1969/2019
50
YEARS
IN THE ELECTRONIC
WORLD

HDT
Motors & Digital Drives

EtherCAT
PROFINET
CANopen
Modbus
EtherNet/IP

TomCatEVO Servosystems

Simple Versatile Compact

New Evo Serie. Power in an unthinkable amount of space.

In thinking about the new servosystems TomCat EVO we took into consideration all the elements to create a family of servodrives that would be powerful and even more versatile than before, still easy to use and increasing to five the available fieldbuses.

Fieldbuses Options
- CanOpen CiA 402
- ModBus RTU
- EtherCat COE
- ProfiNet RT and IRT
- Ethernet IP

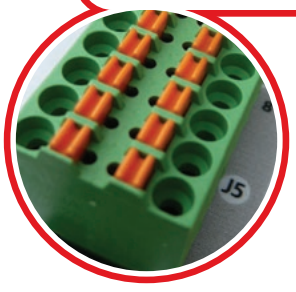
Firmware Functionalities
- Speed control with adjustable ramps with/without jerk
- Torque control with cogging compensation
- Torque limit control
- Multipositioner up to 64 indexes
- Electronic Gear
- Electronic Cam
- Tubolar, linear and rotative motor control
- Digital filters
- Servo pump
- Servo cylinder

Control Mode
- Fieldbuses
- Pulses/Direction
- 12 Bit Analog

Feedbacks
- Sensorless
- Hall Signals at 120°
- Incremental Encoders 5V LD
- Inc. Enc. with Hall Sensors
- Absolute Encoders SSI, BISS, EnDat (32bit)[1]
- 16 bit Resolver (optional)

400VAC 1,8kW

Easy to wire terminals



Motor Brake
- Electronic brake management

Synchronous motors
- AC Brushless
- DC Brushless

DC servomotors
- Permanent Magnets with Incremental Encoder

Main Features

Safety Integrated
SafeTorque Off Input circuit (STO - SIL.3 - Cat.0) according to IEC61800-5-2:2007

Easy Setting
CALIPER is the software tool designed to make the calibration of your servo drive and motor a simple procedure. In addition to saving and loading data, Caliper includes a powerful oscilloscope professional tools for Autophasing, automatic reduction of cogging, Fieldbus Analyzer and many other features to help you to better adjust your applications. Communication is via Micro USB port 2.0 (Windows OS only).

Caliper Software

Filtering Software
- Notch Filter
- Iq Filter
- Digital Input Filter
- Position Observer
- Measured Speed Filter

Alert Status
- via LED's
- via Fieldbuses

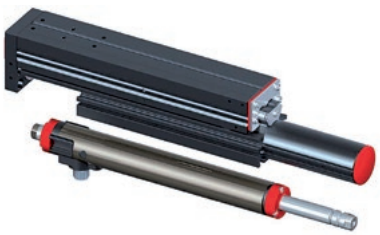
230VAC 2kW

Feedback Output
- Encoder Repetition
- Emulated Encoder[2]

CE

Frame
- Designed around a high efficiency heatsink does not require forced ventilation up to 1.3kW. Dimensions reduced of the 67%. More space in the electrical panel
- Metal Cover as shield to minimize electronic noise.

Linear Motors
- Brushless linear motors control



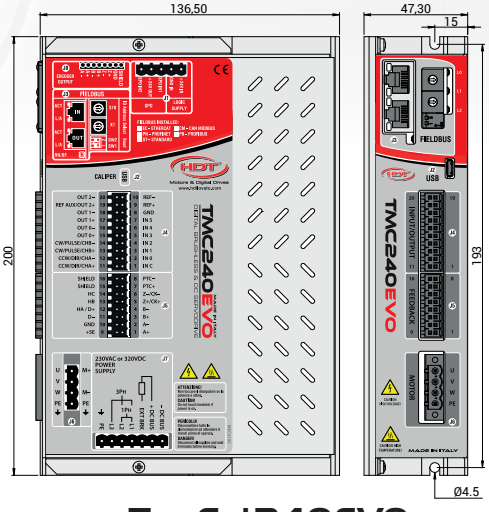
Asynchronous motors
- V/f sensorless control
- V/f control with encoder
- FOC Control sensorless
- FOC Control with encoder

[1] EnDat A depending on the hardware version of the drive.
[2] Only with resolver option.

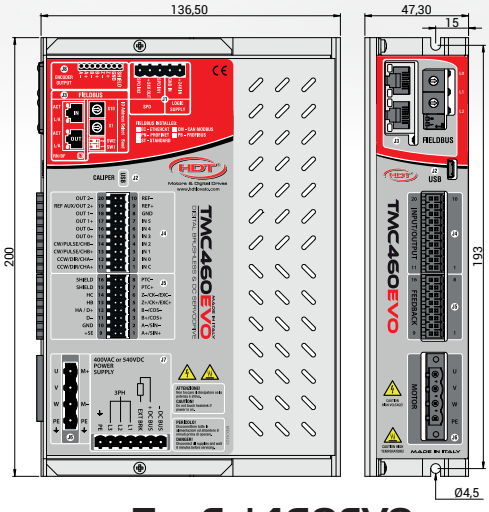
Servodrive technical specifications

		TomCat240EVO			TomCat460EVO	
SIZES	*U of M*	2	4	6	1.5	3
Applied Voltage	V	230 VAC 1Ph - 3Ph		230 VAC 3Ph	400 VAC 3Ph	
Min/Max power supply	V	230VAC ±15%. 50/60Hz 200VDC ÷ 360VDC			400VAC ±15% 50/60Hz 400VDC ÷ 700VDC	
Rated current	A	2	4	6	1.5	3
Peak current for 2"	A	4	8	12	3	6
Max output power	KW	0.65	1.30	2.00	0.9	1.80
Max output power (DC brushed)	KW	0.56	1.12	1.67	0.75	1.5
Control method		IGBT/PWM, sinusoidal or trapezoidal for brushless motors, control for brushed DC motors and Asynchronous AC motors				
Logic power supply	VDC	+24VDC ±20%				
Integrated braking circuit		Standard				
External resistor (Optional)	VDC	R50W47R	R90W39R		R90W100R	
External EMC filter		in appliance of optional EMC 61800-3 cat C2 and C3 law				
Feedback (5V)		Halls Sensors - Inc. Enc. 5V LD with, w/o Halls Sensors - Abs. Enc. 32bit: SSI (Bin), Biss (B-C), EnDat (2.1-2.2) - Sensorless				
Optional feedback		Resolver				
Type of motors driveable		Rotary, linear and tubolar AC/DC brushless motors - DC brushed permanent magnets motors - Asynchronous motors				
Optional fieldbus		Modbus RTU/CanOpen CiA 402 - EtherCat CoE - ProfiNet RT and IRT - Ethernet IP				
Analogue main reference		±10V Differential (12Bit)				
Analogue auxiliary reference		0/+10V Single ended (12Bit)				
Frequency Reference		Pulse/Direction - 5V Line Driver channels A/B - CW/CCW (2MHz)				
Auxiliary encoder input (5V)		5V Line Driver channels A/B				
Digital Inputs and Outputs		6 input NPN/PNP - 3 outputs NPN/PNP				
Control modes		Speed - Adjustable ramps - Torque control - Multipositioner - Electronic gearbox - Electronic CAM - Servopump - Servocylinder				
Limit Switch management function		Braking in torque limit in case of P-OT, N-OT				
Digital Filters		Notch filter, Iq filter, Digital Input Filter, Position Observer, Measured Speed Filter				
Protections functions		Short-circuit - Over/undervolt. - Drive Overtemp.- Feedback break - Rated current limit				
Drive signalings		3 LEDs for status and alarms				
Hardware Safety functions		STO - Safe Torque Off: IEC61800-5-2:2007 SIL3: EN61508:2001 (EN954-1:1996)				
Software Safety functions		Fault Reaction and Emergency Stop modes: Inertia Stop - Ramp Stop - Torque Limit Stop Braking in torque limit in case of a limit switch.				
Brake management		Integrated. Immediate stop or in ramp				
Drive Setting		Through software CALIPER 4 via Micro USB 2.0 port				
Approximative weight	Kg	1.1	1.2	1.2	1.1	1.2

Dimensions



TomCat240EVO



TomCat460EVO

Position transducers

The servodrives are equipped with several inputs for the reading of position transducers. A standard main input that allows to read incremental and absolute SSI, BISS, EnDat encoders. A second input dedicated to the reading of a second external incremental encoder or for a frequency-direction signal from PLC. TomCatEVO also has a third optional for the Resolver.
The transducers mounted on the motor gives to the servodrive the information to control exactly the motion of the motor. The drives can control both rotary and linear motors and are therefore capable to read both transducers for rotary and linear motors of various types.
The drives also allow to control sensorless rotary motors, but this use is limited to "motion control" applications that don't need accurate positioning.
Most of "motion control" applications need an accurate control of the axis, and therefore they rely on position transducers with high precision, repeatability and robustness characteristics.

Resolver

This option allows to read a feedback from a resolver. The resolver is a electromechanical device used in rotary application to detect the speed, the direction and the position of a rotary shaft. Rotating together with the shaft, it develops a sinusoidal signal that is detected and converted in digital from the servodrive granting a precision of 16 bits. The drive can generate the signal of an emulated incremental encoder with selectable resolutions of 256, 1024, 4096 and 16348ppr.
The resolver for its physical structure is certainly the most suitable transducer for heavy work environments and this makes it one of the favorite solutions.

Incremental encoder with Hall sensors

The servodrives in their standard configuration allow reading Incremental Encoders with or without Hall sensors. The Incremental Encoder is an optoelectronic or magnetic device applied to the motor's rotor that develops square-wave signals proportional to the angular shift of its rotary axis that is given back to the drive to manage both the motor and the application. The encoder provides an information of relative position, not absolute, and therefore is always necessary an "homing" procedure to define an absolute position of the system. The signal generated is sent to the drive that performs the count and extrapolates, according to frequency, space, speed and acceleration data needed to control the motor. The resolution depends on the sensor and is measured in PPR, that is "pulses per round". Usually, HDT motors use incremental encoders with 1024 or 2500ppr.

Absolute encoder BiSS - SSI - Endat

The absolute encoder is designed to provide an information of absolute position on the single turn or on the multi-turn; mechanically, the working principle is similar to an incremental encoder, which have a univocal code written on a disk that allows to identify every angular position of the axis.
Therefore it is always possible to know exactly the position of the axis even when stationary, without the necessity to perform an "homing" procedure to define the absolute position. The digital signal sent to the drive or to CNC is a serial protocol. SSI (bin), BiSS (B-C)and EnDat 2.1/2.2 are the three serial protocols handled by the servodrive with a resolution of 32bit on single turn and 16bit on multiturn.
The encoder for a multi-turns information can use a mechanical system or it can memorize the number of turns on a battery powered memory or a Wiegand effect system
HDT installs on its motors an absolute mechanical encoder type BiSS with 22bits of resolution on the single turn and 12 bits on the multi-turn or a Wiegand effect with 17Bits on the single turn and 16Bits on the multiturn.

