

DATA SHEET

C2 Force transducer

SPECIAL FEATURES

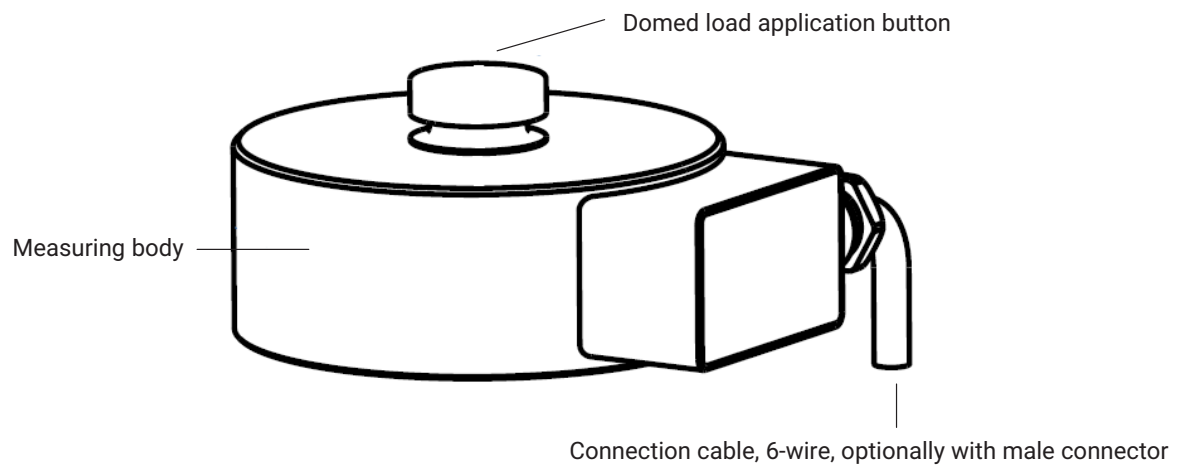
- Compressive force transducer
- Lateral force compensation
- Nominal (rated) forces 500 N... 200 kN
- HBK accuracy class 0.1
- Made of stainless materials, equipment protection level IP67
- Can be configured with different cable lengths, connector attachment, integrated amplifier (0 ... 10 V, 4 ... 20 mA, or IO-Link) and TEDS on request
- Low height of construction



