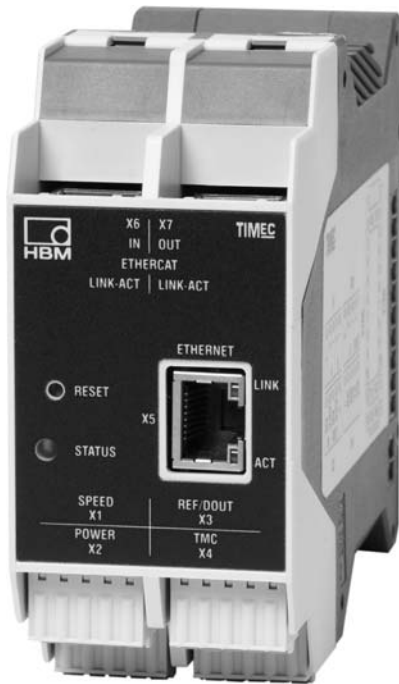


TIM-EC

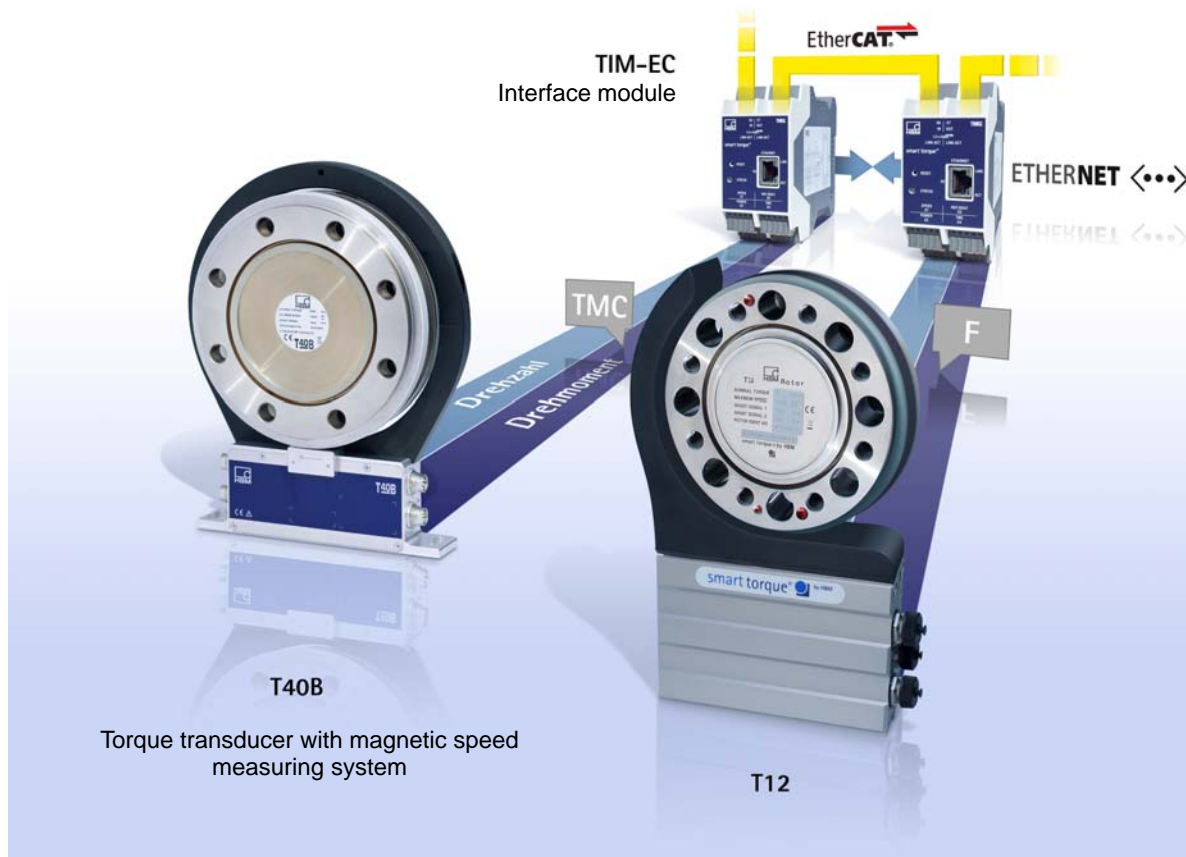
EtherCAT® Interface Module

Special features

- Real-time EtherCAT® interface module
- Output of torque, speed, angle of rotation and power
- Very high dynamics (up to 20 kHz)
- Input resolution up to 25 bits
- Low latency time
- Diagnostic functions
- Integrated web server
- Flexible to use
- Modular design, expandable



