

DATA SHEET

C9C Force Transducer

SPECIAL FEATURES

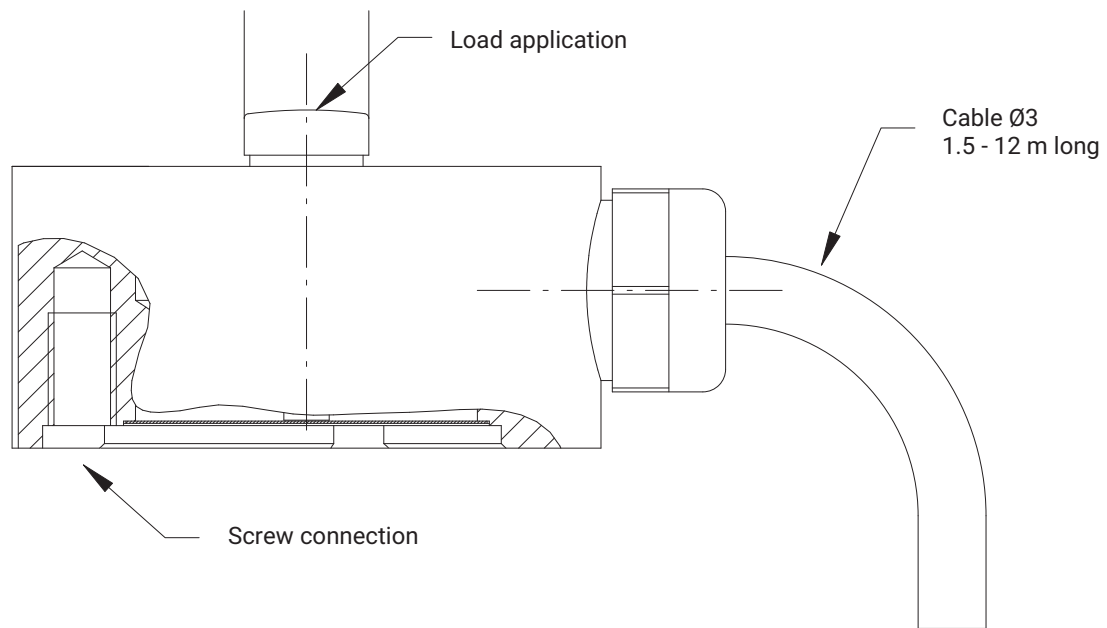
- Compact design compressive force transducer
- HBK Accuracy class 0.2
- Nominal (rated) forces 50 N... 50 kN
- Available on request as a measurement chain with permanently connected inline amplifier.
Output signals: mA, V or IO-Link
- Configurable with different cable lengths, plug assembly and TEDS on request
- Stainless, protection class IP67
- High rigidity, ideally suited for dynamic measurement tasks
- Cable suitable for drag chains, resistant to most oils and operating materials.



