	PF605	50	B22d/E27	150	240/120	3200	Opalized	100	2500lm
	P3/6	PF607	50	B22d/E27	250	240	3400	Opalized	3	6500lm

\* Light output in centre beam candelas.

**NOTE**  
Other lamp types used in enlargers are included under 'Miscellaneous Projector Lamps' (see page 537).

# PROJECTION LAMPS CLASS A1

**RANGE**

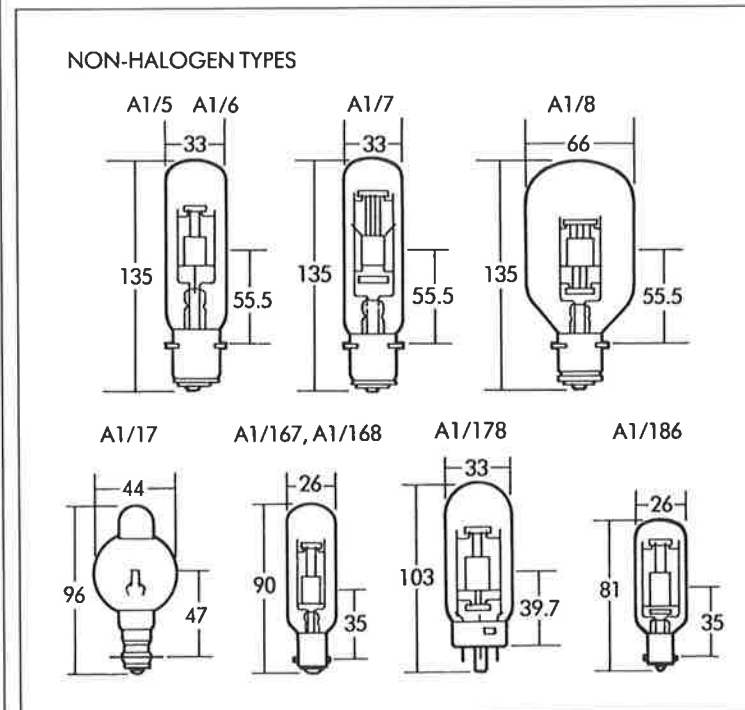
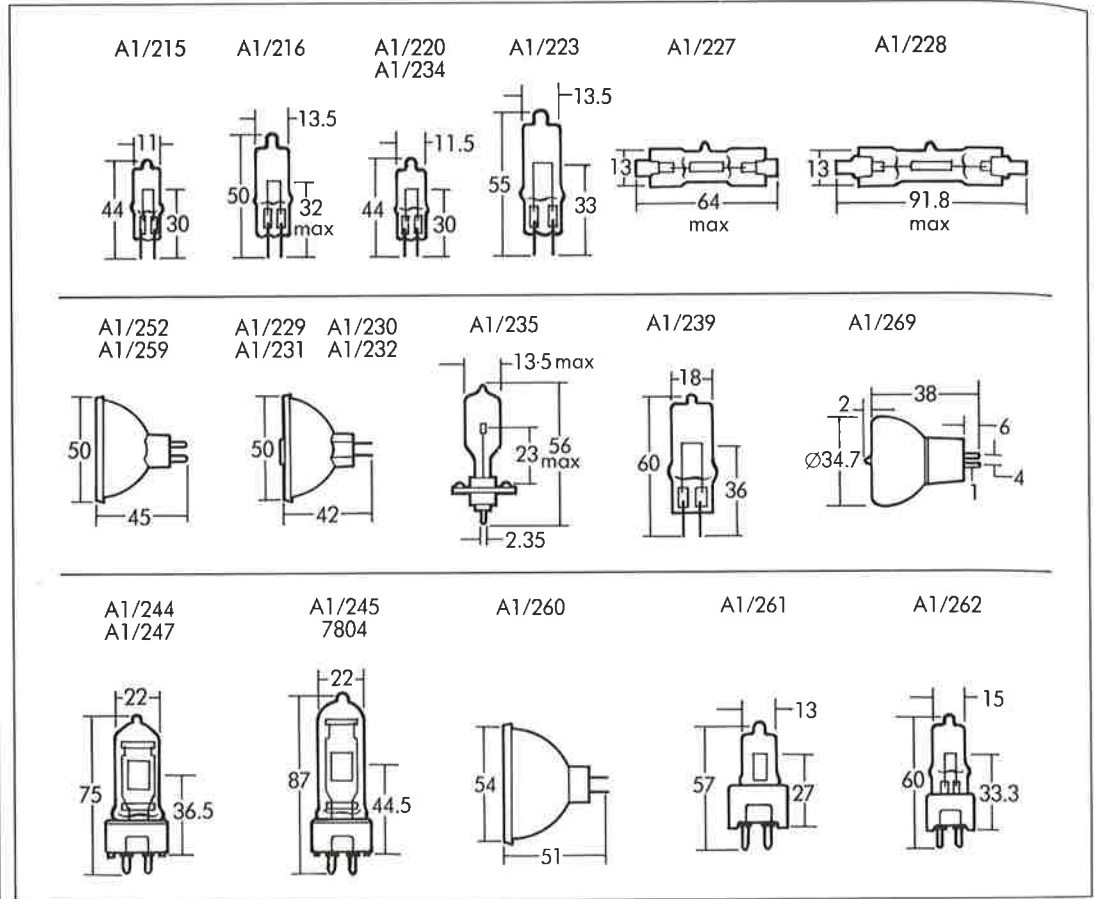
A comprehensive selection of popular halogen types for applications requiring constant high light output with colour temperature in the region of 3300K.

**FEATURES**

Accurately preset filament geometry ensures optimum performance in optical systems.

Exceptional uniformity and reliability in service.

Comply with IEC357 where applicable.



**ORDERING**

Please order lamps in the form given in the following example, quoting LIF Number, Catalogue Number, Wattage and Voltage, and in multiples of the packing quantities shown in the table:

50 Philips projector lamps A1/7, Catalogue No. 6152C, 500W, 240V.

# PROJECTION LAMPS CLASS A1

## HALOGEN TYPES

ORDERING					TECHNICAL			
LIF No.	Catalogue No.	Packing Quantity	Cap	Watts	Volts	Average Life (hrs)	Nominal Lumens	Operating position
A1/215	7023	10/100	GY6.35	100	12	50	3200	A
A1/216	7158	10/100	G6.35	150	24	50	5200	A
A1/220	7027	10/100	G6.35	50	12	50	1450	A
A1/223	7748S	10/100	G6.35	250	24	50	9000	A
A1/227	12216R	50	R7s	420	120	75	11500	Any
A1/228	12260R	50	R7s	600	120, 240/250	75	17000/15600	Any
A1/229	6847	50	GZ6.35	50	8	50	N/A	B
A1/230	6853	50	GZ6.35	75	12	50	N/A	B
A1/231	6834	50	GZ6.35	100	12	50	N/A	B
A1/232	6423	50	GZ6.35	150	15	50	N/A	B
A1/234	6550	10/100	G6.35	150	15	50	5000	A
A1/235	7763C	100	PG22d	250	24	50	8500	B
A1/239	7787	10/100	G6.35	400	36	50	14500	A
A1/244	7389	50	GY9.5	500	240/250	75	14500	Any
A1/245	7764	50	GY9.5	800	240/250	75	21500	A
A1/252	13164-EJL	50	G5.3	200	24	25	N/A	B
A1/259	13163-ELC	50	G5.3	250	24	35	N/A	B
A1/260	6604	50	GZ6.35	75	12	50	N/A	B
A1/261	5973	100	GY9.5	100	12	50	3000	A
A1/262	5974	100	GY9.5	150	24	50	5000	A
-	7804	10/100	GY9.5	900	220/230	50	(proximity)	A

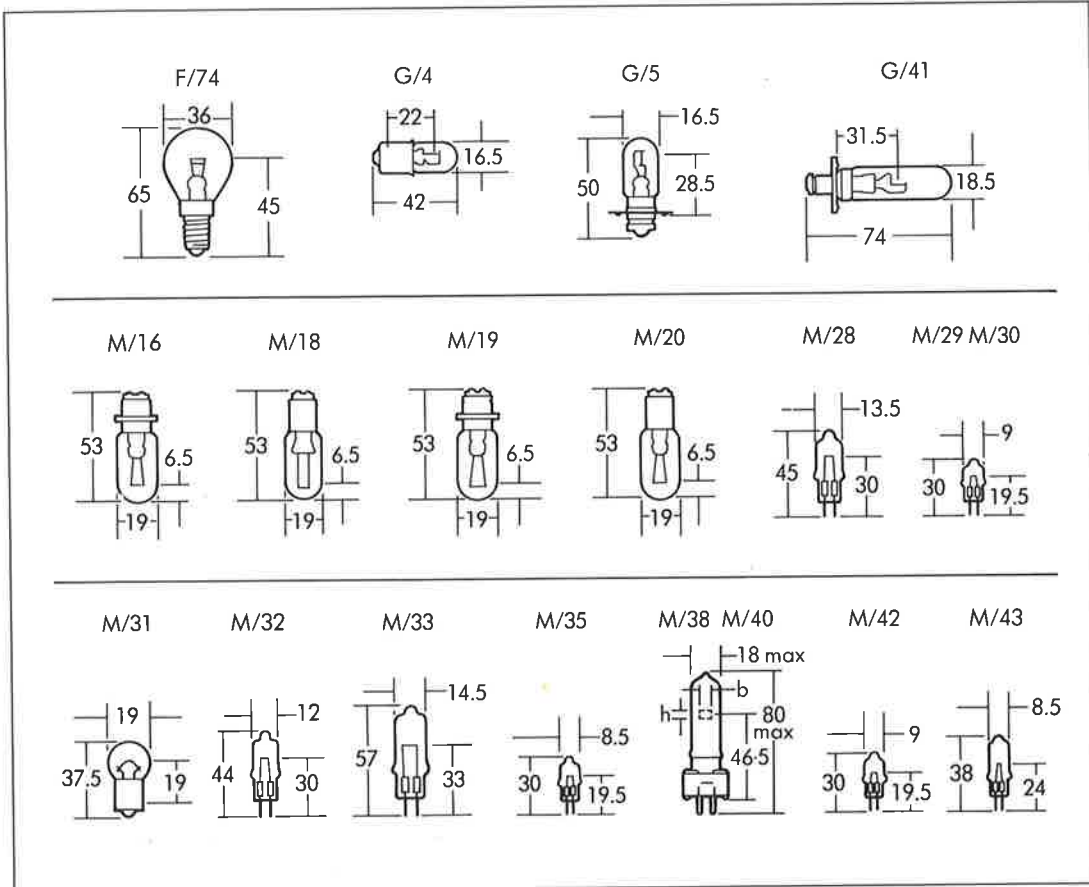
Operating position  
 A: Vertical cap down ± 90°  
 B: Vertical cap down ± 105°

## NON-HALOGEN TYPES

ORDERING					TECHNICAL			
LIF No.	Catalogue No.	Packing quantity	Cap	Watts	Volts	Average Life (hrs)	Nominal Lumens	Operating position
*A1/5	6070C	50	P28s	250	240	50	5200	D
*A1/6	6131C	50	P28s	300	240	25	6900	D
*A1/7	6152C	50	P28s	500	240	25	11400	D
*A1/8	375C	50	P28s	500	240	100	11000	E
*A1/17	13120C	50	P30s	50	8	25	N/A	D
*A1/167	1314N	50	BA15s	150	240	25	2700	D
A1/168	13141W	50	BA15d	150	240	25	2700	D
*A1/178	6280C	50	G17q	300	240	25	6900	D
A1/186	7238N	50	BA15s	100	12	25	2800	D

\* Will become non-stock types.  
 Operating position  
 D: Vertical cap down = 15°  
 E: Vertical cap down = 30°

# MISCELLANEOUS PROJECTOR LAMPS CLASSES F, G AND M



**RANGE**

F, G and non-halogen M types for use as replacement lamps in obsolete equipment. Miniature halogen types for micro viewers, readers and microscopes etc. Popular, internationally standardised types M/28, M/32 and M/330.

**LAMP APPLICATIONS**

**Types M/16, M/18, M/19, M/20** – These lamps have optically clear glass for operation cap-up, and like Class F lamps are often used for microprojection and microscope illumination.

**Types M/29 and M/30** – These miniature types give a relatively high output at about 3200K in a compact size.

**Type M/33** – This lamp is similar to type A1/233 but with a life of 300 hours is useful for discotheque projectors, microfilm readers, etc.

**Type M/35** – This lamp may be operated at 13.5V for use in boats or on motor vehicles.

**Type M/28** is specially designed to withstand traffic signal operating conditions.

**Type 13117** is specifically designed for experimental evaluation of solar collector devices.

**NOTE**

Additional halogen M types for display applications are listed as Halogen Display Lamps in the 'Reflector Lamps' section (please see page 477).