Overall concept



Specifications

Type		TIM-EC
Supply		
Supply voltage	V _{DC}	24 ± 10%
Electrical isolation Torque, speed, EtherCAT [®] . Ethernet and supply voltage are electrically isolated from each other		
Isolation voltage	V	500
Voltage discontinuity Test based on PLC standard DIN EN 61 131-2: 24 V -10%	ms	10
Power consumption Without supply to transducers	W	< 5
Communication interface		
Ethernet Data link Protocol/addressing Plug connection Line length Cable type (minimum requirements)	m	IEEE 802.3, 10Base-T / 100Base-TX TCP/IP (direct address or DHCP), HTTP, UDP RJ45, 8-pin ≤ 100 Cat-5, SFTP
EtherCAT[®] Function Data link Plug connection Line length Cable type (minimum requirements) Baud rate Update rate	m Mbit/s kHz	EtherCAT [®] slave IEEE 802.3, 100Base-TX RJ45 socket, shielded ≤ 100 Cat-5, shielded ≤ 100 ≤ 20
Ambient conditions		
Nominal (rated) temperature range		+10 ... +60
Operating temperature range	°C	-10 ... +60
Storage temperature range		-20 ... +70
Permissible relative humidity, non-condensing	%	10 ... 90
Cases		
Material		Polyamide PA 6.6
Dimensions (W x H x D), without connections	mm	45 x 99 x 107
Weight, approx.	g	230
Mechanical stress capability Vibration test based on IEC/DIN EN 60 068, Part 2-6 (30 min in each direction) Impact test based on IEC/DIN EN 60 068, Part 2-27 (3 times in each direction, impact duration 11 ms)	m/s ² m/s ² m/s ²	10 (5 ... 8 Hz) 25 (10 ... 65 Hz) 200
Installation		Support rail DIN EN 60 715
Connector		Plug terminal
Degree of protection		IP20
EMC conformity		
Emission (EME)		EN 61326; 2013, Class A
Immunity from interference		EN 61326; 2013, industrial environment

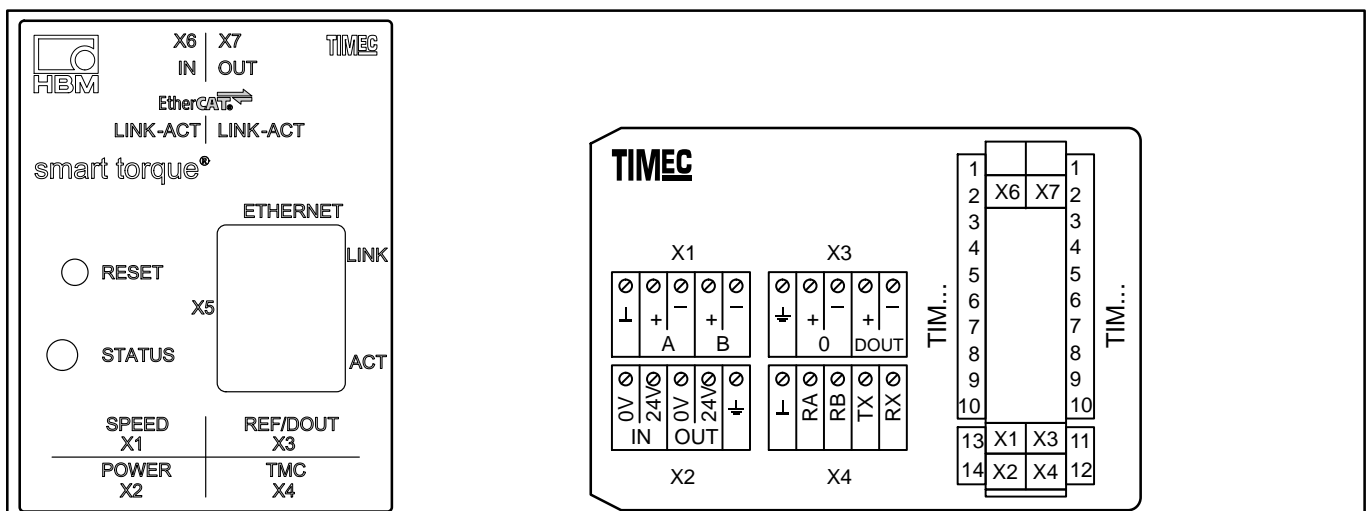
Specifications (continued)