Safety circuit S.T.O.

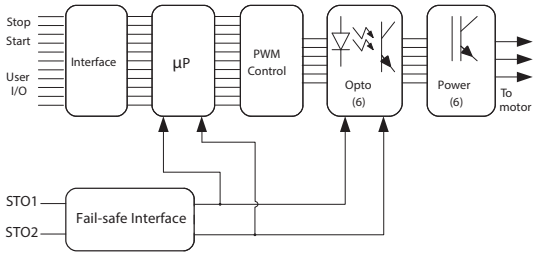
The Safe Torque-Off (STO) feature of TomCat drives is made of a redundant electrical circuit designed to bring a drive to a safe state of torque absence.

It is a feature used to prevent unexpected motor rotation in case of emergency without the necessity to interrupt power supply. When STO function is active, the servodrive and the motor are in a state of functional safety, which means that is impossible to cause an active rotation of motor shaft or, if it is already rotating, the rotation stops by inertia.

The safety circuit implemented in TomCat drives is manufactured and **certified according to IEC EN 61800-5-2 , with category 0 safety stop, and according to IEC61508 for SIL3 level**.

The safety stop category 0 is achieved with the immediate disconnection of electronic components (IGBT) responsible of system energization, that cause an uncontrolled stop of the axis, by inertia.

It is usual, in the applications where there isn't a drive equipped with STO, to secure the system interrupting the power supply using a power contactor of adequate capacity. **Using a STO it is possible to eliminate the power contactor with economical benefit**, space saving in the cabinet and achieving an higher level of security integrity.

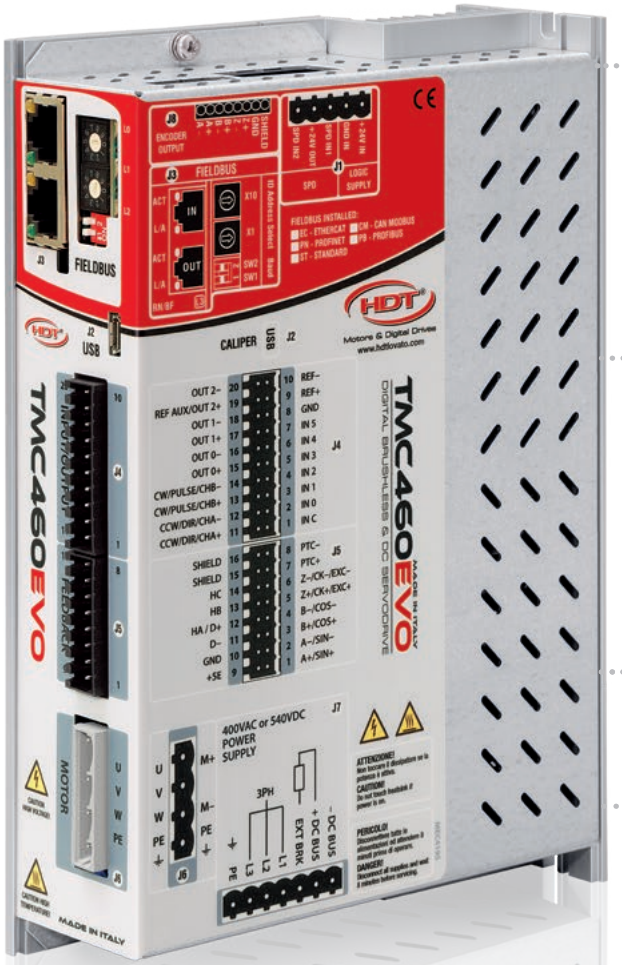


Advanced Communication

The new EVO series drives, thanks to a new CPU, are not simply faster, but they are also more advanced in comunication.

Produced in four versions:

- **ST** - Standard - Analog and frequency control mode only
- **EC** - Ethercat CoE fieldbus in addition to Standard
- **PN** - Profinet RT, IRT and Ethernet IP fieldbus in addition to Standard
- **CM** - ModBus RTU and CanOpen CiA 402 fieldbuses in addition to Standard



ST

STANDARD

STANDARD VERSION

Analogue and pulses train
Speed control
Torque control
Electronic gear
Multipositioner
Electronic cam
Servopump
Servocylinder

EC

EtherCAT

ETHERCAT CoE
CiA 402 Protocol

Position Mode
Velocity Mode
Profile Velocity Mode
Profile Torque Mode
Homing Mode
Interpolated Position Mode
Cyclic Sync Position Mode
Cyclic Sync Velocity Mode
Cyclic Sync Torque Mode
Touch Probe
Electronic Gear
Servopump
Servocylinder

PN

PROFINET

PROFINET RT & IRT (CC-C)
Profidrive Protocol

Speed control (AC1-AC4). Telegr. 1,3,20,120
Positioner in Program Mode (AC3). Telegr. 7,120
Manual positioner (AC3). Telegr. 9,120
Isochronous Position Control (AC4). Telegr. 5,6,105,106
Electronic Gear*
Servopump. Telegr. 121
Servocylinder. Telegr. 122

CM

EtherNet/IP

Ethernet IP
CIP Protocol

Speed control
Torque control
Electronic gear
Multipositioner
Electronic cam
Servopump
Servocylinder

CANopen

CANOPEN
CiA 402 Protocol

Position Mode
Velocity Mode
Profile Velocity Mode
Profile Torque Mode
Homing Mode
Interpolated Position Mode
Cyclic Sync Position Mode
Cyclic Sync Velocity Mode
Cyclic Sync Torque Mode
Touch Probe
Electronic Gear
Pressure Control
Hydrulic Actuator
Servopump
Servocylinder

Modbus

MODBUS
RTU Protocol

Speed control
Torque control
Electronic gear
Multipositioner
Electronic cam
Servopump
Servocylinder

*= Under development - contact HDT for availability

Software interface: Caliper

CALIPER is the software tool designed to simplify the calibration of your servodrive and motor with Microsoft Windows operating systems. A specific graphical interface extremely intuitive speeds up and make it even more simple to access the full range of functions of all the HDT servodrives. In addition to selecting the applications, save and load data, Caliper includes a powerful professional oscilloscope, autophasing tools, automatic cogging reduction, observer for vibrations, fieldbus analizer and many other applications to help you tune your applications at best. The communication is via USB 2.0 port, and therefore it doesn't need special cables or serial converters.

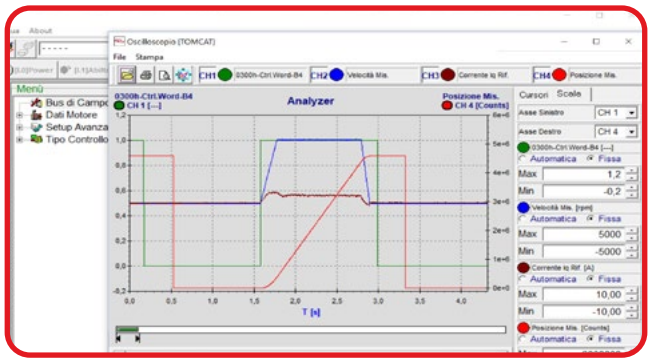
MAIN FEATURES:

- Drive configuration
- Reading, loading and saving of drive parameters
- Possibility to connect via USB Hub different drives and to control them simultaneously from Caliper selecting the specific drive.
- Oscilloscope with 4 configurable channels with the possibility register, save and print the measures taken
- Motor autotuning and autophasing
- Selection and configuration of operative mode:
  - Torque control
  - Torque limit control
  - Speed and positioning control
  - Multi-positioning
  - Electronic Axis
  - Electronic Cam
  - Servo pump
  - Servo cylinder
  - Filters
  - Display Alarms

Micro USB 2.0 port

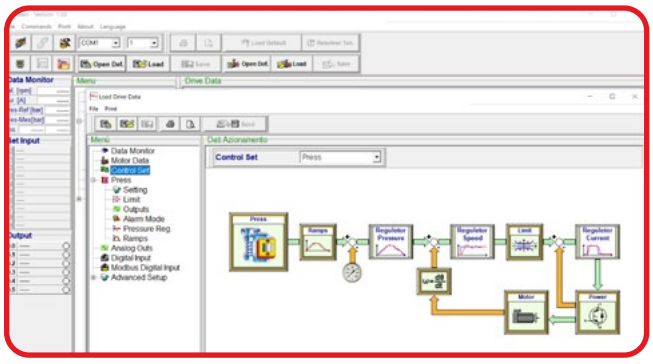
4-channel digital real time oscilloscope

Flagship of Caliper software from the beginning, the new 4 channels oscilloscope allows to sample signals at 100µs via the fast USB2 port. All channels are selectable, recordable, savable also as picture or PDF format.
A convenient wave function generator feature is A, useful to perform the tuning of control loop without having to phisically remove the axes. Data gathered during observation can be saved and printed in order to be shared or stored.



Intuitive Interface.

Clear and logic interface, off-line data input, multi-language mode (english, italian, french, turkish and chinese), simplify the navigation in menus and commands. Important parameters accessible only with password.
"Operator enable" security function to avoid accidental manumissions.



Easy parameterization.

Rationalization of the parameters, the use of block diagrams and the graphical representation of the applications simplify the paratremization of the drive. Ability to save and load axis calibration data and motor data.