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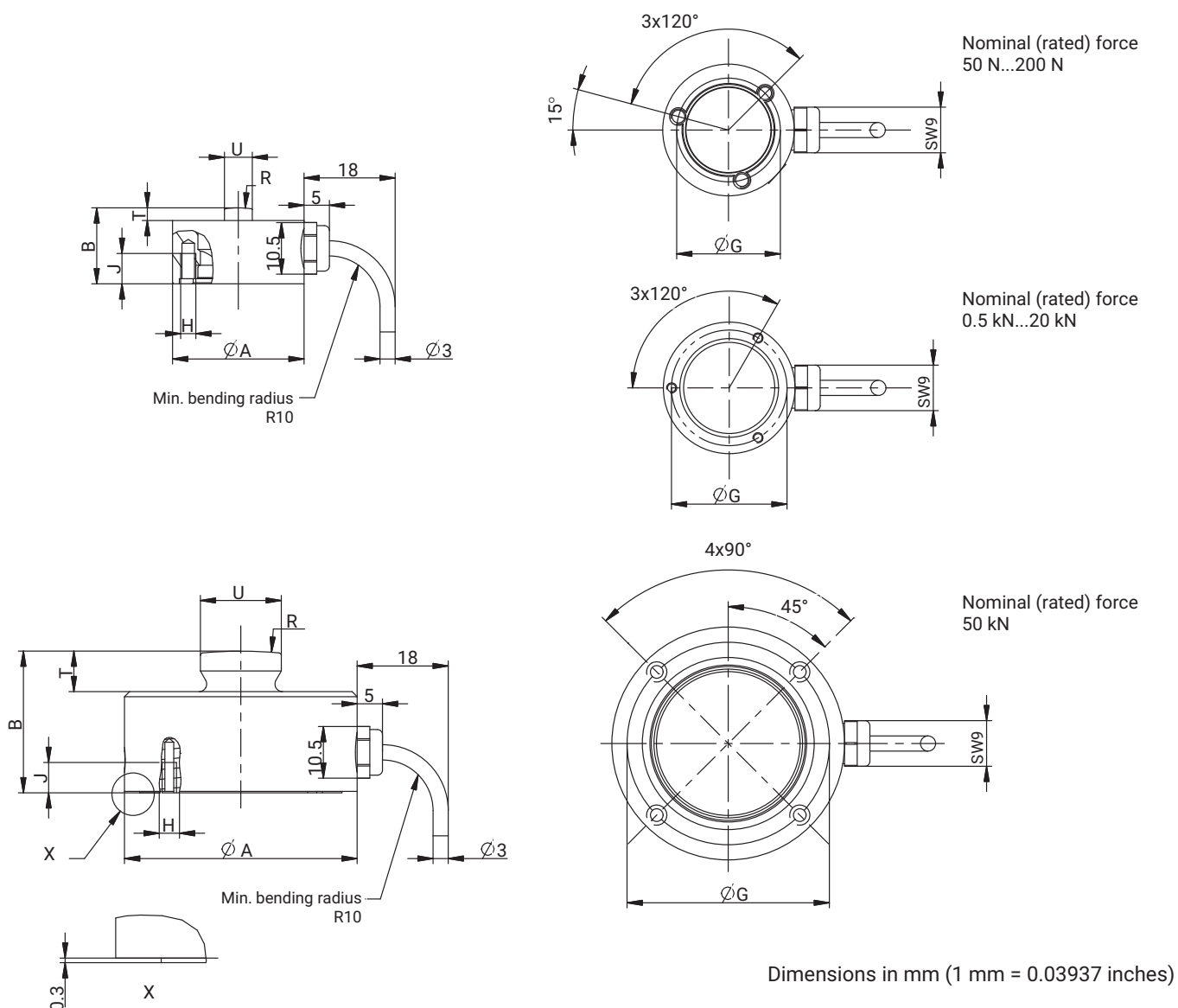
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PRINCIPLE OF THE C9C FORCE TRANSDUCER



