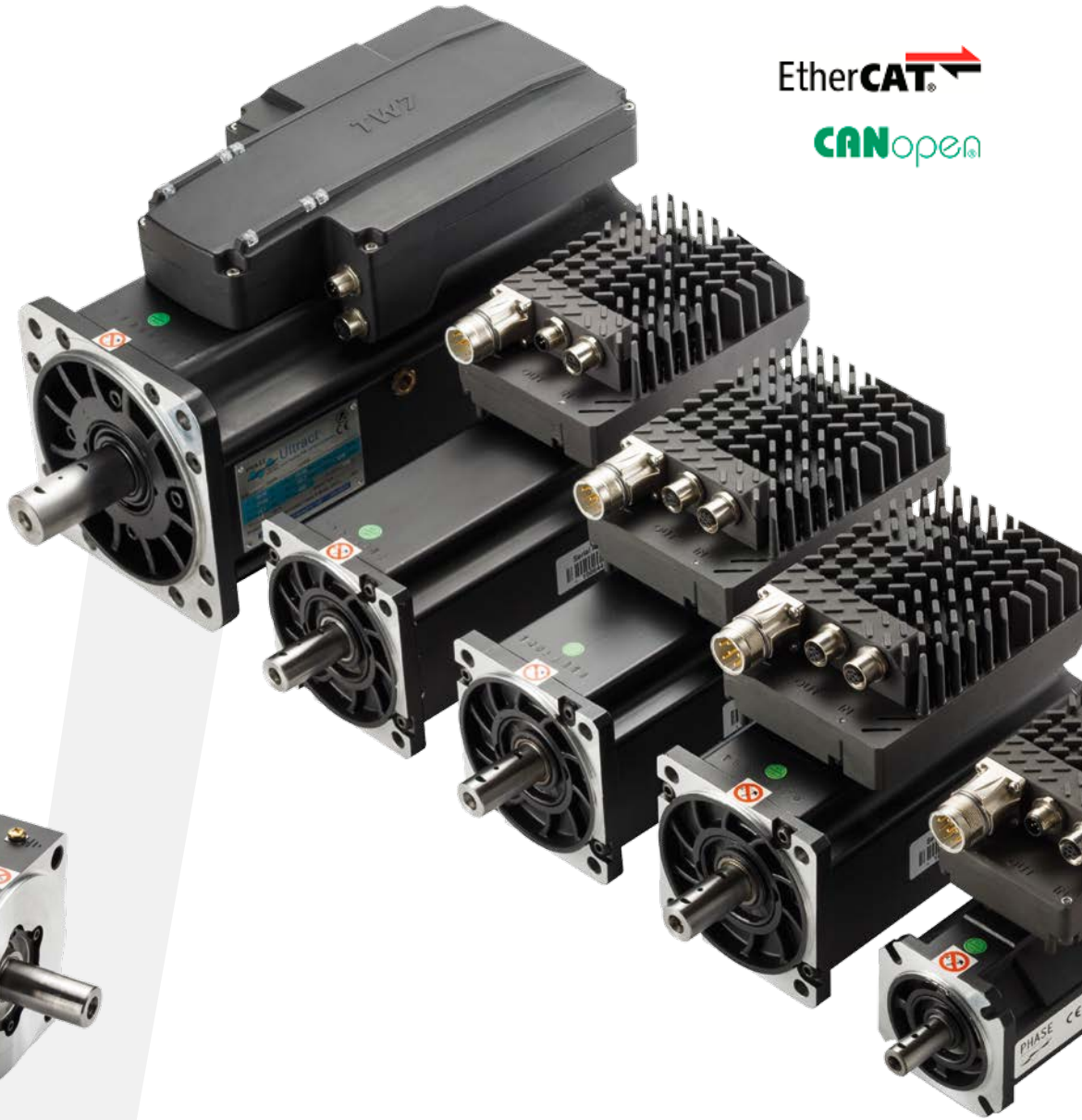
PHASE
MOTION CONTROL

TW Motors

with Integrated Servodrive



Supported Models

Size 3
03A02A.40.4

Size 5 [310 DC Bus]
0503A.30.2
0506A.20.2

Size 5
05A03A.40.4
05A06A.30.4
05A09A.20.4

Size 7
0720C.40.4
0730C.30.4
0740C.20.4

0720F.40.4
0730F.30.4
0740F.20.4

TW Motor Series

THE NEW TORQUEWIRE SERIES OF INTEGRAL SERVO SYSTEMS SETS A NEW STYLE IN COMPLEX AUTOMATIC MACHINERY ARCHITECTURE

TorqueWire motors are complete, self sufficient servo axis building blocks which allow the design, integration and operation of large multi axis systems with minimum hardware and surprising ease. The TorqueWire motor system consists of an advanced, high performance rare earth brushless servo motor, a DSP based, high voltage interpolating servo drive and a single or multi turn absolute encoder, all assembled in a very compact IP 67 protected frame.
The motor systems are controlled via a multi drop CANOpen fieldbus (or EtherCAT fieldbus), linking together groups of motors on a single bus system. The motors are supplied from a common DC bus and braking energy from any drive is intrinsically recycled on any other axis on the network. The performance of TorqueWire originates from the advanced design of both motor and drives.
The motor parts take advantage of a novel, patent pending winding design, along with new magnetic materials and a special winding technique, all of which result in a servo motor with about 60% of the size of a conventional servo design. Such advantage is invested in both temperature rise derating and space for the drive, so that TorqueWire motors, including the drive, are smaller than comparable motors with similar rating.

TW Motor Series

TW Motor Series create a different approach to complex automatic machinery architecture. They are complete, self sufficient servo axis building blocks which allow the design, integration and operation of large multi axis systems with minimum and simplified hardware.

The TW series is particularly innovative in the electromagnetic compatibility approach. As there are no cables between drive and motor, and also between sensor and drive, the system has a very low RFI emission signature and an equally reduced susceptibility to electromagnetic interference.

The drive is designed and validated for high level vibration and wide temperature range. The design is free from electrolythic capacitors, thus enabling long life even in temperature.

Application

» Work-piece setting for wood and metal forming
» Packaging, bottling, wrapping, especially on rotary machines (single wire control for multi axis)
» Tool changers
» Laser plotter
» Pick and place robots
» Mould automation
» Assembly machines

Main features

Typical Supply Voltage Range: 310 – 560 Vdc
Rated Torque Range: 2.4 Nm – 80 Nm
Type of cooling: natural convection, forced air cooling over frame, liquid cooling
Servo Integrated Drive
Integrated RFI filter Class B
Protection Class: IP 67

Feedback devices

Endat Heidenhain Absolute Encoder single or multi-turn (280 arcsec accuracy)
Two pole resolver

Mode of operation

The TW motor is compatible with CiA DS301 V4.02 and with some functionalities of the CiA DSP402 V2.0 (Device Profile Drives and Motion Control):

» Profile position mode
» Profile velocity mode
» Interpolated position mode
» Factor group
» Homing mode
» Cyclic Synchronous Velocity mode (CSV)
» Cyclic Synchronous Position mode (CSP)
» Cyclic Synchronous Torque mode (CST)
» Touch Probe Function

TW specific functions

The TW Motor specific functions are:

» Torque (current) mode
» Auxiliary digital input for emergency disable
» 2nd order digital filters
» Rotary table control

The baud rate and node-id setting are provided by the CiA DSP305 V1.1 (Layer Setting Services protocol)