Position control: multi-positioner

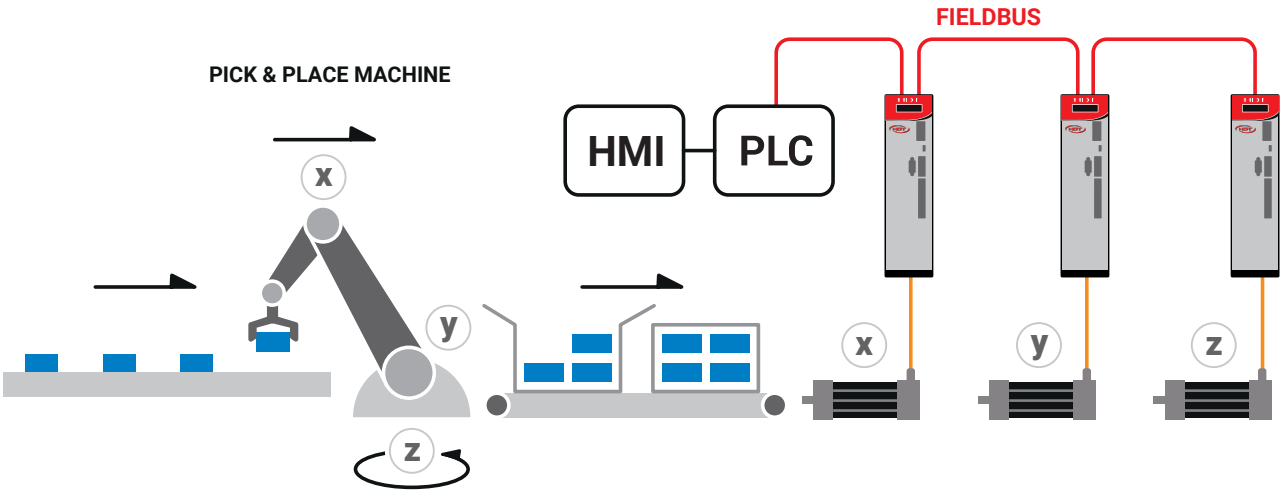
The servodrives integrate a "multi-positioner" operating mode with 4 selectable modes.
The positioner application generates a speed profile to reproduce a motion trajectory with controlled acceleration and jerk, allowing accurate positioning. The profile calculation is performed in real time allowing to modify on-the-fly the position target with time lower than 1 millisecond. This allows to manage in a fast way different motion profiles.
The positioner includes a functionality called "stop on marker" that allows to perform a controlled position stop when a sensor signal is detected by a digital input of the drive during the execution of the trajectory.

Single target positioner.
This mode can be activated both with digital/analog input and with all fieldbuses.
The drive configured in this way allows to generate a trajectory profile only for a target defined as position target, with speed, acceleration, deceleration and jerk. The positions can be absolute or relative.
Using the fieldbuses, all parameters can only be set on the fly by telegram; only the Modbus RTU allows to work with maximum flexibility using both modbus commands and digital/analog input commands.
In case a fieldbus is not A, position and speed can be set in analog mode via the respective input, while the other parameters can be set via Caliper software.

Positioner with targets table.
This mode can be activated both with digital/analog inputs and with Modbus RTU and ProfiNet RT.
The positioner allows to manage a maximum of 64 targets. As with the single target, for each target it is possible to set position, speed, acceleration and jerk. The positions can be absolute or relative.
The targets are wrote in a table on the drive via Caliper or via fieldbus.
The targets can be executed individually or linked in different ways allowing to generate more complex profiles.
It is possible to cycle automatically the series of linked targets and to interpose a waiting time between one target and the other.

Cyclic positioner.
This mode is similar to the positioner with target from table, with the difference that the targets are strictly executed one after the other.
The targets can be activated manually via I/O or via Modbus RTU.
The option to make the sequence of set dimensions cyclical is provided.

"Input-start" positioner.
This mode allows to synchronize the starting of an axis with the reaching of the position of another axis, without the necessity to use a PLC. It is different from the previous one because the input that selects the target or the group of linked targets also becomes the start command of the target itself. The "reached position" signal can be activated on each of the digital output of the drive.
Therefore, connecting one of the output of reached target of a servodrive with the input of another servodrive, it allows the synchronized starting of the latter.
This mode only works with digital/analog inputs and with Modbus RTU fieldbus.

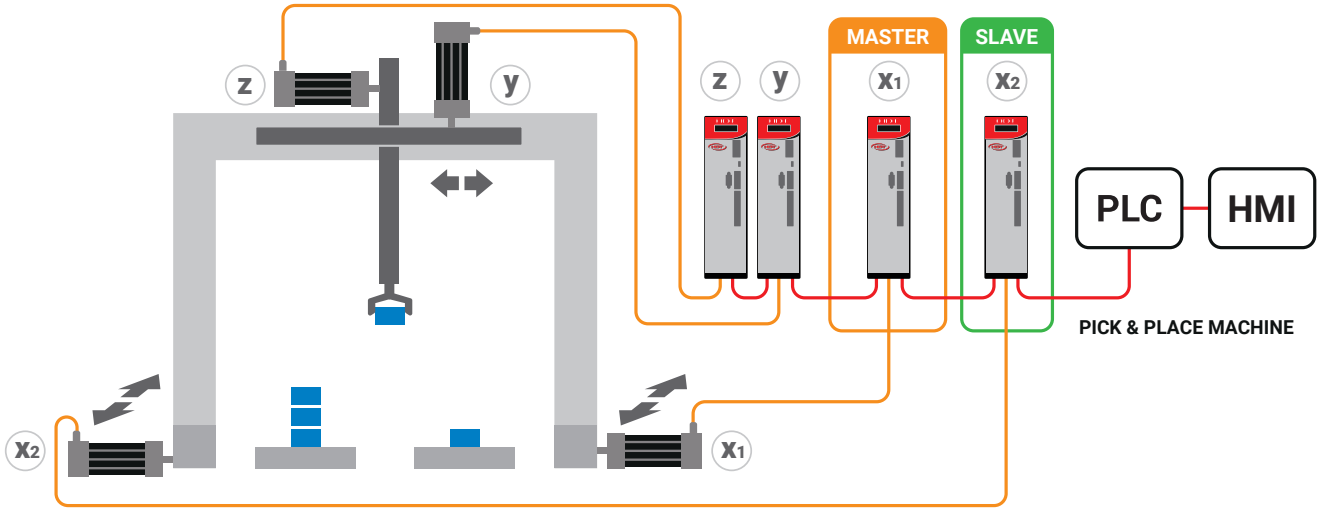


Example of pick and place application where positioner is frequently used.

Position control: electronic gearboxes

The electronic gearboxes is a standard feature of the servodrives that allows to set a transmission ratio between one or more motors, where a slave axis, or "follower", follows a master axis according to a preset ratio. This ratio is set in the slave drive and can be modified at will.The movement of the master is measured with an encoder, which signal is sent to the input of the follower drive, that follows according the set ratio. The electronic axis replicates the mechanical transmission principle, in the same way that happens in a reducer, recirculating ball screw, a rack or a pulley and belt system.

The transmission with mechanical reduction allows to change speed, to increse torque and helps to reach the match of inertia between motor and load. The electrical axis function, compared to mechanical reduction, only regulates the speed but with the advantage of allowing to change on will and to eliminate backlash and deterioration typical of mechanical systems. It is possible to connect different slave axes to a single master axis, with different electrial gear ratio. When managing the electrical axis, It is important to calibrate the parameters of slave axis, especially response times.



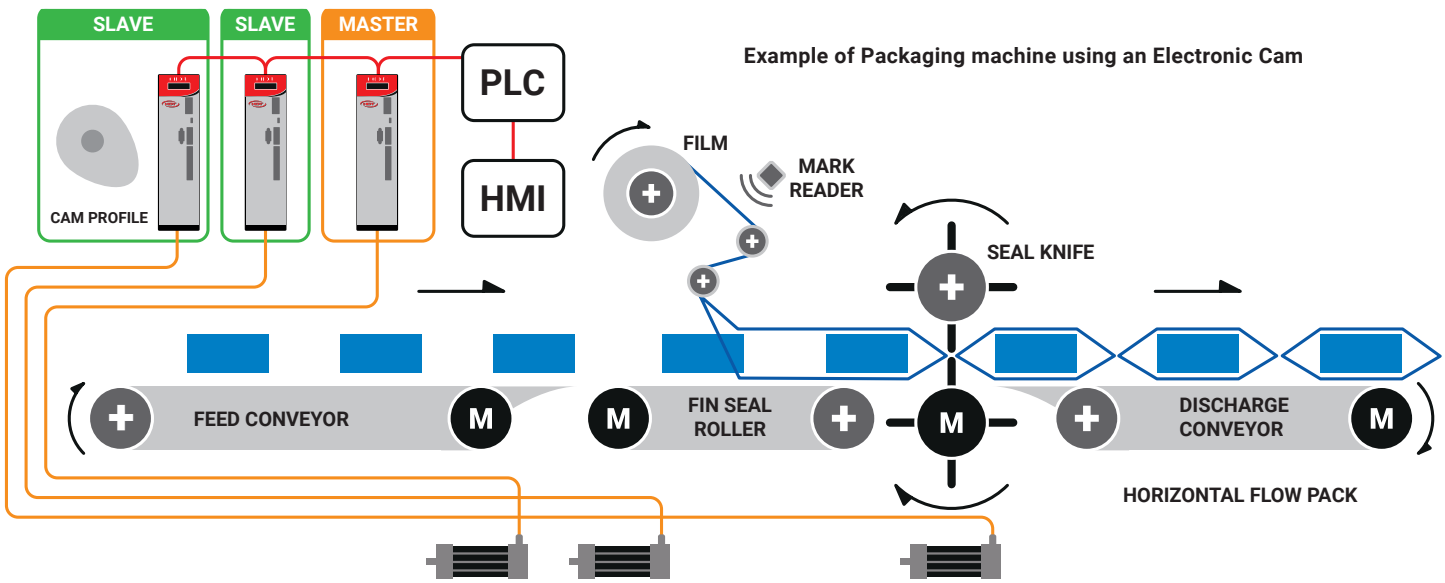
Electronic cam control

The electronic cam is a feature that replicates the concept of mechanical cam. The mechanical cam is an element with irregular shape (tipically ovoid) fixed to a rotating shaft of an axis and wihich moves another mechanical parts that follows and reproduces the profile.

In the electronic cam, the mechanical regulation is replaced with electronic. A cam profile is defined via a X/Y table with a maximum of 576 interpolate points.

Unlike the mechanical cam, where the cam profile is fixed to master axis, in the electronic cam the profile is inserted in the servodrive that drives the follower motor.
The "slave" axis receive the space reference of the "master" axis and replicate the profile described in the table of X/Y points, generating the resulting motion.
The signal of the master axis can come from an esternal encoder or from the signal of a simulated encoder of a servo axis.

The benefit of the electronic cam compared to the mechanical one is evident in the flexibility to manage more than one profile, to be able to modify the profile very easilyu in any moment and not least the reduction of mechanical backlash and the corresponding adjustments that follow.



Example of Packaging machine using an Electronic Cam

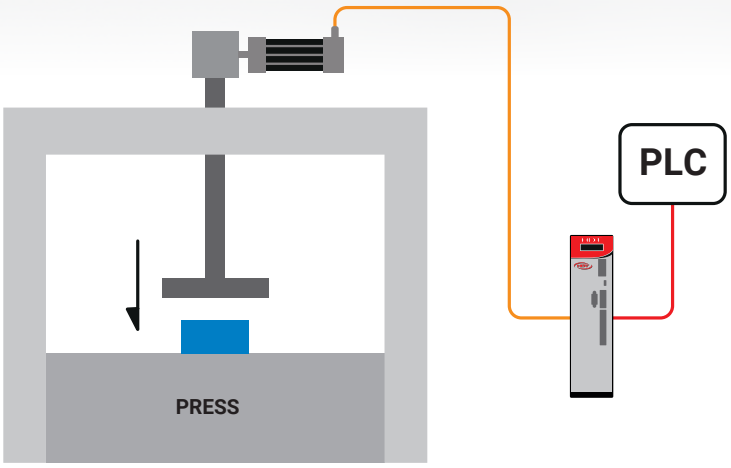
Torque control

The torque control is an application that allows to control the torque provided by the motor thanks to a torque reference managed by an analog input or a command sent via ModBus, CanOpen EtherCat or Profinet.

