

DATA SHEET

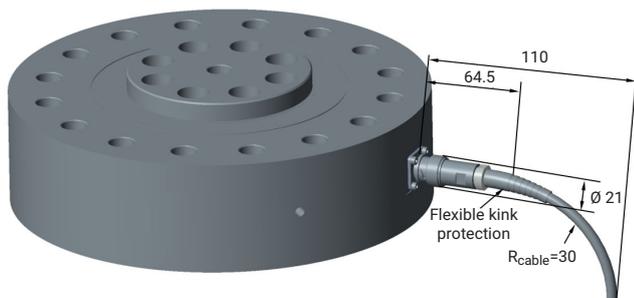
U10F Force transducers

SPECIAL FEATURES

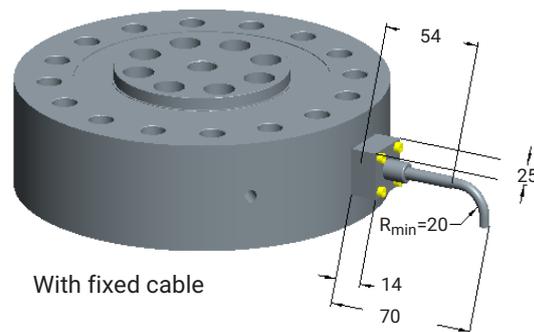
- Precise and rugged tensile/compressive force transducer for static and dynamic measurement tasks
- Nominal (rated) forces from 50 kN to 1.25 MN
- Flange connection on both sides for very easy installation
- Very good lateral force and bending moment stability
- Special design compensates lateral forces and bending moments
- The numerous possible configurations (e.g. TEDS chip, double-bridge version, various electrical connections) mean that it can be flexibly adapted to a great variety of measurement tasks
- Made of non-rusting materials, degree of protection IP68 if desired
- High natural frequency, ideal for measuring fast processes



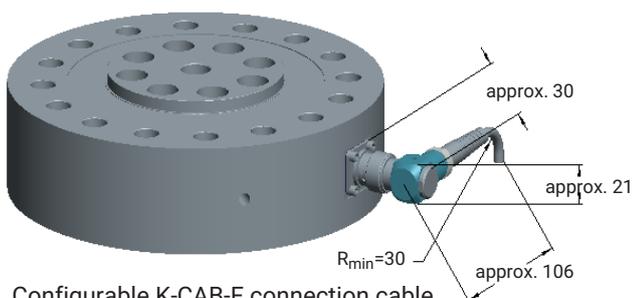
CONNECTOR VERSIONS



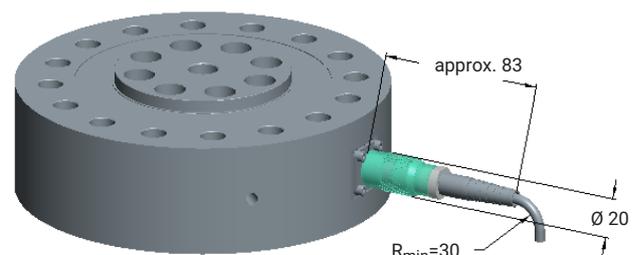
Connection cable KAB 157-3 with bayonet connection, compatible with a MIL-C-26482 series 1 connector