TW option ordering code

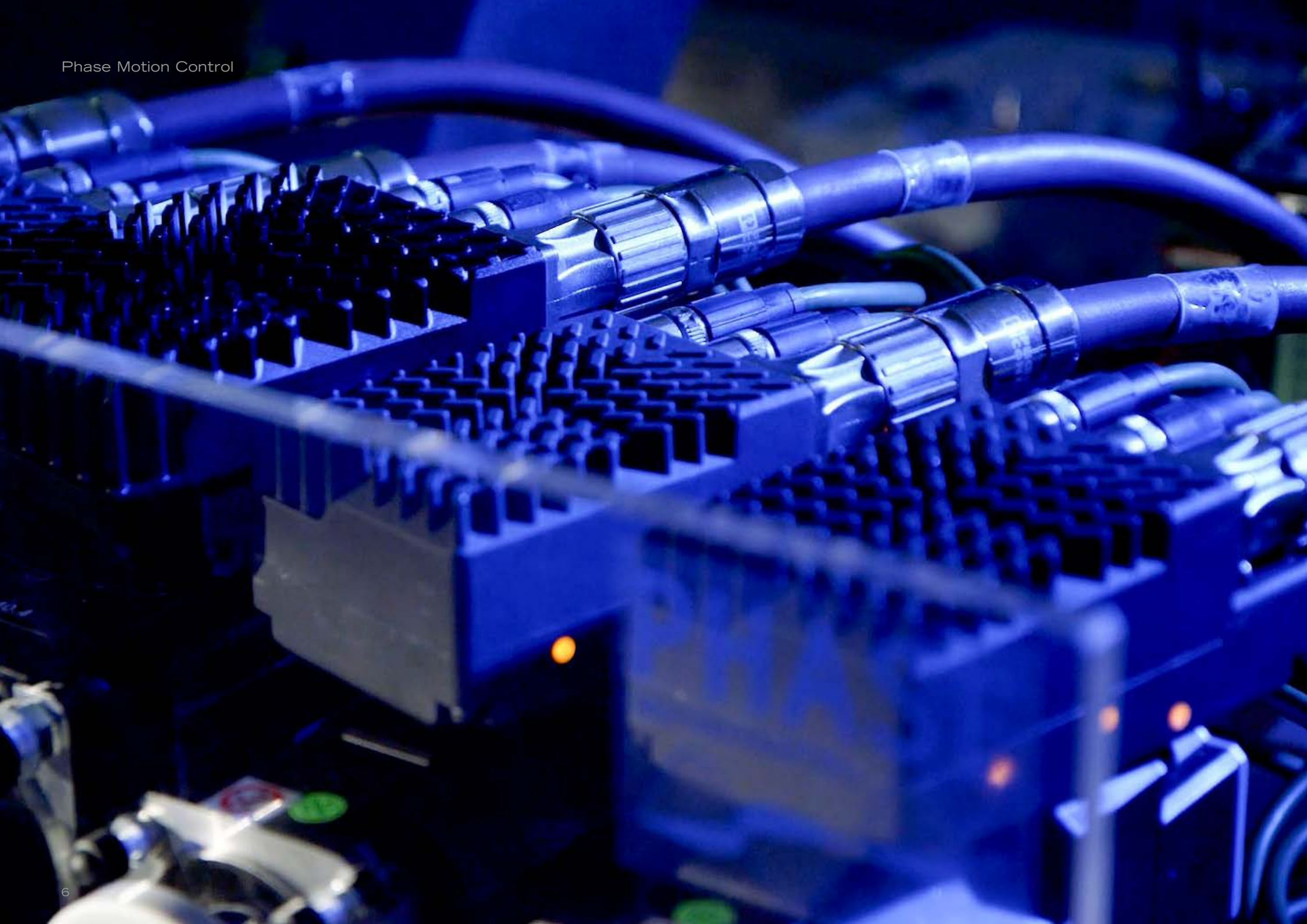
Optional integrated holding brake (B)
Optional shaft forelock (K)
Optional expansion board: EtherCAT – COE (CANOpen Over EtherCAT protocol)

TW programming Phase tools

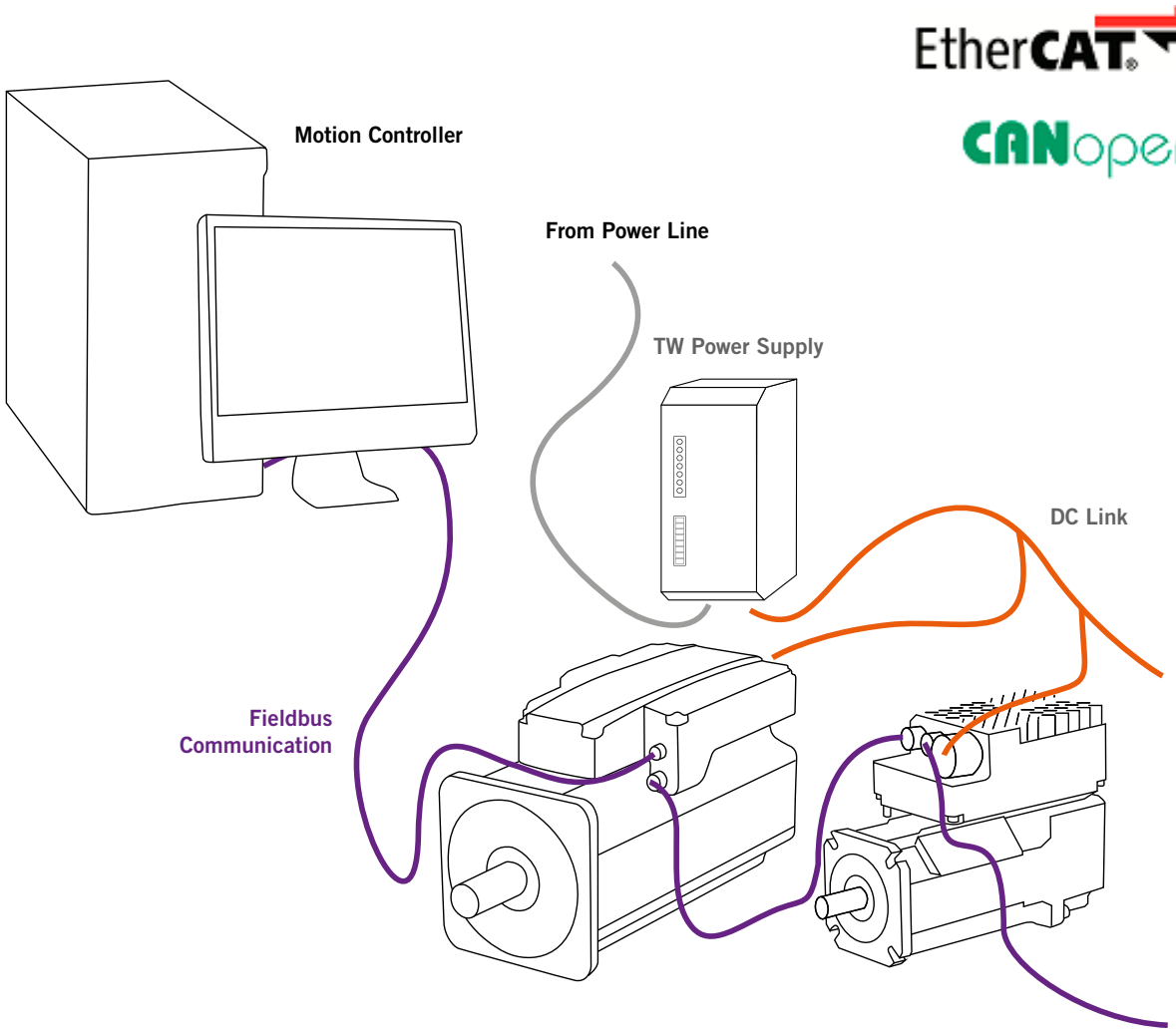
Configuration and control tool: Cockpit 3
Integrated powerful debugging tool: SoftScope
Multilanguage support: Italian, English and Chinese

STO Function

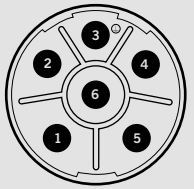
STO Safety Function Performance (TUV certified)
STO function on TW03A, TW05A and TW07 models motor accords to IEC EN 61800-5-2:2007
SIL CAPABILITY: the comparison between PFH value, SFF value and HFT value shows that STO function on TW03A, TW05A and TW07 models motor reach a level of SIL3



General System Connections



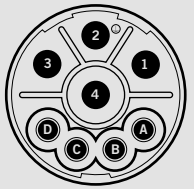
Power Connector
M23 Size



Power connector

CONINVERS 6 pins SF-SEP1N8AWA00 MR23	
Pin	Description
1	DC+
2	DC-
3	GND
4	Auxiliary input (+24 V)
5	0 V Supply
6	+24 V Supply

Power Connector
M23 Size



Power connector

CONINVERS 8 pins SF-7EP1N8AWA00 MR23	
Pin	Description
1	DC+
2	GND
3	DC -
4	0 V Supply
A	+24 V Input Torque H
B	Auxiliary Input (+24 V)
C	+24 V Supply
D	+24 V Input Torque L

Signal Connector
M12 Size - CAN Protocol Connection

Signal connectors

CANOpen protocol (M12 Codification A)	
Pin	Description
1	Shield
2	+ 24 V Supply
3	CAN GND / 0 V Supply
4	Can-H
5	Can-L

Signal Connector
M12 Size - EtherCAT Protocol Connection

Signal connectors

EtherCAT protocol (M12 Codification D)	
Pin	Description
1	Tx+
2	Rx+
3	Tx-
4	Rx-

TW Size 5 [310 DC Bus]

0503A.30.2

Natural Cooling

Reference data	Symbol	0503A.30.2	Units
Nominal torque, S1, ω=0, free air	T_{nc}	3.4	Nm
Nominal torque, S1, ω=0, flanged	$T_{n\omega}$	3.4	Nm
Nominal torque, S1, ω=ω_n, flanged	T_n	2.7	Nm
Peak torque, S6 40%	T_{pk}	7.0	Nm
Maximum structural speed	ω_P	4000	rpm