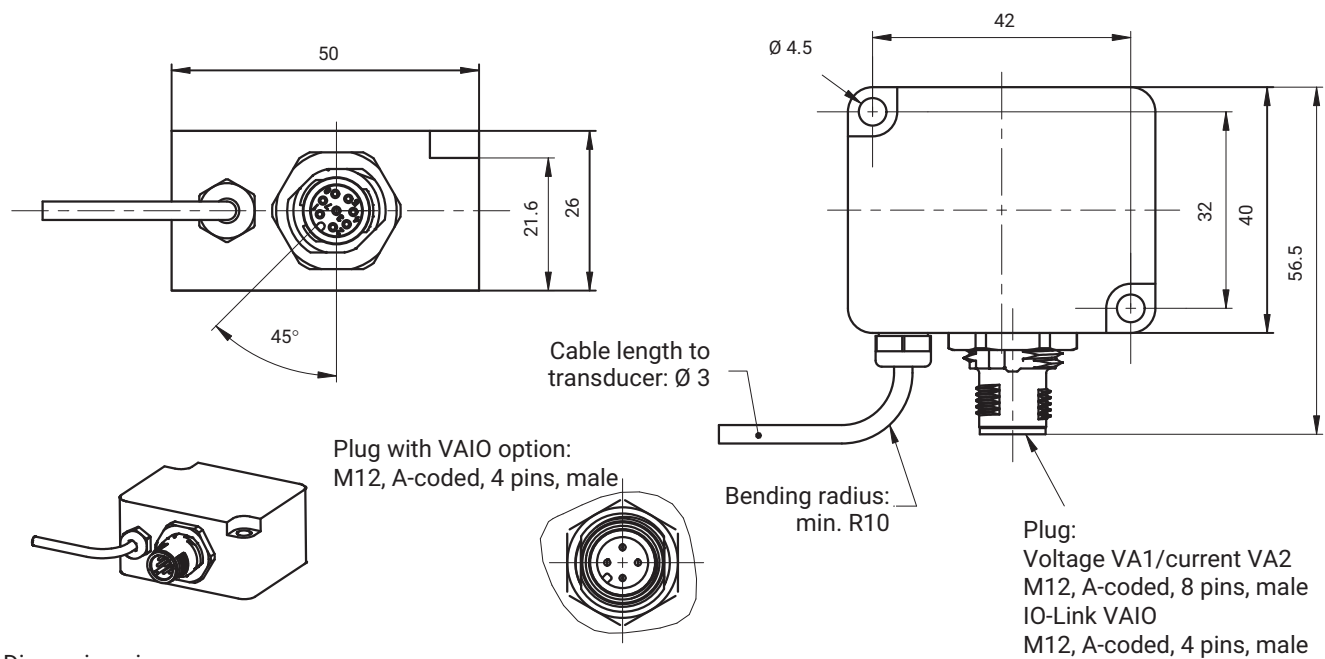
DIMENSIONS

Dimensions of C9C



Nominal (rated) force of C9C	A _{0.1}	B	G _{±0.1}	H	J	R	T	U _{0.1}	X
	[mm]								
50 N - 200 N	26	15	20.5	3 x M3	6	20	2.5	5.5	10.5
0.5 kN - 20 kN	26	13	22.75	3 x M2	3.5	40	1	8	10.5
50 kN	46	28	40	4 x M4	6	80	8	16	10.5

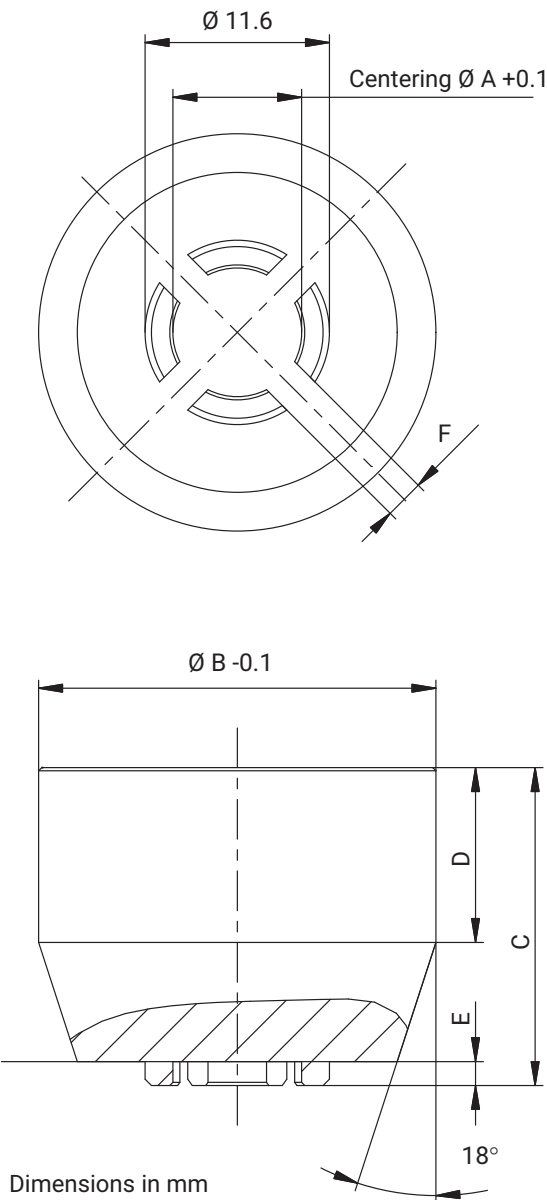
Dimensions of VA1, VA2, VAIO inline amplifiers