With fixed cable

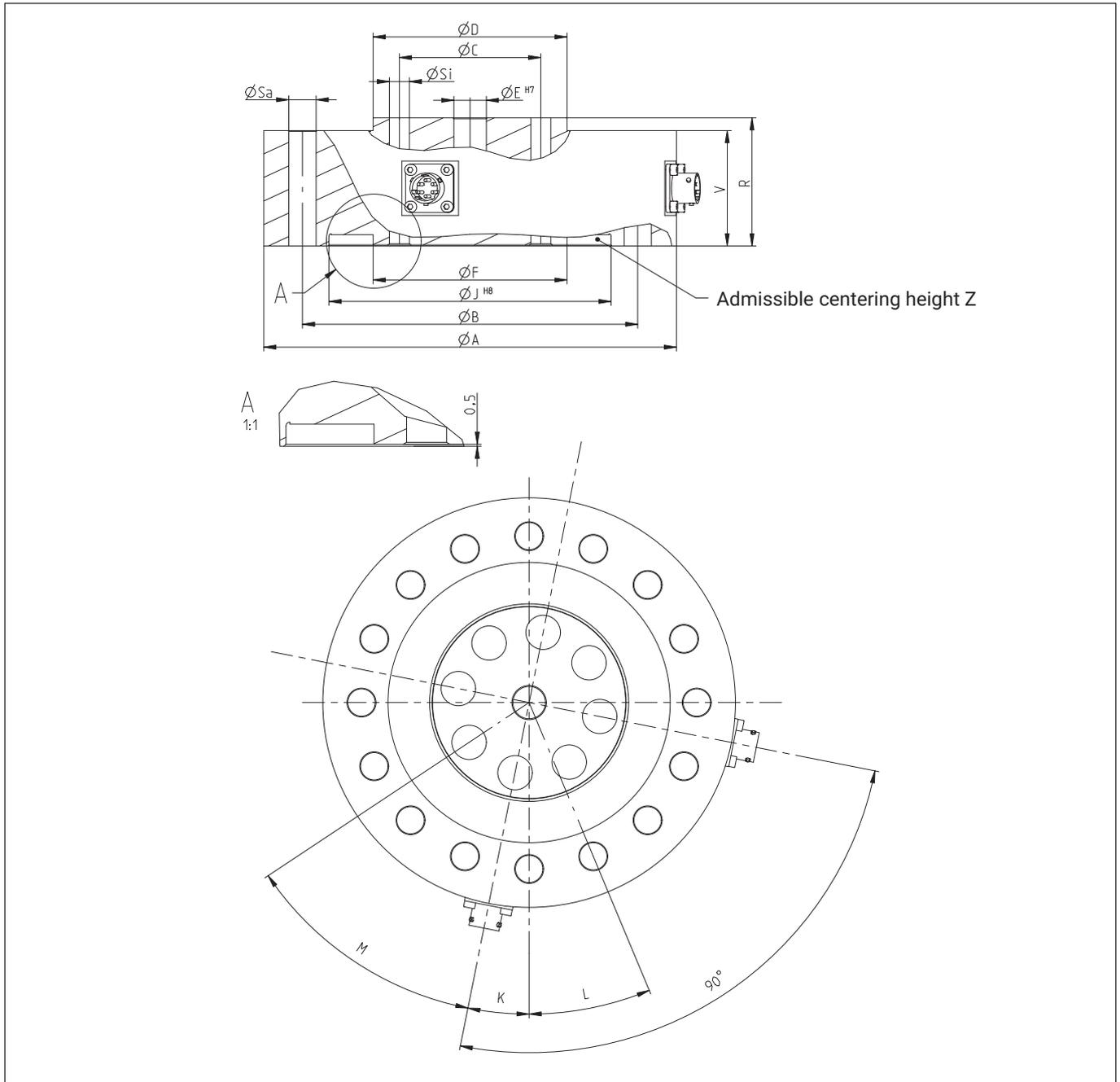


Configurable K-CAB-F connection cable with option of angled bayonet connector, compatible with a MIL-C-26482 series 1 connector



Connection cable KAB-158 with screw connector, compatible with a MIL-C-26482 series 1 connector