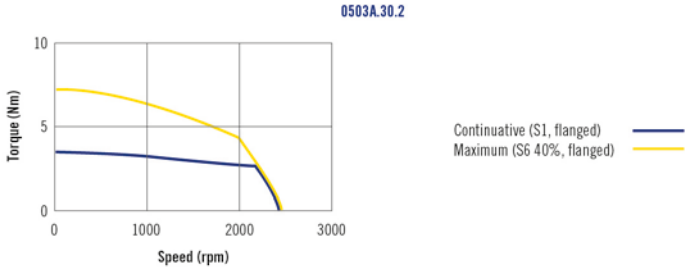
Physical data	Symbol	0503A.30.2	Units
Rotor inertia	J	$0.27 \cdot 10^{-3}$	kgm^2
Acceleration at peak torque	a_{pk}	22600	rad/s^2
Total weigth	M_{sta}	2.7	kg
Insulation		Class H-F	
Protection class		IP 67	

Thermal data	Symbol	0503A.30.2	Units
Thermal time constant	T_c	2189	s
Motor loss at T_{nc} (S1, ω=0, free air)	$L0_c$	41	W
Motor thermal protection threshold		110	°C
Drive thermal protection threshold		100	°C

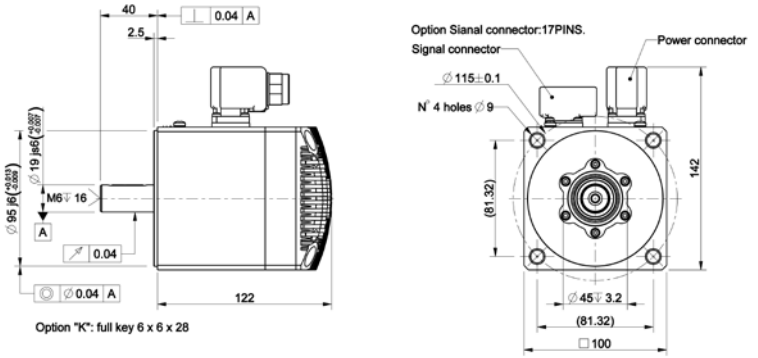
Electrical data	Symbol	0503A.30.2	Units
Power supply (typical)	U_n	310	V_{dc}
Maximum speed	ω_{max}	2500	rpm
Nominal speed	ω_n	2100	rpm
Peak current, $T=T_{pk}$	I_{pk}	6	Arms
Nominal current, $\omega=\omega_n$, $T=T_n$	I_n	2.2	Arms
Nominal power, $\omega=\omega_n$	$P_{n\omega}$	600	W
Torque constant	k_T	1.2	Nm/Arms

Brake Data (optional)	Symbol	0503A.30.2	Units
Supply voltage	U_n	24	Vdc
Power consumption	P20	13	W
Stall braking torque (20°C)	TB_k	7.0	Nm
Rated torque	TB_{kn}	3.8	Nm
Additional Inertia	JBk	$0.041 \cdot 10^{-3}$	kgm^2

TW Servodrive Operational Area



Overall Dimensions



Drawing referred to the TW0503A.30.2 model. For the other drawings model please visit our website www.phase.eu

TW Size 5 [310 DC Bus]

0506A.20.2

Natural Cooling

Reference data	Symbol	0506A.20.2	Units
Nominal torque, S1, ω=0, free air	T_{nc}	4.8	Nm
Nominal torque, S1, ω=0, flanged	$T_{n\omega}$	4.8	Nm
Nominal torque, S1, ω=ω_n, flanged	T_n	4.2	Nm
Peak torque, S6 40%	T_{pk}	10.0	Nm
Acceleration at peak torque	a_{pk}	22000	rad/s^2
Maximum structural speed	ω_P	4000	rpm

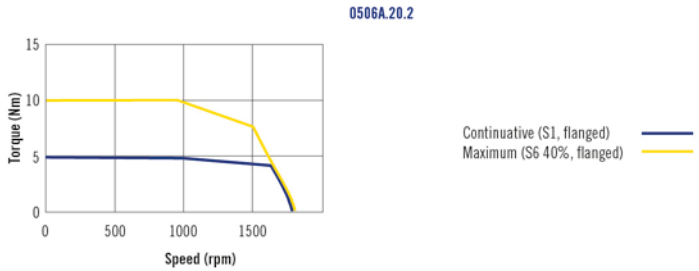
Physical data	Symbol	0506A.20.2	Units
Rotor inertia	J	$0.5 \cdot 10^{-3}$	kgm^2
Total weigth	M_{sta}	3.4	kg
Insulation		Class H-F	
Protection class		IP 67	

Thermal data	Symbol	0506A.20.2	Units
Thermal time constant	T_c	2991	s
Motor loss at T_{nc} (S1, ω=0, free air)	LO_c	47	W
Motor thermal protection threshold		110	°C
Drive thermal protection threshold		100	°C

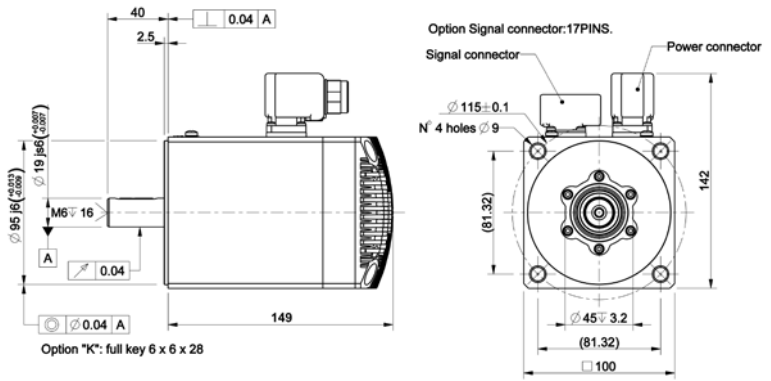
Electrical data	Symbol	0506A.20.2	Units
Power supply (typical)	U_n	310	V_{dc}
Maximum speed	ω_{max}	1800	rpm
Nominal speed	ω_n	1500	rpm
Peak current, $T=T_{pk}$	I_{pk}	6	Arms
Nominal current, $\omega=\omega_n$, $T=T_n$	I_n	2.4	Arms
Nominal power, $\omega=\omega_n$	$P_{n\omega}$	800	W
Torque constant	k_T	1.7	Nm/Arms

Brake Data (optional)	Symbol	0506A.20.2	Units
Supply voltage	U_n	24	Vdc
Power consumption	P20	13	W
Stall braking torque (20°C)	TB_k	7.00	Nm
Rated torque	TB_{kn}	3.8	Nm
Additional Inertia	JBk	$0.041 \cdot 10^{-3}$	kgm^2

TW Servodrive Operational Area



Overall Dimensions



Drawing referred to the TW0506A.20.2 model. For the other drawings model please visit our website www.phase.eu

TW Size 3

03A02A.40.4

Natural Cooling

Reference data (winding independent)	Symbol	03A02A.40.4	Units
Nominal Torque, S1, low speed, free air [1]	T_{nc}	2.40	Nm
Nominal Torque, S1, low speed, flanged [2]	$T_{n\omega}$	2.90	Nm
Nominal Torque, S1, $\omega = \omega_n$, flanged	T_n	1.96	Nm
Peak Torque, S6 40% [1]	T_{pk}	7.10	Nm
Maximum Structural Speed	ω_P	7161	rpm

Physical data (winding independent)	Symbol	03A02A.40.4	Units
Rotor inertia	J_m	$0.085 \cdot 10^{-3}$	kgm^2
Acceleration at peak torque	A_{pk}	67000	rad/s^2
Total weigth	M_{sta}	2.65	Kg
Insulation		Class H-F	
Protection Class		IP 67	

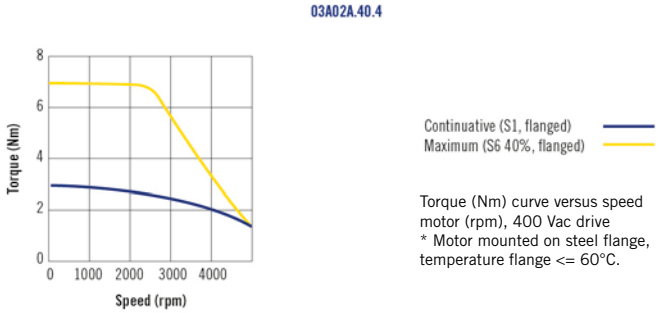
1) Motor in free still air (worst case), ambient 40 °C, copper 130 °C, frame 105 °C.
2) Motor mounted on steel flange, temperature flange <= 60°C.

