

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.

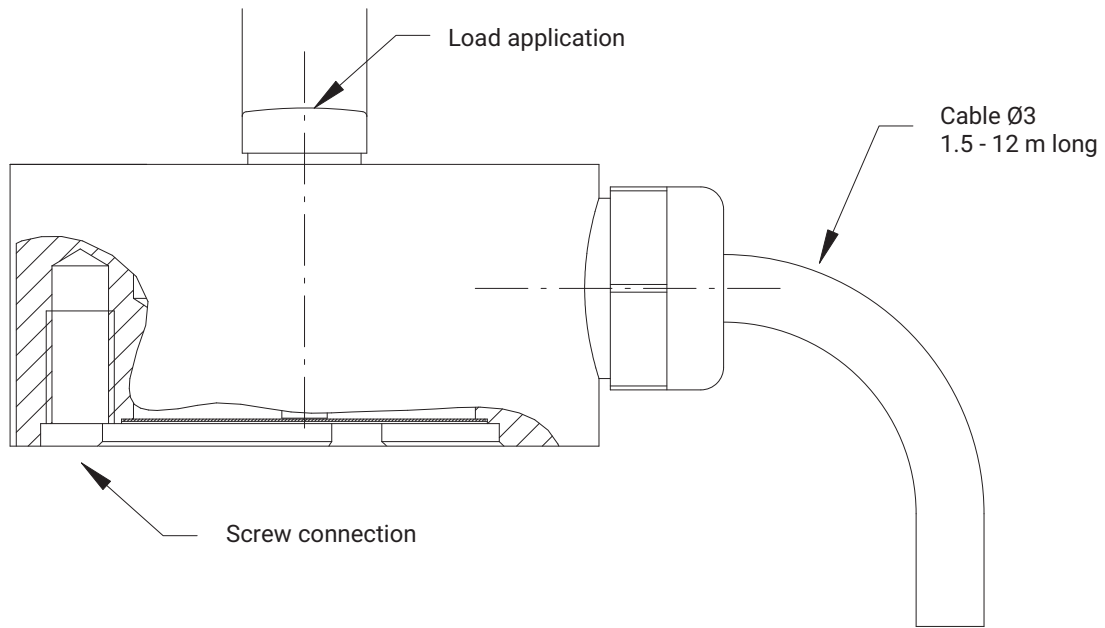


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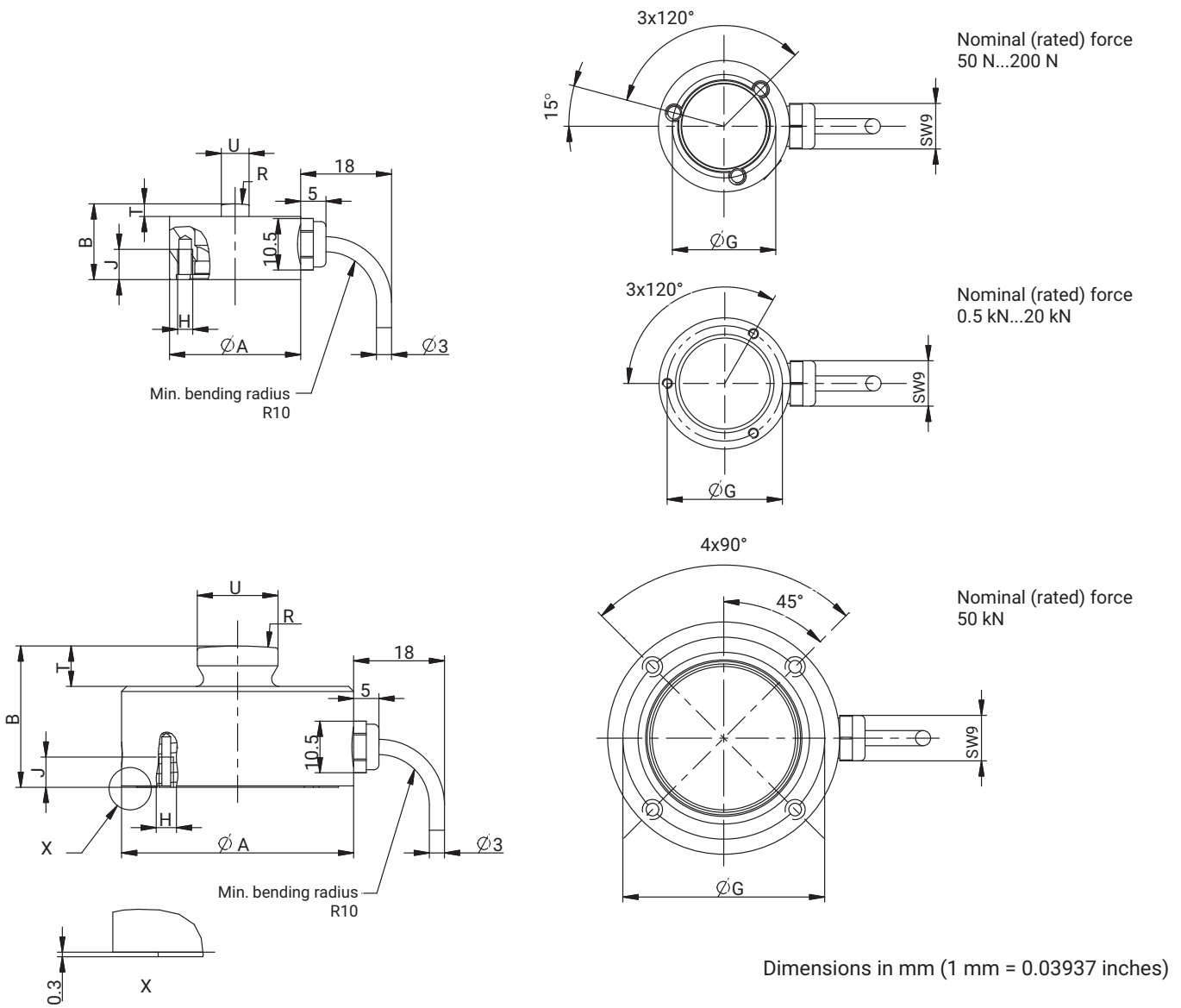
## PRINCIPLE OF THE C9C FORCE TRANSDUCER

