1969/2019
50
YEARS
IN THE ELECTRONIC
WORLD

HDT

Motors & Digital Drives

TomCatEVO and DGFoxEVO Servosystems

Simple Versatile Compact

DGFox EVO & TomCat EVO Servodrives

New Evo Serie. Power in an unthinkable amount of space.
In thinking about the new servosystems TomCat EVO and DGFox 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 four the available fieldbuses.

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

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
- Pressure control

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

Feedbacks
- Sensorless
- Hall Signals at 120°
- Incremental Encoders 5V LD
- Inc. Enc. with Hall Sensors
- Absolute Encoders SSI
- 16 bit Resolver (optional)

Easy to wire terminals

Motor Brake
- Electronic brake management

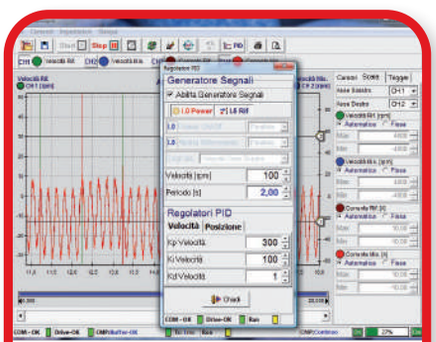
Brushless AC Synchronous motors

DC Servomotors

Main Features

Safety Integrated
SafeTorque Off Input circuit (STO only for TMC), according to IEC61800-5-2:2007[1]

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

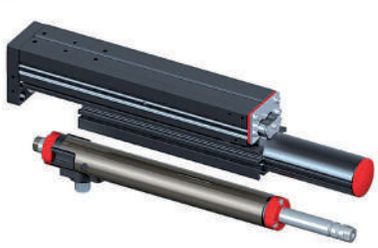
Filtering Software
- Notch Filter
- Iq Filter
- Digital Input Filter
- Position Observer

Alert Status
- via LED's
- via Fieldbuses

Feedback Output
- Encoder Repetition
- Emulated Encoder

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.

AC Asynchronous Motors



Tubolar Linear motors

Linear Servomotors

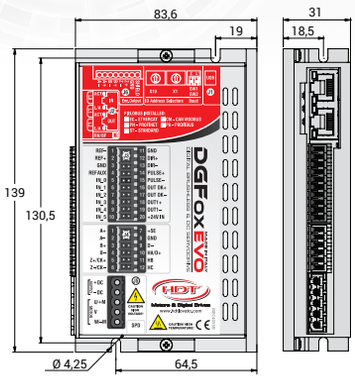
1 Only available on TomCat EVO.

Servodrive technical specifications

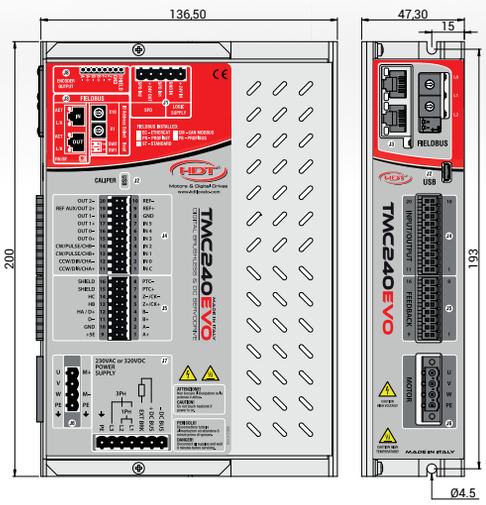
		DGFoxEVO					TomCat240EVO			TomCat460EVO	
SIZES	*U of M*	2.5	5	8	10	13	2	4	6	1.5	3
Applied Voltage	V	60 VDC					230 VAC 1Ph - 3Ph		230 VAC 3Ph	400 VAC 3Ph	
Min/Max power supply	V	20÷80 VDC					230VAC ±15%. 50/60Hz 200VDC ÷ 360VDC			400VAC ±15% 50/60Hz 400VDC ÷ 700VDC	
Rated current	A	2.5	5	8	10	13	2	4	6	1.5	3
Peak current for 2"	A	5	10	16	20	26	4	8	12	3	6
Max output power	KW	0.175	0.350	0.55	0.70	0.90	0.65	1.30	2.00	0.9	1.80
Max output power (DC brushed)	KW	0.125	0.250	0.40	0.50	0.65	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 (V/f).									
Logic power supply	VDC	+24VDC ±20%									
Integrated braking circuit		Not present					Standard				
External resistor (Optional)	VDC	Not managed					R50W47R	R90W39R		R90W100R	
External EMC filter		Not required					in appliance of optional EMC 61800-3 cat C2 and C3 law				
Feedback (5V)		Halls Sensors - Incremental Enc. 5V Line Driver with/without Halls sensors - Absolute Enc. SSI Binary - Sensorless									
Optional feedback		No options					Resolver[1]			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									
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 PNP - 2 outputs NPN/PNP					6 input NPN/PNP - 3 outputs NPN/PNP				
Control modes		Speed - Adjustable ramps - Torque control - Multipositioner - Electronic gearbox - Electronic CAM - Pressure Control									
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									
Protections functions		Short-circuit - Over/undervolt. - Drive Overtemp.- Feedback break - Rated current limit									
Drive signalings		3 LEDs for status and alarms									
Hardware Safety functions		Not Available					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	0.39					1.1	1.2	1.2	1.1	1.2

[1] Under development.

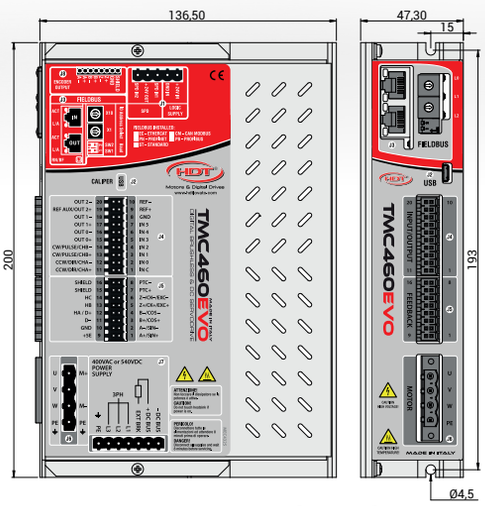
Dimensions



DGFox60EVO



TomCat240EVO



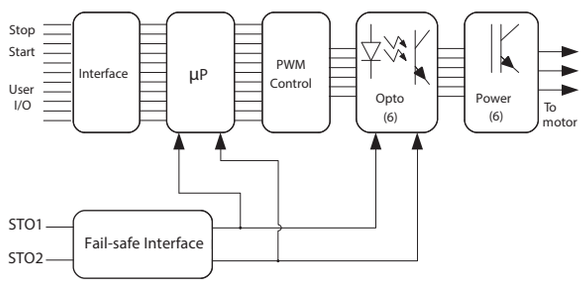
TomCat460EVO

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.