The torque reference that is provided is proportional to the rated torque of the motor.

According to the type of reference you work with, in Caliper software it is possible to set different parameters, for example:

- Full-scale of analog input
- Optimal PID controllers for the application
- The desired digital I/O.



Example of drive connected to an electric cylinder for torque control.

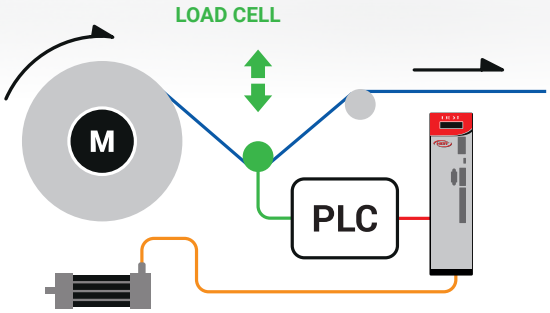
Speed control and torque limit

The speed control is a mode that allows to control the speed of the motor via a speed reference, managed by:

- An analog input
- A frequency input
- A fieldbus command

In I/O or Modbus mode it is possible to use an additional analog auxiliary speed reference or torque limit reference.

Therefore, it is possible to work in speed control mode, limiting the maximum torque output by imposing a limit threshold.



Example of drive connected to a mechanical dancer with load cell.

Servo-cylinder control

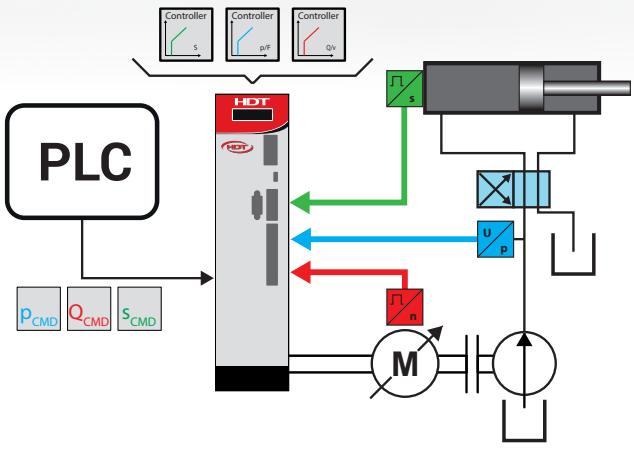
Application designed for the management of an hydraulic cylinder. By activating this mode, the servodrive regulates a servo pump in an hydraulic circuit by finely controlling the position of an hydraulic actuator or cylinder inserted in the circuit itself, whether it is equipped with a linear position transducer or without a sensor.

Open loop circuit

- Without linear encoder on the cylinder
- Positioning with precision> 10mm
- Without error compensation

Closed loop circuit

- With linear encoder on the cylinder
- Positioning with accuracy <1mm (0.2mm)
- with error compensation



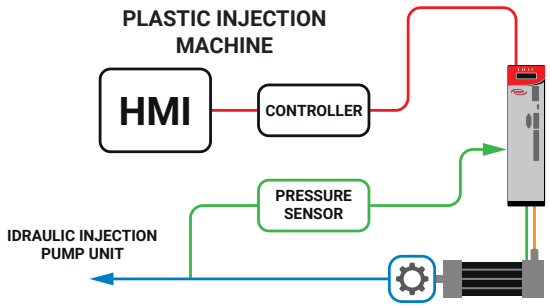
Example of a drive connected to an hydraulic cylinder in a closed loop circuit.

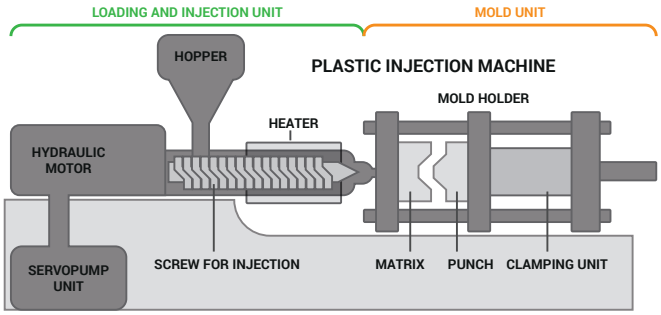
Control methods and applications

Servopump control

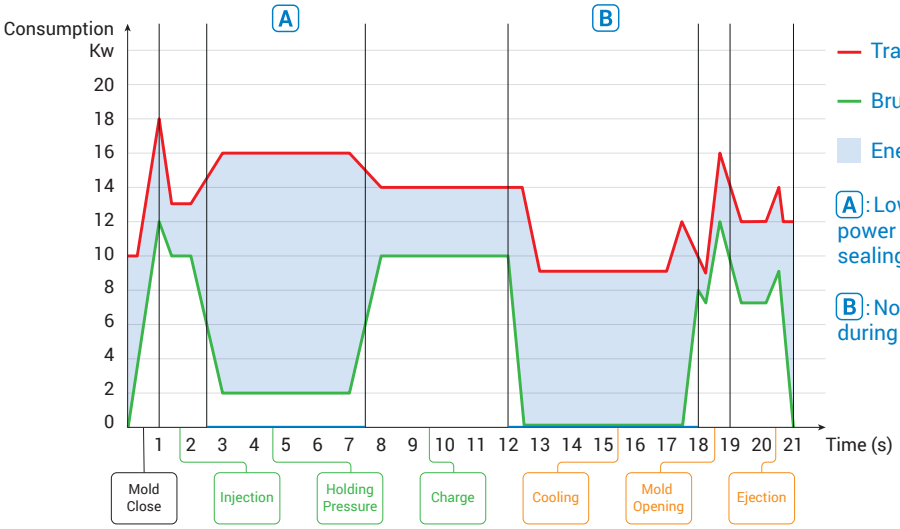
Application designed for operation in machines or applications that use a hydraulic circuit equipped with an open/closed loop servo pump in pressure/flow rate control (p/Q) such as presses or injection machines.

By activating this mode, three inputs are enabled in the servodrive. A first input for the speed reference signal used to regulate the speed of a motor connected to a pump and therefore its flow rate.
A second input is enabled to receive the pressure reference signal while a third input is enabled for the pressure signal sensor (pressure feedback). The two pressure signals are compared and the servodrive exercises a speed control to keep the actual pressure equal to that of the reference.





Energy consumption table: operating cycle of a plastic injection molding machine



Operating modes

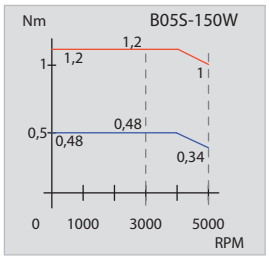
TomCat servodrive	Drive Configuration					
Control Mode	Standard	RTU Modbus	Canopen CiA 402	Ethercat COE	Profinet RT & IRT	Ethernet/IP CIP
Speed	YES	YES	YES	YES	YES	YES
Torque	YES	YES	YES	YES	YES*	YES
Position	YES	YES	YES	YES	YES	YES
Electronic gearbox	YES	YES	YES	YES	YES*	YES
Electronic cam	YES	YES	NO	NO	NO	YES
Pressure control	YES	YES	YES	YES	YES	YES
Hydr. cilinder control	YES	YES	YES	YES	YES	YES
Touch probe	NO	NO	YES	YES	YES	NO

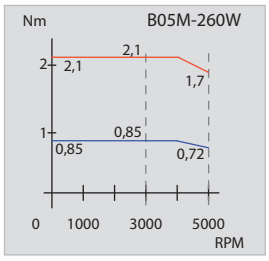
* Under development

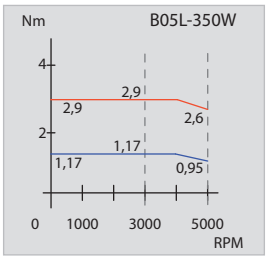
Servomotors Type B technical specs

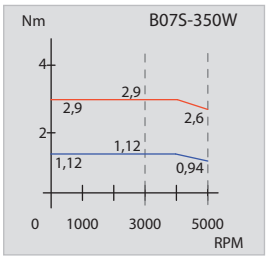
MOTOR TYPE			B05			B07								B10				
Motor Size		UM	S	M	L	S		M		L		G		S		N		M
Drive power supply			220 VAC	220 VAC	220 VAC	220 VAC	400 VAC	220 VAC	400 VAC	220 VAC	400 VAC	220 VAC	400 VAC	220 VAC	400 VAC	220 VAC	400 VAC	220 VAC
Rated output Power	Pn	kW	0,15	0,26	0,35	0,35		0,6		0,8		1,1		1,2		1,5		2,0
Poles count	PN	-	6															
Rated Speed	n	RPM	3000															
Torque at rated speed[1]	Tn	Nm	0,5	0,9	1,2	1,2		2		2,6		3,4		4		4,7		6,5
Peak Torque	Tpk	Nm	1,3	2,2	3	3		5,1		6,6		8,6		8,8		10,8		15,1
Rated current	In	A	0,5	0,9	1,2	1,2	0,7	2	1,3	2,8	1,6	3,9	2,4	4,2	2,5	4,8	2,3	7
Peak current	Ipk	A	1,4	2,3	3,2	3,2	1,9	5,5	3,5	7,1	4,2	9,8	6	9,5	5,5	11	6,4	16,2
Back EMF voltage constant	Ke	Vrms/ Krpm	57,6	57,6	56,5	56,5	96,3	56,5	89	56,5	96,3	53,4	88	56,5	96,3	59,7	102,6	56,5
Torque constant	Kt	Nm/ Arms	0,95	0,94	0,93	0,93	1,6	0,93	1,47	0,93	1,59	0,88	1,46	0,93	1,60	0,98	1,70	0,94
Rotor Inertia	Jm	gm²	0,0126	0,0207	0,0287	0,0481		0,0843		0,1205		0,1566		0,1953		0,2597		0,3237
Rotor inertia with brake	Jmb	gm²	0,0244	0,0324	0,0404	0,0788		0,1149		0,1512		0,1873		0,3089		0,3634		0,4274
Phase/Phase resistance, 20°C	Rw	Ohm	145,5	51,8	27,1	26,6	80,9	9,6	27,6	5,4	15,8	3,6	10,4	5,9	17,0	2,4	8,7	2,1
Phase/Phase inductance 20°C	Lw	mH	51,8	60	33,5	47,5	137,6	19,3	51,2	11,6	37,0	8,6	25,7	19,3	51,4	9,3	31,6	7,9
Resolver	Code	1	A			A								A				
Incr. Optical Encoder 1024ppr with Hall sersors	Code	2	A			A								A				
Incr.Optical Encoder 2500ppr with Hall sersors	Code	200	NA			A								A				
Incr. Mag. Encoder 1024ppr with Hall sersors	Code	280	A			A								A				
Magnetic Absolute Encoder single turn 1024ppr	Code	480	A			A								A				
Absolute Enc. Multiturn BiSS 22Bit/ST - 12Bit/MT	Code	512	NA			A								A				
PTC trigger threshold	PTCt	°C	130															
Insulation class			WINDING: H CLASS - MOTOR: F CLASS															
IP rating			IP 65 (If equipped with optional oil seal)															