ORDERING					TECHNICAL					
LIF No	Catalogue No	Volts	Watts	Cap	Packing Quantity	Average Life (hours)	Nominal Lumens	T-type	Operating Position	Notes
F/74	6106M	6	30	E14	100	100	510	-	Any except within ± 45° vertical cap up	6
G/4	6142N	6	1.0 Amp	B15s	500	100	77	Tubular	Any	6
G/5	7210C	6	1.0 Amp	PX30s	50	100	80	Tubular	Vertical cap ± 45°	6
G/41	7251C	5	4.0 Amp	PX28s	50	1000	270	Tubular	Horizontal - 90°, -45°	6
M/16	13347C	6	15	PX22d	100	100	210	-	Any except within ± 45° vertical cap down	1,3
M/18	13702W	6	15	B15d	100	100	210	-	Any except within ± 45° vertical cap down	1,4
M/19	13702C	6	15	PX22d	100	100	210	-	Any except within ± 45° vertical cap down	1,4
M/20	13347W	6	15	B15d	100	100	210	-	Any except within ± 45° vertical cap down	1,3
M/28	7724	12	100	GY6.35	100	2000	2150	Tubular	Any	2
M/29	7387	6	10	G4	500	100	200	Tubular	Any	2
M/30	7388	6	20	G4	200	100	450	Tubular	Any	2
M/31	6814	6	10	B15s	500	200	115	Editor Lamp	Any	-
M/32	13512	12	50	GY6.35	100	3000	850	Tubular	Any	2,7
M/33	6958	24	250	G6.35	10/100	300	8400	Tubular	Vertical cap ± 90°	2
M/35	-	12	20	G4	100	250	450	Tubular	Any	-
M/38	6874P	240/250	300	GY9.5	10	2000	5100	Tubular	Any	-
M/40	6877P	240/250	500	GY9.5	10	2000	10,000	Tubular	Any	-
M/42	6605	6	10	G4	200	1000	140	Tubular	Any	2
M/43	5972	6	10	G4	200	300	150	Tubular	Any	2
Solar	13117	17	150	GX5.3	-	1000	-	-	Any	5

**NOTES**

- In this case, light centre length is measured from filament to crown of bulb
- Indicates a tungsten halogen lamp with quartz envelope
- Light output taken on axis of lamp
- Light output taken at right angles to lamp axis
- Special dichroic reflector
- Lamps not held in stock, minimum order quantity required
- Total burning time based on 30s on/off cycle

For product description please see page 282



# MISCELLANEOUS PROJECTOR LAMPS (MICROFILM READERS)

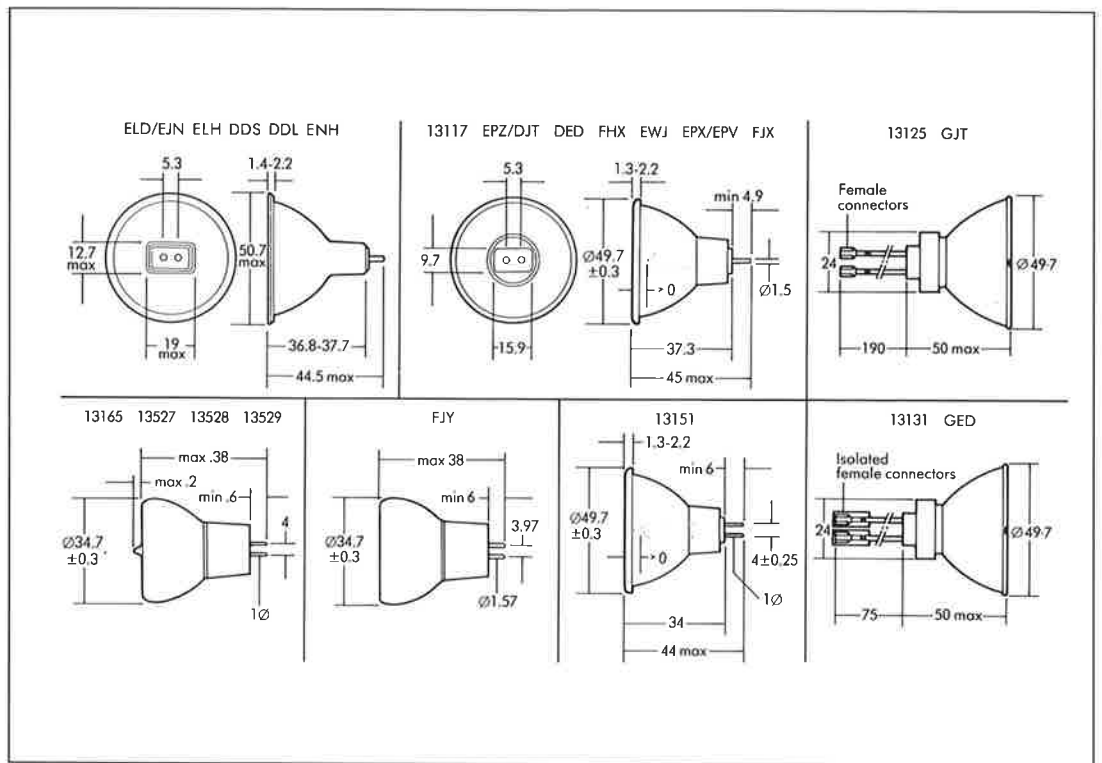
## LAMPS FOR MICROFILM READERS

The integral mirror lamps are individually focused in production to give superior performance in machines originally designed for American faceted mirror lamps. Philips improved optical design enables some types to take the place of two similar ANSI versions; e.g. type 13189 can replace American types EPZ or DJT.

The nominal focal distance shown is for design guidance. In practice, the working distance to the film aperture will be different, with a condenser lens used.

Types 13151 and 13139 may be used without a condenser lens, thereby reducing the optical length and increasing efficiency.

Types 13165 and 13139 are specially adapted ("switchproof") for photographic enlargers.



## ORDERING

Please order in the form given in the following example, quoting LIF No., Catalogue No., voltage and wattage and in multiples of the packing quantity as shown in table: 100 Philips projector lamps Type M/30, Catalogue No. 7388, 6V 20W.

ORDERING					TECHNICAL			
Catalogue No.	ANSI Codes	Volts	Watts	Base	Average Life (hours)	Nominal Focal Distance	Burning Position	Packing Quantity
13151	-	6.0	15	GZ4	500	100	Basedown ± 105°	50
13137	FHX	13.8	25	GX5.3	250	350	Basedown ± 105°	50
13075	EWJ	12.0	28	GX5.3	1000	350	Basedown ± 105°	50
13155	FJX	13.8	30	GX5.3	500	350	Basedown ± 105°	50
13189	EPZ/DJT	13.8	50	GX5.3	1000	350	Basedown ± 105°	50
13933	FML	13.8	50	GX5.3	1000	-	Basedown ± 105°	50
13125	GJT	13.8	50	Leads	1000	350	Basedown ± 105°	50
13139	-	12	75	GZ6.35	50	100	Basedown ± 105°	50
13194	DED	13.8	85	GX5.3	1000	350	Basedown ± 105°	50
13131	GED	13.8	85	Leads	1000	350	Basedown ± 105°	50
13186	EPX/EPV	14.5	90	GX5.3	500	30	Basedown ± 105°	50
13158	ELD/EJN	21.0	150	GX5.3	40 Note 1	30	Basedown ± 90°	50
13160	DDS	21	80	GX5.3	1000	165	Basedown ± 105°	50
13094	DDL	20	250	GX5.3	500	197	Basedown ± 105°	50
13095	ENH	120	250	GX5.3	175	142	Basedown ± 105°	50
13096	ELH	120	300	GX5.3	50	142	Basedown ± 105°	50

Note 1 500h on 17.5V.

## MINIATURE TYPES: 35mm CAP

ORDERING					TECHNICAL		
Catalogue No.	ANSI Codes	Volts	Watts	Base	Average Life (hours)	Nominal Focal Distance	Burning Position
13529	-	6	9	GZ4	250	α	Base down ± 105°
13528	-	6	15	GZ4	500	30	Base down ± 105°
13074	FJY	12	28	G3.9	1000	α	Base down ± 105°
13527	FJZ	13.8	30	GZ4	500	α	Base down ± 105°
13165	-	14	35	GZ4	50	21	Base down ± 130°

For product description please see page 282

# STUDIO AND THEATRE LAMPS CLASSES CP, T, P2, PAR AND MSR

## BIPLANE RANGE

Biplane lamps, illustrated below are compatible with existing halogen and conventional types in respect of light centre length and overall dimensions to permit direct replacement. (see Replacement Guide PL 4053 available on request).

## FEATURES

- Compact filament construction improves the efficiency of spotlights, notably in narrow beam luminaires, to produce useful gains in beam intensity.

- Same life expectancy as existing halogen 'monoplane' filament types.

- Internal proximity reflector types eliminate overheating, adjustment and dust problems associated with external spherical reflectors.

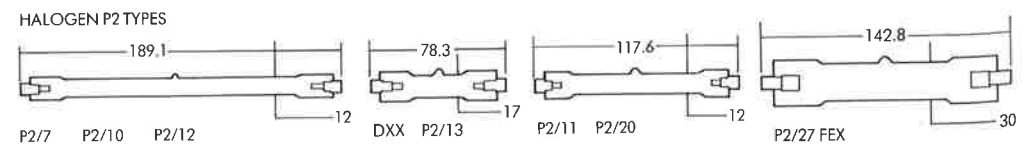
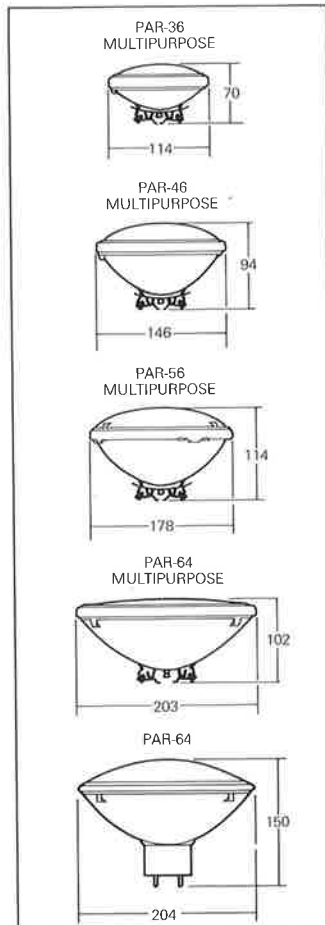
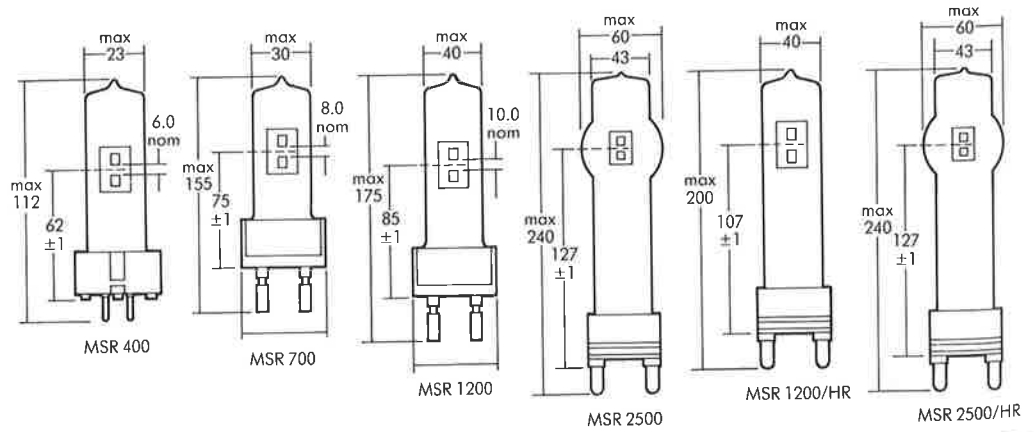
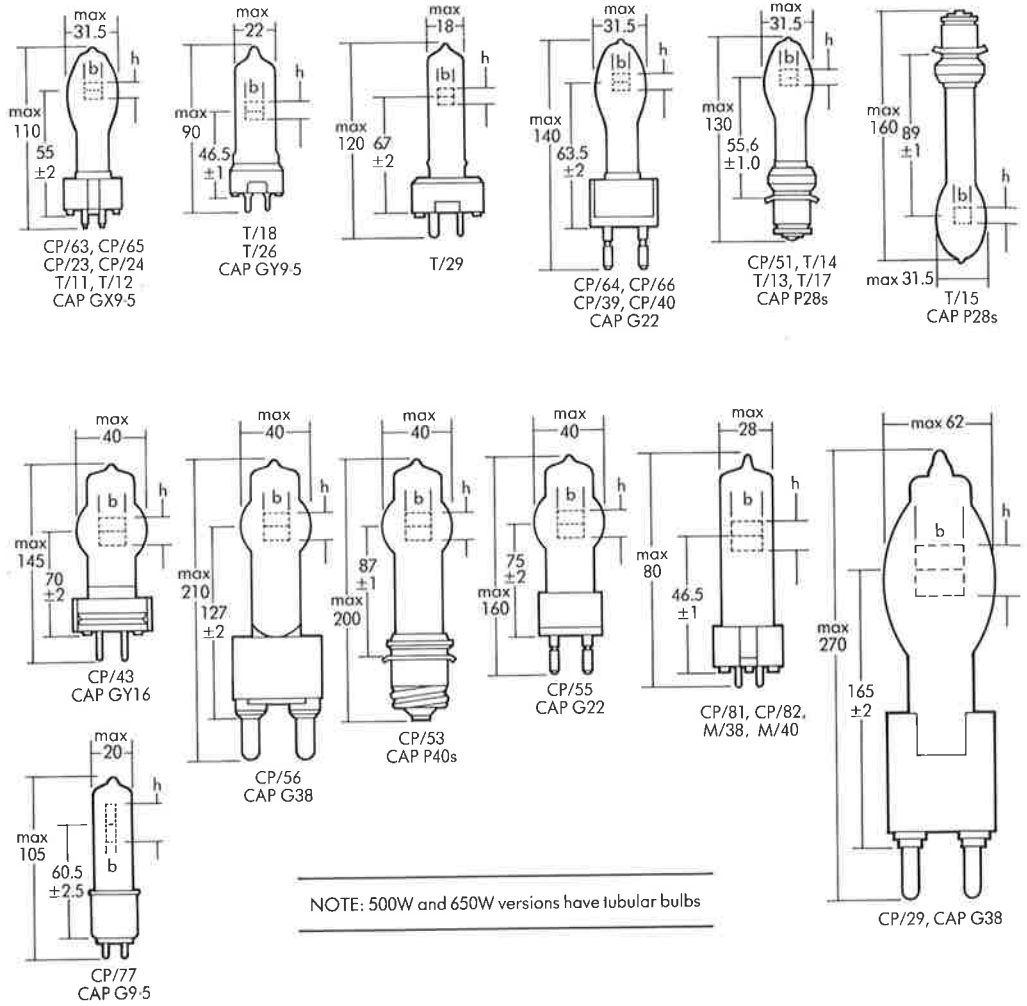
## LINEAR P2 RANGE

- Balanced for 3200K

- Sturdy Construction

## SPECIFICATION

Designed to comply with International specifications, where applicable.