Drives / Motors Matching

		TMC240EVO			TMC460EVO		DGFoxEVO				
SIZES	Tn	2	4	6	1.5	3	2.5	5	8	10	13
B05S	Nm	0.5			0.5		0.5	0.5			
B05M	Nm	0.9			0.9			0.9	0.9		
B05L	Nm	1.2			1.2				1.2	1.2	
B07S	Nm	1.2			1.2				1.2	1.2	
B07M	Nm		1.9		1.9	1.9				1.9	1.9
B07L	Nm		2.6		2.6	2.6					2.6
B07G	Nm		3.4			3.4					
B10S	Nm		4	4		4					
B10N	Nm			4.7		4.7					
MS04M	Nm	0.32			0.32			0.32			
MS06M	Nm	1.27			1.27				1.27	1.27	1.27
MS08L	Nm		2.45			2.45					

Order code

Model drive	Power Voltage	Size (current)				Fieldbus Options	Feedback Options
TomCat EVO: TMC	240 220/230V	24 2/4	48 4/8	612 6/12	M 1Ph / (empty) 3Ph	ST Standard; CM CanOpen Modbus RTU; EC EtherCat CoE; PN ProfiNet	R Resolver (under development); R Resolver
	460 400/460V	13 1.5/3	36 3/6		Type of Mains		
DGFox EVO: DX	060 60VDC	25 2.5/5	510 5/10	816 8/16	1020 10/20 / 1326 13/26		

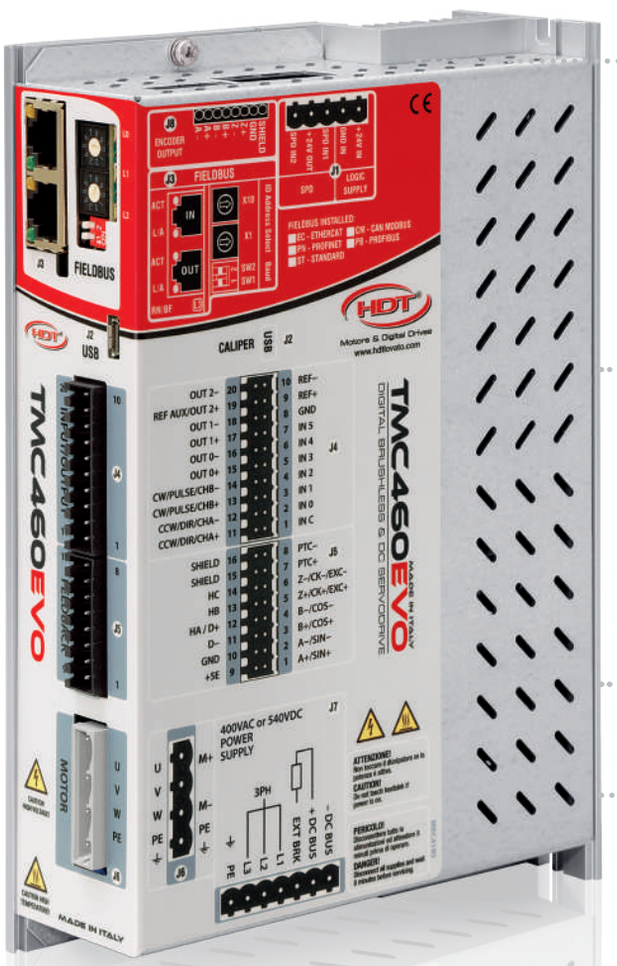
TMC 240 48 M EC		
EXAMPLE :	TMC 240 48 MEC	TOMCAT 240 - 4A./8A. Single Phase - EtherCat

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
- **CM** - ModBus RTU and CanOpen CiA 402 fieldbuses in addition to Standard
- **EC** - Ethercat CoE fieldbus in addition to Standard
- **PN** - Profinet RT and IRT fieldbus in addition to Standard



ST

STANDARD

STANDARD VERSION
Analogue and pulses train
Speed control
Torque control
Electronic gear
Multipositioner
Electronic cam
Pressure Control

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
Pressure Control

CM

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

Modbus

MODBUS
RTU Protocol
Speed control
Torque control
Electronic gear
Multipositioner
Electronic cam
Pressure Control

PN

PROFINET

PROFINET RT and IRT (CC - C)
Profidrive Protocol
Speed control (AC1)
Positioner in Program Mode (AC3)
Manual positioner (AC3)
Isochronous Control (AC4)
Electronic Gear
Pressure Control

Optional fieldbuses

With the name "fieldbus" is identified a series of protocols for industrial networks, standardized in IEC 61158, used for control and communication in real time of a complex automated system.
A complex industrial automated system, for example an automated line of biscuits production, in order to work needs to exchange information with different priority levels and timing between different parts that compose the system, for example HMI, PLC, sensors and servodrives. While the interpolation on many axis requires drive synchronization with timing less than 1ms, the positioning management just requires 10ms, and to send the information of position reached to be displayed on HMI it is possible to wait 100ms.
So the different fieldbuses use rules to grant the "determinism" and the "isochronism", respectively the ability to provide a request in a limited time known a priori (maximum known latency) and to grant a strictly repetitive behavior over time (low jitter).
Historically, the fieldbuses were born around a serial hardware structure like RS485. Among the most known fieldbuses there are ModBus, CanOpen.
In the last years, Ethernet-based bus ,such as EtherCat and ProfiNet, have imposed themselves, preferred becouse to the higher speed and lower costs of Ethernet components.
HDT servodrives offers a wide range of fieldbuses both serial and Ethernet like RTU and TCP*, CanOpen CiA 402, EtherCat CoE and ProfiNet RT and IRT

EtherCat CoE

The EtherCAT protocol is a standard for data exchange in industrial automation, generally defined as "fieldbus", of "open and realtime" type with high performances that uses the Ethernet hardware standard but with a different working principle in data exchange, defined as "on-the-fly".
In particular the standard Ethernet data pack (frame based on IEEE802.3) is no more received, interpreted and copied like a data process in every node. A master with a standard ethernet hardware send the telegrams to slave EtherCAT devices, equipped with modified ethernet hardware. These read the data addressed to them while the telegram passes through the device, processing the data "on-the-fly" and at the same time the input data are inserted while the telegram passes.
Among the different protocols on Ethernet hardware, EtherCAT offers the absolute best realtime performances, being able to elaborate up to 1000 I/O in 32.5 µs or 100 axis in 125 µs.
EtherCat supports the CiA 402 profile of CANopen (CoE), and therefore, in terms of application, users who already use drives in CANopen will find the same variables and parameters they are familiar with.
Very high performance, economy of Ethernet technology and adoption of the CanOpen CiA 402 profile made it in a short time the most widespread ethernet fieldbus in the industrial automation devices.

CanOpen CiA 402

The CanOpen protocol, acronym of Controller Area Network, is an open deterministic fieldbus "real-time" based on serial hardware. Designed to work on environments where is required an high immunity level, the bit rate can reach 1Mbit/s for networks shorter than 40m and uses as means of transmission a differential line. Different profiles exist for different applications.

In particular, the CiA 402 profile define and standardize the functional behavior of controllers for servodrives and allows both interpolation and point-to-point operations. The bus, born over 25 years ago, is defined and managed by CiA IG (Can in Automation Interest Group).

ModBus RTU - TCP

The Modbus is a serial communication protocol (default RS485, but also RS232) of open type created in 1979 to put in communication PLC's with electronic industrial devices.
It is wide spreaded and cheap to handle, although it does not boast great speed it suits itself very well to give commands with time of about 20ms. Modbus allows the communication between different devices connected to the same network and it is often used to connect a supervisor HMI with a remote terminal unit (RTU) in supervision control and data acquisition system (SCADA).
HDT manage the Modbus protocol RTU type, widely used in industrial automation, and TCP type that is really similar to Modbus RTU, but it sends protocol data inside TCP/IP data type.

ProfiNet RT and IRT

ProfiNet (acronym of Process Field Net) is a fieldbus "open and real-time" based on standard Ethernet tecnology according to IEEE802.3 suitable for data management in an industrial environment.
ProfiNet was developed in 3 profiles, divided by field of use, performance and complexity.
The ProfiNet NRT (No Real-time) profile for application where timing is not critical that uses standard TCP/IP and UDP/IP protocols used for parametrization, configuration and acyclic read and write operations that reach cycle time >100ms.
The ProfiNet RT (Real Time) deterministic profile, used for standard cyclic data transfer . The data transfered via RT bypass the TCP/IP interface to accelerate data exchange with PLCs, allowing to create applications with cycle times < 10ms. This profile is comparable as functionality to the old ProfiBus DPV0.
The IRT profile (Isochronous Real-Time) is the high-speed protocol used for Motion Control applications and requires, as the EtherCat, of a Ethernet modified with a custom ASIC.
This profile allows cycle times <1ms.
HDT developed the RT and IRT protocol in classes AC1, AC3, AC4.