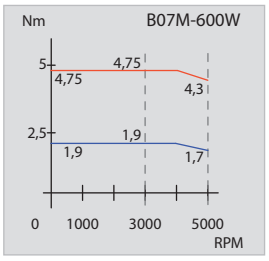
A= Available NA = Not Available AR = on demand. Contact HDT for availability 1 = in case of motor with brake, the rated torque has to be derated of 10%

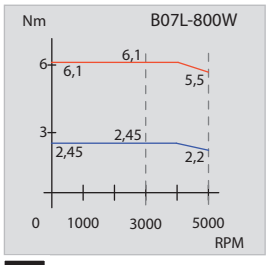


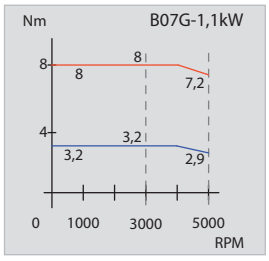


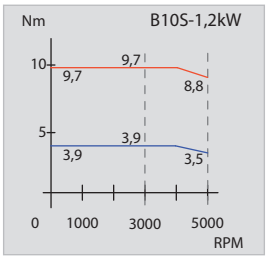


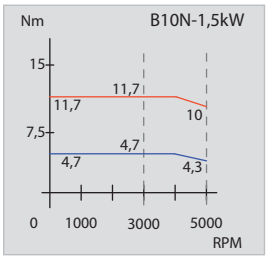


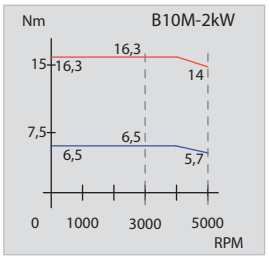






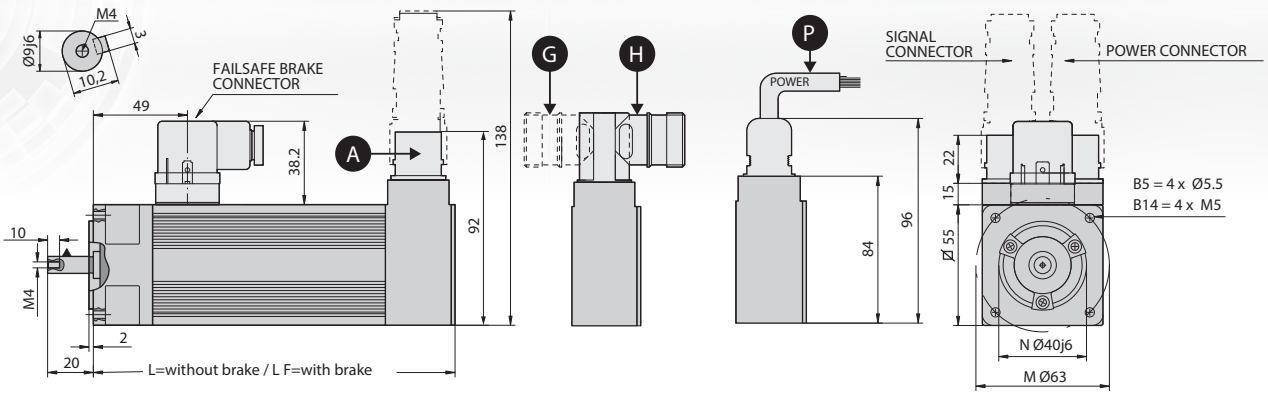




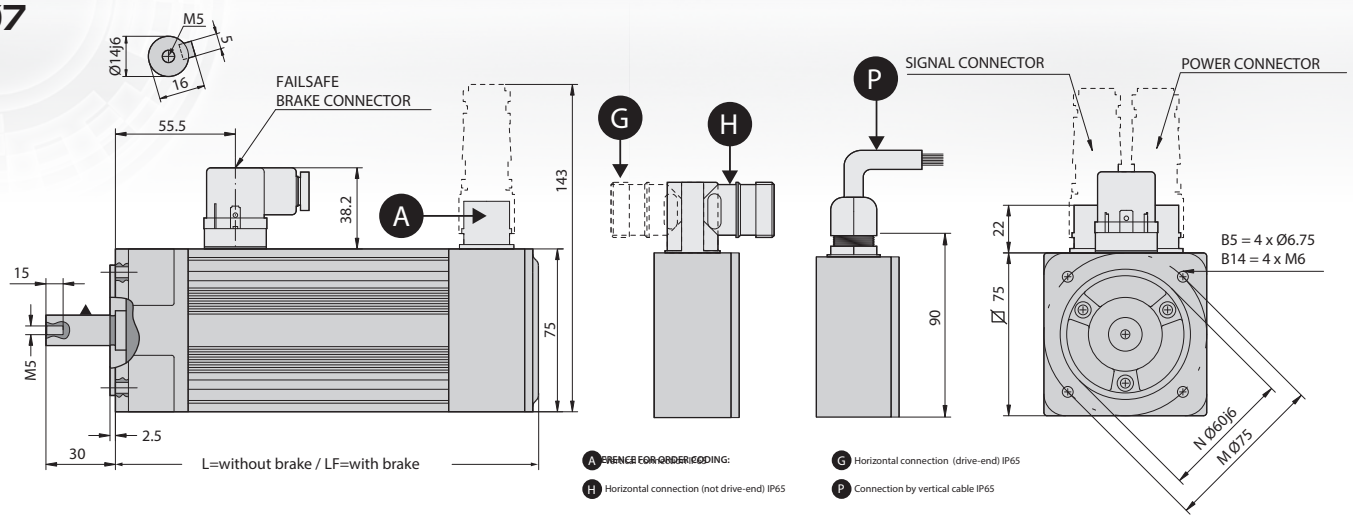


Dimensions

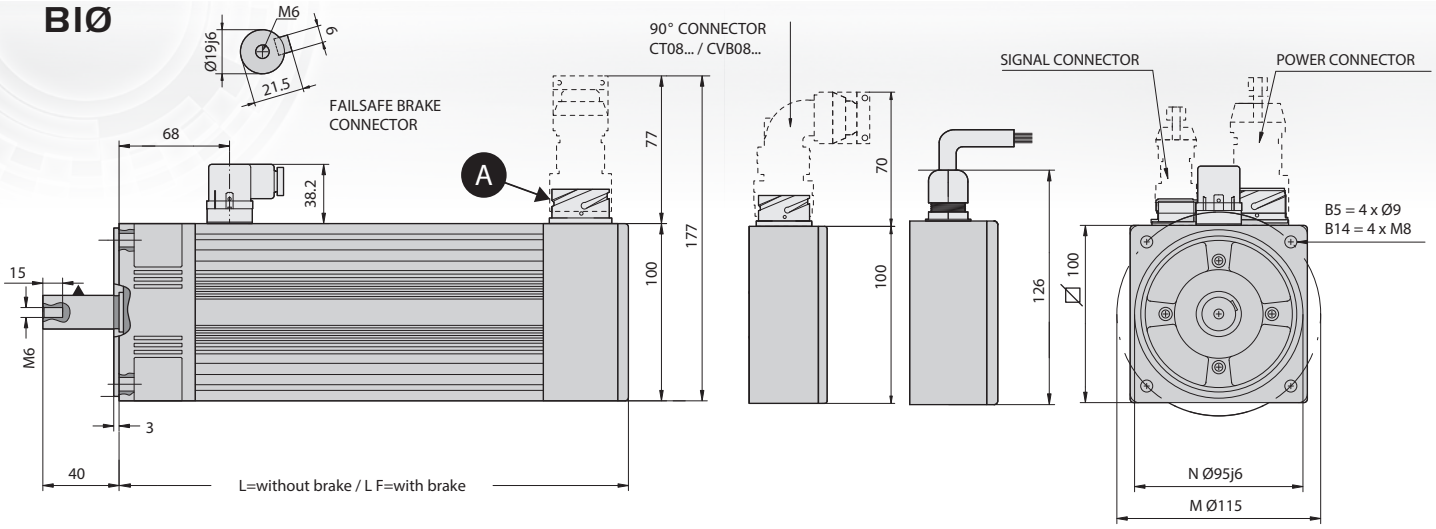
BØ5



BØ7



BIØ



Parking brake data

Motor type	Brake type	Braking Torque	Power	Coupling time	Release time	Brake Voltage
B05S	03	2Nm@100°C	11W	10ms	25ms	24VDC
B05M	03	2Nm@100°C	11W	10ms	25ms	24VDC
B05L	03	2Nm@100°C	11W	10ms	25ms	24VDC
B07S	05	4.5Nm@100°C	12W	18ms	35ms	24VDC
B07M	05	4.5Nm@100°C	12W	18ms	35ms	24VDC
B07L	05	4.5Nm@100°C	12W	18ms	35ms	24VDC
B07G	05	4.5Nm@100°C	12W	18ms	35ms	24VDC
B10S	06	9Nm@100°C	18W	22ms	40ms	24VDC
B10N	06	9Nm@100°C	18W	22ms	40ms	24VDC
B10M	06	9Nm@100°C	18W	22ms	40ms	24VDC

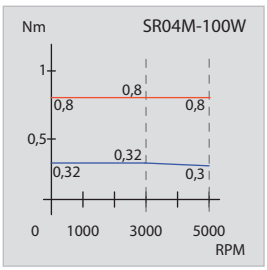
Motor lengths and weights

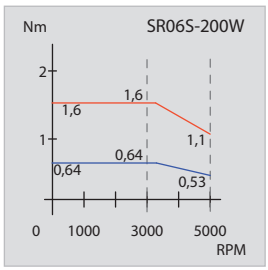
Motor type	L	LF	Weight (Kg)	Weight w/brake (Kg)
B05S	142	172	1.27	1.48
B05M	172	202	1.69	1.84
B05L	202	231	2.05	2.20
B07S	157.5	195	2.20	2.50
B07M	187.5	225	3.00	3.30
B07L	217.5	255	3.85	4.15
B07G	247.5	285	4.75	5.05
B10S	182	223	5.30	5.76
B10N	203	242	6.00	6.46
B10M	223	263	7.40	7.86