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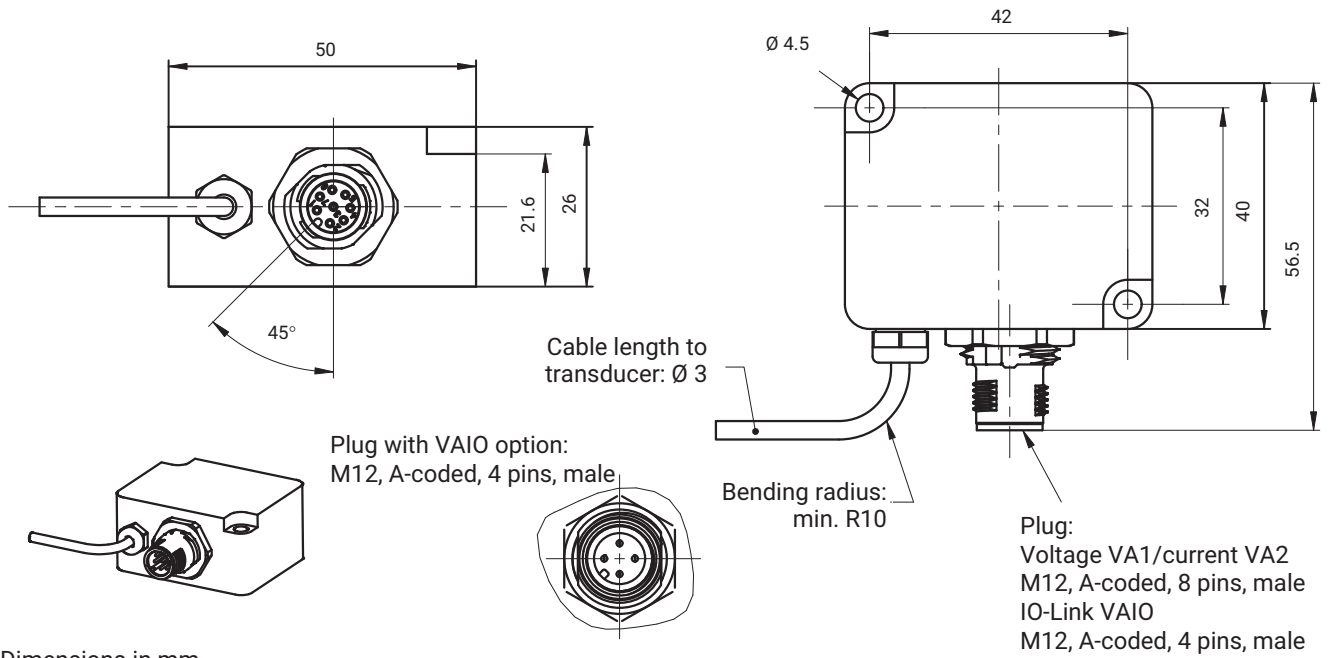
# DIMENSIONS

## Dimensions of C9C



Nominal (rated) force of C9C	A <sub>-0.1</sub>	B	G <sub>+/-0.1</sub>	H	J	R	T	U <sub>-0.1</sub>	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