* Under development - Contact HDT for availability

Software tool: Caliper

CALIPER is the software tool designed to simplify the calibration of your servodrive and motor with Microsoft Windows operating systems. A specific grafic 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
  - Pressure Control (hydraulic press)
  - Filters
  - Display Alarms

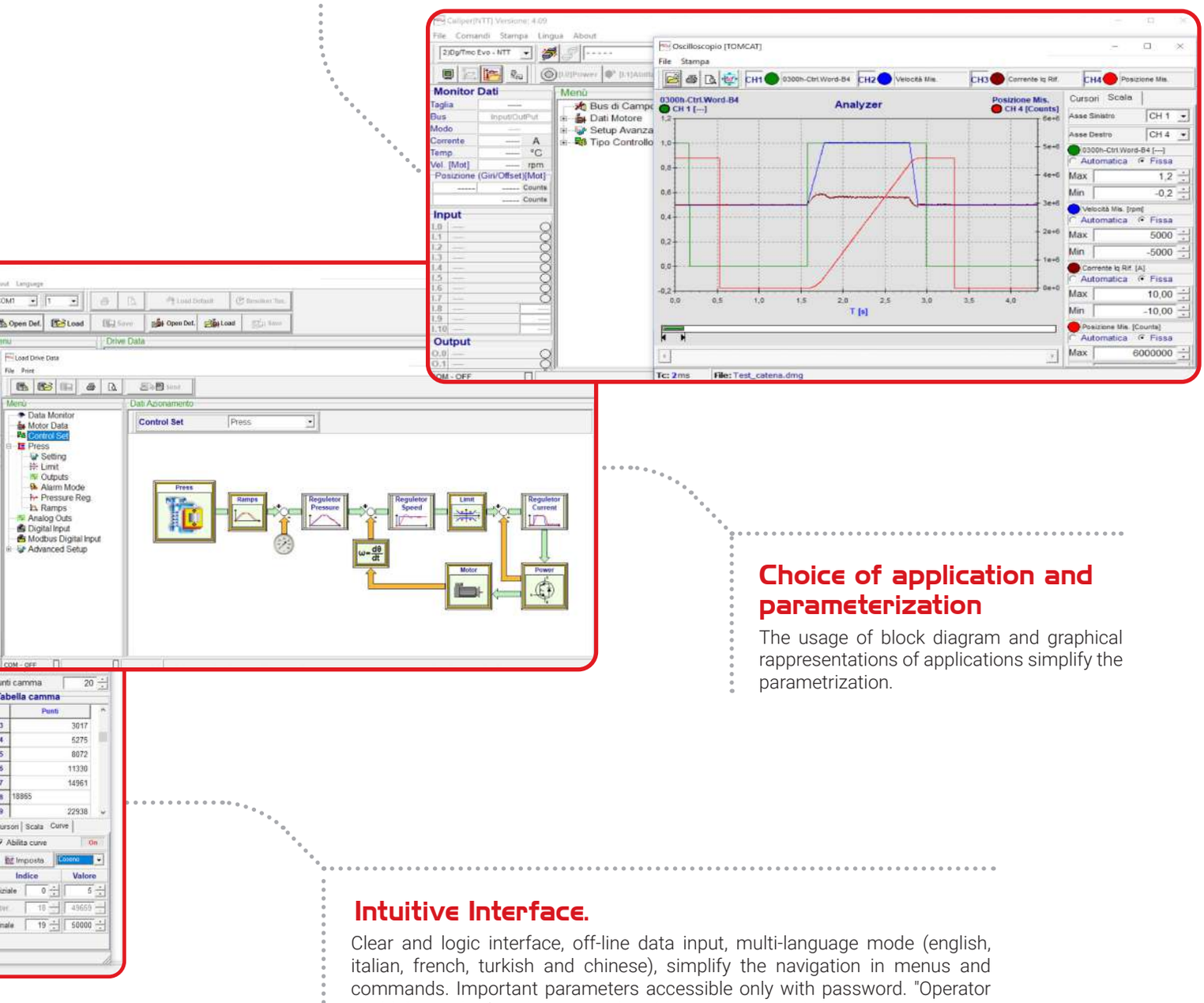
Micro USB 2.0 port

Data sharing.

Caliper allows to save and recharge data for axes tuning and/or motor data. All data can be printed and sent by email

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 available, 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.



Choice of application and parameterization

The usage of block diagram and graphical rappresentations of applications simplify the parametrization.

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.

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 encoders. A second input dedicated to the reading of a second external incremental encoder or for a frequency-direction signal from PLC. TomCat 460 EVO 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, now available only for TomCat EVO 460, and under development on TomCat Evo 240, 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 for this it is a favorite

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 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.

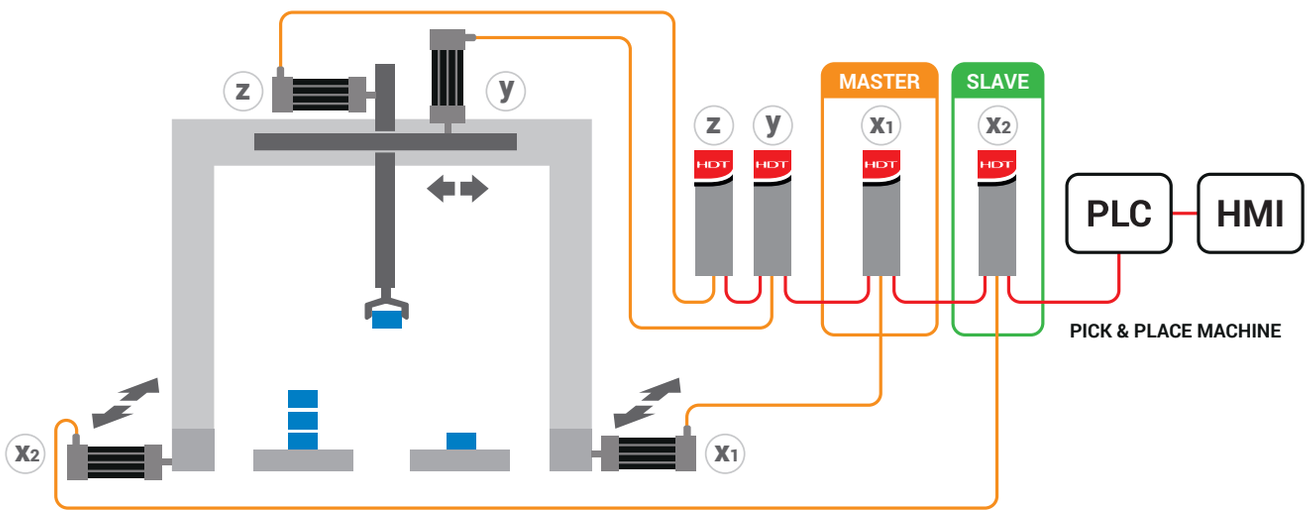
Absolute encoder SSI

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 is the open serial protocol handled by the drives. The resolution of absolute encoders is usually defined in "counts per revolution".
The encoder for multi-turn information can use a mechanical system (more reliable and expensive) or it can memorize the number of turns on a memory supplied by a battery.
HDT uses an SSI binary mechanical absolute encoder with 17 bits of resolution (131072 cpr) on the single turn and 12 bits (4096 turns) on the multi-turn.

Control methods and application

Position Control: Electronic Axis

The electronic axis (electronic gear) 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.