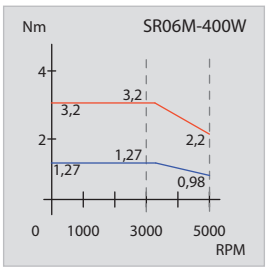
Type SR Servomotors technical specs

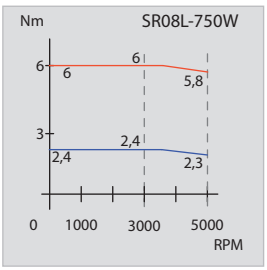
MOTOR TYPE		U of M	SR04	SR06			SR08			
Motor Size			M	S[AR]	M		L		G	
Drive power supply			220V	220V	220V	400V	220V	400V	220V	400V
Rated output Power	Pn	W	100	200	400		750		1000	
Poles count	PN	-	8							
Rated Speed	n	RPM	3000							
Torque at rated speed [(1)]	Tn	Nm	0.32	0.64	1.27		2.39		3.2	
Peak Torque	Tpk	Nm	0.95	1.92	3.8		7.2		9.6	
Rated current	In	A	0.9	1.2	1.9	1.1	3.2	1.8	4.6	2.8
Peak current	Ipk	A	2.8	3.6	5.7	3.3	9.6	5.4	13.7	8.4
Back EMF voltage constant	Ke	Vrms/ Krpm	23.5	36.1	43.3	74.5	47.3	80	44.6	69
Torque constant	Kt	Nm/ Arms	0.35	0.55	0.67	1.15	0.75	1.32	0.7	1.14
Rotor Inertia	Jm	gm^2	0,0035	0,0264	0,0407		0,093		0,12	
Rotor inertia with brake	Jmb	gm^2	0,0036	0,0292	0,0435		0,105		0,134	
Phase/Phase resistance, 20°C	Rw	Ohm	9.05	9	5.3	4.4	1.84	2.15	1.3	3.2
Phase/Phase inductance 20°C	Lw	mH	14.36	44.4	30.56	114	17.4	114	10.1	56
Optical Incr. Enc. 2500ppr with Hall sensors	Codice	200	AR	A	A		A		A	
Magnetic Incr. Enc. 2500ppr with Hall sensors	Codice	210	A	A	A		A		A	
Absolute Enc. Multiturn BiSS 17Bit/ST - 16Bit/MT	Codice	570	NA	A	A		A		A	
PTC trigger threshold	PTCt	°C	NA							
Insulation class			F CLASS							
IP rating			IP 65 (only if equipped of shaft oil seal)							

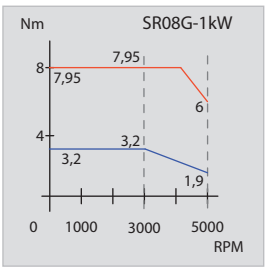
A= Available, NA = Not Available, AR = on demand. Contact HDT for availability, [(1)] = in case of motor with brake, the rated torque has to be derated of 10%





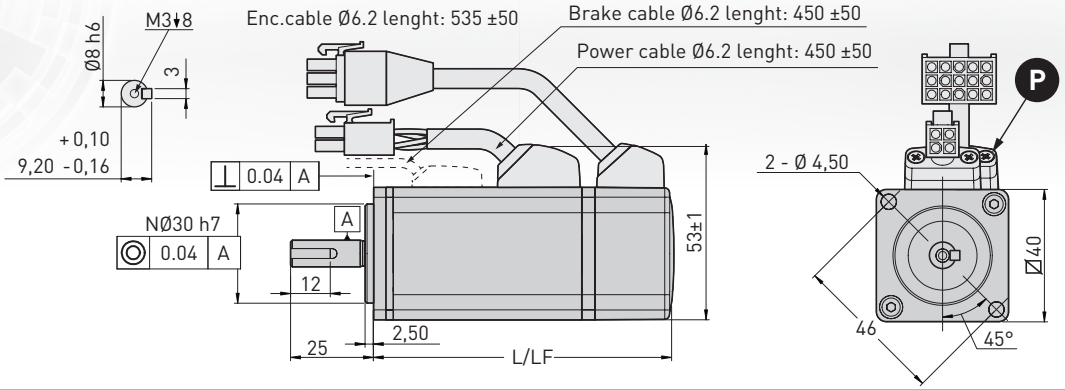




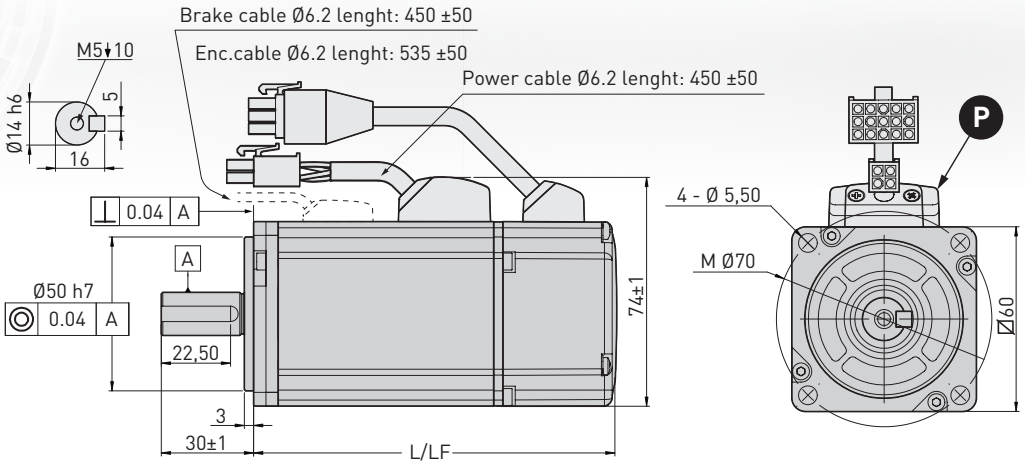


Dimensions

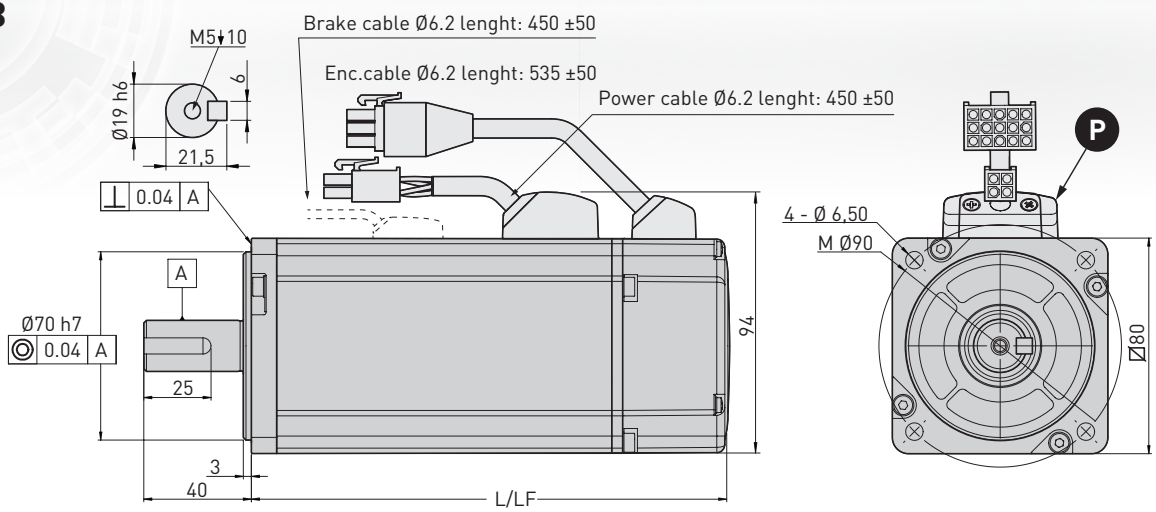
SRØ4



SRØ6



SRØ8



REFERENCE FOR ORDER CODING: P Connection by vertical cable IP65

Parking Brake Data

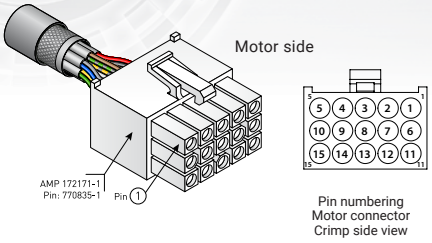
Motor type	Brake type	Braking Torque	Power	Engage time	Release Time	Voltage
SR04M	01	0.3Nm@100°C	6W	<35ms	<20ms	24VDC
SR06S	02	1.3Nm@100°C	7W	<50ms	<20ms	24VDC
SR06M	02	1.3Nm@100°C	7W	<50ms	<20ms	24VDC
SR08L	03	3.2Nm@100°C	11.5W	<70ms	<20ms	24VDC
SR08G	03	3.2Nm@100°C	11.5W	<70ms	<20ms	24VDC

Motor lengths and weights

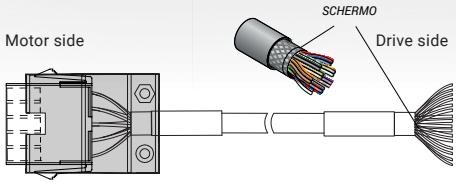
Motor type	Feedback	L	LF	Weight (Kg)	W. with brake(Kg)
SR04M	200	99	136	0.5	0.8
SR06S	200	114.9	156	1	1.6
SR06S	210	95.6	136.6	1	1.6
SR06M	200	143	184	1.4	1.9
SR06M	210	124	165	1.4	1.9
SR06M	570	143	184	1.4	1.9
SR08L	200	144.5	188	3.1	3.6
SR08L	210	125	168	3.1	3.6
SR08L	570	144.5	188	3.1	3.6
SR08G	200	162.5	205	3.6	4.1
SR08G	210	143	186	3.6	4.1
SR08G	570	162.5	205	3.6	4.1