Thermal data (winding independent)	Symbol	03A02A.40.4	Units
Thermal time constant	T_c	400	sec
Motor loss at T_{nc}	LO_c	100	W
Threshold of built-in PTC	PTCt	130	°C
Drive thermal protection threshold		120	°C
Module thermal protection threshold		150	°C

Electrical data (winding dependent)	Symbol	03A02A.40.4	Units
Power supply (typical)	V_n	310 - 700	Vdc
Digital power supply	V_{supply}	10 - 30	Vdc
Nominal speed	ω_n	4000	rpm
Maximum speed	ω_{max}	5000	rpm
Peak current $T=T_{pk}$	I_{pk}	6.07	Arms
Nominal current, $T=T_n$	I_n	1.80	Arms
Nominal power at $\omega=\omega_n$	$P_{n\omega}$	821	W
Torque constant	K_t	1.17	Nm/A

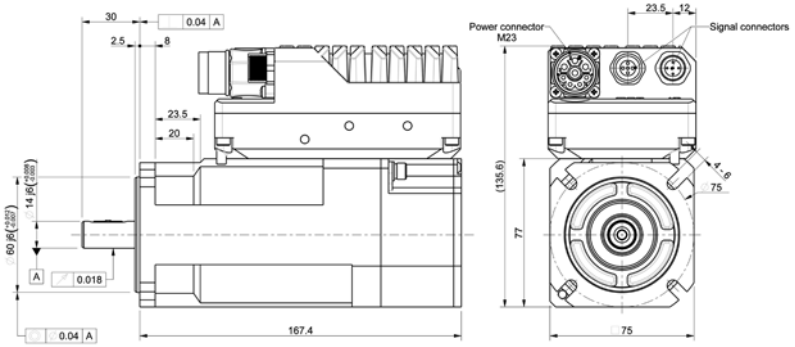
Brake Data (optional)	Symbol	03A02A.40.4	Units
Supply voltage	U_n	24	Vdc
Power consumption	P20	13	W
Stall braking torque (20°C)	TB_k	7.0	Nm
Rated torque	TB_{kn}	3.8	Nm
Additional Inertia	JBk	$0.041 \cdot 10^{-3}$	kgm^2

TW Servodrive Operational Area



Torque (Nm) curve versus speed motor (rpm), 400 Vac drive
* Motor mounted on steel flange, temperature flange <= 60°C.

Overall Dimensions



Drawing referred to the TW03A02A.40.4 model. For the other drawings model please visit our website www.phase.eu

TW Size 5

05A03A.40.4, 05A06A.30.4, 05A09A.20.4

Natural Cooling

Reference data (winding independent)	Symbol	05A03A.40.4	05A06A.30.4	05A09A.20.4	Units
Nominal Torque, S1, low speed, free air [1]	T_{nc}	3.1	5.2	8.5	Nm
Continuous Torque, at low speed, flanged	$T_{n\omega}$	2.9	5.2	8.4	Nm
Nominal Torque, S1, $\omega = \omega_n$, flanged	T_n	2.4	5.1	8.4	Nm
Peak torque, S6 40% [1]	T_{pk}	8.8	12.9	20.7	Nm
Maximum Structural Speed	ω_p	5500	4000	3000	rpm

Physical data (winding independent)	Symbol	05A03A.40.4	05A06A.30.4	05A09A.20.4	Units
Rotor inertia	J_m	$1.81 \cdot 10^{-4}$	$3.15 \cdot 10^{-4}$	$4.49 \cdot 10^{-4}$	kgm^2
Acceleration at peak torque	A_{pk}	$7.99 \cdot 10^{4}$	$9.19 \cdot 10^{4}$	$9.66 \cdot 10^{4}$	rad/s^2
Total weigth	M_{sta}	4.01	6.39	8.88	Kg
Insulation		Class H			
Protection Class		IP 67			

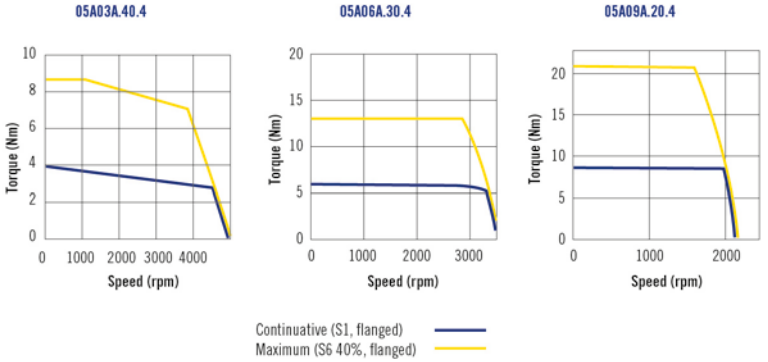
1) Motor in free still air (worst case), ambient 40 °C, copper 130 °C, frame 105 °C.
2) Motor mounted on steel flange, temperature flange <= 60°C.

Thermal data (winding independent)	Symbol	05A03A.40.4	05A06A.30.4	05A09A.20.4	Units
Thermal time constant	T_c	706.52	847.69	939.68	sec
Motor loss at T_{nc}	LO_c	69.6	77.97	116.53	W
Threshold of built-in PTC	PTCt	130	130	130	°C
Drive thermal protection threshold		120			°C
Module thermal protection threshold		150			°C

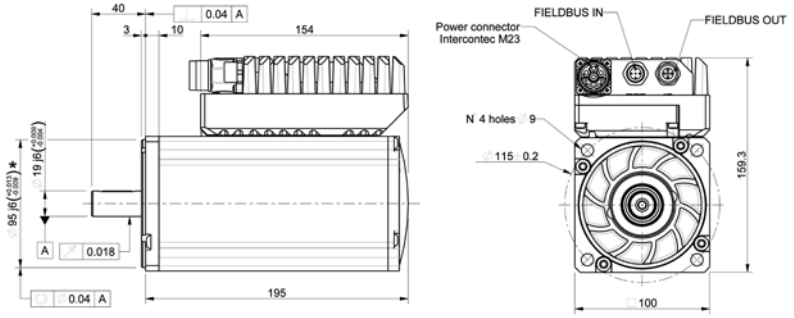
Electrical data (winding dependent)	Symbol	05A03A.40.4	05A06A.30.4	05A09A.20.4	Units
Power supply (typical)	V_n	310 - 700			Vdc
Digital power supply	V_{supply}	10 - 30			Vdc
Rated speed	ω_n	4000	3000	2000	rpm
Maximum speed	ω_{max}	5000	3500	2200	rpm
Peak current, $T=T_{pk}$	I_{pk}	8.0	8.0	8.0	Arms
Nominal current, $\omega=\omega_n$, $T=T_n$	I_n	2.1	3.1	3.1	Arms
Nominal power, $\omega=\omega_n$	$P_{n\omega}$	1020	1600	1750	W
Torque constant	K_t	1.26	1.77	2.85	Nm/A

Brake Data (optional)	Symbol	05A03A.40.4	05A06A.30.4	05A09A.20.4	Units
Supply voltage	U_n	24			Vdc
Power consumption	P20	15			W
Stall braking torque (20°C)	TB_k	16			Nm
Rated torque	TB_{kn}	10			Nm
Additional Inertia	JBk	$0.107 \cdot 10^{-3}$			kgm^2

TW Servodrive Operational Area



Overall Dimensions



Drawing referred to the TW05A03A model. For the other drawings model please visit our website www.phase.eu

TW Size 7

07A20C.40.4, 07A30C.30.4, 07A40C.20.4

Water Cooling

Reference data (winding independent)	Symbol	07A20C.40.4	07A30C.30.4	07A40C.20.4	Units
Nominal Torque, S1, low speed, water cooled H20	T_{nc}	36	55	80	Nm
Nominal Torque, S1, $\omega = \omega_n$, flanged	T_n	33	55	75	Nm
Peak torque, S6 40% [1]	T_{pk}	57	74	107	Nm
Maximum Structural Speed	ω_P	6000	6000	6000	rpm

Physical data (winding independent)	Symbol	07A20C.40.4	07A30C.30.4	07A40C.20.4	Units
Rotor inertia	J_m	$1{,}29 \cdot 10^{-3}$	$1{,}85 \cdot 10^{-3}$	$2{,}41 \cdot 10^{-3}$	kgm^2
Acceleration at peak torque	A_{pk}	$5{,}07 \cdot 10^{4}$	$5{,}30 \cdot 10^{4}$	$5{,}42 \cdot 10^{4}$	rad/s^2
Total weigth	M_{sta}	13	18	23	Kg
Insulation		Class H			
Protection Class		IP 67			

Each size of TW7 motor requires a different coolant flow (water) with a max inlet temperature of 30°C:

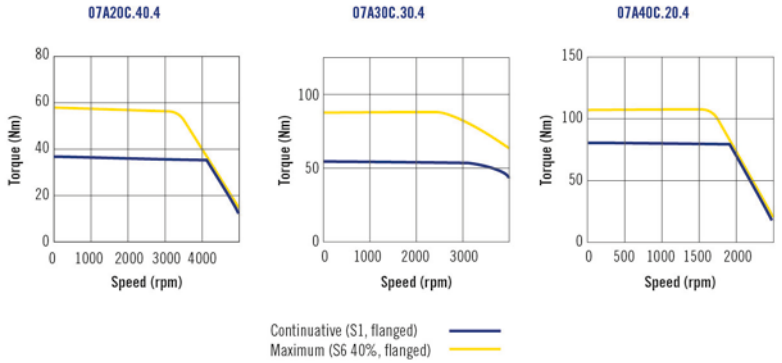
- » TW720 needs 1.3 liter/min
- » TW730 needs 1.9 liter/min
- » TW740 needs 2.5 liter/min