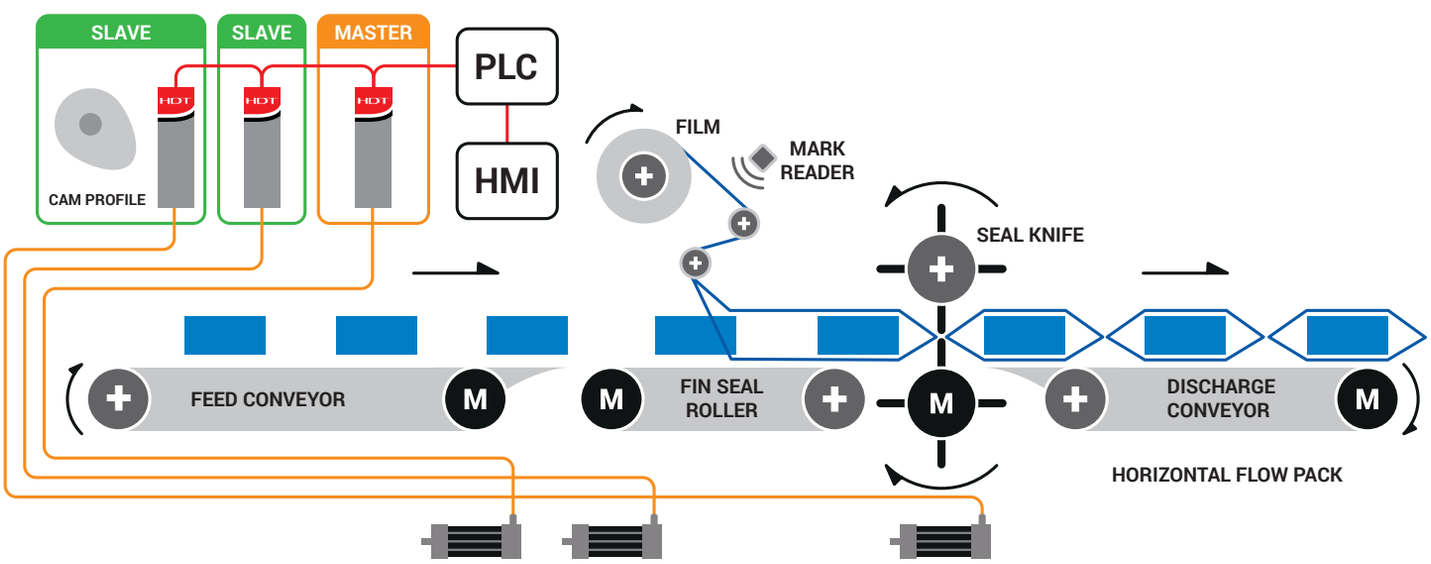
Electronic Cam Control

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 replased with electronic. A cam profile is defined via a X/Y table with a maximum of 576 interpolable 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.



Position Control: Multi-positioner

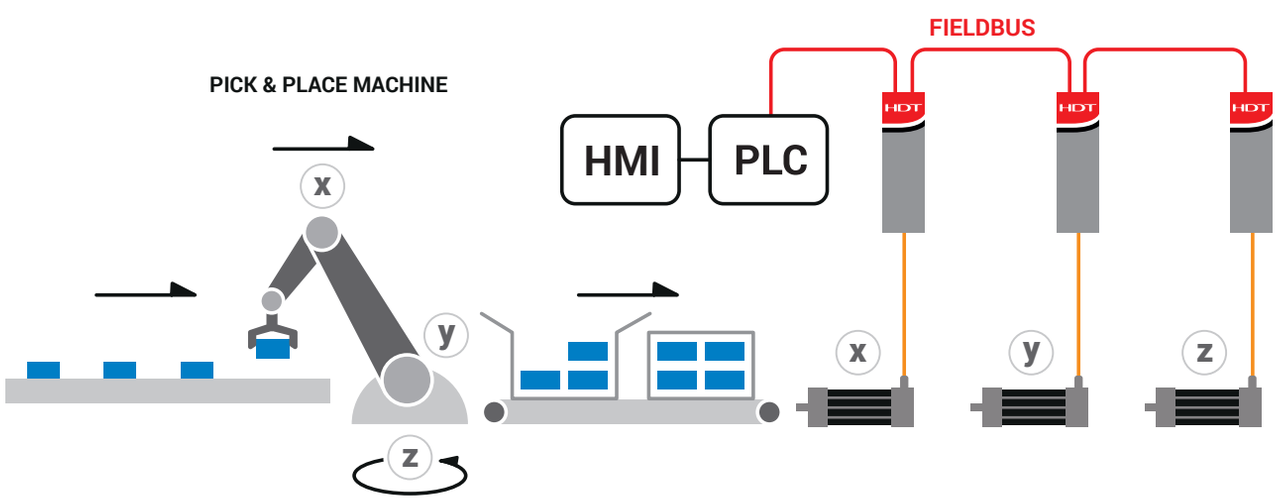
The servodrives integrate a "multi-positioner" operating mode with 4 selectable modes.
The positioner application generates a speed profile to reproduce a motion trajectory with controlled acceleration and jerk, allowing accurate positioning. The profile calculation is performed in real time allowing 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 available, 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 table of targets.
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.

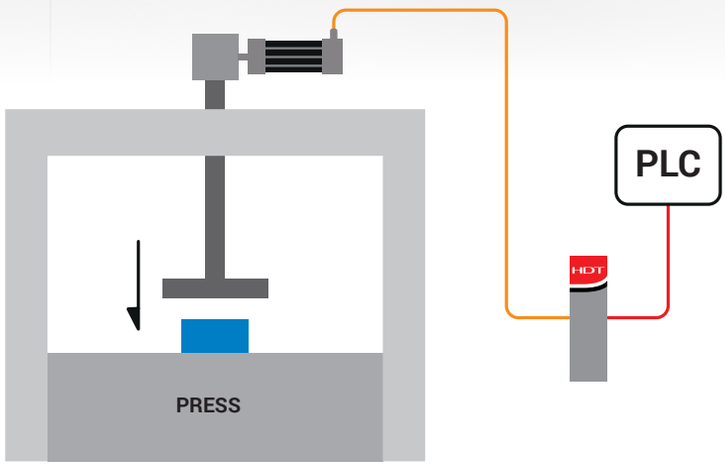
Cyclic positioner.
This mode is similar to the positioner with target from table, with the difference that the targets are strictly executed one after the other. The targets can be activated manually via I/O or via Modbus RTU.
The option to make the sequence of set dimensions cyclical is provided.

"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.



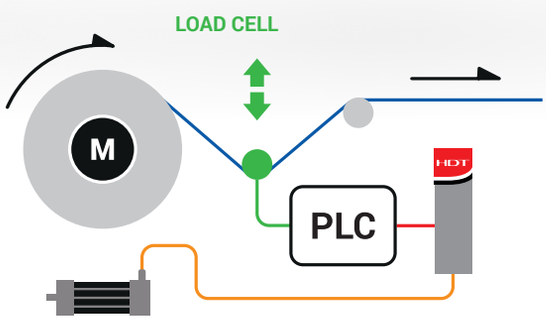
Torque Control

The torque control is a mode 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 and the desired digital I/O.



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 or 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.