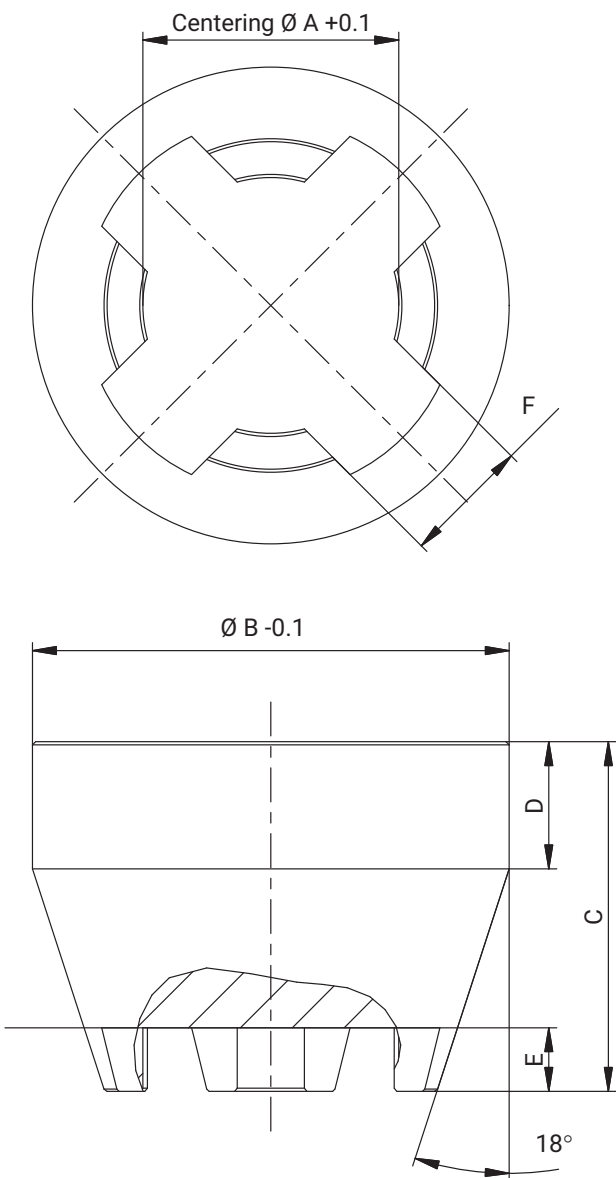
Dimensions in mm

Dimensions of ED09 (to be ordered separately)

Nominal (rated) force 0.5...20 kN



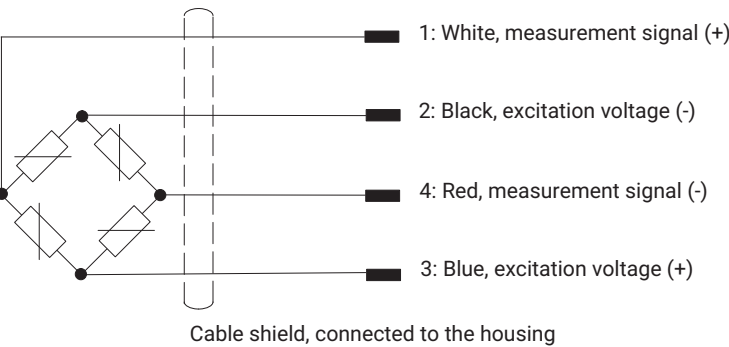
Nominal (rated) force 50 kN



Dimensions in mm

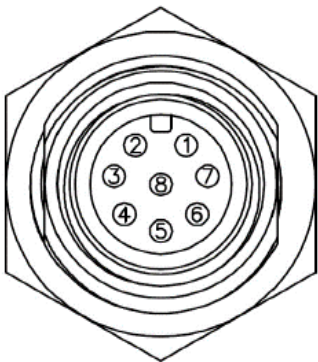
ED09 Ordering number	Force range	øA	øB	C	D	E	F
		[mm]					
1-ED09/20kN	0.5 ... 20 kN	8.1	25	20	11	1.5	2.5
1-ED09/50kN	From 50 kN	16.1	30	22	8	4	8

Wiring diagram of C9C without inline amplifier



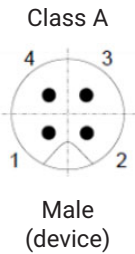
VA1, VA2 inline amplifier wiring diagram

Pin	Version VA 1 (voltage output)	Version VA 2 (current output)	KAB168 connection cable wire assignment
1	Supply voltage 0 V (GND)		White
2	Not in use		Brown
3	Zero control input		Green
4	Not in use		Yellow
5	Output signal 0 ... 10 V	Output signal 4 ... 20 mA	Gray
6	Output signal 0 V	Not in use	Pink
7	Not in use		Blue
8	Voltage supply -19 ... +30 V		Red