1) Motor water-cooled with 30°C water temperature
Connector cooling water-pipe: opposite inlet and outlet version

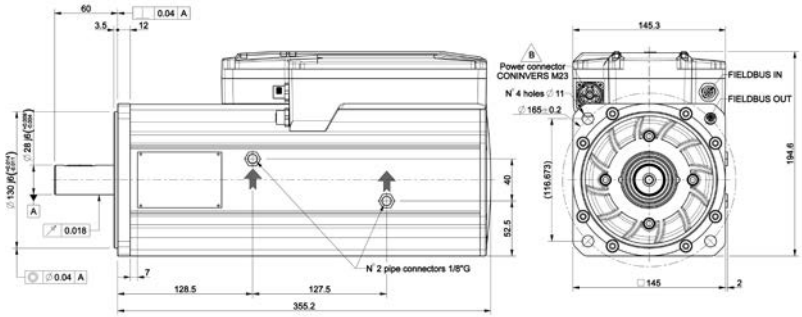
Thermal data (winding independent)	Symbol	07A20C.40.4	07A30C.30.4	07A40C.20.4	Units
Thermal time constant, water-cooled H20 [1]	T_c	372	329	308	s
Motor loss at T_{nc}	LO_c	$0.86 \cdot 10^3$	$1.29 \cdot 10^3$	$1.71 \cdot 10^3$	W
Threshold of built-in PTC	PTCt	130	130	130	°C
Drive thermal protection threshold			120		°C
Module thermal protection threshold			130		°C

Electrical data (winding dependent)	Symbol	07A20C.40.4	07A30C.30.4	07A40C.20.4	Units
Power supply (typical)	V_n		310 - 700		Vdc
Digital power supply	V_{supply}		10 - 30		Vdc
Nominal speed	ω_n	4000	3000	2000	rpm
Maximum speed	ω_{max}	5000	4000	2500	rpm
Peak current, $T=T_{pk}$	I_{pk}	48	48	48	Arms
Nominal current, $T=T_n$	I_n	30	36	36	Arms
Nominal power, $\omega = \omega_n$	$P_{n\omega}$	14	17	20	kW
Torque constant	K_t	1,35	1,71	2,50	Nm/A

TW Servodrive Operational Area



Overall Dimensions



Drawing referred to the TW07A30C.30.4 model. For the other drawings model please visit our website www.phase.eu

TW Size 7

07A20F.40.4, 07A30F.30.4, 07A40F.20.4

Fan Cooling

Reference data (winding independent)	Symbol	07A20F.40.4	07A30F.30.4	07A40F.20.4	Units
Nominal Torque, S1, low speed	T_{nc}	29	45	68	Nm
Nominal Torque, S1, $\omega = \omega_n$, flanged	T_n	25	42	65	Nm
Peak torque, S6 40% [1]	T_{pk}	44	74	107	Nm
Maximum Structural Speed	ω_P	6000	6000	6000	rpm

Physical data (winding independent)	Symbol	07A20F.40.4	07A30F.30.4	07A40F.20.4	Units
Rotor inertia	J_m	$1.29 \cdot 10^{-3}$	$1.85 \cdot 10^{-3}$	$2.41 \cdot 10^{-3}$	kgm^2
Acceleration at peak torque	A_{pk}	$5.07 \cdot 10^{4}$	$5.30 \cdot 10^{4}$	$5.42 \cdot 10^{4}$	rad/s^2
Total weigth	M_{sta}	23	28	33	Kg
Insulation		Class H			
Protection Class		IP 54			

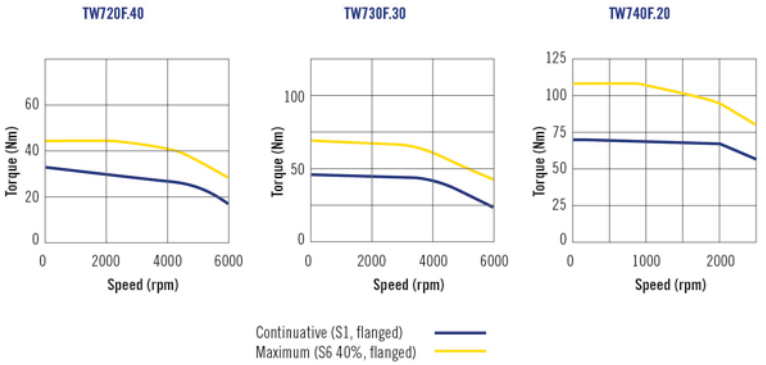
1) Fan cooling behavior controlled by PWM command
2) Motor mounted on steel flange, temperature flange <=60°C

Thermal data (winding dependent)	Symbol	07A20F.40.4	07A30F.30.4	07A40F.20.4	Units
Thermal time constant	T_c	372	329	308	s
Motor loss at T_{nc}	LO_c	$0.86 \cdot 10^3$	$1.29 \cdot 10^3$	$1.71 \cdot 10^3$	W
Motor loss at $T_{n\omega}$	LO_ω	$1.02 \cdot 10^3$	$1.44 \cdot 10^3$	$1.83 \cdot 10^3$	
Threshold of built-in PTC	PTCt	130			°C
Drive thermal protection threshold		120			°C
Module thermal protection threshold		130			°C

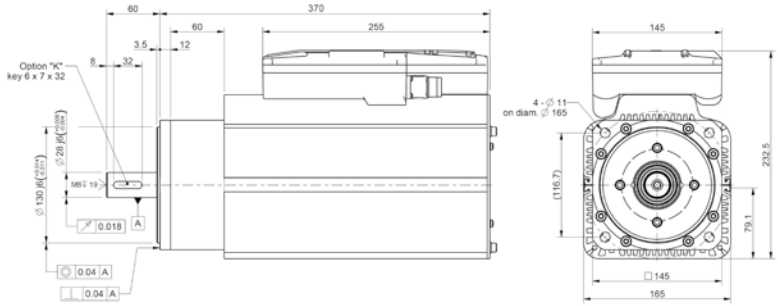
Electrical data (winding dependent)	Symbol	07A20F.40.4	07A30F.30.4	07A40F.20.4	Units
Power supply (typical)	V_n	310 - 700			Vdc
Digital power supply	V_{supply}	10 - 30			Vdc
Nominal speed	ω_n	4000	3000	2000	rpm
Maximum speed	ω_{max}	5000	4000	2500	rpm
Peak current, $T=T_{pk}$	I_{pk}	37	50	50	Arms
Nominal current, $T=T_n$	I_n	21	28	28	Arms
Nominal power, $\omega = \omega_n$	$P_{n\omega}$	10.5	13.0	14.0	kW
Torque constant	K_t	1.30	1.65	2.40	Nm/A

Brake Data (optional)	Symbol	07A20F.40.4	07A30F.30.4	07A40F.20.4	Units
Supply voltage	U_n	24			Vdc
Power consumption	P20	26			W
Stall braking torque (20°C)	TB_k	36			Nm
Rated torque	TB_{kn}	32			Nm
Additional Inertia	JBk	$5.4 \cdot 10^{-4}$			kgm^2

TW Servodrive Operational Area



Overall Dimensions



Drawing referred to the 07A30F.30.4 model. For the other drawings model please visit our website www.phase.eu

TW Size 7

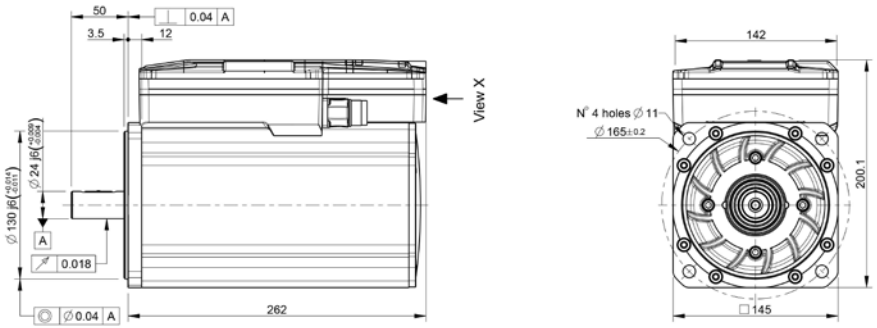
07A20A.40.4, 07A30A.30.4, 07A40A.20.4

Preliminary Data Information

Natural Cooling

Electrical data (winding dependent)	Symbol	07A20A.40.4	07A30A.30.4	07A40A.20.4	Units
Power supply (typical)	V_n	310 - 700			Vdc
Digital Power Supply	V_{supply}	10 - 30			Vdc
Nominal speed	ω_n	4000	3000	2000	rpm
Maximum Speed	ω_{max}	5000	4000	2500	rpm
Nominal Torque, S1, $\omega=\omega_n$, flanged	T_n	10	13	20	Nm
Peak torque, S6 40%	T_{pk}	35	48	57	Nm
Nominal power, $\omega = \omega_n$	$P_{n\omega}$	4.00	4.00	4.00	kW
Torque constant	K_t	1.30	1.65	2.41	Nm/A
Protection Class		IP 65			