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SCHEMATIC DIAGRAM

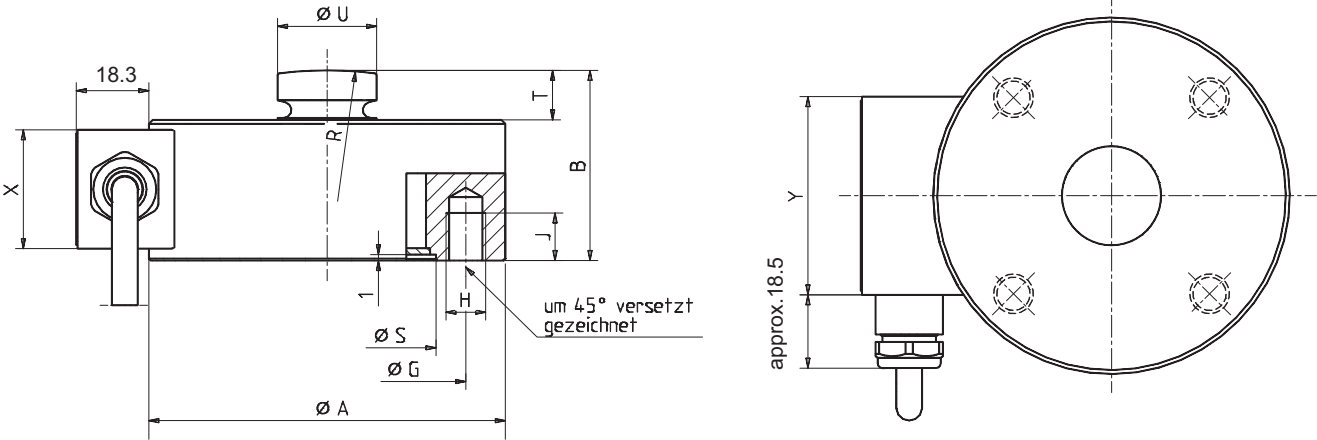


DIMENSIONS

C2 force transducer

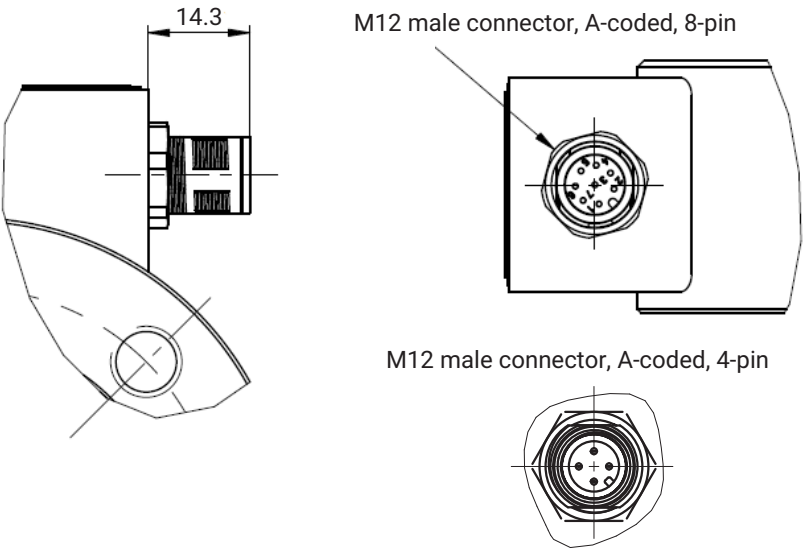
Dimensions in mm

C2 (nominal (rated) force 500 N...200kN)

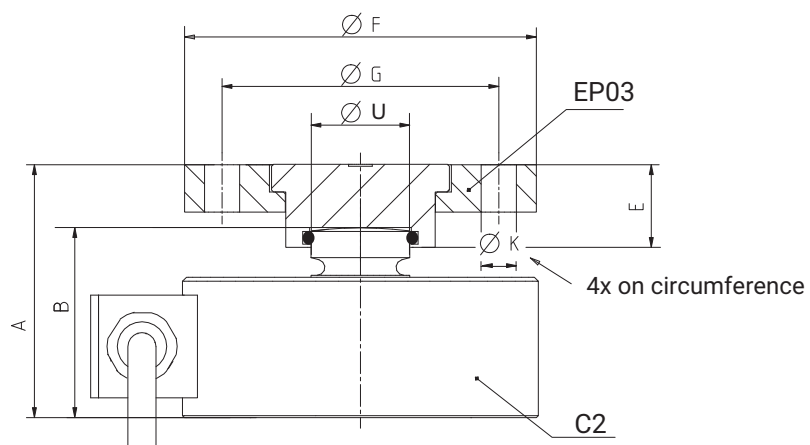


Nominal (rated) force	ØA _{0.2}	B	ØG	H	J	R	ØS ^{H8}	T	ØU	X	Y
500 N...10 kN	50	30	42	4xM5	7	60	34	7	13	20	35
20 kN, 50 kN	90	48	70	4xM10	12	100	55	12.5	25	30	50
100 kN, 200 kN	115	60	90	4xM12	16	160	68	12.5	32	30	50