VA10 inline amplifier wiring diagram

PIN	U9/C9 plug 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 for C9C

Nominal (rated) force	F _{nom}	N	50	100	200								
		kN				0.5	1	2	5	10	20	50	
Accuracy													
HBK Accuracy class			0.2										
Relative reproducibility and repeatability errors in unchanged mounting position	b _{rg}	%	< 0.2										
Relative reversibility error	v	%	< 0.2										
Non-linearity	d _{lin}	%	< 0.2										
Relative creep	d _{crf+E}	%	< 0.2				< 0.1						
Temperature coefficient of sensitivity													
In the nominal (rated) temperature range	TC _S	%/10K	< 0.2										
In the operating temperature range	TC _S	%/10K	< 0.50										
Temperature coefficient of zero signal													
In the nominal (rated) temperature range	TC ₀	%/10K	< 0.2										
In the operating temperature range	TC ₀	%/10K	< 0.50										
Rated electrical output													
Nominal (rated) output	C _{nom}	mV/V	1										
Tolerance range of zero signal	d _{s,0}	mV/V	± 0.2										
Sensitivity error	d _c	%	< 1										
Input resistance	R _e	Ω	250 - 400				300 - 450						
Output resistance	R _a	Ω	200 - 400				100 - 450						
Insulation resistance	R _{Iso}	Ω	> 1*10 ⁹										
Operating range of the excitation voltage	B _{u,gt}	V	0.5....12										
Reference excitation voltage	U _{ref}	V	5										
Connection			4-wire circuit										
Temperature													
Reference temperature	t _{,ref}	°C	23										
Nominal temperature range	B _{t,nom}	°C	-10...+70										
Operating temperature range	B _{t,g}	°C	-30...+85										
Storage temperature range	B _{t,S}	°C	-30...+85										
Characteristic mechanical quantities													
Max. operating force	F _G	% of F _{nom}	200				120						
Force limit	F _L	% of F _{nom}	> 200				> 150						
Breaking force	F _B	% of F _{nom}	> 400										
Permissible eccentricity when loaded with nominal (rated) force	e _g	mm	2.6	2.5	2.5	3.5	2.6	3.2	1.8	2.0	0.8	2.5	
Nominal (rated) displacement ±15%	S _{nom}	mm	0.009			0.015	0.019	0.020	0.025	0.040	0.055	0.075	
Natural frequency	f _G	kHz	7.3	10	15.7	3.5	5	7	13	15.1	20	12	
Permissible oscillation stress	F _{rb}	% of F _{nom}	80										70
Maximum impact load to IEC 60068-2-6													
Number			1000										
Duration		ms	3										
Acceleration		m/s ²	1000										

Nominal (rated) force	F _{nom}	N	50	100	200							
		kN				0.5	1	2	5	10	20	50
Vibrational stress as per IEC 60068-2-27												
Frequency range		Hz	5 ... 65									
Duration		min	30									
Acceleration		m/s ²	150									
General information												
Degree of protection as per EN 60529			IP67									
Spring element material			Steel									
Measuring point protection			Hermetically welded									
Cable			Four-wire circuit, PUR insulation									
Cable length	m		1.5 m; 3 m; 5 m; 6 m; 7 m; 12 m									
Weight	g		55			65						260

Specifications of VA1, VA2 inline amplifiers

Module type		VA1	VA2
Accuracy			
HBK Accuracy class	%	0.15	
Effect of temperature on amplification	%	0.10	
Relative linearity error	%	0.01	
Effect of temperature on zero point	%	0.15	
Rated electrical output			
Output signal		0 ... 10 V	4 ... 20 mA
Nominal (rated) output		10 V	16 mA
Sensitivity tolerance		± 0.1 V	± 0.16 mA
Zero signal		0 V	4 mA
Output signal range		-0.3 ... 11 V	3 ... 21 mA
Cut-off frequency (-3 dB)	kHz	2	
Supply voltage	V	19 ... 30	
Nominal (rated) voltage	V	24	
Maximum current consumption	mA	15	30
Temperature			
Nominal temperature range	°C	-10...+50	
Operating temperature range	°C	-20...+60	
Storage temperature range	°C	-25...+85	
Reference temperature	°C	23	
Maximum impact load to IEC 60068-2-6			
Number		1000	
Duration	ms	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	
General information			
Housing material		Aluminum	
Weight without cable	g	125	

Module type		VA1	VA2
Max. cable length for supply voltage/output signal	m	30	
Degree of protection as per EN 60529		IP67	