Overall Dimensions



Drawing referred to the 07A20A.40 model. For the other drawings model please visit our website www.phase.eu

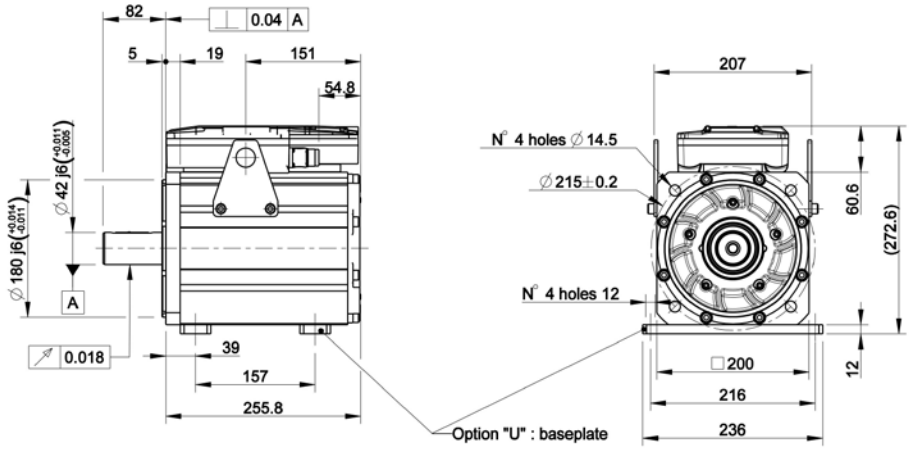
TW Size 10

10A02A.30.4, 10A04A.20.4

Preliminary Data Information

Electrical data (winding dependent)	Symbol	10A02A.30.4	10A04A.20.4	Units
Power supply (typical)	V_n	310 - 700		Vdc
Digital Power Supply	V_{supply}	10- 30		Vdc
Nominal speed	ω_n	3000	2000	rpm
Maximum Speed	ω_{max}	4000	2200	rpm
Nominal Torque, S1, $\omega=\omega_n$, flanged	T_n	11.0	22.0	Nm
Peak torque, S6 40%	T_{pk}	23.0	51.0	Nm
Nominal power, $\omega = \omega_n$	$P_{n\omega}$	3.5	4.7	kW
Torque constant	K_t	1.6	2.68	Nm/A
Protection Class		IP 65		

Overall Dimensions



Drawing referred to the 10A02A.30 model. For the other drawings model please visit our website www.phase.eu

Natural Cooling

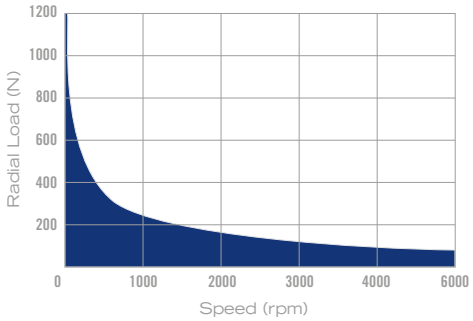
Shaft Load

TW motors employ a classic dual bearing arrangement with axial preload for zero backlash, The bearings are heavy duty type, shielded and lubricated for life. The standard shaft lip seal is available from the motor front for easy replacement or suppression.
All TW motors have a bearing system which is virtually backlash free, locked in the motor frame, and able to support radial, axial and momentum loads. The permissible radial loads vs. point of load application on the shaft are defined in the graphs below for a life expectancy of 30,000 h.

Axial loads should never exceed 30% of radial load. Avoid impacts on the shaft during assembly (hammering) as this would degenerate bearing life. A threaded axial hole is provided to fasten keyless locking assemblies (recommended).

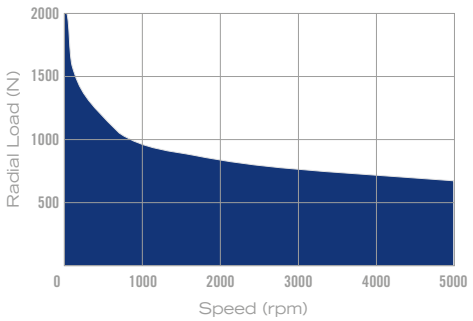
TW03A Motor

Max. Radial Load
applicable in the middle of the shaft extension



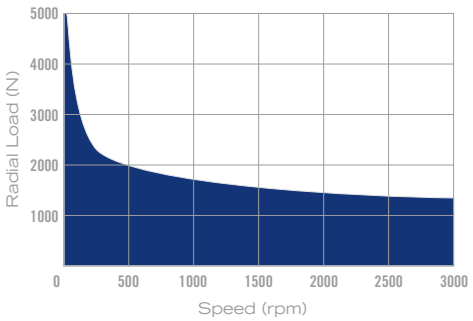
TW05A Motor

Max. Radial Load
applicable in the middle of the shaft extension



TW07 Motor

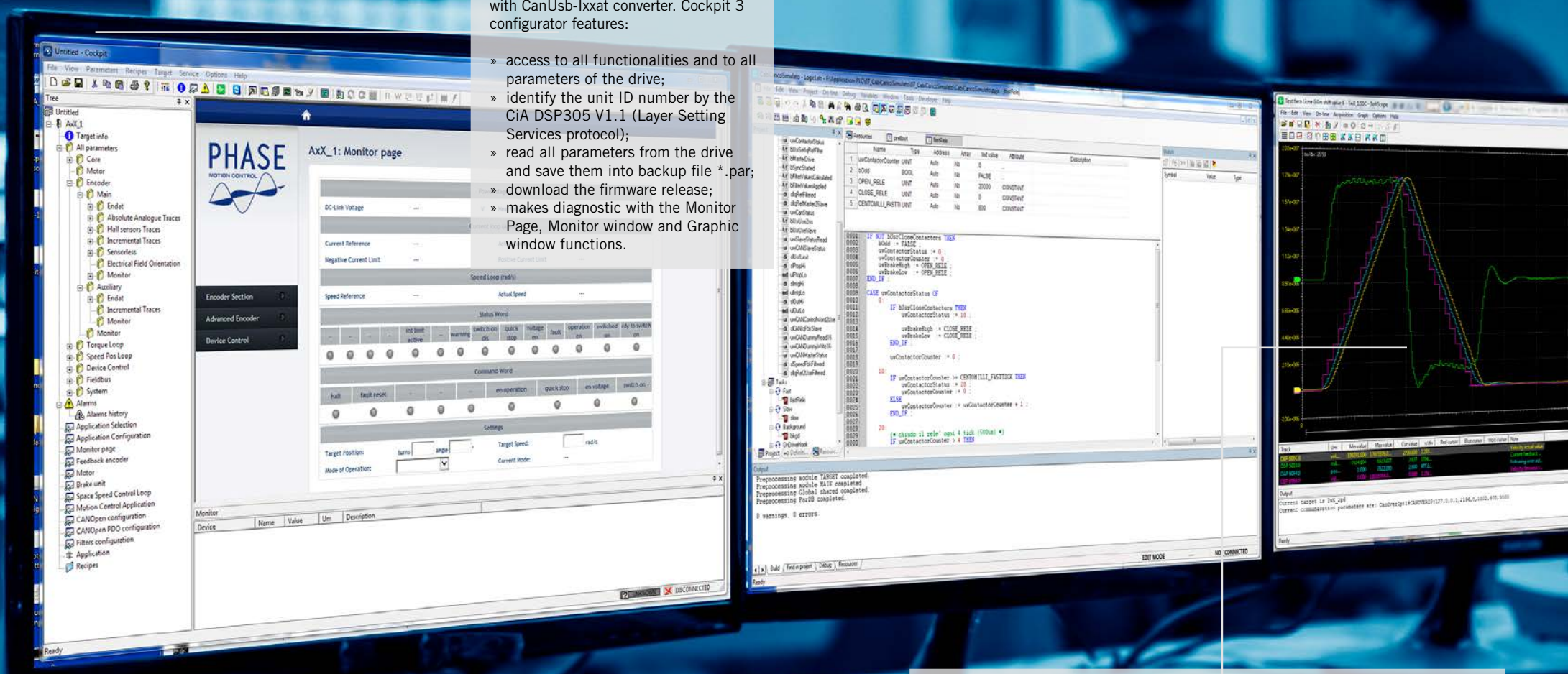
Max. Radial Load
applicable in the middle of the shaft extension



Cockpit3 Interface

The Cockpit 3 configuration tool is useful to create, analyze, modify and copy all parameters for your applications. This tool has to be installed on a PC, with CanUsb-Ixxat converter. Cockpit 3 configurator features:

- access to all functionalities and to all parameters of the drive;
- identify the unit ID number by the CiA DSP305 V1.1 (Layer Setting Services protocol);
- read all parameters from the drive and save them into backup file *.par;
- download the firmware release;
- makes diagnostic with the Monitor Page, Monitor window and Graphic window functions.