Optionally passive or active with M12 A-coded connector

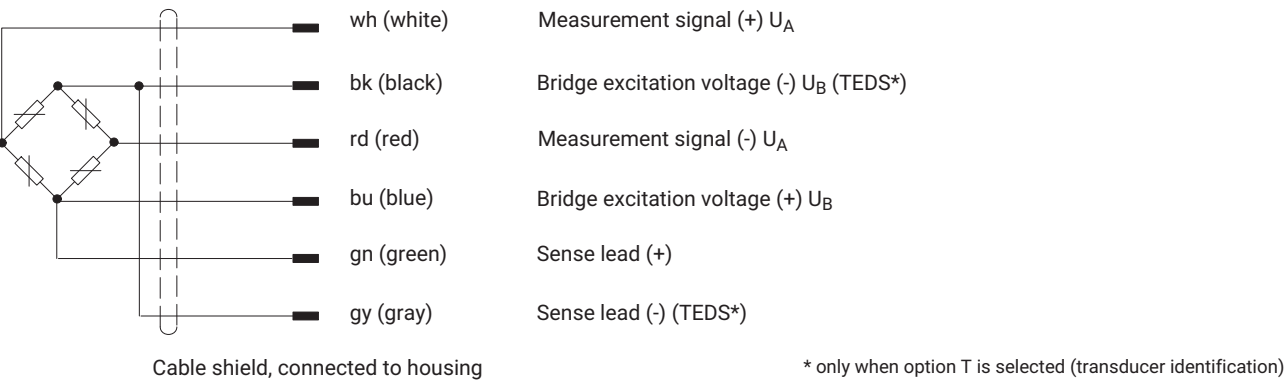


C2 force transducer with EP03/EP03R thrust piece



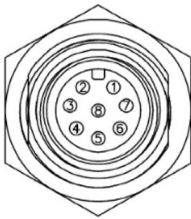
Nominal (rated) force	Thrust piece ¹⁾	A	B	E	ØF	ØG	ØU	ØK
500 N...10 kN	1-EP03/200KG	46	30	21	89	70	13	9
20 kN, 50 kN	1-EP03R/5T	64	48	21	89	70	25	9
100 kN, 200 kN	1-EP03R/20T	80	60	27.5	110	90	32	13

Electrical connection with a fixed cable (without amplifier)



Electrical connection with an M12 8-pin connector (with/without amplifier)

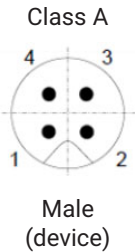
Pin	Wire color	Version VA 1 (voltage output)	Version VA 2 (current output)	Connection cable wire assignments without integrated amplifier
1	White	Supply voltage 0 V (GND)		Measurement signal (+)
2	Brown	Not in use		Bridge excitation voltage (-) (TEDS ¹)
3	Green	Zeroing control input		Bridge excitation voltage (+)
4	Yellow	Not in use		Measurement signal (-)
5	Gray	Output signal 0 ... 10 V	Output signal 4 ... 20 mA	Not in use
6	Pink	Output signal 0 V	Not in use	Sense lead (+)
7	Blue	Not in use		Sense lead (-) (TEDS ¹)
8	Red	Voltage supply +19 ... +30 V		Not in use
Cable shield, connected to housing				



¹⁾ TEDS only if ordered

Electrical connection with integrated VAIO amplifier (IO-Link)

Pin	C2 assignment
1	Supply voltage +
2	Digital output (DI/DO pin function)
3	Supply voltage -, reference potential
4	IO-Link data (C/Q), switchover to the digital output (SIO mode) possible



Specifications without integrated amplifier

Type			C2 without integrated amplifier									
Nominal (rated) force	F _{nom}	N	500									
		kN		1	2	5	10	20	50	100	200	
Accuracy												
HBK accuracy class			0.2	0.1								
Relative reproducibility and repeatability errors in unchanged mounting position	b _{rg}	%	0.1									
Relative reversibility error (hysteresis) at 0.5 * F _{nom}	V _{0.5}		0.2	0.15								
Non-linearity	d _{lin}		0.2	0.1								
Relative zero point return	v _{w0}	%	0.05									
Relative creep (30 min)	d _{cr,F+E}	%	0.06									
Effect of eccentricity at 10% F _{nom} * 10 mm ¹⁾	d _E	%/mm	0.3	0.2		0.1						
Temperature coefficient of sensitivity	TC _S	%/10K	0.1									
Temperature coefficient of zero signal	TC ₀		0.1	0.05								
Rated electrical output												
Rated output (nominal)	C _{nom}	mV/V	2									
Relative zero signal deviation	d _{s,0}	%	1									
Sensitivity error	d _c		0.2									
Input resistance	R _e	Ω	> 340									
Output resistance	R _a		200 ... 400									
Insulation resistance	R _{iso}	GΩ	> 2									
Operating range of the excitation voltage	B _{U,G}	V	0.5 ... 12									
Reference excitation voltage	U _{ref}		5									
Connection			6-wire circuit									
Temperature												
Reference temperature	T _{ref}	°C [°F]	+23 [73.4]									
Nominal (rated) temperature range	B _{T,nom}		-10 ... +70 [14 ... +158]									
Operating temperature range	B _{T,G}		-30 ... +85 [-22 ... +185]									
Storage temperature range	B _{T,S}		-50 ... +85 [-58 ... +185]									
Mechanical quantities												
Maximum operating force	F _G	% of F _{nom}	130	150								
Force limit	F _L		130	150								
Breaking force	F _B		300									
Static lateral force limit ²⁾	F _Q	mm	100			70	40	55	12	15	9	
Permissible eccentricity	e _G		5.4	5.3	5.2	4.8	4.2	8.0	2.0	1.5	1.5	
Nominal (rated) displacement	s _{nom}		0.049	0.053	0.047	0.048	0.04	0.069	0.074	0.08	0.10	
Natural frequency	f _G	kHz	4.4	8.7	9.7	18.5	19.3	13	14	13	14	
Permissible oscillation stress	f _{rb}	% of F _{nom}	100									