# STUDIO AND THEATRE LAMPS

## CLASSES CP, T AND P2

### STUDIO LAMPS. CLASS 'CP' & THEATRE LAMPS CLASS HALOGEN

ORDERING				TECHNICAL					REPLACEMENT GUIDE	
Reference No.	Catalogue No.	Cap	Watts	Volts	Filament Area (bxh)	Nominal* Total (lumens)	Average Life (h)	Operating Position	Replaces Conventional Type	Biplane Type with Proximity Reflector
CP81	6872P	GY9.5	300	240	6 x 13	7800	150	Any		
CP82	6873P	GY9.5	500	240	8 x 18	13500	150	Any		
CP/23 (CP/67)	6993P	GX9.5	650	240	11 x 10	16500	100	VBD ± 90°		CP/65
CP/39 (CP/68)	6993Z	G22	650	240	11 x 10	16500	100	VBD ± 90°	CP/33	CP/66
CP/51 (CP/69)	6993C	P28s	650	240	11 x 10	16500	100	VBD ± 90°	CP/49	
CP/24 (CP70)	6995P	GX9.5	1000	240	11 x 15	25000	200	VBD ± 90°		CP/63
CP/40 (CP71)	6995Z	G22	1000	240	13 x 15	25000	200	VBD ± 90°	CP/44, CP/19	CP/64
CP/77	6983P-FEP	G9.5	1000	240	21*	26000	150	Any		
CP90	6895P	GX9.5	1200	240	16 x 14	30000	200	VBD ± 90°		
CP93	6895Z	G22	1200	240	16 x 14	30000	200	VBD ± 90°		
CP/43 (CP/72)	6994P	GY16	2000	240	19 x 19	50000	300	VBD ± 90°		
CP/53 (CP74)	6994C	P40S	2000	240	19 x 19	50000	300	VBD ± 90°	CP/28	
CP55 (CP75)	6994Y	G22	2000	240	19 x 19	50000	300	VBD ± 90°		
CP56 (CP73)	6994Z	G38	2000	240	19 x 19	50000	300	VBD ± 90°	CP/34, CP/42, CP/12	
CP91	6894Y	G22	2500	240	20 x 21	63750	400	VBD ± 90°		
CP94	6894Z	G38	2500	240	20 x 21	63750	400	VBD ± 90°		
CP29 (CP/85)	6963Z	G38	5000	240	26 x 26	135000	300	VBD ± 90°	CP/35, CP/13	
CP/65	6999P	GX9.5	650	240	11 x 10	(proximity)	100	VBD ± 90°		
CP/66	6999Z	G22	650	240	11 x 10	(proximity)	100	VBD ± 90°		
CP/63	6984P	GX9.5	1000	240	11 x 14.5	(proximity)	150	VBD ± 90°		
CP/64	6984Z	G22	1000	240	11 x 14.5	(proximity)	150	VBD ± 90°		
T17 (T24)	6800C	P28S	500	240	11 x 11	9500	750	VBD ± 90°	T/1 (T/7)	
T18 (T25)	6820P	GY9.5	500	240	11 x 11	11000	300	VBD ± 90°		
T12 (T21)	6998P	GX9.5	650	240	11 x 12	13000	750	VBD ± 90°		
T13 (T22)	6998C	P28S	650	240	11 x 12	12600	750	VBD ± 90°		
T26 (T27)	6823P	GY9.5	650	240	11 x 13	14500	500	VBD ± 90°		
T14 (T20)	6996C	P28S	1000	240	15 x 13	21000	750	VBD ± 90°	T/6	
T15 (T23)	6997C	P28S	1000	240	15 x 13	21000	750	VBD ± 90°	T/4	
T11 (T19)	6996P	GX9.5	1000	240	15 x 13	21000	750	VBD ± 90°		
T29	6897P	GX9.5	1200	240	16 x 14	27600	400	VBD ± 90°		

\* Linear filament

### STUDIO LAMPS CLASS P2: LINEAR HALOGEN TYPES

ORDERING				TECHNICAL				
Reference No.	Catalogue No.	Cap	Watts	Volts	Filament Length	Nominal Total Lumens	Average Life (h)	Operating Position
P2/7	13989R	R7s	1000	240	120	26000	200	Any
P2/10	7775R16	R7s	650	240	120	15625	150	Any
P2/11	13477R	R7s	800	240	68	21600	150	H ± 4°
P2/12	6358R	R7s	1250	240	120	33750	200	H ± 4°
P2/13 (DXX)	13162	R7s	800	240	21	21600	75	H ± 4°
P2/20	7786R	R7s	1000	240	70	27000	300	H ± 4°
P2/27 (FEX)	13134R	R7s	2000	240	50	50000	250	H ± 15°

#### PACKING QUANTITIES AND ORDERING

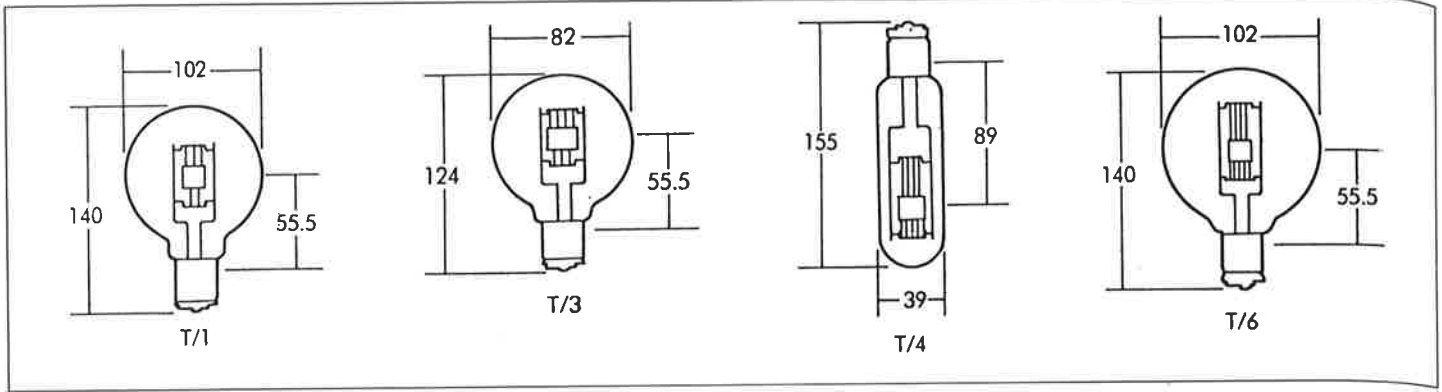
Please order in multiples of the packing quantity, as shown in the price list, in the form given in the following example, quoting lamp references and Philips type number:

72 Philips lamps P2/7 type 13989R

#### OPERATING POSITIONS

VBD – Vertical, base down.  
 VBU – Vertical, base up.  
 Operating angles refer only to orientation in a plane which is at right angles to the filament plane.

# THEATRE LAMPS CLASS T HALOGEN, PAR AND MSR



## THEATRE LAMPS, CLASS 'T': HALOGEN TYPES

ORDERING				TECHNICAL				
Reference No.	Catalogue No.	Cap	Watts	Volts	Filament Area (b x h)	Nominal* Total (Lumens)	Average Life (h)	Operating Position
T1	559C	P28s	500	240	17 x 13	10000	200	VBD ± 45°
T3	558C	P28s	250	240	16 x 8	4000	200	VBD ± 45°
T4	6291C	P28s	1000	240	14 x 14	22000	200	VBV ± 15°
T6	7401C	P28s	1000	240	14 x 14	22500	200	VBD ± 75°

## PAR PRESSED GLASS LAMPS

ORDERING				TECHNICAL				
Reference No.	Description	Cap	Watts	Volts	Initial PK Intensity - Candelas	Average Life Hrs	Operating Position	Colour Temperature
4405	PAR 36	M-P	30	12.8	50,000	100	Any	2800K
4505	PAR 36	M-P	50	28.0	45,000	400	Any	2800K
4509X	PAR 36	M-P	100	13.0	110,000	25	Any	
4515	PAR 36	M-P	30	6.4	55,000	100	Any	2800K
4435	PAR 46	M-P	30	12.8	45,000	300	Any	2800K
4535	PAR 46	M-P	30	6.4	95,000	100	Any	2800K
4545	PAR 56	M-P	100	12.0	240,000	100	Any	2800K
4559	PAR 64	M-P	600	28.0	600,000	25	Any	2800K
Q4559	PAR 64	M-P	600	28.0	600,000	100	Any	2800K
Q4559X	PAR 64	M-P	600	28.0	765,000	100	Any	2800K
FFN	PAR 64	M-P	1000	120	400,000	800	Any	3200K
FFP	PAR 64	M-P	1000	120	330,000	800	Any	3200K
FFR	PAR 64	M-P	1000	120	125,000	800	Any	3200K
FFS	PAR 64	M-P	1000	120	40,000	800	Any	3200K

## MSR/MEDIUM SOURCE RARE EARTH LAMPS

ORDERING			TECHNICAL							
Reference No.	Cap	Watts	Lamp Volts	Lamp Current	Arc Length (mm)	Initial Lumens	Luminous Efficacy (lm/W)	Colour Rendering Index	Range of Average Life Hours (1)	Burning Position
MSR 400	GX9.5	400	67	6.9	6	30,000	75	92	500-200	Any
MSR 700	G22	700	72	11.0	8	56,000	80	95	750-200	Any
MSR 1200	G22	1200	100	13.8	10	110,000	91	95	750-200	Any
MSR 2500	G38	1500	115	25.6	14	240,000	96	95	500-200	Any
MSR 700 HR	G38	700	72	11.0	8	56,000	80	95	750-200	Any
MSR 1200 HR	G38	1200	100	13.8	10	110,000	91	95	750-200	Any
MSR 2500 HR	G38	2500	115	25.6	14	240,000	96	95	750-200	Any

Note (1): Based on an operating cycle 3 hrs on/1 hr off to 15 mins on/15 mins off.

### DESCRIPTION - PAR LAMPS

- Compact Light Sources
- High Lumen Output
- Excellent Colour Rendering
- Constant performance from lamp to lamp
- Internal Fuse Mechanism

### DESCRIPTION - MSR LAMPS

- Colour temperature 5600K, slightly below the black body line, in order to match film sensitivity.
- High luminous efficacies, between 75 and 96 lm/W.
- Axial arc with single-ended lamp base giving optimum efficiency in optical systems.
- Dimmable to 40% of lamp power with constant colour temperature.
- Universal burning position.
- Restrike time between 5 and 10 minutes, depending on cooling conditions or Hot Restrike with /HR Lamps.
- Light centre length, tolerance only ± 1mm.

# GENERAL DATA

## PHOTOGRAPHIC, PROJECTION, STUDIO and THEATRE LAMPS

### TEMPERATURE LIMITS OF HALOGEN LAMPS

Overheating of the 'pinch' seal and quartz bulb will lead to early failure and can cause the lamp to shatter.

	Rated life		
	< 15h	15-300h	> 300h
Max pinch temp:	450°	400°	350°

Bulb temps: max 900°, min 250°.

### HANDLING

Do not touch the quartz bulb with bare hands, as finger marks leave permanent indelible brown stains. Clean with methylated spirits if inadvertently handled. Avoid jolting or vibrating lamps while operating.

It is advisable to remove lamps when transporting luminaires.

Observe luminaire manufacturer's limitations regarding adjustment and tilt as lamps can otherwise quickly overheat and fail.

### FUSING

It is important to ensure that halogen lamps are protected by the correct HBC fuse to reduce the risk of shattering due to internal arcing at the instant of filament rupture.