DIMENSIONS



Max. capacity		$\varnothing A$	V	R	$\varnothing B$	$\varnothing C$	$\varnothing D$	$\varnothing E$ (H7)	$\varnothing F$	$\varnothing J$ (H8)	$\varnothing Sa$	$\varnothing Si$	M	K	L	z
50KN -125 kN	mm	153.9	41.4	44.5	130.3	45	61.2	10	61.2	108	10.5	10.5	45°	15°	30°	2.5
	inch	6.06	1.63	1.75	5.13	1.77	2.41	0.39	2.41	4.25	0.41	0.41				
250KN	mm	203.2	57.2	63.5	165.1	71	95.5	16	95.5	138.9	13.5	17	45°	11.25°	22.5°	3.5
	inch	8.00	2.25	2.5	6.5	2.8	3.76	0.63	3.76	5.47	0.53	0.67				
500KN	mm	279	76.2	88.9	229	88	122.2	16	122.2	172.1	17	21	45°	11.25°	22.5°	3.5
	inch	10.98	3.0	3.5	9.02	3.46	4.81	0.63	4.81	6.78	0.67	0.83				
1.25MN	mm	390	112	127	322	150	190	20	190	254.4	26	26	30°	7.5°	15°	3.5
	inch	15.35	4.41	5.00	12.68	5.91	7.48	0.79	7.48	10.02	1.02	1.02				

SPECIFICATIONS

Nominal (rated) force	F_{nom}	kN	50	125	250	500	
		MN					1.25
		US lbf	11.2k	28.1k	56.2k	112.4k	281.0k
Accuracy							
Accuracy class			0.04			0.05	
Relative repeatability errors with unchanged mounting position	b_{rg}	%	0.02				
Relative reversibility error (hysteresis) at 0.4 F_{nom}	$v_{0.4}$	%	0.04			0.05	
Non-linearity	d_{lin}	%	0.035			0.05	
Relative zero point return	v_{w0}	%	0.008				
Relative creep	d_{crf+E}	%	0.02				
Effect of the bending moment at 10% F_{nom} * 10 mm	d_{Mb}	%	0.01				
Effect of lateral forces (lateral force = 10 % of F_{nom})	d_Q	%	0.01				
Temperature coefficient of sensitivity	TC_S	%/10K	0.015				
Temperature coefficient of zero signal	TC_0	%/10K	0.015				
Rated electrical output							
Nominal (rated) output	C_{nom}	mV/V	2				
Rated output range (if the "adjusted rated output" option is not selected)	C	mV/V	2...2.5				
Rated output error with "adjusted rated output" option	d_c	%	0.1				
Tension/compression sensitivity variation	d_{zd}	%	0.2				
Relative zero signal error	$d_{s,0}$	mV/V	0.08				
Input resistance	R_e	Ω	> 345				
Output resistance without "adjusted rated output" option	R_a	Ω	280 ... 360				
Output resistance with "adjusted rated output" option	R_a	Ω	365 ± 0.5				280 ... 360
Insulation resistance	R_{is}	G Ω	>2				
Operating range of the excitation voltage	$B_{U,G}$	V	0.5 ... 12				
Reference excitation voltage	U_{ref}	V	5				
Connection			6-wire				
Temperature							
Reference temperature	T_{ref}	°C [°F]	23 [73.4]				
Nominal (rated) temperature range	$B_{T,nom}$	°C [°F]	-10 ... +45 [14 ... 113]				
Operating temperature range	$B_{T,g}$	°C [°F]	-30 ... +85 [-22 ... +185]				
Storage temperature range	$B_{T,s}$	°C [°F]	-30 ... +85 [-22 ... +185]				
Characteristic mechanical quantities							
Maximum operating force	F_G	% of F_{nom}	240	210	240	240	200
Force limit	F_L		240	210	240	240	200
Breaking force	F_B		>400	>250	>280	>240	>240
Torque limit without taking into account the properties of the flange screw fitting ¹⁾	$M_{G max}$	N·m	1270	3175	5715	11430	28575
Bending moment limit without taking into account the properties of the flange screw fitting ¹⁾	$M_{b max}$	N·m	1270	3175	5715	11430	28575
Static lateral force limit without taking into account the properties of the flange screw fitting ¹⁾	F_q	% of F_{nom}	100				
Nominal (rated) displacement	s_{nom}	mm	0.04	0.05	0.06	0.06	0.09
Natural frequency	f_G	kHz	5.7	6.9	5.3	4.1	3