SoftScope Interface

SoftScope is a powerful debugging tool, which can be working either as the asynchronous debugger or as the synchronous debugger. Being an asynchronous tool, SoftScope allows you to plot the evolution of the values of a set of parameters. In addition, being a synchronous tool, it allows you to select a set of parameters, to have them sampled synchronously which occurs when the processor reaches the position where you place the trigger and to have their curve displayed in a proper window.

TW Technical Data Overview

MODEL		Flange Size [mm]	Length Range [mm]	Nominal Speed (rpm)	Nominal Torque [Nm]	Peak Torque [Nm] S6 40%
TW05A [310 DC Bus]	0503A.30.2	100	122	2100	2.4	7.0
	0506A.20.2	100	149	1500	4.0	10.0

These data are referred to 310 Vdc

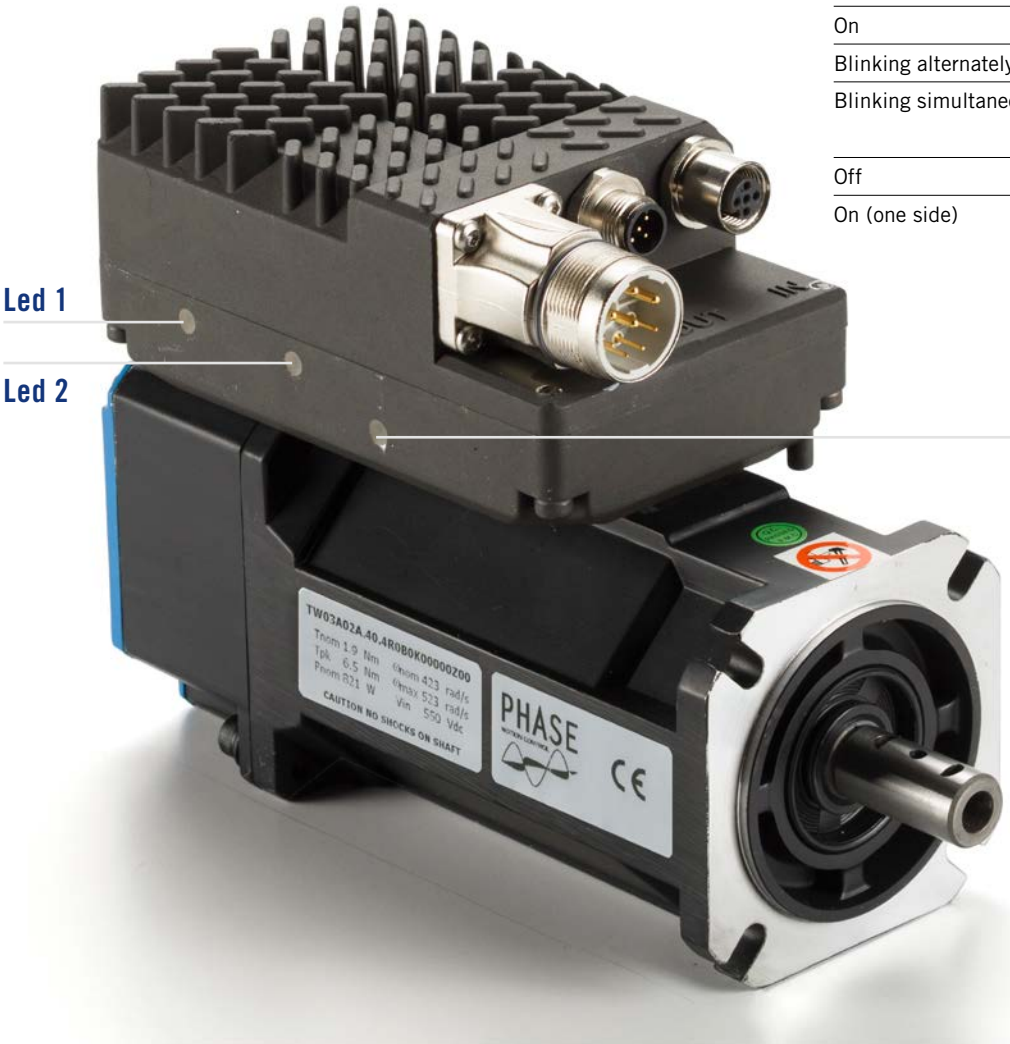
MODEL		Flange Size [mm]	Length Range [mm]	Nominal Speed (rpm)	Nominal Torque [Nm]	Peak Torque [Nm] S6 40%
TW03A	TW03A02A.40	75	167	4000	1.9	7.10
TW05A	TW05A03A.40	100	195	4000	2.4	8.8
	TW05A06A.30	100	239	3000	5.1	12.9
	TW05A09A.20	100	279	3000	8.4	20.7
TW07C Water Cooled	TW07A20C.40	145	305	4000	36.0	57.0
	TW07A20C.40	145	355	3000	55.0	74.0
	TW07A20C.40	145	406	2000	80.0	107.0
TW07F Fan Cooled	TW07A20F.40	145	343	4000	25.0	44.0
	TW07A30F.30	145	393	3000	42.0	74.0
	TW07A40F.20	145	444	2000	65.0	107.0

These data are referred to 560 Vdc

	Sensor Position		Communication Protocol				Typical DC Power Supply	
Models	Endat	Resolver	CANOpen	EtherCAT	Brake	Shaft Forelock	310	560
TW05A [310 DC Bus]	✓	✓	✓			✓	✓	
TW03A	✓	✓	✓	✓	✓	✓	✓*	✓
TW05A	✓	✓	✓	✓	✓	✓	✓*	✓
TW07C	✓	✓	✓	✓		✓	✓*	✓
TW07F	✓	✓	✓	✓	✓	✓	✓*	✓

* Speed performance derating 60%

Motor Led Behaviour



The Tw Motor is equipped with two couples of leds, which indicate the motor status (led on the upper and lower side of the motor give redundant information, except when different noted).

Led1	Led2	Motor Status
Blinking	Off	Power supply Ok. Power output disabled
On	Blinking	Power supply Ok. Power output enabled
Blinking alternately		Fault condition
Blinking simultaneously		Waiting for firmware download (due to Firmware download activation or wrong firmware CRC check)
Off	Two fast blink	Low DC link circuit voltage
On (one side)	Off (both side)	Flash memory corrupted, contact technical service

EtherCAT behaviour

EtherCAT Behavior	Communication Status
Off	No physical link connection.
On	Physical link connection established.

Available only for the TW03A, TW05A and TW07 models motor series

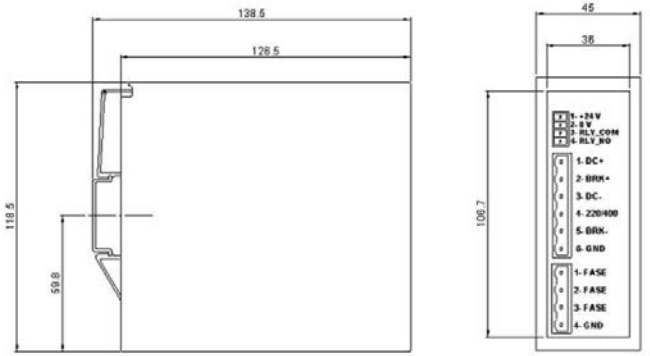
TW Power Supply Size 1

TW Power Supply Size 1, 400 Vac rated 1 kW power supply with pre-charge cycle and integral brake unit.

- Three phase supply 200-440 Vac.
- Dynamic braking (external resistor required). Pre-charge capability.
- Integrated EMC filter.
- Nominal output voltage, Vin*1.35 volt, max 600 Vdc.
- Continuous output power 1 kW.
- Din rail mounted. Free air convection cooling.

TW Power Supply Size 1	PX1.001.4		
Main Power	220Vac Single Phase	220Vac Three Phase	380Vac Three Phase
Rated Output Voltage	310Vdc		560Vdc
Rated Output Power	500W	700W	1.2KW
Peak Output Power	2KW	2.8KW	4.8KW
Clamping Voltage Value	375Vdc		750Vdc
Recommend Braking resistor	70Ω		100Ω
	100W		300W
Auxiliary Power Supply	24Vdc / 0.2A		
Max. Working Temperature	40°C		

Overall Dimensions



Note

The supplied external resistor can absorb continuosly a maximum power rating of 100 Watts during braking.