Torque		
TMC connector input		
Signal type		TMC (digital serial data)
Data rate	Hz	38000 ... 39000
Resolution	bits	16
Signal type		
FM (frequency modulation via TMC connection)		
Data rate	Hz	approx. 39000
Resolution	bits	25
Frequency measurement resolution, min.		
10 +/- 5kHz		1
60 +/-30kHz	mHz	8
240 +/- 120kHz		16
Accuracy		
Frequency measurement rel. to act. value	%	<=0.01
Temperature effect per 10K, rel. to act. value	%	<=0.01
Internal sampling rate	mHz	125
Termination resistor, internal	ohms	120
Low pass filter, 4th order	Hz	0.1 / 1 / 10 / 100 / 1000 / 3000 / Off
Runtimes of filters 1 and 2		
Filter off	µs	0.944
3000 Hz	µs	54.4
1000 Hz	µs	212
100 Hz	ms	2.6
10 Hz	ms	26.8
1 Hz	ms	230
0.1 Hz	s	3.12
Linearization for full range 1:1 and partial range 1:5 or 1:10 (right, left, up to 11 points)		
Calibration coefficients can be entered directly		
Maximum cable length for TIM-EC/torque transducer	m	50
Rotational speed		
Input signal		Quadrature / single / direct for T40 family
Signal type		RS422
Data rate	Hz	approx. 39000
Measuring range of pulse frequency measurement		Determined automatically from max. speed and pulses/revolution of the transducer
Resolution	bits	25
Frequency measurement resolution, min.		
Measuring range 20kHz		1
Measuring range 200kHz	mHz	10
Measuring range 1000 kHz		125
Accuracy		
Frequency measurement rel. to act. value	%	<=0.01
Temperature effect per 10K, rel. to act. value	%	<=0.01
Internal sampling rate	mHz	125
Input filter / glitch filter time constant (adjustable)		80ns, 800ns, 8ms, 80ms
Low pass filter, 4th order	Hz	0.1 / 1 / 10 / 100 / 1000 / 3000 / Off
Runtimes of filters 1 and 2		
Filter off	µs	0.944
3000 Hz	µs	54.4
1000 Hz	µs	212
100 Hz	ms	2.6
10 Hz	ms	26.8
1 Hz	ms	230
0.1 Hz	s	3.12
Max. cable length of TIM-EC/torque transducer/speed encoder	m	50

Specifications (continued)

Angle of rotation		
Resolution		1x / 2x / 4x with interpolation
Zero balance		360° / 720° / 1440° EtherCAT® / manual / zero index
Power		
Low pass filter, 4th order	Hz	0.1 / 1 / 10 / 100
Runtimes, filter 1		360° / 720° / 1440° EtherCAT® / manual / zero index
Filter off	µs	0.944
100 Hz	ms	2.6
10 Hz	ms	26.8
1 Hz	ms	230
0.1 Hz	s	3.12
If HBM torque transducers with integrated rotational speed measuring are used, the power calculation is runtime_corrected		
EtherCAT®		
Control via EtherCAT®		Zero balance / shunt trigger / parameter set selection
Parameter set (saved in device and selectable via EtherCAT®)		32
Flags		
Torque transducer (via TMC), TIM-EC		Status (diagnosis)
Torque / speed / power		Status (diagnosis), measured values, overflow

Terminal assignment



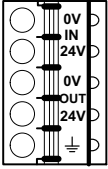
Terminal X1, speed encoder

Pin	Assignment
1	DGND (digital GND), color code black ¹⁾ / brown ²⁾
2	A + F1 rotational speed measurement signal, pulse sequence, 5V, 0°, color code red
3	A - F1 rotational speed measurement signal, pulse sequence, 5V, 0°, color code white
4	B + F2 rotational speed measurement signal, pulse sequence, 5V, phase_shifted 90°, color code gray
5	B - F2 rotational speed measurement signal, pulse sequence, 5V, phase_shifted 90°, color code green

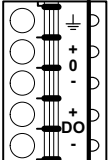
1) Speed cable type KAB153

2) Speed cable type KAB164

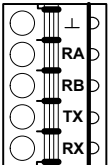
Terminal X2, voltage supply

	Pin	Assignment
		Connection for energy supply, input
	1	GND (TIM-EC and stator supply)
	2	+24 V \pm 10% supply (TIM-EC and stator)
		Output for the supply voltage of the torque transducer
	3	GND (looped through from X2-1): color code blue
	4	+24V (looped through from X2-2): color code black
	5	Shield (TMC), connected with ground

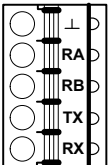
Terminal X3, speed encoder

	Pin	Assignment
	1	Shield (speed), connected with ground
	2	+, Reference signal (1 pulse/revolution), 5V, color code blue
	3	-, Reference signal (1 pulse/revolution), 5V, color code black
	4	Reserved
	5	Reserved

Terminal X4, torque transducer - frequency

	Pin	Assignment
	1	Measurement signal 0V; symmetrical, color code gray
	2	RA, torque measurement signal 5V, color code red
	3	RB, torque measurement signal 5V, color code white
	4	Not in use
	5	Not in use

Terminal X4, torque transducer - TMC

	Pin	Assignment
	1	DGND (digital GND), color code purple
	2	RS-422 RA, color code red
	3	RS-422 RB, color code white
	4	RS-232-TX, color code grey
	5	RS-232-RX, color code green

Supplementary technical information



EtherCAT[®] is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

Subject to modifications.
All product descriptions are for general information
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Hottinger Baldwin Messtechnik GmbH
Im Tiefen See 45 · 64293 Darmstadt · Germany
Tel. +49 6151 803-0 · Fax +49 6151 803-9100
Email: info@hbm.com · www.hbm.com

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