Connections for SR motor

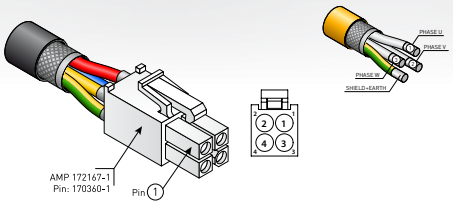
Signal connector



Extension cable



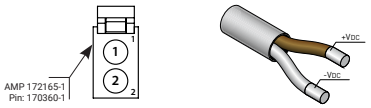
Power connector



SIGNAL CONNECTIONS ON MOTOR SIDE ENCODER			EXTENSION CABLE
CONNECTOR	INCREMENTAL	ABSOLUTE	COLOUR
PIN	FUNCTION	FUNCTION	
1	DC+5V	DC+5V	RED
2	GND	GND	BLACK
3	Hall C+		GREY/PINK
4	Hall C-		BROWN/GREEN
5	Hall B+	CK+	VIOLET
6	Hall B-	CK-	WHITE/GREEN
7	Hall A+	D+	GREY
8	Hall A-	D-	RED/BLUE
9	A+		GREEN
10	A-		BROWN
11	B+		YELLOW
12	B-		ORANGE OR PINK
13	Z+		BLUE
14	Z-		WHITE
15	SHIELD	SHIELD	SHIELD

CONNECTOR	POWER CONNECTIONS
PIN	FUNCTIONS
1	U
2	V
3	W
4	PE

Brake Connector



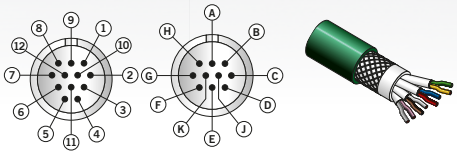
CONNECTOR	BRAKE CONNECTOR
PIN	FUNCTION
1	+VDC
2	-VDC

Connections for B motor

Encoder Connector and cable

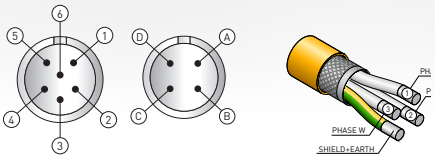
Motors B05-B07-B10

Resolver Connector and cable



Motors B05-B07 — Motors B10

Power Connector and cable



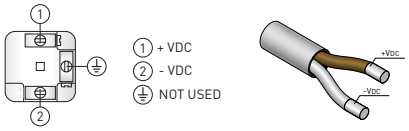
Motors B05-B07 — Motors B10

ENCODER CONNECTOR			CABLE
PIN	INCREMENTAL	ABSOLUTE	COLOUR
1	SHIELD	SHIELD	SHIELD
2	PTC[1]	PTC[1]	YELLOW/BROWN
3	+5V	+5V	RED
4	0V	0V	BLACK
5	CHA	SIN+[2]	GREEN
6	CHA-	SIN-[2]	BROWN
7	CHB	COS+[2]	YELLOW
8	CHB-	COS-[2]	ORANGE OR PINK
9	CHZ	-	BLUE
10	CHZ-	-	WHITE
11	HALL A	D+	GREY
12	HALL A-	D-	RED/BLUE
13	HALL B-	CK-	WHITE/GREEN
14	HALL B	CK+	VIOLET
15	HALL C	-	GREY/PINK
16	HALL C-	-	BROWN/GREEN
17	PTC[1]	PTC[1]	WHITE/YELLOW

RESOLVER CONNECTOR			CABLE
PIN B05/B07	PIN B10	RESOLVER	COLOUR
1	A	COS+	GREEN
2	B	COS-	YELLOW
3	C	SIN-	RED
4	D	EXC-	BROWN
5	E	SIN+	BLUE
6	F	EXC+	WHITE
7	G	PTC	PINK
8	H	PTC	GREY
9	J	SHIELD	-
10	K	NOT USED	-
11	-	NOT USED	-
12	-	NOT USED	-

POWER CONNECTIONS		
PIN B05-B07	PIN B10-B14	FUNCTIONS
1	A	U
3	B	V
5	C	W
6	D	PE

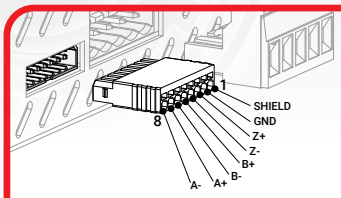
Brake Cable



BRAKE CONNECTIONS	
PIN B05-B07-B10-B14	FUNCTIONS
1	+VDC
2	-VDC
NOT USED	PE

1- Not present in motors wound at 60V
2- SIN / COS signal not usable by the TMC drive

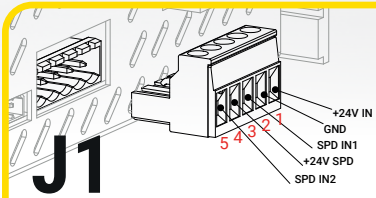
Drive Connections



BUFFERED HARDWARE REPEAT 5V
OF INCREMENTAL CHANNELS AND ZERO NOTCH
COMING FROM THE INCREMENTAL ENCODER
OF THE MAIN FEEDBACK

J8

FLYING CONNECTOR ENCODER REPEAT



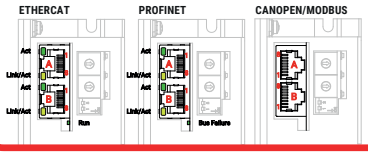
POWER CONNECTION
OF THE DRIVE LOGIC
AND THE SAFETY CIRCUIT
SAFE TORQUE OFF

J1

STO - SAFETY FLYING CONNECTOR

FIELD BUS COMMUNICATION PORT RJ45

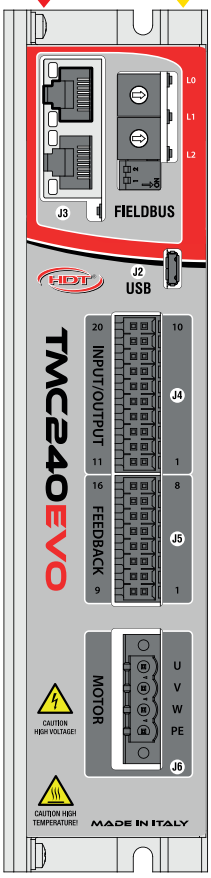
J3



MICRO USB PORT FOR PROGRAMMING

MICRO USB 2.0 12Mbps
Drive programming with Caliper software
Firmware update

J2



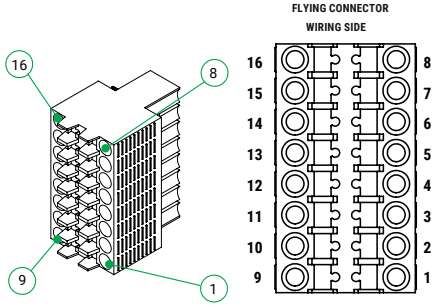
FLYING SIGNAL CONNECTOR

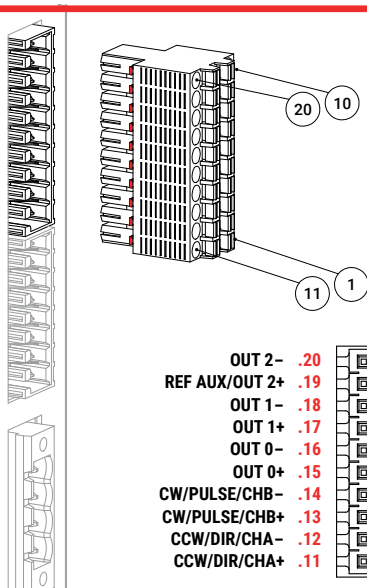
J5

INCREMENTAL ENCODER
- 5V LINE DRIVE
- OPEN COLLECTOR
- PUSH/PULL

ABSOLUTE ENCODER
-SSI
-BISS
-ENDAT

RESOLVER (OPTION)

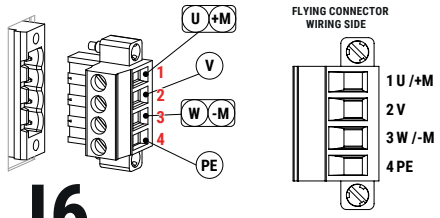




OUT 2–	.20	10.	REF–
REF AUX/OUT 2+	.19	9.	REF+
OUT 1–	.18	8.	GND
OUT 1+	.17	7.	IN 5
OUT 0–	.16	6.	IN 4
OUT 0+	.15	5.	IN 3
CW/PULSE/CHB–	.14	4.	IN 2
CW/PULSE/CHB+	.13	3.	IN 1
CCW/DIR/CHA–	.12	2.	IN 0
CCW/DIR/CHA+	.11	1.	IN C

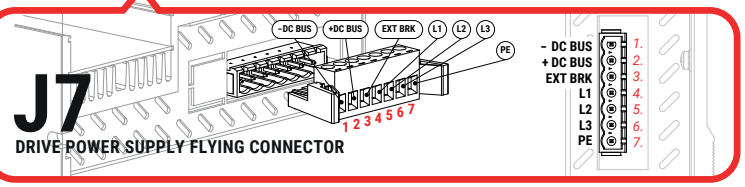
J4

ANALOG AND DIGITAL I/O FLYING CONNECTOR



J6

POWER FLYING CONNECTOR



J7

DRIVE POWER SUPPLY FLYING CONNECTOR

J5				
CONNECTOR	INCREMENTAL	ABSOLUTE	ABSOLUTE	RESOLVER
PIN	FUNCTION	FUNCTION	FUNCTION	FUNCTION
1	CH A+	CH A+	-	SEN+
2	CH A-	CH A-	-	SEN-
3	CH B+	CH B+	-	COS+
4	CH B-	CH B-	-	COS-
5	CH Z+	CK+	CK+	EXC+
6	CH Z-	CK-	CK-	EXC-
7	PTC	PTC	PTC	PTC-
8	PTC	PTC	PTC	PTC+
9	+VDC	+VDC	+VDC	-
10	GND	GND	GND	-
11	-	DATA-	DATA-	-
12	HALL A+	DATA+	DATA+	-
13	HALL B+	-	-	-
14	HALL C+	-	-	-
15	PE	PE	PE	SHIELD
16	PE	PE	PE	SHIELD

J6		
CONNECTOR	BRUSHLESS	DC MOTOR
PIN	FUNCTION	FUNCTION
1	U	M+
2	V	-
3	W	M-
4	PE	PE

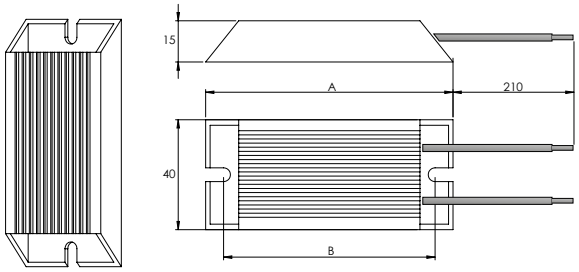
J1		
PIN	FUNCTION	DESCRIPTION
1	+24V IN	Drive logic power supply
2	GND IN	Drive logic power supply
3	SPD IN 1	SPD1 redundant channel input
4	+24V SPD	Power SPD circuit
5	SPD IN 2	SPD2 redundant channel input