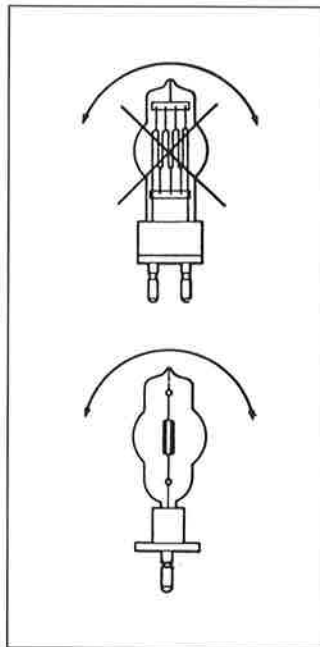
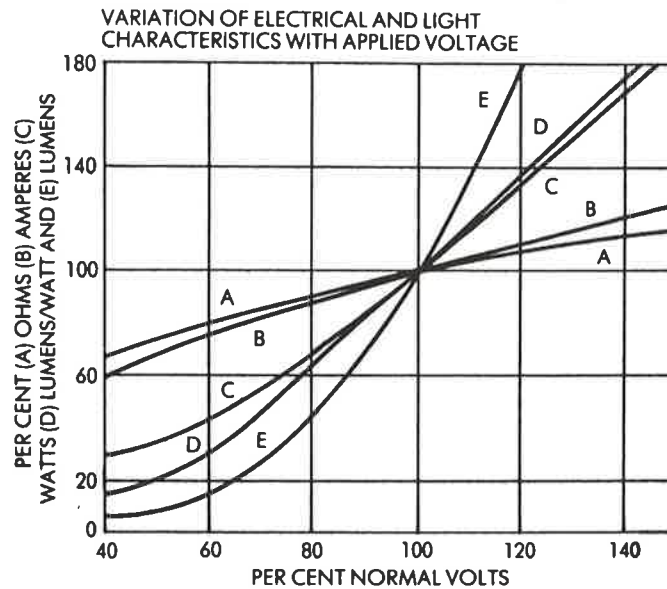
Lamp Watts	500/650	800/1250	1.5 kW	2kW	5kW
HBC Fuse (UK)	4A	6A	10A	30A	

These fuse ratings are for 240/250V lamps only.

### SAFETY

Halogen lamps are pressure-filled and can shatter in use if overheated, incorrectly fused, damaged or operated above the rated voltage. It is advisable to shield these lamps wherever possible for safety reasons.

Figure 2 CURVE 1



### OPERATING POSITIONS

Life expectancy may be reduced if lamps are operated in attitudes other than recommended burning positions.

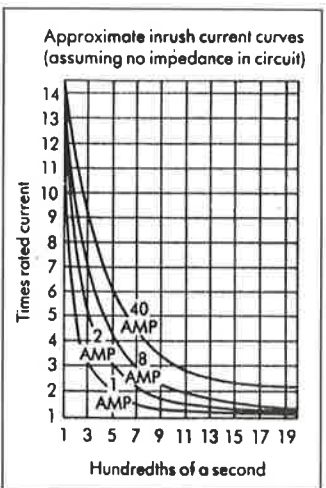
### EFFECT OF VOLTAGE VARIATION ON LAMP LIFE

These curves are based on averages of many lamps, and can only be used as an approximate guide to performance.

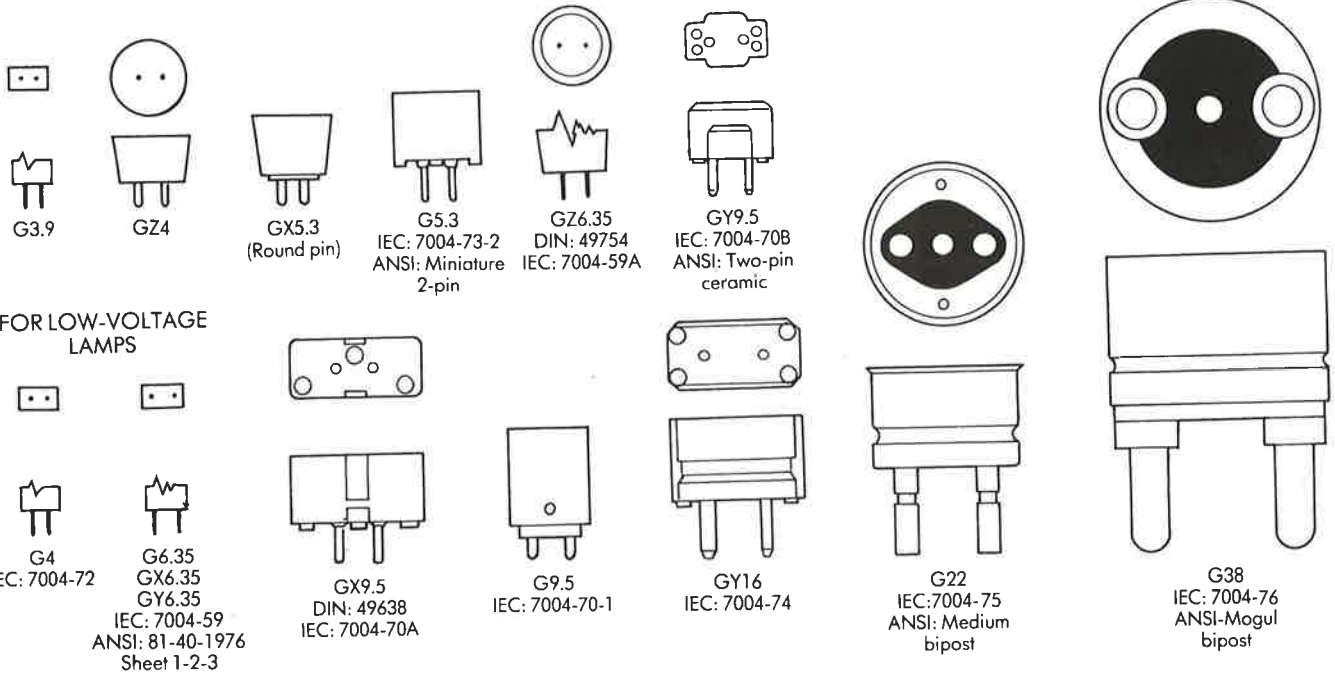
Photographic and projection lamp filaments operate close to the melting point of tungsten. Over-volting will cause very early failure.

Continuous operation at reduced voltage or over-cooling can cause failure of filament legs due to improper halogen cycle action.

Rapid switching or over-volt peaks can cause the filament to melt due to arcing.

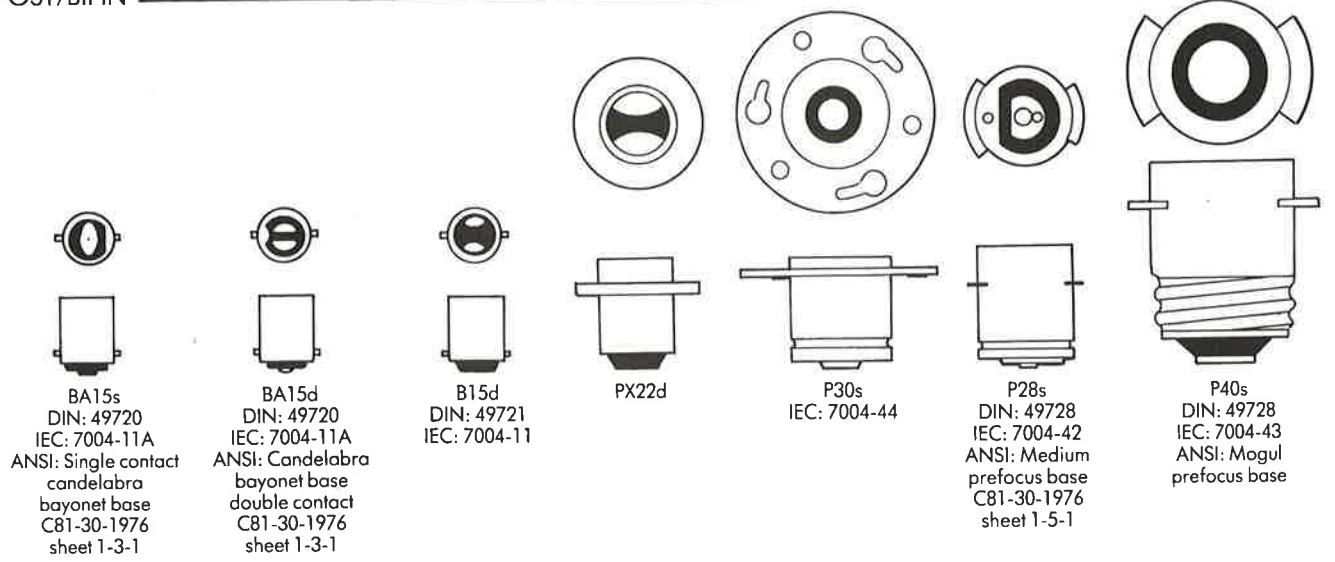


# GENERAL DATA LAMP BASES

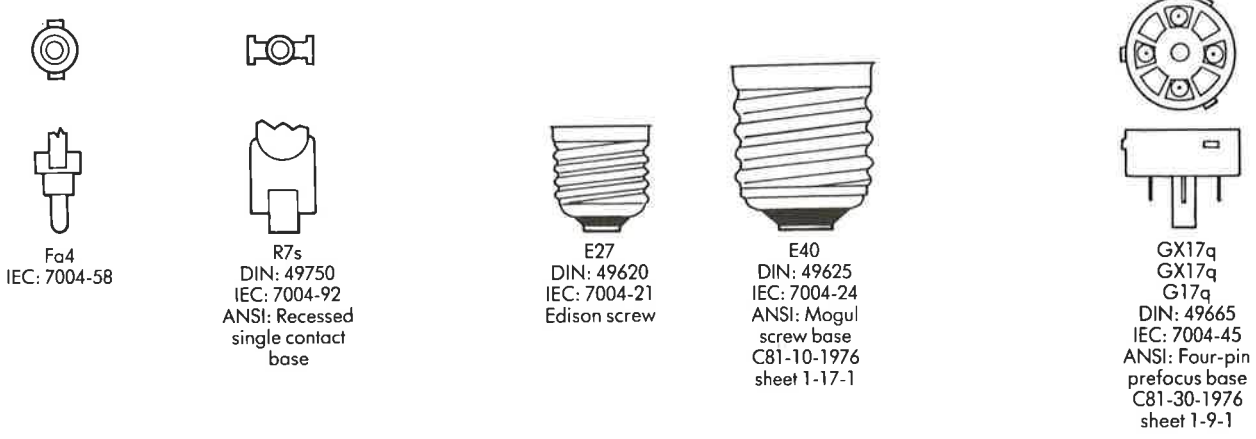


**FOR LOW-VOLTAGE  
LAMPS**

**BIPOST/BIPIN**



**PREFOCUS/BAYONET**



**FOR DOUBLE ENDED LAMPS**

**SCREW CAP**

**VALVE BASE**

## FEATURES

■ Clear, striking, colour coding provides easy distinction of the four ranges:

- Normal – Blue and black
- Extra – Red and black
- Super – All black
- Greenline – Black and green
- Alkaline – Black and Bronze
- Walkaline – All green
- Fotoflash – All gold

■ Superior construction for prevention of leakage and for long life with extra robust steel jacket.

■ Every battery is double checked for charge retention.

■ Complies with International Standard IEC86, and exceeds the performance requirements of the Standard.

■ Both Normal and Extra types have good recuperation capacity, so life is increased with intermittent use.

■ Greenline types contain no mercury – not only are they environmentally friendly but they are 10% more powerful than Super types.

■ Alkaline types have a high efficiency at high current drains over long periods without recuperation.

■ Alkaline batteries operate at temperatures as low as -20°C.

■ Open date coded to show extent of available shelf life.

## PACKAGING QUANTITIES

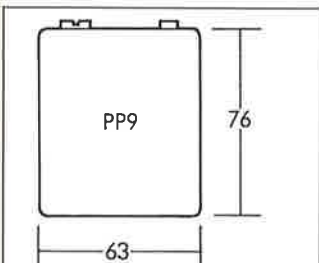
Most batteries are available loosely packed in trays, or blister-packed for retail sale.

Trays and blister packs are themselves supplied in outer cartons.

Please see table for quantities in each type of pack: note that 'outer' quantity shows number of batteries, not number of packs.