Operating Modes

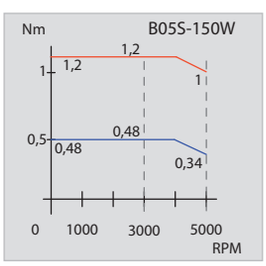
TMC / DGFox	Drive Configuration				
Control Mode	Standard	RTU Modbus	Canopen CiA 402	Ethercat COE	Profinet RT and IRT
Speed	YES	YES	YES	YES	YES
Torque	YES	YES	YES	YES	YES*
Position	YES	YES	YES	YES	YES
Electronic gearbox	YES	YES	YES	YES	YES*
Electronic Cam	YES	YES	NO	NO	NO
Pressure Control	YES	YES	YES	YES	YES
Touch Probe	NO	NO	YES	YES	YES

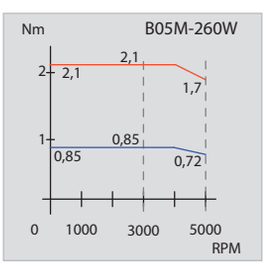
* Under development

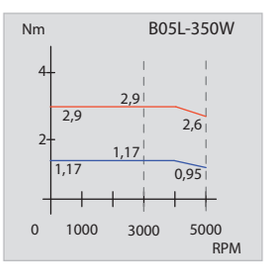
Servomotors Type B technical specs

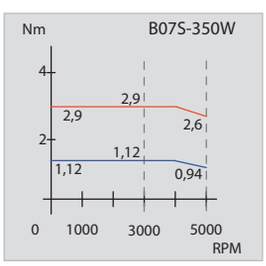
MOTOR TYPE - TIPO MOTORE		U of M	B05						B07										B10				
Motor Size - Taglia motore		UdM	S		M		L		S			M			L			G		S		N		M
Drive power supply			60 VDC	220 VAC	60 VDC	220 VAC	60 VDC	220 VAC	60 VDC	220 VAC	400 VAC	60 VDC	220 VAC	400 VAC	60 VDC	220 VAC	400 VAC	220 VAC	400 VAC	220 VAC	400 VAC	220 VAC	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[4]	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	2,3	0,5	4,0	0,9	5,6	1,2	5,3	1,2	0,7	9,4	2	1,3	12,4	2,8	1,6	3,9	2,4	4,2	2,5	4,8	2,3	7
Peak current	Ipk	A	7,6	1,4	11,6	2,3	15,5	3,2	17,4	3,2	1,9	30	5,5	3,5	31,6	7,1	4,2	9,8	6	9,5	5,5	11	6,4	16,2
Back EMF voltage constant	Ke	Vrms/ Krpm	8,4	57,6	9,4	57,6	9,4	56,5	8,4	56,5	96,3	8,4	56,5	89	12,6	56,5	96,3	53,4	88	56,5	96,3	59,7	102,6	56,5
Torque constant	Kt	Nm/ Arms	0,14	0,95	0,15	0,94	0,15	0,93	0,14	0,93	1,6	0,14	0,93	1,47	0,21	0,93	1,59	0,88	1,46	0,93	1,60	0,98	1,70	0,94
Rotor Inertia	Jm	kgm^2 x10^{-4}	0,126		0,207		0,287		0,481			0,843			1,205			1,566		1,953		2,597		3,237
Rotor inertia with brake	Jmb	kgm^2 x10^{-4}	0,244		0,324		0,404		0,788			1,149			1,512			1,873		3,089		3,634		4,274
Phase/Phase resistance, 20°C	Rw	Ohm	2,2	145,5	0,9	51,8	0,6	27,1	0,6	26,6	80,9	0,2	9,6	27,6	0,24	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	2,2	51,8	1,0	60	0,7	33,5	1,0	47,5	137,6	0,5	19,3	51,2	0,55	11,6	37,0	8,6	25,7	19,3	51,4	9,3	31,6	7,9
Feedback			Incremental, Optical[1] or Inductive[2], Encoder 5V Line Drive with Halls or absolute encoder single and multi turn SSI[3] or Resolver																					
PTC trigger threshold	PTCt	°C	-	130	-	130	-	130	-	130		-	130		-	130								
Insulation class			WINDING: H CLASS - MOTOR: F CLASS																					
IP rating			IP 65 (If equipped with optional oil seal)																					
Lenght	L	mm	142		172		202		157,5			187,5			217,5			247,5		182		203		223
Weight		Kg	1,27		1,69		2,05		2,20			3,00			3,85			4,75		5,30		6,00		7,40
Brake option			Available (24VDC)																					
Lenght with brake	LF	mm	172		202		231		195			225			255			285		223		242		263
Weight with brake		Kg	1,42		1,84		2,20		2,50			3,30			4,15			5,05		5,76		6,46		7,86

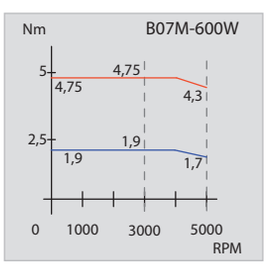
1 = encoder resolution 1024 - 2500PPR 2 = encoder resolution 1024PPR 3 = not available on all models 4 = in case of motor with brake, the rated torque has to be derated of 10%