Type			C2 without integrated amplifier								
Nominal (rated) force	F _{nom}	N	500								
		kN		1	2	5	10	20	50	100	200
Stiffness	c _{ax}	10 ⁵ N/mm	0.086	0.18	0.42	1.06	2.13	3.08	6.1	11.1	16.67
General information											
Degree of protection in accordance with EN 60529			IP67 ³⁾								
Spring element material			Non-rusting stainless steel								
Measuring point protection			Hermetically-welded measuring body								
Cable (only with "fixed cable" option)			6-wire, polyethylene insulated								
Cable length (standard version)		m	3					6		12	
Cable length (to customer requirements)			See page 6 "C2 versions and ordering numbers"								
Weight	m	kg	0.4					1.8		3	
	m	lbs	0.9					4		6.6	
Mechanical shock resistance as per IEC 60068-2-6											
Number		n	1000								
Duration		min	3								
Acceleration		m/s ²	1000								
Vibrational stress as per IEC 60068-2-27											
Frequency range		Hz	5 ... 65								
Duration		min	30								
Acceleration		m/s ²	150								

¹⁾ Application point for lateral force effect

²⁾ Permissible FQ application point

³⁾ Test condition: 1 m water column, 0.5 h; connected with cable if version with M12 male connector selected

Specifications with integrated amplifier VA1 (0...10 V) and VA2 (4...20 mA)

Type			C2 with integrated VA1 and VA2 amplifier								
Nominal (rated) force	F _{nom}	N	500								
		kN		1	2	5	10	20	50	100	200
Accuracy											
HBK accuracy class			0.2	0.1							
Relative reproducibility and repeatability errors in unchanged mounting position	b _{rg}	%	0.1								
Relative reversibility error (hysteresis) at 0.5 * F _{nom}	V _{0.5}										
Non-linearity	d _{lin}			0.2	0.1						
Relative zero point return	v _{w0}	%	0.05								
Relative creep (30 min)	d _{cr,F+E}	%	0.06								
Effect of eccentricity at 10% F _{nom} * 10 mm ⁴⁾	d _E	%/mm	0.3	0.2		0.1					
Temperature coefficient of sensitivity	TC _S	%/10K	0.1								
Temperature coefficient of zero signal	TC ₀										
Rated electrical output VA1 (voltage output)											
Output signal		V	0 ... 10								
Rated output (nominal)			10								
Sensitivity tolerance			±0.1								
Zero signal			0								
Output signal range			-3 ... 11								
Cut-off frequency (-3 db)	f _G	kHz	2								
Nominal (rated) supply voltage	U _{ref}	V	24								
Operating range of the supply voltage	B _{u,gt}	V	19 ... 30								
Max. current consumption		mA	15								
Electrical connection			M12 male connector, 8-pin, A-coded								
Electrical characteristic values VA2 (voltage output)											
Output signal		mA	4 ... 20								
Rated output (nominal)			16								
Sensitivity tolerance			±0.16								
Zero signal			4								
Output signal range			3 ... 21								
Cut-off frequency (-3 db)	f _G	kHz	2								
Nominal (rated) supply voltage	U _{ref}	V	24								
Operating range of the supply voltage	B _{u,gt}	V	19 ... 30								
Max. current consumption		mA	30								
Electrical connection			M12 male connector, 8-pin, A-coded								
Temperature											
Reference temperature	T _{ref}	°C [°F]	+23 [73.4]								
Nominal (rated) temperature range	B _{T,nom}		-10 ... +50 [14 ... +122]								
Operating temperature range	B _{T,G}		-20 ... +60 [-4 ... +140]								
Storage temperature range	B _{T,S}		-25 ... +85 [-77 ... +185]								