Nominal (rated) force	F _{nom}	kN	50	125	250	500	
		MN					1.25
		US lbf	11.2k	28.1k	56.2k	112.4k	281.0k
Permissible oscillation stress	f _{rb}	% of F _{nom}	200				
Stiffness	c _{ax}	10 ⁵ N/mm	12.5	25	41.7	83.3	140
General information							
Degree of protection as per EN 60529, with bayonet connector (standard version), jack connected to sensor			IP67				
Degree of protection as per EN 60529, with "threaded connector" option			IP64				
Degree of protection as per EN 60529, with "integrated cable" option			IP68 ²⁾				
Spring element material			Stainless steel				
Measuring point protection			Hermetically welded measuring body				
Cable (only with "integrated cable" option)			TPE insulation, outside diameter 5.4 mm, 6-wire				
Cable length		m	6 or 15				
Mechanical shock resistance as per IEC 60068-2-6							
Number		n	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				
Weight	m	kg	3.9	4.1	10	29	81
		lbs	8.6	9	22	63.9	179

1) Data without taking into account the load limit of the flange screw fitting. Please pay attention to the mounting instructions.

2) Test condition: 1 m water column, 100 hours

VERSIONS AND ORDERING NUMBERS

Code	Measurement range	Ordering number
50k0	50 kN	1-U10F/ 50kN
125k	125 kN	1-U10F/125kN
250k	250 kN	1-U10F/250kN
500k	500 kN	1-U10F/500kN
1M25	1.25 MN	1-U10F/1.25MN

 Preferred version, available at short notice

The ordering number for the preferred types is 1-U10F..., the ordering number for customized versions is K-U10F...

No. of measuring bridges	Rated output	Calibration	Transducer identification	Mechanical design	Plug protection	El. connection, measuring bridge A	El. connection, measuring bridge B	Connector version for measuring bridge A "fixed cable" option	Connector version for measuring bridge B "fixed cable" option
Single bridge SB	Not adjusted N	100 % (dynamic) 1	Without TEDS S	Standard S	Without U	Bayonet connector B		Free ends Y	
Double bridge DB	Adjusted J		With TEDS T		With P	Threaded connector G		D-sub connector, 15-pin F	
						Fixed cable (6 m) K		D-sub HD connector, 15-pin Q	
						Fixed cable (15 m) V		Connector ME3106PEMV N	
								ODU connector, 15-pin P	
								M12 female connector, 8-pin M	

Ordering example

K-U10F-1M25-	DB-	N-	1-	T-	S-	U-	V-	V-	Q-	Q-
U10F, nominal (rated) force 1.25 MN	Double bridge	No sensitivity compensation	Calibrated at nominal (rated) force (dynamic application)	With transducer identification	Mechanical design	Without plug protection	Measuring bridge A: fixed cable, 15 m long	Measuring bridge B: fixed cable, 15 m long	Measuring bridge A: Fitted D-sub HD connector	Measuring bridge B: Fitted D-sub HD connector

Glossary

No. of measuring bridges	To ensure redundancy, in safety-relevant devices the plausibility of the measurement signal must be checked using a second measuring bridge (installed on the same measuring body). The signals are independently conditioned and evaluated by two separate signal conditioners. It is therefore possible to connect two signal conditioners with different characteristics.
Rated output	The exact (nominal) rated output is stated on the type plate. The transducer can also be adjusted to an exact rated output of 2.00 mV/V. The relative tolerance of the rated output is then 0.1% of the rated output. The rated output range of an unadjusted transducer is between 2 and 2.5 mV/V. See Specifications for details.
Calibration	The force transducer is calibrated at 100 % of the nominal (rated) force in any case, so that it can be used for alternating dynamic loads. If you order the U10F with compensated rated output, sensors with nominal (rated) forces from 50 kN to 500 kN inclusive are suitable for connection in parallel. No options available.
Transducer identification	Integration of TEDS (Transducer Electronic Data Sheet) chip as per IEEE1451.4. If the relevant data acquisition electronics are provided, the measurement chain will parameterize itself.
Mechanical design	No options available
Plug protection	Mechanical protection through the installation of an additional square profile around the connector. Approx. dimensions: WxHxW: 30x30x20 mm, a solid round tube at nominal (rated) force 1.25 MN.