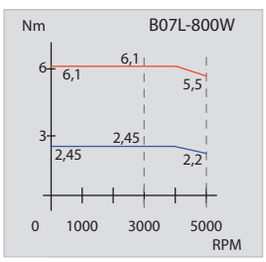


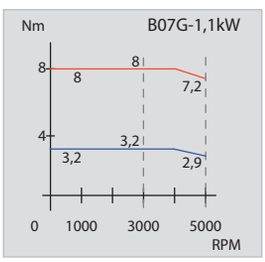


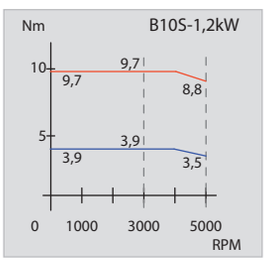


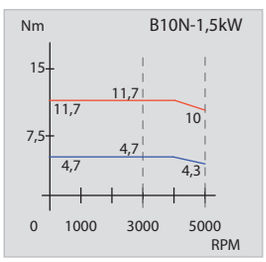


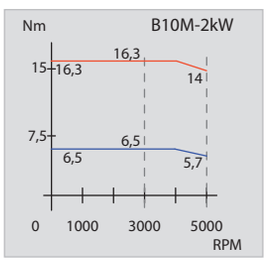




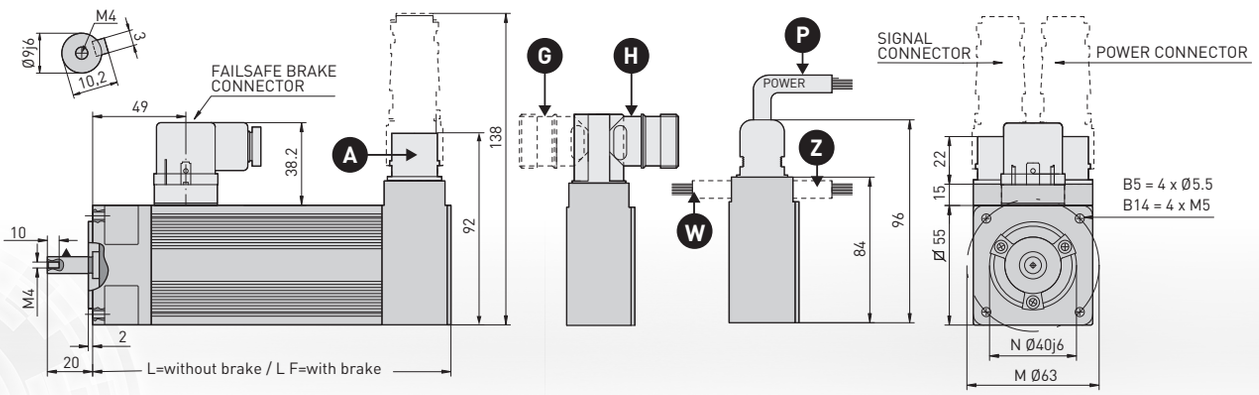




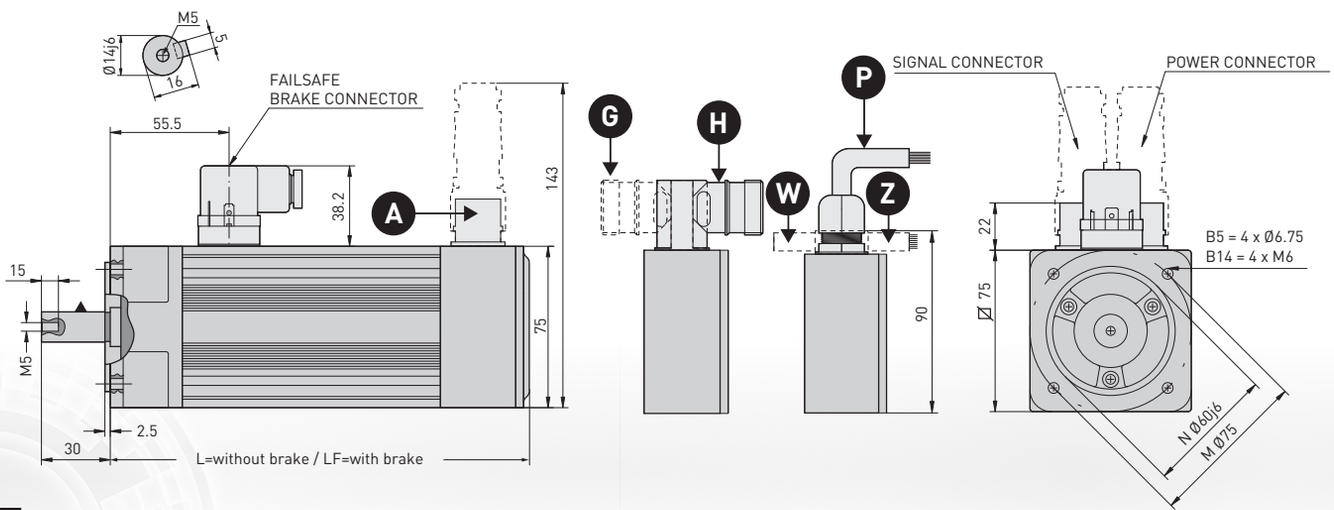




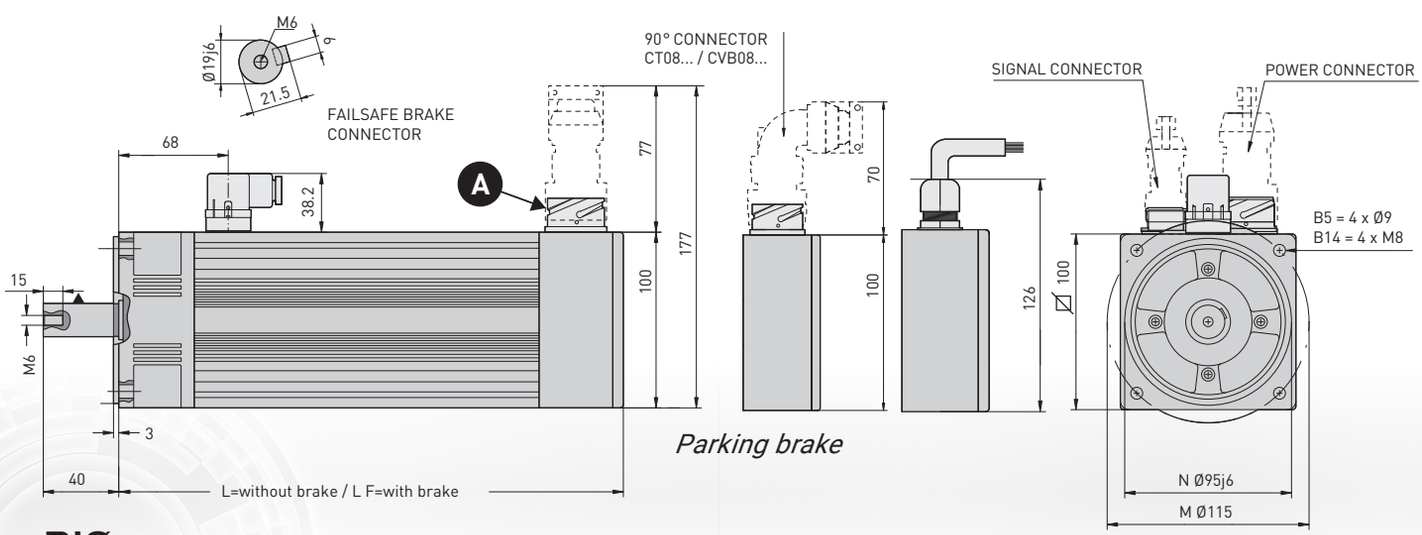
Dimensions



BØ5



BØ7



BIØ

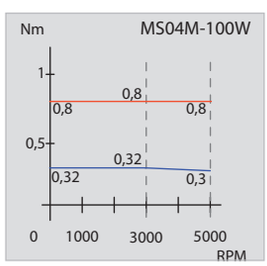
REFERENCE FOR ORDER CODING:

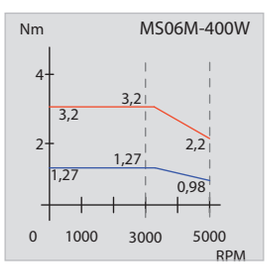
- **A** Vertical connection IP65
- **G** Horizontal connection (drive-end) IP65
- **H** Horizontal connection (not drive-end) IP65
- **P** Connection by vertical cable IP65
- **W** Connection by horizontal cable (drive-end) IP55
- **Z** Connection by horizontal cable (not drive-end) IP55

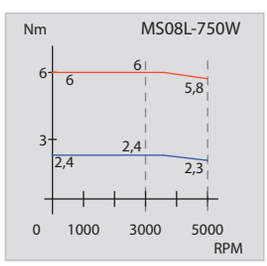
Type MS Servomotors technical specs

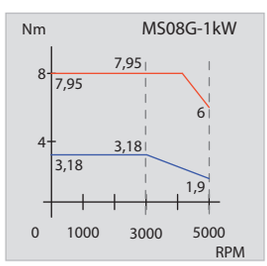
MOTOR TYPE		U of M	MS04		MS06				MS08
Motor Size			M		S(1)		M		L
Drive power supply			60VDC	220V	60VDC	220V	60VDC	220V	220V
Rated output Power	Pn	W	100		200		400		750
Poles count	PN	-	8						
Rated Speed	n	RPM	3000						
Torque at rated speed (2)	Tn	Nm	0,32		0,64		1,27		2,45
Peak Torque	Tpk	Nm	0,95		1,92		3,8		7,0
Rated current	In	A	2,6	1,2	4,0	1,68	7,7	1,7	3,2
Peak current	Ipk	A	7,7	3,6	11	5,0	23,1	5,1	9,6
Back EMF voltage constant	Ke	Vrms/ Krpm	7,5	16,1	10	24	10	45	45
Torque constant	Kt	Nm/ Arms	0,12	0,27	0,16	0,38	0,16	0,75	0,75
Rotor Inertia	Jm	$kgm^2 x10^{-4}$	0,0428		0,094		0,19		0,93
Rotor inertia with brake	Jmb	$kgm^2 x10^{-4}$	0,0494		0,22		0,326		0,97 (1)
Phase/Phase resistance, 20°C	Rw	Ohm	1,71	10,03	-	7,29	0,44	9,19	2,1
Phase/Phase inductance 20°C	Lw	mH	2,4	11,85	-	19,0	1,67	30,3	12,5
Standard feedback			Inc. Opt. Enc. 5V LD 2500 ppr with Halls						
PTC trigger threshold	PTCt	°C	Not available						
Insulation class			B CLASS						
IP rating			IP 65 (If equipped with optional oil seal)						
Lenght	L	mm	109		98		118		131
Weight		Kg	0,55		1,05		1,39		2,63
Brake option			Available (24 VDC)						24 VDC (1)
Lenght with brake	LF	mm	147		145		158		178
Weight with brake		Kg	0,8		1,6		1,9		3,4