Type			C2 with integrated VA1 and VA2 amplifier								
Nominal (rated) force	F _{nom}	N	500								
		kN		1	2	5	10	20	50	100	200
Mechanical quantities											
Maximum operating force	F _G	% of F _{nom}	130	150							
Force limit	F _L		130	150							
Breaking force	F _B		300								
Static lateral force limit ⁵⁾	F _Q		100			70	40	55	12	15	9
Permissible eccentricity	e _G	mm	5.4	5.3	5.2	4.8	4.2	8	2	1.5	1.5
Nominal (rated) displacement	s _{nom}		0.049	0.053	0.047	0.048	0.04	0.069	0.074	0.08	0.1
Natural frequency	f _G	kHz	4.4	8.7	9.7	18.5	19.3	13	14	13	14
Permissible oscillation stress	f _{rb}	% of F _{nom}	100								
Stiffness	c _{ax}	10 ⁵ N/mm	0.086	0.18	0.42	1.06	2.13	3.08	6.1	11.1	16.67
General information											
Degree of protection in accordance with EN 60529			IP67 ⁶⁾								
Spring element material			Stainless steel								
Material of permanently installed amplifier housing			Stainless steel								
Measuring point protection			Hermetically-welded measuring body								
Weight	m	kg	0.4				1.8		3		
	m	lbs	0.9				4		6.6		
Mechanical shock resistance as per IEC 60068-2-6											
Number		n	1000								
Duration		min	3								
Acceleration		m/s ²	1000								
Vibrational stress as per IEC 60068-2-27											
Frequency range		Hz	5 ... 65								
Duration		min	30								
Acceleration		m/s ²	150								

⁴⁾ Application point for lateral force effect

⁵⁾ Permissible FQ application point

⁶⁾ Test condition: 1 m water column, 0.5 h; connected with cable if version with M12 male connector selected

Specifications with integrated VAIO amplifier

Type			C2 with integrated VAIO amplifier								
Nominal (rated) force	F _{nom}	N	500								
		kN		1	2	5	10	20	50	100	200
Accuracy											
HBK accuracy class			0.2	0.1							
Relative reproducibility and repeatability errors in unchanged mounting position	b _{rg}	%	0.1								
Relative reversibility error (hysteresis) at 0.5 * F _{nom}	V _{0.5}		0.2	0.15							
Non-linearity	d _{lin}		0.03								
Relative zero point return	v _{w0}		0.05								
Relative creep (30 min)	d _{cr,F+E}		0.06								
Effect of eccentricity at 10% F _{nom} * 10 mm ⁷⁾	d _E	%/mm	0.3	0.2		0.1					
Temperature coefficient of sensitivity	TC _S	%/10K	0.1								
Temperature coefficient of zero signal	TC ₀		0.03								
VAIO electrical characteristics											
Output signal			COM3, to IO-Link standard, class A								
Min. cycle time		ms	0.9								
Sample rate (internal)		S/s	40000								
Cut-off frequency (-3 dB)	f _G	kHz	4								
Nominal (rated) supply voltage	U _{ref}	V	24								
Operating range of the supply voltage	B _{u,gt}	V	19 ... 30								
Max. power consumption		mW	3200								
Noise		ppm of nominal force	With Bessel filter 1Hz: 25 With Bessel filter 10 Hz: 63 With Bessel filter 100 Hz: 195 With Bessel filter 200 Hz: 275 Without filter: 3020								
Low-pass filter			Freely adjustable cut-off frequency, Bessel or Butterworth characteristic, 6th order								
Device functions											
Limit value switches			2 limit value switches. Invertible, freely adjustable hysteresis. Output via process data or digital output								
Digital IO			According to IO-Link Smart Sensor Profile, 1 permanently available digital output; 1 output can be set to data output. Measurement is then not possible								
Slave pointer function			Yes								
Peak value memory			Yes								
Peak-to-peak memory			Yes								
Warning functions			Warning on exceeding nominal (rated) force/maximum operating force; Nominal (rated) temperature/maximum operating force								

Type			C2 with integrated VAIO amplifier								
Nominal (rated) force	F _{nom}	N	500								
		kN		1	2	5	10	20	50	100	200
Temperature											
Reference temperature	T _{ref}	°C [°F]	+23 [73.4]								
Nominal (rated) temperature range	B _{T,nom}		-10 ... +50 [14 ... +122]								
Operating temperature range	B _{T,G}		-10 ... +60 [14 ... +140]								
Storage temperature range	B _{T,S}		-25 ... +85 [-77 ... +185]								
Mechanical quantities											
Maximum operating force	F _G	% of F _{nom}	130	150							
Force limit	F _L		130	150							
Breaking force	F _B		300								
Static lateral force limit ⁸⁾	F _Q		100		70	40	55	12	15	9	
Permissible eccentricity	e _G	mm	5.4	5.3	5.2	4.8	4.2	8	2	1.5	1.5
Nominal (rated) displacement	s _{nom}		0.049	0.053	0.047	0.048	0.04	0.069	0.074	0.08	0.1
Natural frequency	f _G	kHz	4.4	8.7	9.7	18.5	19.3	13	14	13	14
Permissible oscillation stress	F _{rb}	% of F _{nom}	100								
Stiffness	c _{ax}	10 ⁵ N/mm	0.086	0.18	0.42	1.06	2.13	3.08	6.1	11.1	16.67
General information											
Degree of protection in accordance with EN 60529			IP67 ⁹⁾								
Spring element material			Stainless steel								
Material of permanently installed amplifier housing			Stainless steel								
Measuring point protection			Hermetically-welded measuring body								
Weight	m	kg	0.4				1.8		3		
	m	lbs	0.9				4		6.6		
Mechanical shock resistance as per IEC 60068-2-6											
Number		n	1000								
Duration		min	3								
Acceleration		m/s ²	1000								
Vibrational stress as per IEC 60068-2-27											
Frequency range		Hz	5 ... 65								
Duration		min	30								
Acceleration		m/s ²	150								