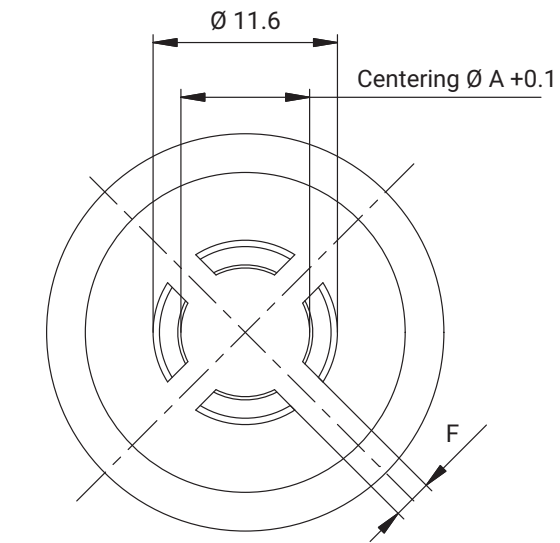
## Dimensions of VA1, VA2, VAIO inline amplifiers



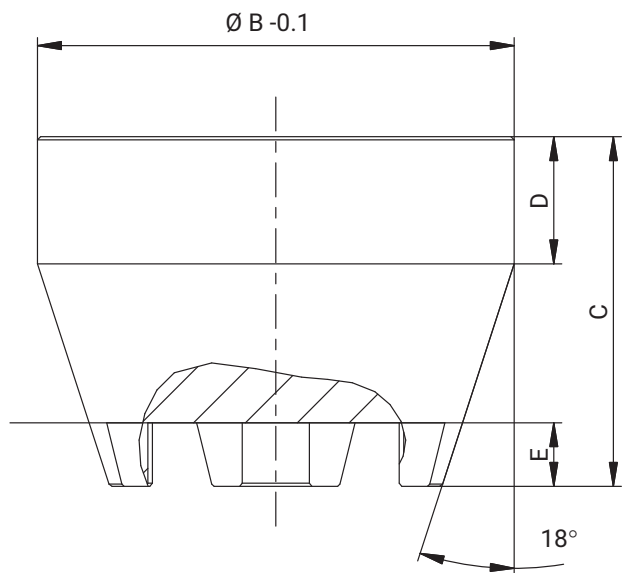
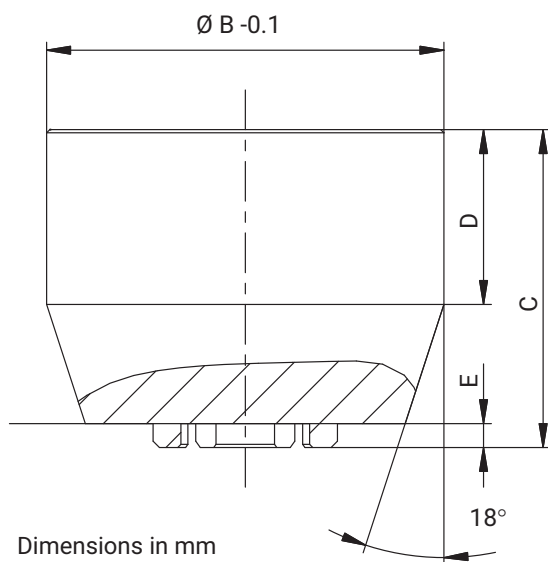
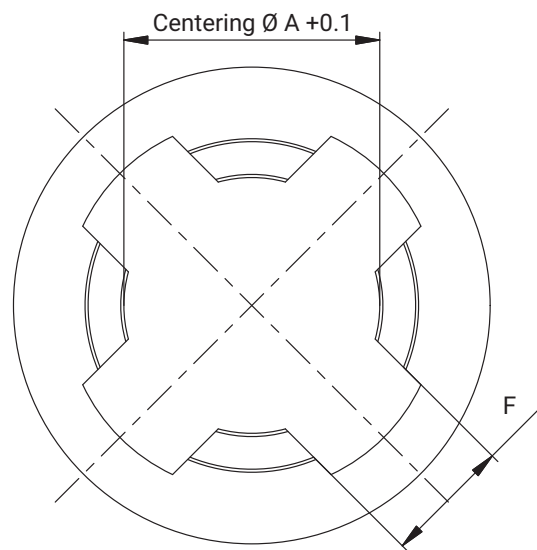
Dimensions in mm