Electrical connection, measuring bridge A	The standard version is the male connector with bayonet connection (PT02E 10-6P-compatible). As an option, a screw-type male connector (PC02E10-6P-compatible) can be fitted. A third variant where the force transducers are fitted with a fixed cable is also available. In this variant, all U10F connections have degree of protection IP68.
Electrical connection, measuring bridge B	The standard version is the male connector with bayonet connection (PT02E 10-6P-compatible). As an option, a screw-type male connector (PC02E10-6P-compatible) can be fitted. A third variant where the force transducers are fitted with a fixed cable is also available. In this variant, all U10F connections have degree of protection IP68.
Connector selection with the "fixed cable" option, measuring bridge A/B	<p>If you have ordered the U10F with an integrated cable, you can also order a fitted connector at the end of the cable, so that the force sensor can be directly connected to a signal conditioner.</p> <p>Y = free ends, no connector fitted F = D-sub connector, 15-pin, for connection to MGC+ (e.g. AP01) Scout Q = D-sub HD connector, 15-pin, for connection to many HBM data acquisition systems from the Quantum series (MX410, MX440, MX840) N = MS connector, for connection to HBM data acquisition systems such as MGC+ (Ap03) DMP or DK38 P = ODU connector, 14-pin. Degree of protection IP68. For connection to all HBM data acquisition systems from the Somat XR series that are suitable for measuring full bridge circuits. M = M12 female connector for connection to HBM PAD and DSE sensor-oriented electronics</p>

ACCESSORIES (NOT INCLUDED IN THE SCOPE OF SUPPLY)

Description	Ordering number
Connection cable KAB157-3; IP67 (with bayonet connection); 3 m long, outer sheath TPE; 6 x 0.25 mm ² ; free ends, shielded, outside diameter 6.5 mm	1-KAB157-3
Connection cable KAB158-3; IP54 (with screw connection), 3 m long, outer sheath TPE; 6 x 0.25 mm ² ; free ends, shielded, outside diameter 6.5 mm	1-KAB158-3
Cable, configurable with different connectors and lengths	K-CAB-F
Loose female connector (bayonet connection)	3-3312.0382
Loose female connector (screw connection)	3-3312.0354
Ground cable (400 mm long)	1-EEK4
Ground cable (600 mm long)	1-EEK6
Ground cable (800 mm long)	1-EEK8

Force transducers		Dimensions	Piece per set	Ordering number
U10F/50 kN	Inner flange	M10 x 1.25; 55 mm long	12	1-SRS/M10/1.25/55
	Outer flange	M10 x 1.25; 55 mm long		
U10F/125 kN	Inner flange	M10 x 1.25; 55 mm long		
	Outer flange	M10 x 1.25; 55 mm long		
U10F/250 kN	Inner flange	M16 x 1.5; 100 mm long	16	1-SRS/M16/1.5/100
	Outer flange	M12 x 1.25; 80 mm long		1-SRS/M12/1.25/80
U10F/500 kN	Inner flange	M20 x 1.5; 120 mm long	8	1-SRS/M20/1.5/120
	Outer flange	M16 x 1.5; 100 mm long	16	1-SRS/M16/1.5/100
U10F/1.25 MN	Inner flange	M24 x 2; 170 mm long	12	1-SRS/M24/2/170
	Outer flange	M24 x 2; 150 mm long	24	1-SRS/M24/2/150

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