⁷⁾ Application point for lateral force effect

⁸⁾ Permissible FQ application point

⁹⁾ Test condition: 1 m water column, 0.5 h; connected with cable if version with M12 male connector selected

C2 VERSIONS AND ORDERING NUMBERS

Measuring range	Ordering number	
500 N	1-C2/500N	The ordering numbers with a gray background are preferred types. These can be delivered at short notice. All preferred types with a cable length of 3/6/12 m (depending on the nominal (rated) force) with free ends, without TEDS, without integrated amplifier and, consequently, without firmware. The ordering number of the preferred type is 1-C2.... The ordering number of the customized version is K-C2-... The ordering number example K-C2--020K-00A4-X-S-VAIO-IO04 shown below is a: C2, nominal (rated) force 20 kN, no fixed cable on the sensor, no TEDS and with integrated amplifier (IO-Link output).
1 kN	1-C2/1KN	
2 kN	1-C2/2KN	
5 kN	1-C2/5KN	
10 kN	1-C2/10KN	
20 kN	1-C2/20KN	
50 kN	1-C2/50KN	
100 kN	1-C2/100KN	
200 kN	1-C2/200KN	

Nominal (rated) force	Electrical connection ¹⁾		Connector version for the “fixed cable” option	Transducer identification	Integrated amplifier	Firmware
500 N 500N	M12 4-pin connector, A-coded 00A4		Free ends Y	With TEDS ²⁾ T	No amplifier N	No firmware N
1 kN 001K	M12 8-pin connector, A-coded 00A8		D-SUB-HD15,15-pin F	Without TEDS S	Amplifier 0... 10 V VA1	Version 2.0.10 ³⁾ IO04
2 kN 002K	Fixed cable (1 m) 01M0		D-SUB-HD connector, 15-pin Q		Amplifier 4 ... 20 mA VA2	Version 2.0.12 ³⁾ IO05
5 kN 005K	Fixed cable (3 m) 03M0		MS3106PEMV connector N		Digital amplifier: IO-Link VAIO	
10 kN 010K	Fixed cable (6 m) 06M0		CONP1016 connector P			
20 kN 020K	Fixed cable (12 m) 12M0		M12 connector, 8-pin M			
50 kN 050K	Fixed cable (20 m) 20M0		No cable available X			
100 kN 100K						
200 kN 200K						
K-C2--	020K-	00A4-	X-	S-	VAIO-	IO04

¹⁾ M12 8-pin male connectors or fixed cables can be ordered for passive sensors. M12 4-pin male connectors (IO-Link output) and M12 8-pin male connectors (current and voltage output) are available for active sensors.

²⁾ TEDS only for sensors without amplifier module

³⁾ Only for versions with IO-Link interface

ACCESSORIES

Accessories (not included in the scope of supply)	Ordering number
Ground cable, 400 mm	1-EEK4
Ground cable, 600 mm	1-EEK6
Ground cable, 800 mm	1-EEK8
Thrust piece for nominal (rated) forces 500 N...10 kN	1-EPO3/200kg
Thrust piece for nominal (rated) forces 20 kN...50 kN	1-EPO3R/5t
Thrust piece for nominal (rated) forces 100 kN...200 kN	1-EPO3R/20t
Cable to connect to M12 male connector, 20 m long; not suitable for the IO-Link interface	1-KAB168-20
Cable to connect to M12 male connector, 5 m long; not suitable for the IO-Link interface	1-KAB168-5

Hottinger Brüel & Kjaer GmbH

Im Tiefen See 45 · 64293 Darmstadt · Germany
Tel. +49 6151 803-0 · Fax +49 6151 803-9100
www.hbkworld.com · info@hbkworl.com

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