## ORDERING

Please order in multiples of the outer carton quantity, specifying the pack required, in the form given in the following example: 120 Philips blister pack batteries R6N



Extra – 6F100E

## ORDERING

Catalogue number	Replaces	Voltage	Traypack tray	Outer	Blister pack	Outer
<b>NORMAL</b>						
R20N	R20B	1.5	25	200		
R14N	R14B	1.5	25	200		
R6N	R6B	1.5	40	480		
<b>EXTRA</b>						
R20E	HP2	1.5	25	200	2	60
R14E	HP11	1.5	25	200	2	60
R6E	HP7	1.5	40	480	4	120
6F22E	PP3-P	9.0	10	150	1	30
3R12E	1289	4.5	20	120	1	30
4R25E	PJ996	6.0	—	20	—	—
6F100	PP9	9.0	—	24	—	—
<b>GREENLINE</b>						
R20G	—	1.5	—	—	2	24
R14G	—	1.5	—	—	2	24
R6G	—	1.5	—	—	4	48
<b>SUPER.</b>						
R20S	R20PP	1.5	25	200	2	60
R14S	R14PP	1.5	25	200	2	60
R6S	R6PP	1.5	40	480	4	120
6F22S	—	9.0	10	150	1	30
<b>ALKALINE</b>						
LR20	MN1300	1.5	25	200	2	24
LR14	MN1400	1.5	25	200	2	24
LR6	MN1500	1.5	40	200	4	120
LR6	MN1500	1.5	—	—	2	60
LR03	MN2400	1.5	50	500	4	48
LR1	MN9100	1.5	50	500	2	60
6LR61	MN1604	9.0	10	150	1	20
<b>FOTOFLASH</b>						
LR6	MN1500	1.5	—	—	4	120
LR03	MN2400	1.5	—	—	4	120
<b>WALKALINE</b>						
LR6	MN1500	1.5	—	—	4	120
LR03	MN2400	1.5	—	—	4	120

APPLICATIONS	Intermittent use	Intensive use
1. Long Life Applications: eg Calculators, remote control, flash guns, test equipment.	Super/ Greenline	Alkaline
2. Motorised Equipment: eg Tape recorders, toys, cine cameras	Super/ Greenline	Alkaline
3. Lower Power Equipment: eg Clocks, computer games, torches, portable radios, emergency lights, shavers, toys	Extra	Super/ Greenline
4. Low Drain Uses: eg Torches, clocks	Normal	Extra

Normal – R6N	Extra – 6F22E	Alkaline – LR1
Extra – R6E	Super – 6F22S	
Super – R6S	Alkaline – 6LR61	
Greenline – R6G		
Alkaline – LR6		
Walkaline – LR6		
Fotoflash – LR6		

Alkaline – LR03  
Walkaline – LR03  
Fotoflash – LR03

Normal – R14N  
Extra – R14E  
Super – R14S  
Greenline – R14G  
Alkaline – LR14

Normal – R20N  
Extra – R20E  
Super – R20S  
Greenline – R20G  
Alkaline – LR20

Extra – 4R25E

Extra – 3R12E

# RECHARGEABLE BATTERIES AND CHARGER

## FEATURES

### Batteries

■ Rechargeable up to 1,000 times in Philips universal charger to enable equipment to be maintained in constant use.

■ Exceptionally economical source of battery power compared with zinc-carbon and alkaline equivalents.

■ Bold, blister-packed appearance encourages customer pick-up.

■ Full QDL quality approval.

■ High performance to permit use in most radios, cassette recorders, video cameras, photographic equipment, toys and torches.

### Charger

■ Universal – accepts all of the Philips range of rechargeable batteries except for RO3 which requires an adaptor type PNAOR.

■ Electronic timer with LED indicator eliminates possibility of overcharging.

■ Polarity reverse and overcurrent protection.

■ Fully recharges batteries in 8–14 hours, depending on type.

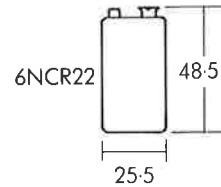
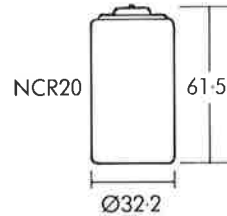
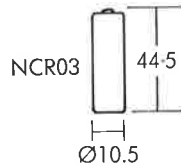
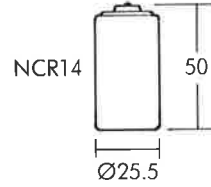
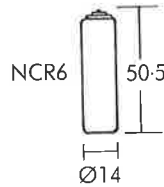
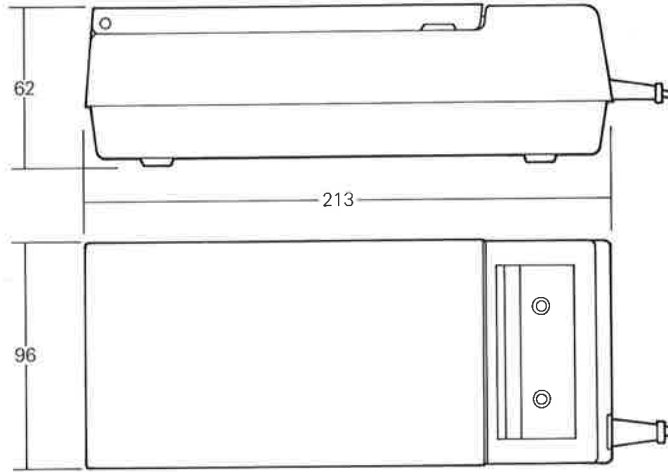
■ Approved to European Standards.

■ Normal 240V 50Hz operation.

## ORDERING

Catalogue No.	Replaces	Voltage	Discharge Rate (mAh)	Blister Pack	Outer
Batteries:					
NCR20	HP2	1.5	1200	2	24
NCR14	HP11	1.5	1200	2	24
NCR6	HP7	1.5	500	2	24
NCR03	LR03	1.5	180	2	24
6NCR22	PP3-P	9.0	75	1	12
Charger:					
PNC200	—	—	8–14 hrs*	1	1
PNAOR Adaptor	—	—	—	2	48

\* Recharge cycle, depending on battery type.



## PACKING QUANTITY

All batteries except 6NCR22 are blister-packed in twos, in outer cartons of 24. 6NCR22 is individually blister-packed, in outer cartons of 12. Charger is individually blister-packed, in outer carton of 1.

## ORDERING

Please order in multiples of the outer carton quantity, in the form given in the following example: - 96 Philips batteries NCR20 5 Philips chargers PNC200



**RANGE**

<b>Alkaline</b>	LR43
	LR44
	LR54
	4LR44
<b>Mercury</b>	MR9
	MR44
<b>Silver Oxide</b>	SR41
	SR43
	SR44
	4SR44
	SR48
	SR54
	SR55
	SR58
	SR59
SR60	
<b>Lithium</b>	CR2016
	CR2032

**PACKING QUANTITY AND ORDERING**

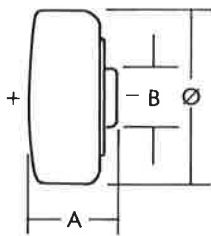
All mini cells are individually blister packed and supplied in transparent trays.

Please order in multiples of the tray quantity, quoting type required, in the form given in the following example;

20 Philips lithium mini cell batteries CR2032.

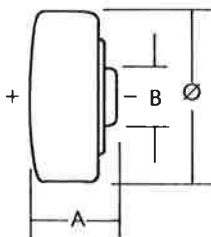
**LR43**

	max.	min.
A	4.2	3.8
B		3.8
Ø	11.6	11.25



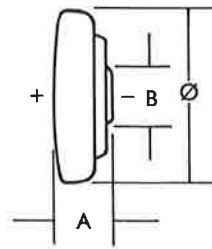
**LR44**

	max.	min.
A	5.4	5.0
B		3.8
Ø	11.6	11.25



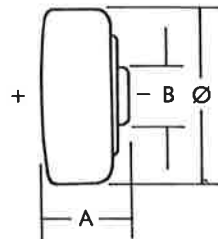
**LR54**

	max.	min.
A	3.05	2.75
B		3.8
Ø	11.6	11.25



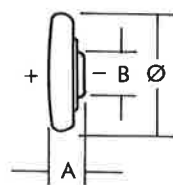
**MR44**

	max.	min.
A	5.4	5.0
B		3.8
Ø	11.6	11.25



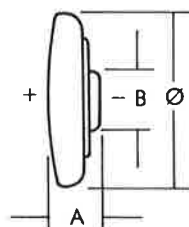
**SR41**

	max.	min.
A	3.6	3.3
B		3.8
Ø	7.9	7.55



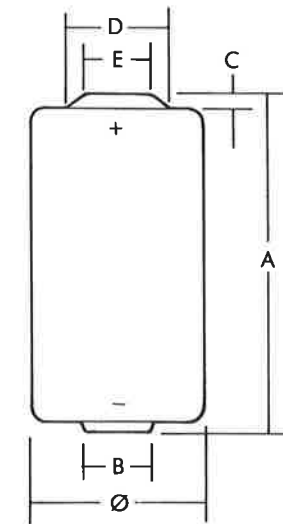
**SR43**

	max.	min.
A	4.2	3.9
B		3.8
Ø	11.6	11.25



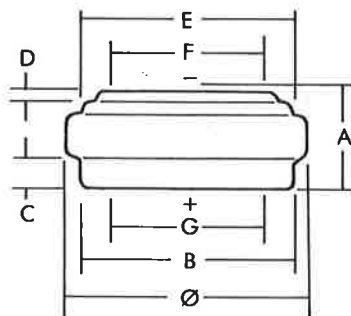
**4LR44**

	max.	min.
A	25.8	23.9
B		5.0
C		0.7
D	6.5	
E		5.0
Ø	13.0	12.0



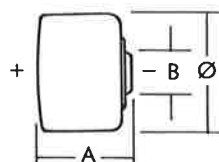
**MR9**

	max.	min.
A	6.2	5.6
B	13.5	
C		2.0
D		0.2
E	12.5	
F		10.0
G		20.0
Ø	16.0	15.0



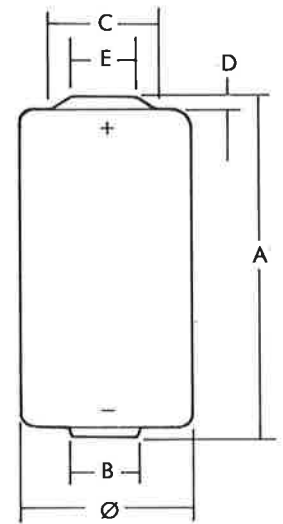
**SR48**

	max.	min.
A	5.4	5.0
B		3.0
Ø	7.9	7.55



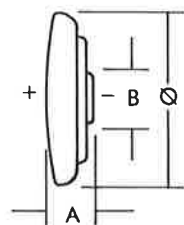
**4SR44**

	max.	min.
A	25.8	23.9
B		5.0
C	6.5	
D		0.7
E		5.0
Ø	13.0	12.00



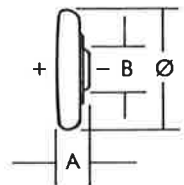
**SR54**

	max.	min.
A	3.05	2.75
B		3.8
Ø	11.6	11.25



**SR58**

	max.	min.
A	2.1	1.85
B		3.0
Ø	7.9	7.55



# BATTERIES MINI CELL

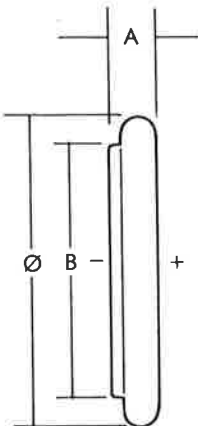
ORDERING			TECHNICAL						TYPICAL DISCHARGE VALUES			
Catalogue Number	IEC Type	Nominal Voltage (volts)	Packing Quantities (tray quantity/No. per tray)	Nominal Capacity (milliamperere hours - mAh)	Internal Resistance (ohms)	Casing (SS = stainless steel NP = nickel plated)	Weight (grams)	Approximate capacity loss with time (%) *	Load (kΩ)	Endpoint Voltage (volts)	Service Life (hours)	
<b>Alkaline<sup>1</sup></b>	LR43	LR43	1.5	1/10	65	5	SS,NP	1.4	10	68	0.9	3200
	LR44	LR44	1.5	1/10	95	5	SS,NP	1.8	10	68	0.9	4900
	LR54	LR54	1.5	1/10	38	10	SS,NP	1.0	10	68	0.9	1900
	4LR44	4LR44	6.0	1/5	90	20	SS	10.0	10	15	3.6	225
<b>Mercury<sup>2</sup></b>	MR9	MR9	1.35	1/10	250	2	SS,NP	4.1	10	3	0.9	600
	MR44	MR44	1.35	1/10	220	3.5	SS,NP	2.6	10	1.5	1.2	250
<b>Silver Oxide<sup>3</sup></b>	SR41	SR41	1.55	1/10	38	10	SS,NP	0.6	10	68	1.2	1650
	SR43	SR43	1.55	1/10	120	4	SS,NP	1.6	10	22	1.2	1620
	SR44	SR44	1.55	1/10	190	4	SS,NP	2.1	10	15	1.2	1820
	4SR44	4SR44	6.0	1/5	170	16	SS	12.0	10	15	3.6	400
	SR48	SR48	1.55	1/10	70	10	SS,NP	1.0	10	33	1.2	1540
	SR54	SR54	1.55	1/10	70	10	SS,NP	1.1	10	39	1.2	1740
	SR55	SR55	1.55	1/10	38	12	SS,NP	0.8	10	68	1.2	1650
	SR58	SR58	1.55	1/10	18	50	SS,NP	0.4	10	68	1.2	800
	SR59	SR59	1.55	1/10	24	20	SS,NP	0.5	<5	68	1.2	1200
	SR60	SR60	1.55	1/10	15	60	SS,NP	0.3	<5	68	1.2	680
<b>Lithium<sup>4</sup></b>	CR2016	-	3.0	1/10	60	20	SS,NP	1.7	10	30	2.0	600
	CR2032	-	3.0	1/10	170	20	SS,NP	3.0	10	30	2.0	1700

\* Capacity loss measured after 12 months storage at 25°C

- Notes:** Electrolyte systems are -
1. Zinc - manganese dioxide, alkaline
  2. Zinc - mercury oxide, alkaline
  3. Zinc - silver oxide, alkaline
  4. Lithium - manganese dioxide, organic