✕ = not available 1= Only on demand, please contact HDT for availability 2 = in case of motor with brake, the rated torque has to be derated of 10%

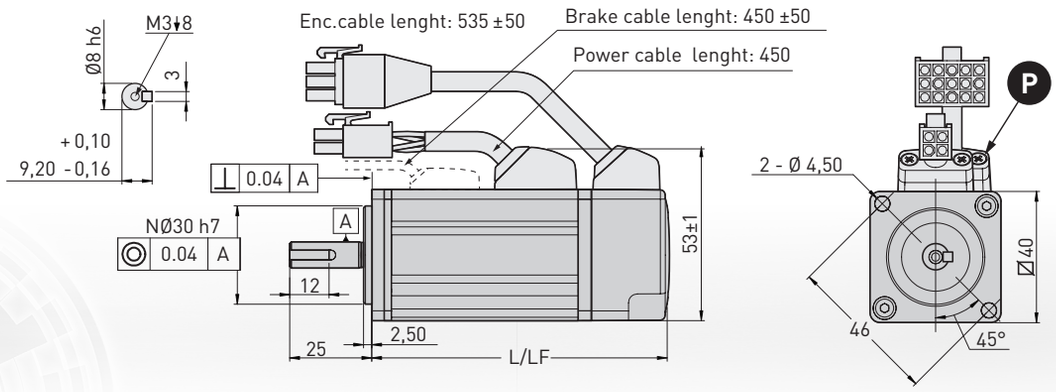




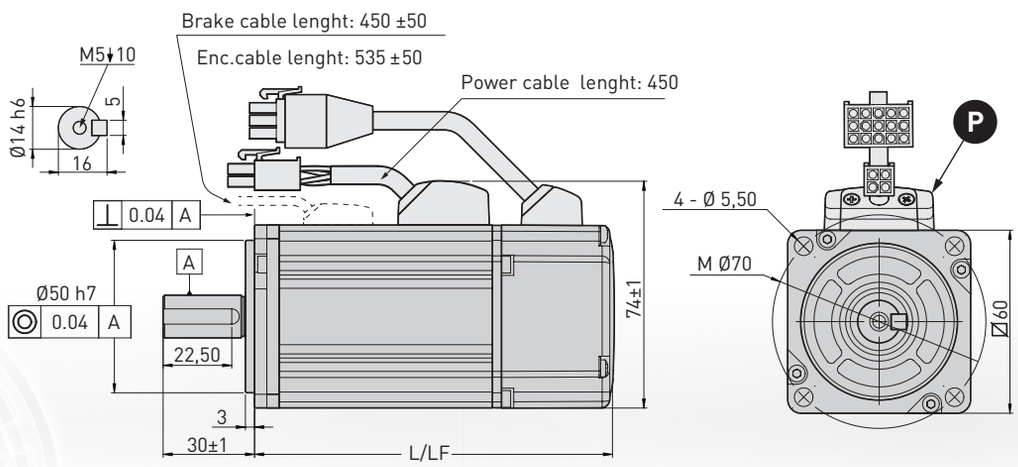




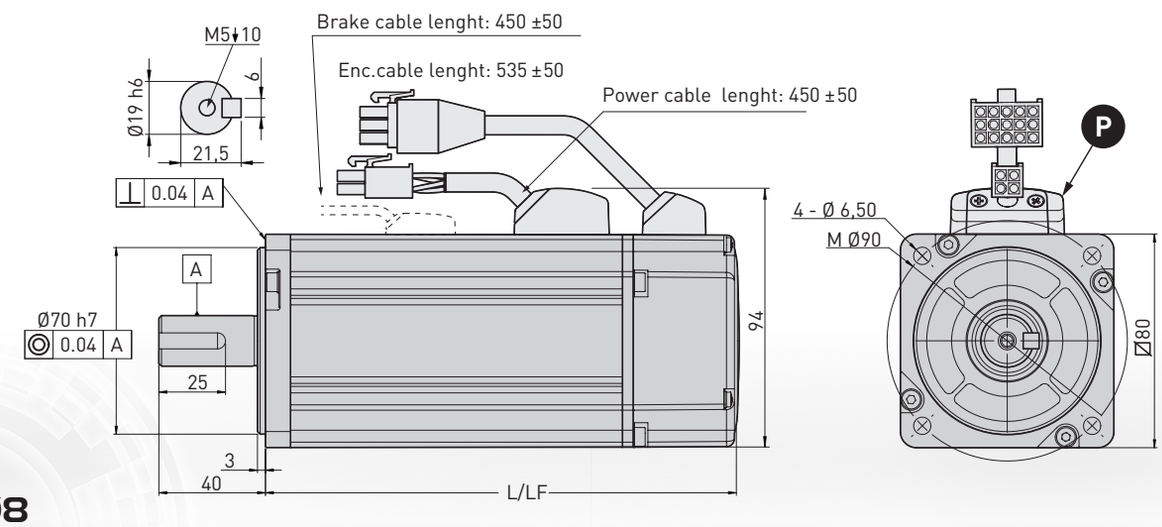
Dimensions



MSØ4



MSØ6

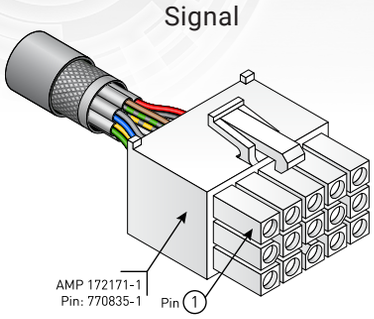


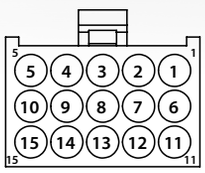
MSØ8

REFERENCE FOR ORDER CODING: P Connection by vertical cable IP65

Connections for MS motor

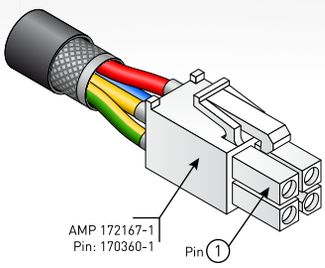
Signal

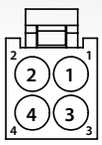




Pin Numbering
Motor connector
View crimp side

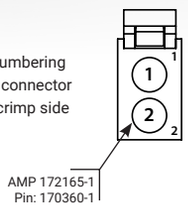
Power





Brake

Pin Numbering
Motor connector
View crimp side

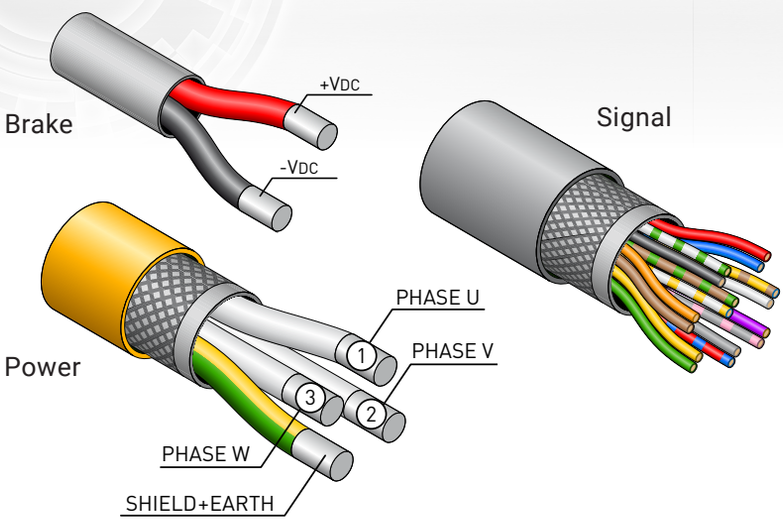


INCREMENTAL ENCODER CONNECTIONS MOTOR SIDE								
PIN#	COLOUR	FUNCTION	PIN#	COLOUR	FUNCTION	PIN#	COLOUR	FUNCTION
1	RED	DC+5V	6	GREY BLACK	Hall V-	11	GREEN	B+
2	BLACK	GND	7	WHITE	Hall U+	12	GREEN BLACK	B-
3	BROWN	Hall W+	8	WHITE BLACK	Hall U-	13	YELLOW	Z
4	BROWN BLACK	Hall W-	9	BLUE BLACK	A+	14	YELLOW BLACK	Z-
5	GREY	Hall V+	10	BLUE	A-	15	SHIELD	SHIELD