TW Power Supply Size 2

Main Features

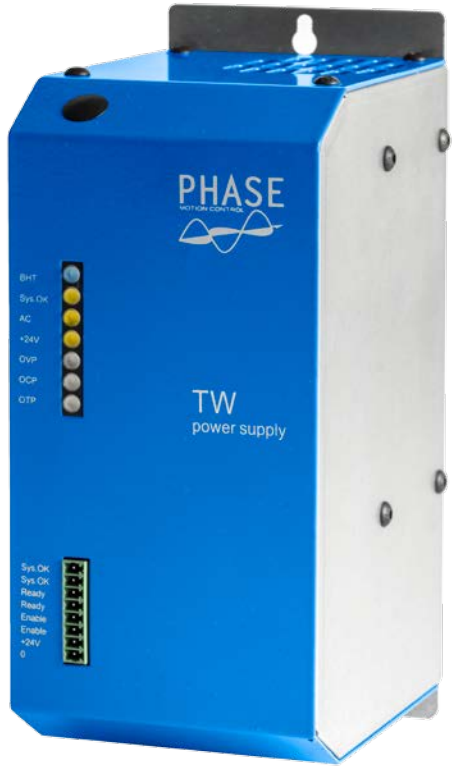
- Main Power supply: three or single phase supply.
- Power on relay output (System Ready).
- Precharge circuit.
- Protection: braking desaturation, overvoltage, overcurrent and overtemperature.
- Bluetooth monitoring.

TW Power Supply Size 2	PX1.010.2		PX1.015.4
Main Power	220Vac Single Phase	220Vac Three Phase	380Vac Three Phase
Rated Output Voltage	310 Vdc		560 Vdc
Rated Output Power	4 kW	8 kW	15 kW
Peak Output Power	5.5 kW	16 kW	30 kW
Clamping Voltage value	375Vdc		750 Vdc
Overload Current	> 15 A	> 27 A	>27 A
Brake Voltage	400 Vdc		800 Vdc
Recommend Braking resistor	20 Ω		20 Ω
	1000 W		1000 W
Auxiliary Power Supply	24 V, 2 A		24 V, 2 A

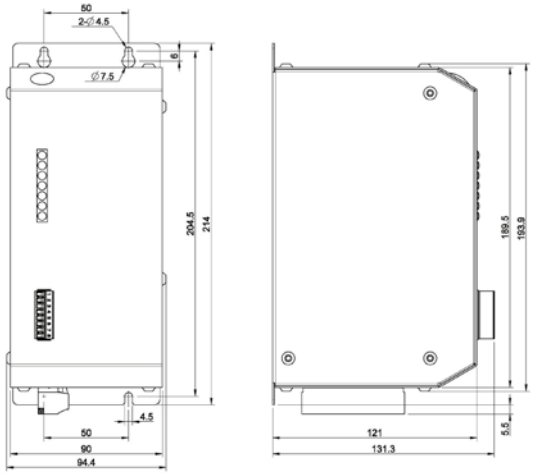
LED

NO.	name	off	blink	on
1	BHT	Main Power off	No Bluetooth connection	Bluetooth connection active
2	Sys.OK	DC Bus	DC Bus Value Out of range	DC Bus Enable
3	AC	Main Power Off	Main Power Value Out of range	Main Power Normal
4	+24V	Auxiliary Power Off	Auxiliary Power Low	Auxiliary Power Normal
5	OVP	DC Bus Normal	Brake open	Over Voltage Alarm
6	OCP	Current Normal	Overload Current	Over Current Alarm
7	OTP	Temperature Normal	Fan Working	Temperature Alarm

*It works also with 220 Vac three phase main power supply: rated output power = 8kW



Overall Dimensions



TW05A [310 DC Bus] Ordering Code

Example Code

TW05	03	A.	30.	2	N0	0	0	K1	0	0	0	0	0	0	00

Family Code

		Nom. Torque		Cooling		Speed		Voltage	
Code	Description	Code	Description	Code	Description	Code	Description	Code	Description
TW05	Torque Wire Motor	**03**	2.5 Nm	**A**	Air cooling	**30**	3000rpm	**2**	200-400 Vdc
TW05	Torque Wire Motor	**06**	4.5 Nm	**A**	Air cooling	**20**	2000rpm	**2**	200-400 Vdc

Double Bearing Only

Option

	Position Sensor		Brake		Connector		Shaft
Code	Description	Code	Description	Code	Description	Code	Description
M0	Endat Single Turn	**0**	No Brake	**0**	M23 6 PIN + 2 x M12 5 PIN	**G1**	19j6 x 40
N0	Endat Multi Turn	**B**	Brake			**K1**	19j6 x 40 - KEY 6x6x22
R0	Resolver						

TW03A Ordering Code

Example Code

TW03A	02	A.	40.	4	R0	0	D	K0	E	0	0	0	0	0	00

Family Code

		Nom. Torque		Cooling		Speed		Voltage	
Code	Description	Code	Description	Code	Description	Code	Description	Code	Description
TW03A	Torque Wire Motor	**02**	2.4 Nm	**A**	Air cooling	**40**	4000rpm	**4**	310-700 Vdc

Option

Position Sensor		Brake		Connector		Shaft		Expansion Board	
Code	Description	Code	Description	Code	Description	Code	Description	Code	Description
M0	Endat Single Turn	**0**	No Brake	**0**	M23 6 PIN + 2 x M12 5 PIN	**G0**	14j6 x 30	**0**	No Expansion
N0	Endat Multi Turn	**B**	Brake	**P**	M23 8 PIN + 2 x M12 5 PIN (STO Function)	**K0**	14j6 x 30 - KEY 5x5x20	**E**	EtherCAT Board
R0	Resolver			**D**	M23 8 PIN + 2 x M12 4 PIN (STO Function)				

TW05A Ordering Code

Example Code

TW05A	02	A.	40.	4	M0	B	P	00	0	0	0	0	0	0	00

Family Code

		Nom. Torque		Cooling		Speed		Voltage	
Code	Description	Code	Description	Code	Description	Code	Description	Code	Description
TW05A	Torque Wire Motor	**03**	2.4 Nm	**A**	Air cooling	**40**	4000rpm	**4**	310-700 Vdc
TW05A	Torque Wire Motor	**06**	5.1 Nm	**A**	Air cooling	**30**	3000rpm	**4**	310-700 Vdc
TW05A	Torque Wire Motor	**09**	8.4 Nm	**A**	Air cooling	**20**	2000rpm	**4**	310-700 Vdc

Option

	Position Sensor		Brake		Connector		Shaft		Expansion Board
Code	Description	Code	Description	Code	Description	Code	Description	Code	Description
M0	Endat Single Turn	**0**	No Brake	**0**	M23 6 PIN + 2 x M12 5 PIN	**G1**	19j6 x 40	**0**	No Expansion
N0	Endat Multi Turn	**B**	Brake	**P**	M23 8 PIN + 2 x M12 5 PIN (STO Function)	**K1**	19j6 x 40 - KEY 6x6x28	**E**	EtherCAT Board
R0	Resolver			**D**	M23 8 PIN + 2 x M12 4 PIN (STO Function)				

TW07A Ordering Code

Example Code

TW07A	02	C.	40.	4	R0	0	D	00	E	0	0	0	0	0	00

Family Code

		Nom. Torque		Cooling		Speed		Voltage	
Code	Description	Code	Description	Code	Description	Code	Description	Code	Description
TW07A	Torque Wire Motor	**20**	36 Nm	**C**	Water cooling	**40**	4000rpm	**4**	310-700 Vdc
TW07A	Torque Wire Motor	**30**	55 Nm	**C**	Water cooling	**30**	3000rpm	**4**	310-700 Vdc
TW07A	Torque Wire Motor	**40**	80 Nm	**C**	Water cooling	**20**	2000rpm	**4**	310-700 Vdc
TW07A	Torque Wire Motor	**20**	25 Nm	**F**	Fan cooling	**40**	4000rpm	**4**	310-700 Vdc
TW07A	Torque Wire Motor	**30**	42 Nm	**F**	Fan cooling	**30**	3000rpm	**4**	310-700 Vdc
TW07A	Torque Wire Motor	**40**	65 Nm	**F**	Fan cooling	**20**	2000rpm	**4**	310-700 Vdc

Option

Position Sensor		Brake		Connector		Shaft		Expansion Board	
Code	Description	Code	Description	Code	Description	Code	Description	Code	Description
M0	Endat Single Turn	**0**	No Brake	**P**	M23 8 PIN + 2 x M12 5 PIN (STO Function)	**G2**	28j6 x 60	**0**	No Expansion
N0	Endat Multi Turn	**B**	Brake	**D**	M23 8 PIN + 2 x M12 4 PIN (STO Function)	**K2**	28j6 x 60 - KEY 8x7x40	**E**	EtherCAT Board
R0	Resolver								

Note: Brake option is available only for fan cooling version.

TW Power Supply Ordering Code

Example Code

PX1	001.	4.	0	0	0	0

Family Code

Size 1

Code	Description	Code	Description	Code	Description
			Nominal Power		**Power Supply**
PX1	Power Supply	**001**	1 kW	**4**	440 Vac

Size 2

Code	Description	Code	Description	Code	Description
			Nominal Power		**Power Supply**
PX1	Power Supply	**010**	4 kW	**2**	220 Vac
PX1	Power Supply	**015**	15 kW	**4**	440 Vac

Option

Clamp

Code	Description
0	With brake resistor
H	Witout brake resistor

Certificates

PHASE
MOTION CONTROL

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