Specifications of inline amplifier VAIO

Module type		VAIO
Accuracy		
HBK Accuracy class		0.01
Effect of temperature on amplification	%/10K	0.01
Effect of temperature on zero point	%/10K	0.01
Rated electrical output		
Output signal; interface		COM3, to IO-Link standard, class A
Min. cycle (max. output rate)	ms	0.9
Sample rate (internal)	S/s	40000
Cut-off frequency (-3 dB)	kHz	4
Reference supply voltage	V	24
Supply voltage range	V	19 - 30
Max. power consumption	mW	3200
Noise	ppm of nominal force	With Bessel filter 1 Hz: 25 With Bessel filter 10 Hz: 63 With Bessel filter 100 Hz: 195 With Bessel filter 200 Hz: 275 Without filter: 3020
Filter		
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, then no measurement possible
Lag indicator 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
Temperature		
Nominal temperature range	°C	-10 ... +50
Operating temperature range	°C	-10 ... +60
Storage temperature range	°C	-25 ... +85
Reference temperature	°C	23
Maximum impact load to IEC 60068-2-6		
Number		1000
Duration	ms	3
Acceleration	m/s ²	1000
Maximum vibrational stress to IEC 60068-2-27		
Frequency range	Hz	5 ... 65
Duration	min	30
Acceleration	m/s ²	150

VERSIONS AND ORDERING NUMBERS

Code	Measuring range	Ordering number
050 N	50 N	1-C9C/50N
100 N	100 N	1-C9C/100N
200 N	200 N	1-C9C/200N
00K5	0.5 kN	1-C9C/0.5KN
01K0	1 kN	1-C9C/1KN
02K0	2 kN	1-C9C/2kN
05K0	5 kN	1-C9C/5kN
10K0	10 kN	1-C9C/10kN
20K0	20 kN	1-C9C/20KN
50K0	50 kN	1-C9C/50KN

The ordering numbers shown in gray are preferred types. They can be delivered rapidly.

All preferred types with 1.5 m cable, open ends, without TEDS and without firmware.

The ordering number for the preferred types is 1-C9C...

The ordering number for customer-specific designs is K-C9C...

The ordering number example **K-C9C-05K0-03M0-VAIO-S-IO02** below is a: C9C, nominal force 5 kN with 3 m cable, inline amplifier with IO-Link output, firmware version 2.0.0

Nominal (rated) force	Cable length	Electrical connection	Transducer identification	Firmware
50 N 050N	1.5 m 01M5	Free ends Y	With TEDS chip T	No firmware N
100 N 100N	3 m 03M0	15-pin Sub-D connector F	Without TEDS chip S	Version 1.2.6 IO01
200 N 200N	5 m 05M0	Male connector MS3106PEMV N		Version 2.0.0 IO02
0,5 kN 00K5	6 m 06M0	15-pin Sub-HD connector Q		Version 2.0.8 IO03
1 kN 01K0	7 m 07M0	8-pin M12 connector M		Version 2.0.10 IO04
2 kN 02K0	12 m 12M0	With inline amplifier 0 .. 10 V VA1		Version 2.0.12 IO05
5 kN 05K0		With inline amplifier 4 .. 20 mA VA2		
10 kN 10K0		With IO-Link inline amplifier VAIO		
20 kN 20K0				
50 kN 50K0				

Ordering example

K-C9C-	05K0-	03M0-	VAIO-	S-	IO02
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All cable lengths can be combined with all plugs.

TEDS can only be ordered in conjunction with a plug option. TEDS can only be ordered in conjunction with a plug option. A combination of TEDS and free cable ends or the 8-pin M12 plug (option M) is not possible.

Versions with inline amplifiers (VA1, VA2 and VAIO) can only be combined with cable lengths of 1.5 m and 3 m; TEDS is not available for these measurement chains.

All firmware versions only for sensors with IO-LINK interface.

ACCESSORIES

Accessories not included in the scope of supply.

Description	Ordering number
KAB168-5, PUR connection cable with M12 8-pin socket, 5 m long, opposite ends free. To connect the amplifier module to the downstream electronics. Not suitable for use with the IO-Link interface.	1-KAB168-5
KAB168-20, PUR connection cable with M12 8-pin socket, 20 m long, opposite ends free. To connect the amplifier module to the downstream electronics. Not suitable for use with the IO-Link interface.	1-KAB168-20
Ground cable 400 mm long	1-EEK4
Ground cable 600 mm long	1-EEK6
Ground cable 800 mm long	1-EEK8
Thrust piece EDO9/20 kN; suitable for nominal (rated) forces of 0.5 kN to 20 kN	1-EDO9/20kN
Thrust piece EDO9/50 kN; suitable for nominal (rated) force 50 kN	1-EDO9/50kN