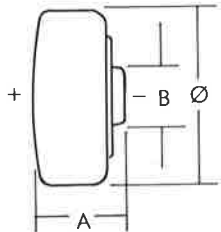
**CR2032**

A	3.2 - 0.2
B	16.5 - 0.2
∅	20.0 - 0.2



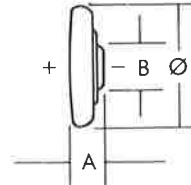
**SR44**

	max.	min.
A	5.4	5.0
B		3.8
∅	11.6	11.25



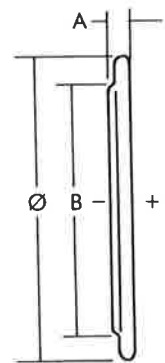
**SR59**

	max.	min.
A	2.6	2.3
B		3.0
∅	7.9	7.55



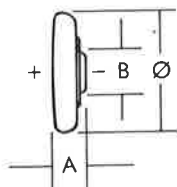
**CR2016**

A	1.6 - 0.2
B	16.9
∅	20.0 - 0.2



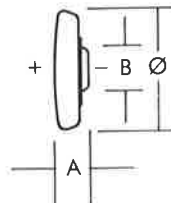
**SR58**

	max.	min.
A	2.1	1.85
B		3.0
∅	7.9	7.55

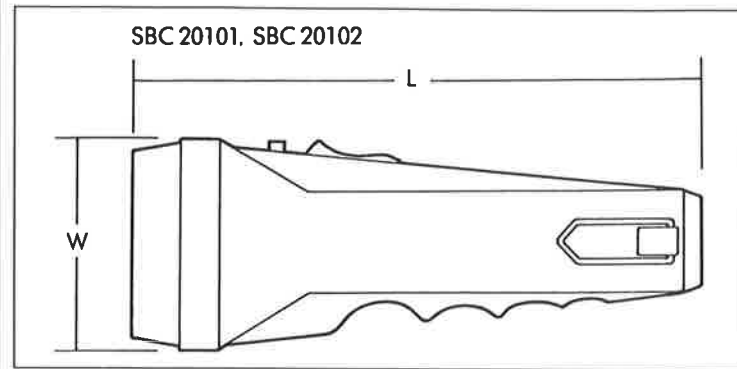


**SR60**

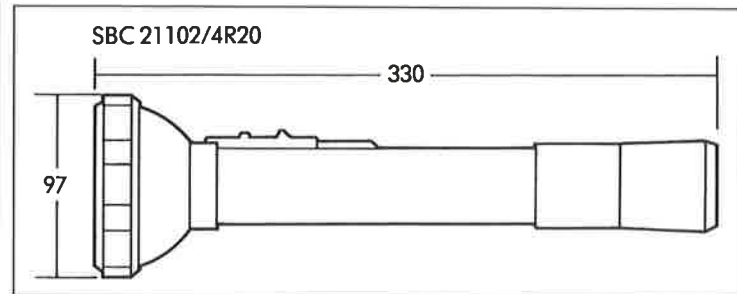
	max.	min.
A	2.10	1.85
B		3.0
∅	6.8	6.55



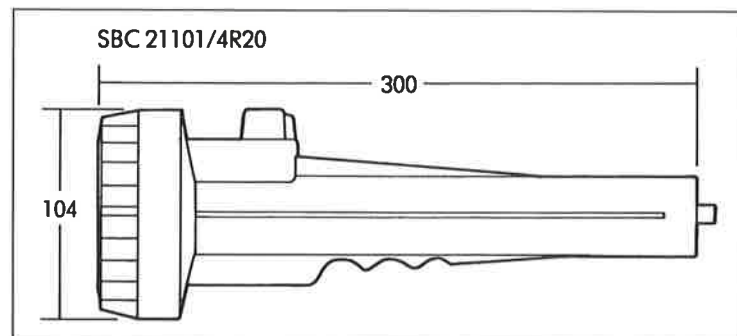
**For product description please see page 288**



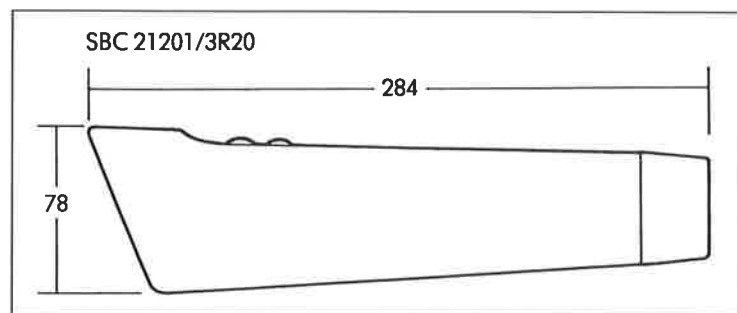
**AVUS RANGE  
LARGE AND SMALL**



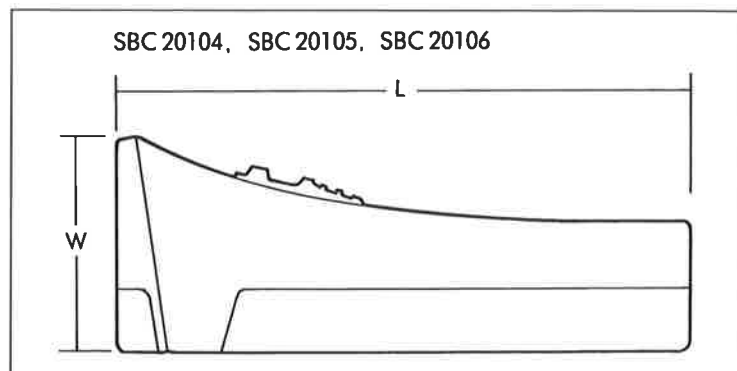
**HALOGEN  
1000 M BEAM**



**HALOGEN  
WATERTIGHT**



**HALOGEN  
RUBBER**



**HARMONY  
SMALL  
MEDIUM  
LARGE**

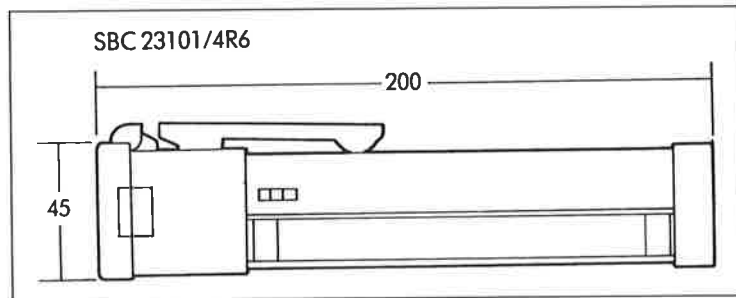
### PACKING QUANTITIES AND ORDERING

Torches are individually packed in display boxes and are supplied in cartons of 12 or 6.

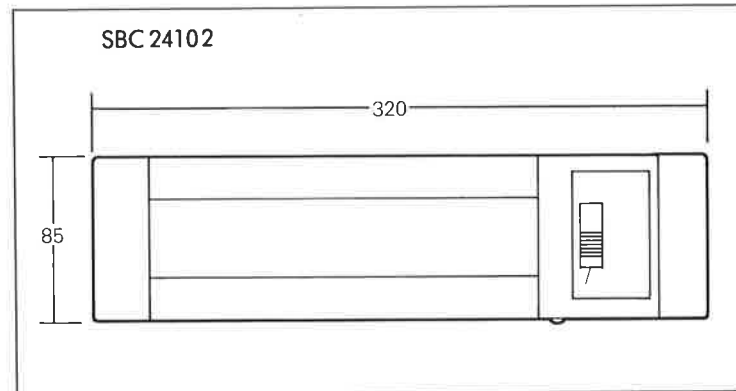
Please order in multiples of the carton quantity shown in the table, in the form given in the following example:

24 Philips Avus torches  
SBC 20101.

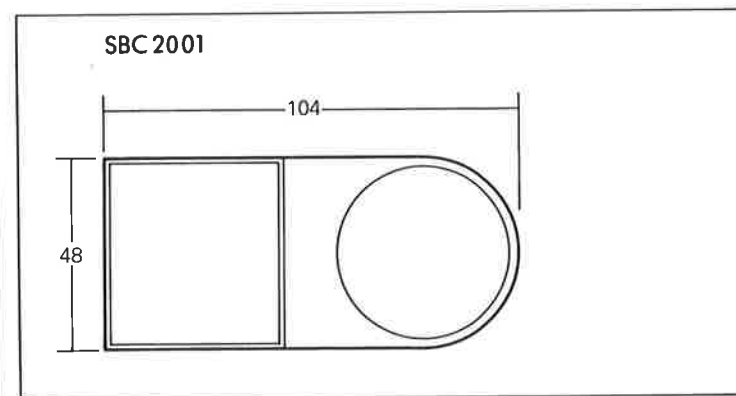
Description	Catalogue number	Bulb type	Battery (no and type)	TECHNICAL			
				L when reqd (mm)	W when reqd (mm)	Packing quantity (no. per carton)	Unit weight (g) (excluding batteries)
Avus (small)	SBC 20101	PR6	2 × R14S	147	47	12	50
Avus (large)	SBC 20102	PR6	2 × R20S	185	69	12	100
Halogen (1000m beam)	SBC 21102	HMP20	4 × R20/R20S/LR20	—	—	12	240
Halogen (watertight)	SBC 21101	HMP20	4 × R20/R20S	—	—	6	370
Halogen (rubber)	SBC 21202	HMP14	3 × R20/R20S	—	—	6	260
Harmony (small)	SBC 20104	KPR102	2 × LR14/R14S	150	50	12	60
Harmony (medium)	SBC 20105	KPR102	2 × LR20/R20S	180	67	12	98
Harmony (large)	SBC 20106	KPR103	3 × LR20/R20S	240	67	12	120
Lantern (small)	SBC 23101	PR13	4 × R6S	—	—	12	140
Lantern (large)	SBC 24101	PR13	4 × R20S	—	—	12	330
Pocket light	SBC 2001	PR3	3 × R6S	—	—	12	—



**LANTERN SMALL**



**LANTERN LARGE**



**POCKET LIGHT**

The following pages provide an easily used guide to the light output performance, initial design lumens and related control gear (where applicable) for lamps used in the vast majority of lighting applications.

Full details of other lamps, including lamps for specialised applications, can be found in this catalogue by referring to the index on page 185.

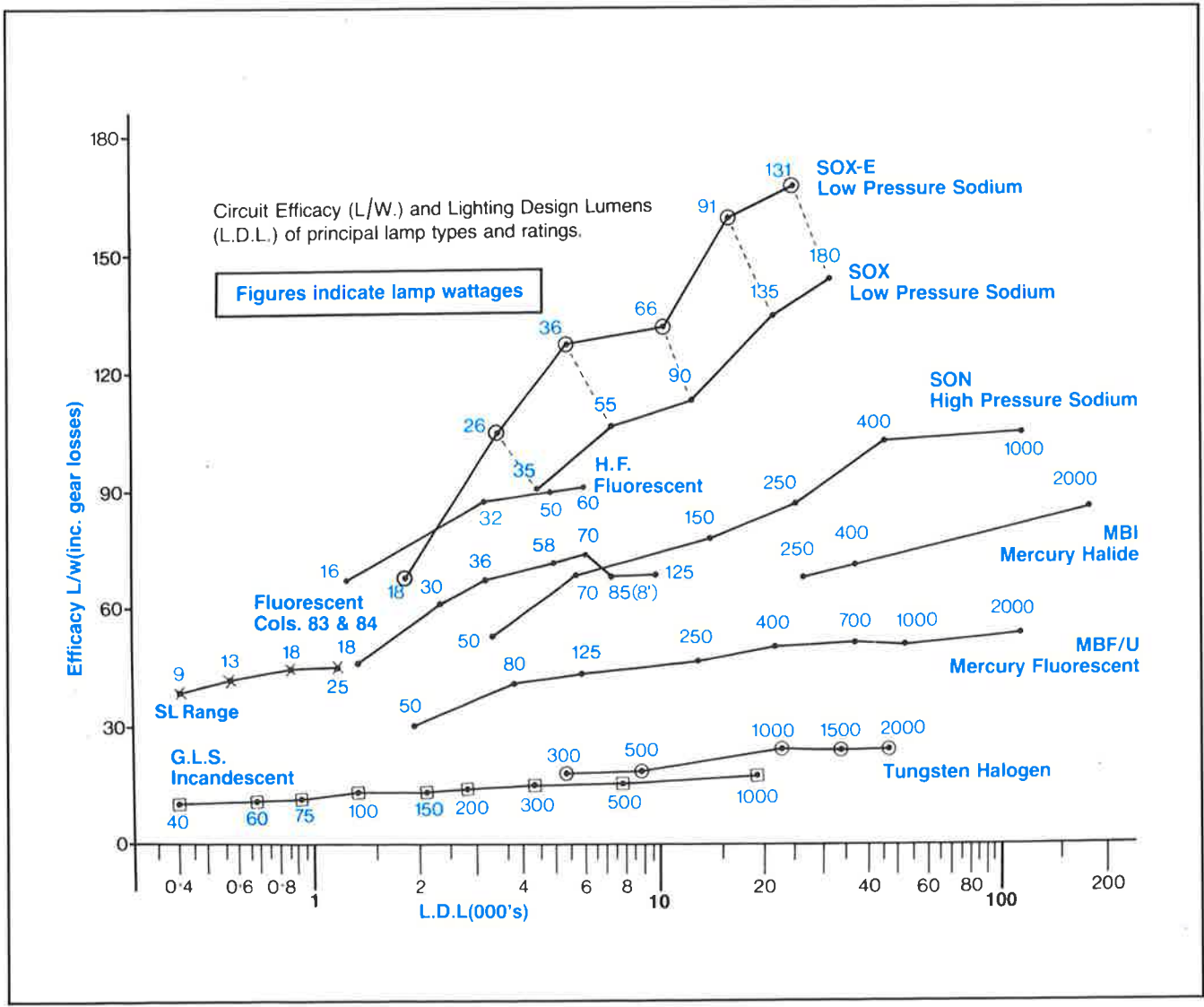
# CIRCUIT EFFICACY AND LIGHTING DESIGN LUMENS

The key factor in the energy and cost effectiveness of lighting is the choice of lamp.