Drive / Motors Matching

		TMC240EVO			TMC460EVO	
SIZES	T_0	2	4	6	1.5	3
B05S	Nm	0.5			0.5	
B05M	Nm	0.9			0.9	
B05L	Nm	1.2			1.2	
B07S	Nm	1.2			1.2	
B07M	Nm		1.9		1.9	1.9
B07L	Nm		2.6		2.6	2.6
B07G	Nm		3.4			3.4
B10S	Nm		4	4		4
B10N	Nm			4.7		4.7
SR04M	Nm	0.32			0.32	
SR06S	Nm	0.64			0.64	
SR06M	Nm	1.27			1.27	
SR08L	Nm		2.45			2.45
SR08G	Nm			3.2		2.45

Braking Resistors

DRIVE	RESISTANCE	RESISTANCE	NOM.POWER	DIMENSIONS	
TYPE	TYPE	VALUE	VALUE	A	B
TMC240 2/4	R50W47R	47 Ohm	50 W	90	120
TMC240 4/8	R90W39R	39 Ohm	90 W	77	106
TMC240 6/12	R90W39R	39 Ohm	90 W	77	106
TMC460 1.5/3	R90W100R	100 Ohm	90 W	77	106
TMC460 3/6	R90W100R	100 Ohm	90 W	77	106



Cables and Extensions order code

CABLE CODE	FUNCTION	MOTORS PAIRINGS					
TYPE	DESCRIPTION	SR04	SR06	SR08	B05	B07	B10
CNTSRPWR-PF01-XXX	Fixed laying power cable for SR motor	✓	✓	✓	×	×	×
CNTSRPWR-PM01-XXX	Power cable for mobile laying for SR motor	✓	✓	✓	×	×	×
CNTSRENC-PF16-XXX	Encoder cable for fixed installation for SR motor	✓	✓	✓	×	×	×
CNTSRENC-PM16-XXX	Encoder cable for mobile laying for SR motor	✓	✓	✓	×	×	×
CNTSRBRK-XXX	Brake cable for SR motor	✓	✓	✓	×	×	×
CNT6PM23C-PF01-XXX	B05 / B07 power connector wired with 4x1 cable for fixed installation	×	×	×	✓	✓	×
CNT6PM23C-PM01-XXX	B05 / B07 power connector wired with 4x1 mobile laying cable	×	×	×	✓	×	×
CNT6PM23C-PM15-XXX	B05 / B07 power connector wired with 4x1.5 mobile laying cable	×	×	×	×	✓	×
CNT12PM23C-PF00-XXX	Resolver connector B05 / B07 wired with cable for fixed installation	×	×	×	✓	✓	×
CNT12PM23C-PM00-XXX	Resolver connector B05 / B07 wired with cable for mobile laying	×	×	×	✓	✓	×
CNT17PM23C-PF16-XXX	B05 / B07 / B10 encoder connector wired with cable for fixed installation	×	×	×	✓	✓	✓
CNT4PMILC-PM15-XXX	B10 / B14 power connector wired with 4x1.5 mobile laying cable	×	×	×	×	×	✓
CNT4PMIL90C-PM15-XXX	B10 90 ° power connector wired with 4x1.5 mobile laying cable	×	×	×	×	×	✓
CNT10PMILC-PF00-XXX	B10 resolver connector wired with cable for fixed installation	×	×	×	×	×	✓
CNT10PMILC-PM00-XXX	B10 resolver connector wired with cable for mobile laying	×	×	×	×	×	✓
CNT10PMIL90C-PF00-XXX	B10 90 ° resolver connector wired with cable for fixed installation	×	×	×	×	×	✓
CNT10PMIL90C-PM00-XXX	B10 90 ° resolver connector wired with cable for mobile laying	×	×	×	×	×	✓
CNTB10BRK-XXX	Brake connector for B05 / B07 / B10 / B14 motors	×	×	×	✓	✓	✓

TMC EVO Order code

TMC 240 EVO 48 M E C R

Model drive = Tomcat

Power voltage
240 = 220/230V
460 = 400/460V

Serie = EVO

Sizes (current)
24 = 2A rated (230VAC single-phase and three-phases)
48 = 4A rated (230VAC single-phase and three-phases)
612 = 6A rated (230VAC three-phases)
13 = 1.5A rated (400VAC three-phases)
36 = 3A rated (400VAC three-phases)

Feedback options
R = additional Resolver
No options = Feedback standard

Fieldbus options
ST = (Standard) No Fieldbus installed
CM = CanOpen CiA402 - Modbus RTU
EC = EtherCat CoE
PN = Profinet RT-IRT - Ethernet IP

Type of Mains
M = 230V Single phase
T = 230V Three-phases
Empty = 400V three-phases

EXAMPLE:	TMC240EVO-4/8-M-EC-R	TomCat Evo - 230V power supply, 4A of current size, Single-phase, Ethercat Fieldbus, additional feedback Resolver

SR Series Motors Order Code

SR	0 4	M	1	S	1	C	5	P	2 1 0	P	3 0	N

Model = SR

Frame

04 = ⍁40mm
06 = ⍁60mm
08 = ⍁80mm

Size

S = 1st Size
M = 2nd Size
L = 3rd Size
G = 4th Size

Available combinations:

SR04	M	100W	0.32Nm
SR06	S	200W	0.64Nm
SR06	M	400W	1.27Nm
SR08	L	750W	2.45Nm
SR08	G	1000W	3.20Nm

Mechanical Configuration

1 = B5

Drive Voltage Supply

S = 230VAC
R = 400VAC

Available combinations:

S	SR04M SR06S/M SR08L/G
R	SR06M SR08L/G

Parking Brake

1 = without brake
6 = with 24 VDC

Shaft and Protection

C = With key
5 = without seal ring

Power connections

Cable output

Feedback system:

200 = Inc.Enc 2500ppr, 5V Line Driver + Halls, Optical
210 = Inc.Enc. 2500ppr, 5V Line Driver + Halls, Magnetic
570 = Abs. Enc. BiSS 17bit + 16 Mturns without Battery

Available combinations:

SR04	M	200	-	-
SR06	S	200	210	570
SR06	M	200	210	570
SR08	L	-	210	570
SR08	G	-	210	570

Signal Connection

Cable output

Rated speed

30 = 3.000rpm

Cooling system

N = Natural air

EXAMPLE:	SR04M1S1C5P210P30N	SR - 40mm Frame, 2nd Size, B5 mechanical conf., 230VAC, without brake, with key, without seal ring, Inc. Enc. 2500ppr, Cable Output, 3000 rpm rated speed, natural air cooling.

B Series Motors Order Code

B	1 0	M	1	S	1	C	5	A	5 1 2	A	3 0	N				

Model = B

Frame

05 = ⍁55mm
07 = ⍁75mm
10 = ⍁100mm

Size

S = 1st Size
N = 2nd Size
M = 3rd Size
L = 4th Size
G = 5th Size

Available Combinations:

B05	S	0.48Nm	07	L	2.48Nm
B05	M	0.81Nm	07	G	3.20Nm
B05	L	1.10Nm	10	S	3.28Nm
B07	S	1.10Nm	10	N	4.00Nm
B07	M	1.90Nm	10	M	5.60Nm

Mechanical Configuration

1 = B5 2 = B14

Drive Voltage Supply

S = 230VAC
R = 400VAC

Parking Brake

1 = without brake
3 = with 24 VDC Brake for B05
5 = with 24 VDC Brake for B07
6 = with 24 VDC Brake for B10

Shaft and Protection

C = with key
5 = without oil seal

Power connections

Available combinations:

B05	A	G	H	P
B07	A	G	H	P
B10	A	-	-	P

A = Vertical connector
G = Horiz. connector Shaft Side
H = Horiz. Connector Back Side
P = Cable output

Feedback system:

1= Resolver
480 = Abs. Enc. Singleturn SSI
200 = Inc. Enc. 5V LD 2500ppr + Halls (optic)
280 = Inc. Enc- 5V LD 1024ppr + Halls (Inductive)
512 = Abs. Enc. Multiturn BISS (22bit/turn - 12bit/mturns)*

Available combinations:

B05	S/M/L	1	200	480	280	-
B07	S/M/L/G	1	200	480	280	512
B10	S/N/M	1	200	480	280	512

Signal Connection

Available combinations

B05	A	G	H	P
B07	A	G	H	P
B10	A	-	-	P

A = Vertical connector
G = Horiz. connector Shaft Side
H = Horiz. connector Back Side
P = Cable output

Rated speed

30 = 3.000rpm

Cooling system

N = Natural air

Special Versions

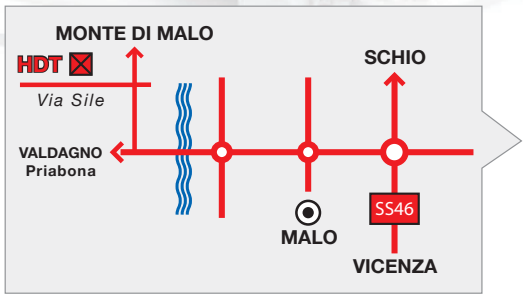
EXAMPLE:	B10M1S1C5A512A30N	B - 100mm Frame, Size M, B5 mechanical conf., 230VAC, without brake, with key, w/o seal ring, Abs. Enc. BiSS Mt 16/17, Vertical connector output, 3000 rpm rated speed, natural air cooling.

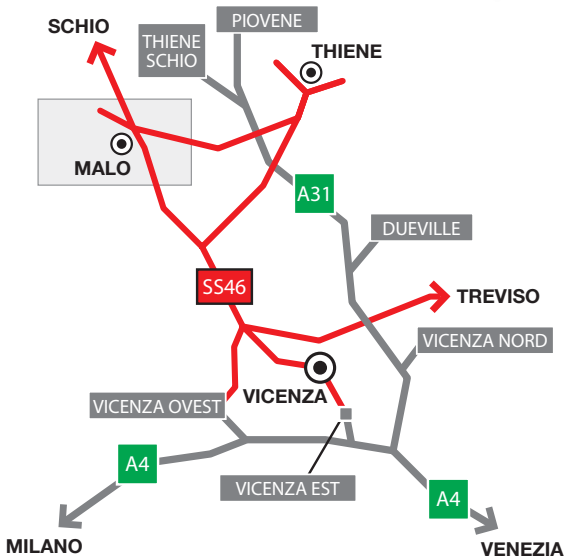
HDT

Motors & Digital Drives

CATTMC032023UK

1969/2019 50 YEARS IN THE ELECTRONIC WORLD





UK

HDT

H.D.T. srl - Via Sile, 8 - 36030 Monte di Malo (VI) Italy
Tel: +39.0445.602744 - Fax: +39.0445.602668 - EMail: info@hdtlovato.com - www.hdtlovato.com