## Dimensions of EDO9 (to be ordered separately)

Nominal (rated) force 0.5...20 kN



Nominal (rated) force 50 kN

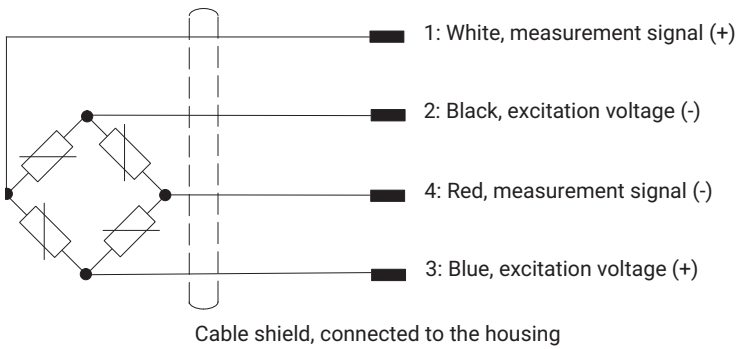


Dimensions in mm

EDO9 Ordering number	Force range	øA	øB	C	D	E	F
		[mm]					
1-EDO9/20kN	0.5 ... 20 kN	8.1	25	20	11	1.5	2.5
1-EDO9/50kN	From 50 kN	16.1	30	22	8	4	8

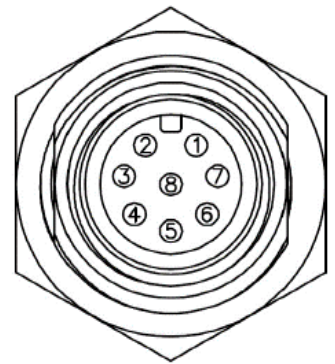
## ELECTRICAL CONNECTION

### Wiring diagram of C9C without inline amplifier



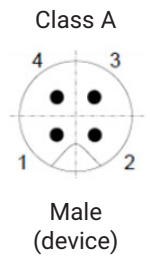
### VA1, VA2 inline amplifier wiring diagram

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

## Specifications for C9C

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

Nominal (rated) force	F <sub>nom</sub>	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 <sup>2</sup>	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 <sup>2</sup>	1000	
Vibrational stress as per IEC 60068-2-27			
Frequency range	Hz	5 ... 65	
Duration	min	30	
Acceleration	m/s <sup>2</sup>	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
<b>Accuracy</b>		
HBK Accuracy class		0.01
Effect of temperature on amplification	%/10K	0.01
Effect of temperature on zero point	%/10K	0.01
<b>Rated electrical output</b>		
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
<b>Filter</b>		
Low-pass filter		Freely adjustable cut-off frequency, Bessel or Butterworth characteristic, 6th order
<b>Device functions</b>		
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
<b>Temperature</b>		
Nominal temperature range	°C	-10 ... +50
Operating temperature range	°C	-10 ... +60
Storage temperature range	°C	-25 ... +85
Reference temperature	°C	23
<b>Maximum impact load to IEC 60068-2-6</b>		
Number		1000
Duration	ms	3
Acceleration	m/s <sup>2</sup>	1000
<b>Maximum vibrational stress to IEC 60068-2-27</b>		
Frequency range	Hz	5 ... 65
Duration	min	30
Acceleration	m/s <sup>2</sup>	150

## VERSIONS AND ORDERING NUMBERS

Code	Measuring range	Ordering number
<b>050 N</b>	50 N	1-C9C/50N
<b>100 N</b>	100 N	1-C9C/100N
<b>200 N</b>	200 N	1-C9C/200N
<b>00K5</b>	0.5 kN	1-C9C/0.5KN
<b>01K0</b>	1 kN	1-C9C/1KN
<b>02K0</b>	2 kN	1-C9C/2kN
<b>05K0</b>	5 kN	1-C9C/5kN
<b>10K0</b>	10 kN	1-C9C/10kN
<b>20K0</b>	20 kN	1-C9C/20KN
<b>50K0</b>	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 <b>050N</b>	1.5 m <b>01M5</b>	Free ends <b>Y</b>	With TEDS chip <b>T</b>	No firmware <b>N</b>
100 N <b>100N</b>	3 m <b>03M0</b>	15-pin Sub-D connector <b>F</b>	Without TEDS chip <b>S</b>	Version 1.2.6 <b>IO01</b>
200 N <b>200N</b>	5 m <b>05M0</b>	Male connector MS3106PEMV <b>N</b>		Version 2.0.0 <b>IO02</b>
0,5 kN <b>00K5</b>	6 m <b>06M0</b>	15-pin Sub-HD connector <b>Q</b>		Version 2.0.8 <b>IO03</b>
1 kN <b>01K0</b>	7 m <b>07M0</b>	8-pin M12 connector <b>M</b>		Version 2.0.10 <b>IO04</b>
2 kN <b>02K0</b>	12 m <b>12M0</b>	With inline amplifier 0 .. 10 V <b>VA1</b>		Version 2.0.12 <b>IO05</b>
5 kN <b>05K0</b>		With inline amplifier 4 .. 20 mA <b>VA2</b>		
10 kN <b>10K0</b>		With IO-Link inline amplifier <b>VAIO</b>		
20 kN <b>20K0</b>				
50 kN <b>50K0</b>				

### Ordering example

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

TEDS can only be ordered in conjunction with a plug option. It is not possible to combine TEDS and free cable ends.

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

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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

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