The suitability of the lamp as a light source for a given application is primarily determined by its colour characteristics: colour temperature (colour appearance) and colour rendering ability.

Good colour rendering and high efficacy are no longer necessarily incompatible. The most efficient fluorescent lamps, for example, are Colour 84 (4000K) and Colour 83 (3000K). These lamps also have Deluxe colour rendering.

The diagram below, whilst not containing every lamp type and rating, gives a quick guide to the relative efficacy of various lamp types.



# INCANDESCENT AND COMPACT FLUORESCENT LAMPS LAMP PERFORMANCE AND CONTROL GEAR SCHEDULES

## INCANDESCENT LAMPS

Standard GLS Lamps (240V)								Tungsten Halogen Floodlamps (240V)		
Normal Efficiency, Pear Shaped				High Efficiency, Coiled Coil, Pear Shaped				Double Ended Lamps		
Watts	Cap	Initial Lumens	LDL (750 Hrs)	Watts	Cap	Initial Lumens	LDL (750 Hrs)	Watts	Cap	Nominal Lumens
15	BC	115	110	25	BC	225	210	200	R7s-15	3200
200	BC or ES	2900	2725	40	BC or ES	420	395	300	R7s-15	5100
300	GES	4650	4370	60	BC or ES	710	665	500	R7s-15	9000
500	GES	8300	7800	75	BC or ES	940	885	750	R7s-15	15500
1000	GES	18400	17295	100	BC or ES	1360	1280	1000	R7s-15	22000
				150	BC or ES	2180	2050	1500	R7s-15	34100
								2000	F 4	44000

## COMPACT FLUORESCENT LAMPS WITH INTEGRAL GEAR

SL Lamps (240V)*					The SLD Family of Lamps (240V)*					PLCE Lamps			
Type	Watts	Cap	Lumens @ 100 Hrs	Lumens @ 2000 Hrs	Type	Watts	Cap	Lumens @ 100 Hrs	Lumens @ 2000 Hrs	Watts	Cap	Lumens @ 100 Hrs	Lumens @ 2000 Hrs
Prismatic	9	BCorES	450	405	SLD	18	BCorES	850	720	7	BCorES	400	360
Opal	9	BCorES	400	360	SLDE	20	ES	1200	1020	11	BCorES	600	510
Prismatic	13	BCorES	650	585	SLR (Agro)†	18	BCorES	N/A - Reflector Lamps		15	BCorES	900	810
Opal	13	BCorES	600	540	SLDERT	20	ES			20	BCorES	1200	1020
Prismatic	18	BCorES	900	810	SL (Aqua)	13	ES	550	460				
Opal	18	BCorES	800	720	† Reflector Lamps - see page 480 for details								
Prismatic	25	BCorES	1200	1020									
Opal	25	BCorES	1050	890									

N.B. TOTAL CIRCUIT WATTAGE = LAMP WATTAGE

## COMPACT FLUORESCENT LAMPS WITH INTEGRAL STARTER

PLS Lamps - 2 pin*							PLC Lamps - 2 pin						
Watts	Cap	Ballast	Circuit Watts		Lumens @ 100 Hrs	Lumens @ 2000 Hrs	Watts	Cap	Ballast	Capacitor	Circuit Watts 1 Lamp	Lumens @ 100 Hrs	Lumens @ 2000 Hrs
			1 Lamp	2 Lamps in Series									
5	G23	BPL 10L 23	10	15	250	210	10	G24d-1	BTL 13L 23	H1635/1	16	600	540
7	G23	BPL 10L 23	12	18	400	360	13	G24d-1	BTL 13L 23	H1635/1	18	900	810
9	G23	BPL 10L 23	14	N/A	600	540	18	G24d-2	BTP 20L 25	H1635/1	23	1200	1080
9	G23	BTL 13L 23	N/A	22	600	540	26	G24d-3	BTP 20L 25	H1635/1	34	1800	1620
11	G23	BPL 10L 23	15	N/A	900	810							

## COMPACT FLUORESCENT LAMPS WITHOUT INTEGRAL GEAR OR STARTER

PLS Lamps - 4 pin*							PLC Lamps - 4 pin						
Watts	Cap	Ballast	Circuit Watts		Lumens @ 100 Hrs	Lumens @ 2000 Hrs	Watts	Cap	Ballast	Capacitor	Circuit Watts 1 Lamp	Lumens @ 100 Hrs	Lumens @ 2000 Hrs
			1 Lamp	2 Lamps in Series									
5	2G7	BPL 10L 23	10	15	250	210	10	G24q-1	BTL 13L 23	H1635/1	16	600	540
7	2G7	BPL 10L 23	12	18	400	360	13	G24q-1	BTL 13L 23	H1635/1	18	900	810
9	2G7	BPL 10L 23	14	N/A	600	540	18	G24q-2	BTP 20L 25	H1635/1	23	1200	1080
9	2G7	BTL 13L 23	N/A	22	600	540	26	G24q-3	BTP 20L 25	H1635/1	34	1800	1620
11	2G7	BPL 10L 23	15	N/A	900	810							

PLL Lamps - 4 pin							
Watts	Cap	Ballast	Capacitor	Circuit Watts		Lumens @ 100 Hrs	Lumens @ 2000 Hrs
				1 Lamp	2 Lamps in Series		
18	2G11	BTP 20L 25	H1635/1	28	N/A	1200	1080
18	2G11	BTP 40L 25	H1635/1	N/A	46	1200	1080
24	2G11	BTP 20L 25	H1635/1	32	N/A	1800	1620
36††	2G11	BTP 40L 25	H1635/1	45	N/A	2900	2600

†† Can also be used on HF Ballasts - See page 553

**NOTE:** For PLS 4 pin, PLC 4 pin and PLL lamps, use S10 starter for single lamp and 2 x S2 starters for 2 lamps in series.

\* If power factor correction is desired use bulk correction at 2µF per lamp for SL and per circuit for PLS.

**Note:** All lumen outputs quoted were obtained under standard conditions using a calibration ballast where applicable.

**This schedule includes the most frequently-used lamp types. Please see relevant catalogue pages for non-listed items.**

# TUBULAR FLUORESCENT LAMPS LAMP PERFORMANCE

Lumen output at 100 and 2000 Hrs are given below.

### TLD (T8-26mm $\phi$ ) KRYPTON FILLED

Circuit Types: A, C			Colour 83	Colour 84	White 35	Warm White 29	Cool White 33	Colour 93	Colour 94
Watts	Length	Cap							
18	600	G13	1450 1300	1405 1300	1190 1100	1150 1060	1150 1060	950 895	1000 940
36	1200	G13	3450 3200	3455 3200	3025 2800	3000 2760	3000 2760	2300 2160	2350 2210
58	1500	G13	5400 5100	5510 5100	4860 4500	4800 4415	4800 4415	3600 3385	3750 3525
70	1800	G13	6805 6300	6805 6300	6050 5600	—	—	—	—

### T12 (38mm $\phi$ ) KRYPTON FILLED

Watts	Length	Cap	Colour 83	Colour 84	White 35
100	2400	G13	9300 8900	9300 8900	8400 7800

Note: Lumen outputs do not apply if the lamps are used on H.F. Ballasts.

### T12 (38mm $\phi$ ) ARGON FILLED

Circuit Types: A, B			Colour 83	Colour 84	White 35	Warm White 29	Cool White 33	Natural 25	Tru-Colour 38	Soft-Tone 32	North-light 55
Watts	Length	Cap									
20	600	G13	1270 1200	1270 1200	1080 1000	1080 1000	1080 1000	970 900	865 800	755 700	865 800
40	600	G13	—	—	2000 1700	2000 1700	1900 1600	1420 1300	—	—	1180 1080
40	1200	G13	3180 3000	3180 3000	2915 2700	2915 2700	2915 2700	2375 2200	2050 1900	1945 1800	2050 1900
65/80	1500	G13	5195 4900	5195 4900	4970 4600	4970 4600	4970 4600	3780 3500	3240 3000	3025 2800	3240 3000
75/85	1800	G13	6255 5900	6255 5900	6050 5600	6050 5600	6050 5600	4320 4000	3780 3500	3350 3100	3780 3500
85	2400	G13	7550 7100	7550 7100	7250 6750	7250 6750	7000 6500	—	—	3990 3670	—
125	2400	G13	9965 9400	9965 9400	9505 8800	9505 8800	9505 8800	7560 7000	5940 5500	5400 5000	5940 5500

Notes: 1. 65/80 lamps. Lumens measured at 65W (output is approximately 10% higher at 80W).  
2. 75/85 lamps. Lumens measured at 75W (output is approximately 10% higher at 85W).

### TLD (T8-26mm $\phi$ ) ARGON FILLED HF ELECTRONIC LAMPS

Circuit Type: D			Colour 83	Colour 84	Colour 93	Colour 94
Watts	Length	Cap				
16	600	G13	1400 1300	1400 1300	—	—
32	1200	G13	3300 3200	3300 3200	2120 2000	2160 2050
50	1500	G13	5200 5100	5200 5100	3325 3100	3450 3250
60	1500	G13	6470 6100	6470 6100	—	—

### TLD (T8-26mm $\phi$ ) ARGON FILLED

Circuit Types: A, B			Colour 84	White 35	Warm White 29	Cool White 33	Softone 32	North-light 55	Natural 25
Watts	Length	Cap							
30	900	G13	2545 2400	2375 2200	2350 2160	2300 2120	1510 1400	1500 1250	—
15	450	G13	—	865 800	1000 920	960 880	—	—	790 720

### MINIATURE FLUORESCENT LAMPS

Circuit Type: A			White 35	Warm White 29	Cool White 33
Watts	Length	Cap			
4	150	G5	—	140 130	140 130
6	225	G5	280 260	280 260	280 260
8	300	G5	410 370	410 370	410 370
13	525	G5	930 855	930 855	930 855

### CIRCUIT TYPES

- A: Switch Start
- B: Starterless
- C: Can be used on HF (non-regulating) circuits but will not give optimum performance
- D: H.F.

Note: All lumen outputs quoted were obtained under standard conditions using a calibration ballast.

**This schedule includes the most frequently-used lamp types.  
Please see relevant catalogue pages for non-listed items.**



# TUBULAR FLUORESCENT CONTROL GEAR SCHEDULES

## T8 TUBULAR FLUORESCENT ELECTRICAL DETAILS

Watts	Length	Ballast	Capacitor	Starter	CIRCUIT WATTS	
					1 Lamp	2 Lamps in Series
15	450	BTP 20L25	H1635/1	S10	25	-
15	450	BTP 30L25	H1635/1	2 × S2	-	40
18	600	BTP 20L25	H1655/1	S10	29	-
18	600	BTP 40L25	H1635/1	2 × S2	-	46
30	900	BTP 30L25	H1635/1	S10	40	-
36	1200	BTP 40L25	H1635/1	S10	46	-
58	1500	BTP 65L25	H1655/1	S10	70	-
70	1800	BTL 75	H1684/1	S16	86	-

## T12 TUBULAR FLUORESCENT ELECTRICAL DETAILS

Watts	Length	Ballast	Capacitor	Starter	CIRCUIT WATTS	
					1 Lamp	2 Lamps in Series
20	600	BTP 20L25	H1635/1	S10	31	-
20	600	BTP 40L25	H1635/1	2 × S2	-	50
40	600	BHL 80L16	H1684/1	2 × S2	-	95
40	1200	BTP 40L25	H1635/1	S10	50	-
65/80	1500	BTP 65L25	H1684/1	S10	77	-
75/85	1800	BCS 75/L	H1684/1	S16	91	-
100	2400	BCS 100/1	H1684/1	S16	115	-
125	2400	BCS 125	H1672	S18	140	-

Notes: 1. 65/80 Lamps: Circuit watts measured using a 65W ballast.  
2. 75/85 Lamps: Circuit watts measured using a 75W ballast.

## TLD HF LAMPS

Watts	Length	Ballast	CIRCUIT WATTS	
			1 Lamp	2 Lamps in Series
16	600	BHF 116	20	-
16	600	BHF 216	-	39
32	1200	BHF 132	36	-
32	1200	BHF 232	-	72
50	1500	BHF 150	56	-
50	1500	BHF 250	-	111
60	1500	BHF 260	-	136

Circuit watts refer to standard HF ballasts.  
Refer to page 493 for details of Regulating HF ballasts.