POWER CONNECTIONS		
PIN#	COLOUR	FUNCTION
1	YELLOW	U
2	RED	V
3	BLUE	W
4	YELLOW GREEN	PE

BRAKE CONNECTIONS		
PIN#	COLOUR	FUNCTION
1	RED	+VDC
2	BLACK	-VDC

Extension Shielded Cable for MS



EXTENSION CABLE DETAILS			
COLOUR	FUNCTION	COLOUR	FUNCTION
SHIELD	SHIELD	WHITE	CHZ-
RED	+5V	GREY	HALL A
BLACK	0V	RED/BLUE	HALL A-
GREEN	CHA	WHITE/GREEN	HALL B-
BROWN	CHA-	VIOLET	HALL B
YELLOW	CHB	GREY/PINK	HALL C
ORANGE or PINK	CHB-	BROWN/GREEN	HALL C-
BLUE	CHZ		

Order code

MS	04	M	1	W	1	C	5	P	200	P	30	N	2500

Model = MS

Type: 04 = 40mm; 06 = 60mm; 08 = 80mm

Size = S - M - L - G

Mechanical Configuration: 1= B5

Drive Supply Voltage: W = 60VDC; S = 230VAC

1 = Without brake; 6 = With brake 24VDC

C = With key; 5 = Without seal ring

Power Conn. = Cable output

200 = Inc. Enc. 5V Line Driver + Halls

Signal Conn. = Cable output

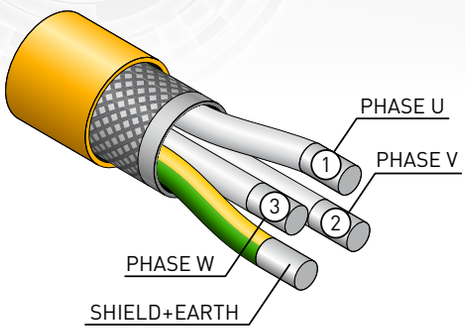
RPM : 30 = 3.000

N = Not Ventilated

Enc. = 2500ppr

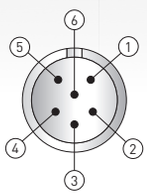
Power Connections for B serie motor and Brake

Power Cable

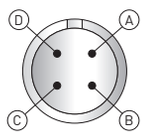


Flying Connector Welding Side

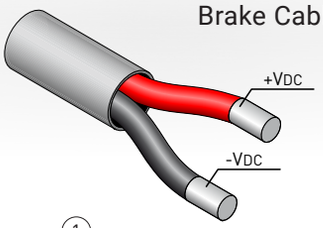
BØ5-BØ7



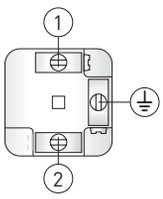
B1Ø-B14



Brake Cable



BØ5
BØ7
B1Ø

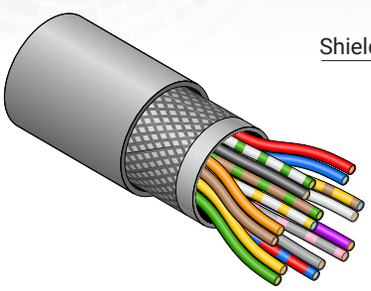


1 + VDC
2 - VDC
NOT USED

Flying Connector Welding Side

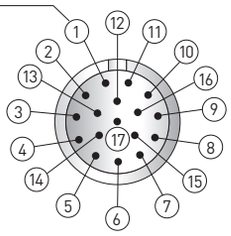
Encoder and Resolver Connections for B serie motor

Encoder Cable



Flying Connector Welding Side

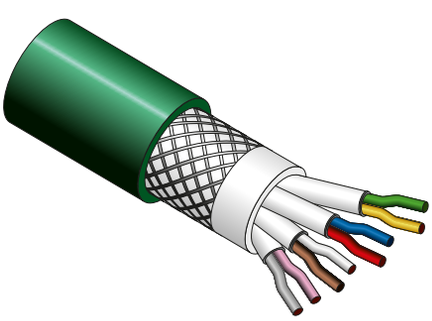
BØ5 - BØ7 - B1Ø



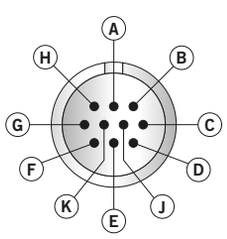
COLOUR	INC. FUNCTION	PIN	COLOUR	FUNCTION INC.	FUNCTION SSI	PIN
YELLOW/BROWN	PTC*	2	WHITE	CHZ-		10
RED	+5V	3	GREY	HALL A	D+	11
BLACK	0V	4	RED/BLUE	HALL A-	D-	12
GREEN	CHA	5	WHITE/GREEN	HALL B-	CK-	13
BROWN	CHA-	6	VIOLET	HALL B	CK+	14
YELLOW	CHB	7	GREY/PINK	HALL C		15
ORANGE or PINK	CHB-	8	BROWN/GREEN	HALL C-		16
BLUE	CHZ	9	WHITE/YELLOW	PTC*		17

* not present in 60V winded motors

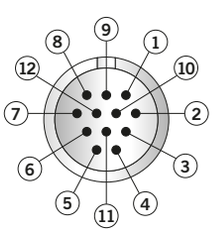
Resolver Cable



B1Ø



BØ5-BØ7



COLOUR	PIN		FUNZIONE
GREEN	1	A	COS +
YELLOW	2	B	COS -
RED	3	C	SIN -
BROWN	4	D	EXC -
BLUE	5	E	SIN +
WHITE	6	F	EXC +
PINK	7	G	PTC MOTOR 1
GREY	8	H	PTC MOTOR 2
--	9 - 10 - 11 - 12 J - K		UNUSED

Flying Connector Wiring Side

Order code

B	0 5	M	1	W	1	C	5	P	2 8 0	P	3 0	N					

Model = B

Type: 05 = 55mm; 07 = 75mm; 10 = 100mm

Size = S - N - M - L - G

Mechanical Configuration: 1= B5; 2=B14

Drive Supply Volt.: W = 60VDC; S = 230VAC; R = 400VAC

1 = W/o brake; Opt.Brake 24VDC: 3 = B05; 5 = B07; 6 = B10

C = with key; 5 = Without seal ring

Power Conn. = Cable Output

Feedback: 280 = Inc.Enc.5V LD 1024ppr + Halls (Inductive)
200 = Inc. Enc. 5V LD 2500ppr + Halls (optical)
480 = Abs. Enc.SingleTurn SSI
500 = Abs. Enc. MultiTurn SSI binary
1= Resolver

Signal Conn. = Cable Output

RPM : 30 = 3.000

N = Not Ventilated

Only for customized versions

Motors & Digital Drives

CATSS0220UK

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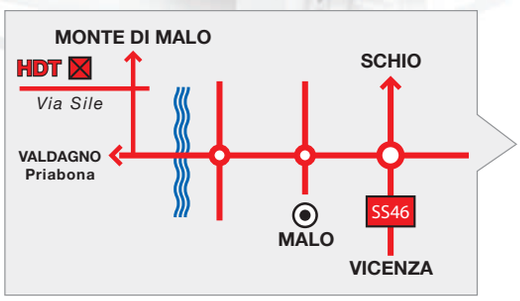

UK

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