## PLL LAMPS WITH HF CONTROL GEAR

Watts	Length	Ballast	CIRCUIT WATTS	
			1 Lamp	2 Lamps in Series
36	410	BPL 132	37	-
36	410	BPL 232	-	73

Note: Lumen outputs identical to values quoted on page 551 for PLL Lamps on conventional gear.

## MINIATURE FLUORESCENT LAMPS

Watts	Length	Ballast	Starter	CIRCUIT WATTS	
				1 Lamp	2 Lamps in Series
4	150	BAS 8	S2	10	-
4	150	BAS 8	2 × S2	-	13
6	225	BAS 8	S2	11	-
6	225	BAS 13	2 × S2	-	17
8	300	BAS 8	S2	13	-
8	300	BAS 13	2 × S2	-	21
13	525	BAS 13	S10	18	-

If power factor correction is desired use bulk correction at 2µF per circuit.

**This schedule includes the most frequently-used lamp types. Please see relevant catalogue pages for non-listed items.**

# DISCHARGE LAMPS

## LAMP PERFORMANCE AND CONTROL GEAR SCHEDULES

### LOW PRESSURE SODIUM LAMPS

Type/ Watts	CAP	Ballast	Capacitor	Ignitor	Circuit Watts	Lumens @ 100 Hrs	Lumens @ 2000 Hrs
35W SOX	BC	BSX355L16	L4008	SX72	48	4500	4300
55W SOX	BC	BSX355L16	L4008	SX72	68	7400	7150
90W SOX	BC	BSX90L32	L4010	SX76	104	13000	12250
135W SOX	BC	BSX135H66	L5007	SX74	159	22500	21200
135W SOX	BC	L4135	L5020	Not Req'd.	175	22500	21200
180W SOX	BC	L4135	L5020	Not Req'd.	220	33000	31500
SOX-E18	BC	BSX18H16	L4005	Not Req'd.	25	1800	1750
SOX-E26	BC	BSX26L16*	L4005	SX26	32	3500	3400
SOX-E36	BC	BSX36H66*	L5004	SX72	43	5700	5580
SOX-E66	BC	BSX66H66*	L5008	SX70	79	10700	10400
SOX-E91	BC	BSX91H66*	L5005	SX74	106	17000	16600
SOX-E131	BC	BSX131H66*	L5003	SX131	151	26000	25000

**\*Optimum Gear**

See data for circuit Watts of SOX-E lamps when operated on standard gear.

### HIGH PRESSURE SODIUM LAMPS

Type/ Watts	Cap	Ballast	Capacitor	Starter	Circuit Watts	Lumens @ 100 Hrs	Lumens @ 2000 Hrs
50W SON-I	ES	BSN50L32	L4008	Internal	60	3300	3100
50W SON/T	ES	BSN50L34	L4008	SN57	60	4000	3600
70W SON-I	ES	BSN70L32	L4010	Internal	81	5800	5510
70W SON/T	ES	BSN70L34	L4010	SN57	81	6000	5850
70W SON-E	ES	BSN70L34	L4010	SN57	81	5800	5510
70W SON/ST	ES	BSN70L34	L4010	SN57	81	6500	6200
100W SON	GES	BSN100L34	L4010	SN58	114	9500	9000
100W SON/T	GES	BSN100L34	L4010	SN58	114	10000	9500
150W SON	GES	BSN150L34	L4016	SN58	170	13500	13500
150W SON/T	GES	BSN150L34	L4016	SN58	170	14000	14000
150W SON COMFORT	GES	BSN150L34	L4016	SN58	170	12000	11000
150W SON/T COMFORT	GES	BSN150L34	L4016	SN58	170	12700	12000
150W SON/ST	GES	BSN150L34	L4016	SN58	170	16000	15500
250W SON	GES	BSN250L34	2 x L4016	SN58	276	25000	24000
250W SON/T	GES	BSN250L34	2 x L4016	SN58	276	27000	25000
250W SON COMFORT	GES	BSN250L34	2 x L4016	SN58	276	22000	20800
250W SON/T COMFORT	GES	BSN250L34	2 x L4016	SN58	276	23000	21850
400W SON	GES	BSN400L34	2 x L4016	SN58	431	47000	45000
400W SON/T	GES	BSN400L34	2 x L4016	SN58	431	48000	46500
400W SON COMFORT	GES	BSN400L34	2 x L4016	SN58	431	34000	30000
400W SON/T COMFORT	GES	BSN400L34	2 x L4016	SN58	431	35000	32000
1000W SON	GES	BSN1000L66	4 x L4025	SN53	1060	120000	110000
1000W SON/T	GES	BSN1000L66	4 x L4025	SN53	1060	130000	123000
210W SON/H	GES	BHL250L32	L4016	Not Req'd.	228	18000	17250
350W SON/H	GES	BHL400L32	L4025	Not Req'd.	374	34500	32600

### HIGH PRESSURE SODIUM LAMPS – "WHITE SON"

Type/ Watts	Cap	Ballast	Capacitor	Starter	Circuit Watts	Lumens @ 100 Hrs	Lumens @ 2000 Hrs
SDW-T35W	PG12	BSL35L32	L4008	CSL35	41	1300	1100
SDW-T50W	PG12	BSL50L32	L4010	CSL50	65	2300	1950
SDW-T100W	PG12	BSL100L32	L4016	CSL100	117	4800	4080

**Note:** All lumen outputs quoted were obtained under standard conditions using a calibration ballast where applicable.

**This schedule includes the most frequently-used lamp types.  
Please see relevant catalogue pages for non-listed items.**

# DISCHARGE LAMPS

## LAMP PERFORMANCE AND CONTROL GEAR SCHEDULES

### DOUBLE ENDED METAL HALIDE LAMPS

Type/ Watts	CAP	Ballast	Capacitor	Starter	Circuit Watts	Lumens @ 100 Hrs	Lumens @ 2000 Hrs
MHW-TD70W	R7S	BSN70L34	L4010	SN57	81	5000	4750
MHN-TD70W	R7S	BSN70L34	L4010	SN57	81	5000	4750
MHN-TD150W	R7S	BSN150L34	L4016	SN58	170	11250	10690
MHN-TD250W	FC2	BSN250L34	2 × L4016	SN58	276	20000	19000

### METAL HALIDE LAMPS

Type/ Watts	Cap	Ballast	Capacitor	Starter	Circuit Watts	Lumens @ 100 Hrs	Lumens @ 2000 Hrs
250W HPI/T	GES	BHL250L32	L4016	SI51	268	17000	13600
400W HPI/T	GES	BHL400L32	L4025	SI51	427	31500	29200
400W HPI BUS	GES	BHL400L32	L4025	Not Req'd.	427	30600	28300
1000W HPI/T	GES	BHL1000L66	2 × L4025	SI52	1040	81000	70000
2000W 240V HPI/T	GES	240 BHL2000	4 × L4025	SI52	2105	189000	166320
2000W 415V HPI/T	GES	415 BHL2000	4 × L4020	SI54	2085	183000	166530

### HIGH PRESSURE MERCURY LAMPS

Type/ Watts	Cap	Ballast	Capacitor	Starter	Circuit Watts	Lumens @ 100 Hrs	Lumens @ 2000 Hrs
50W HPL COMFORT	ES	BHL50L16 or BHL50L32	L4008	-	60	2000	1890
80W HPL COMFORT	ES	BHL80L16 or BHL80L32	L4008	-	93	3850	3690
125W HPL COMFORT	ES	BHL125L32	L4010	-	138	6550	6200
250W HPL COMFORT	GES	BHL250L32	L4016	-	271	14000	13250
400W HPL COMFORT	GES	BHL400L32	L4025	-	424	24000	22800
50W HPL-N	ES	BHL50L16 or BHL50L32	L4008	-	60	1800	1700
80W HPL-N	ES3 PBC	BHL80L16 or BHL80L32	L4008	-	93	3700	3550
125W HPL-N	GES ES 3PBC	BHL125L32	L4010	-	138	6300	5800
250W HPL-N	GES	BHL250L32	L4016	-	271	13000	12000
400W HPL-N	GES	BHL400L32	L4025	-	424	22000	20400
700W HPL-N	GES	240 BHL700	2 × L4016	-	736	40000	38100
1000W HPL-N	GES	BHL1000L66	2 × L4025	-	1041	58000	50500
2000W (415V) HPL-N	GES	415 BHL2000	4 × L4020	-	2085	125000	100000
125W HPL-R	ES	BHL125L32	L4010	-	138	5700	5100
250W HPL-R	GES	BHL250L32	L4016	-	271	12000	10800
400W HPL-R	GES	BHL400L32	L4025	-	424	20000	18000
700W HPL-R	GES	240 BHL700	2 × L4016	-	736	36000	34000
1000W HPL-R	GES	BHL1000L66	2 × L4025	-	1041	54000	48000

### MERCURY BLENDED DISCHARGE LAMPS

(No Control Gear Required)

Type/ Watts	Cap					Lumens @ 100 Hrs	Lumens @ 2000 Hrs
100W ML	BC or ES	-	-	-	-	1100	1000
160W ML	BC or ES	-	-	-	-	3150	3000
250W ML	GES	-	-	-	-	5700	5700
500W ML	GES	-	-	-	-	14000	14000
160W MLR	ES	-	-	-	-	2750	2750

Circuit Watts = Lamps Watts

**Note:** All lumen outputs quoted were obtained under standard conditions using a calibration ballast where applicable.

**This schedule includes the most frequently-used lamp types.  
Please see relevant catalogue pages for non-listed items.**

## NOTES

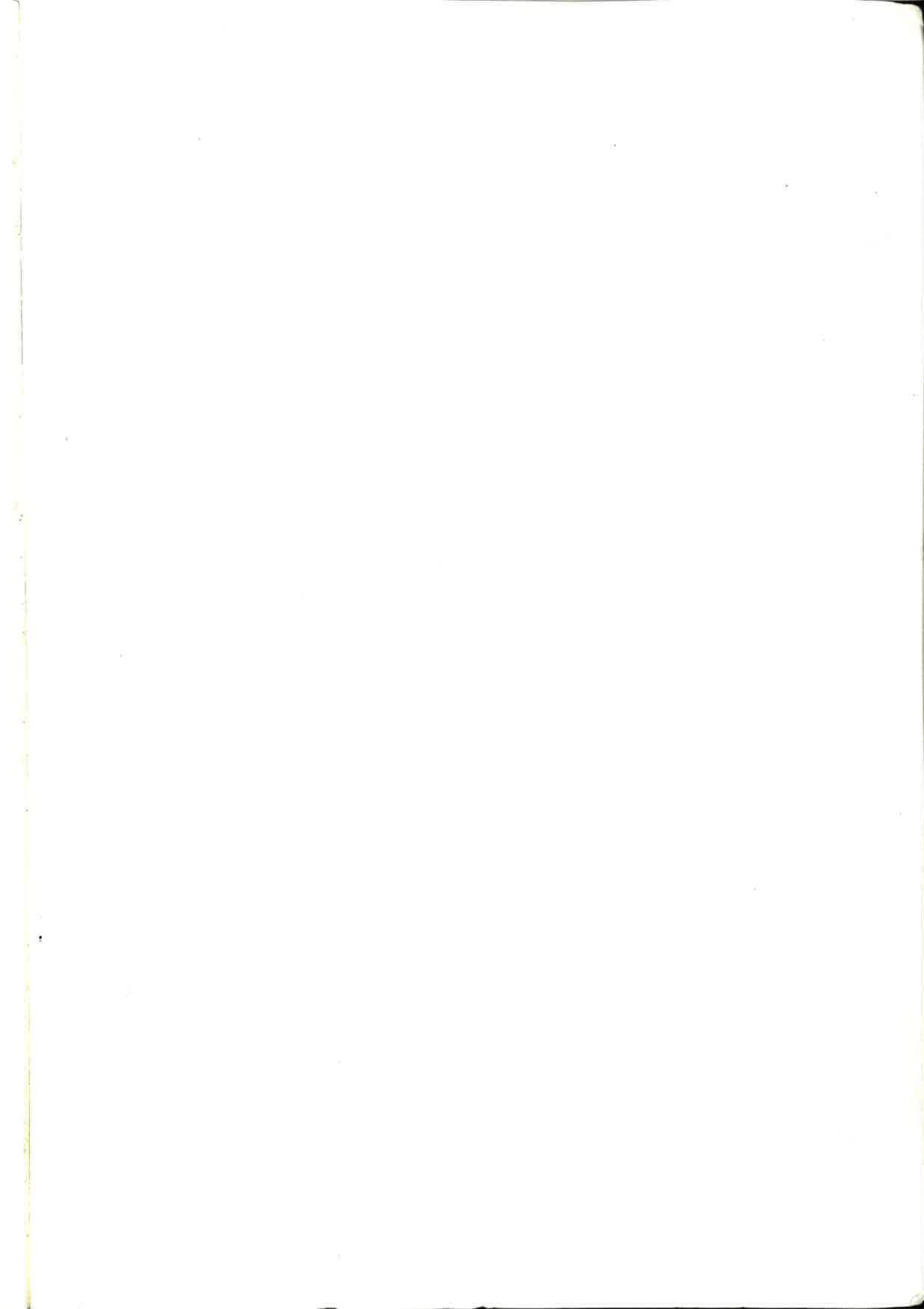
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