

DATA SHEET

# S9M Force Transducer

**SPECIAL FEATURES**

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- Tensile/compressive force transducer
- HBK accuracy class 0.02
- Hermetically encapsulated (IP68)
- Rust-resistant materials
- Available in different cable lengths and with connector mounted on request
- TEDS on request

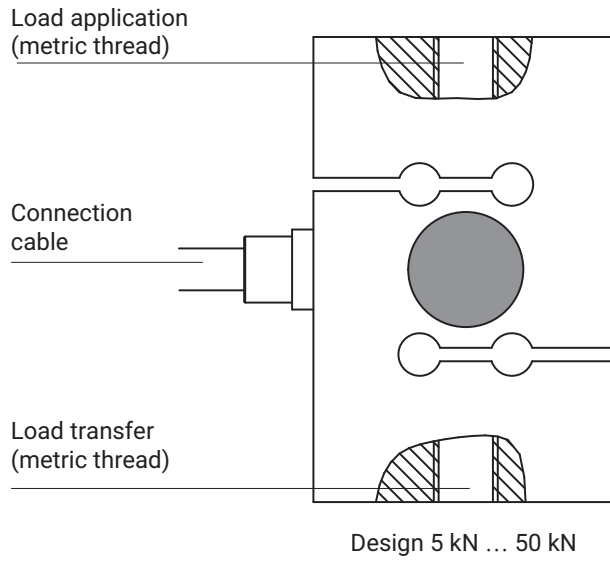


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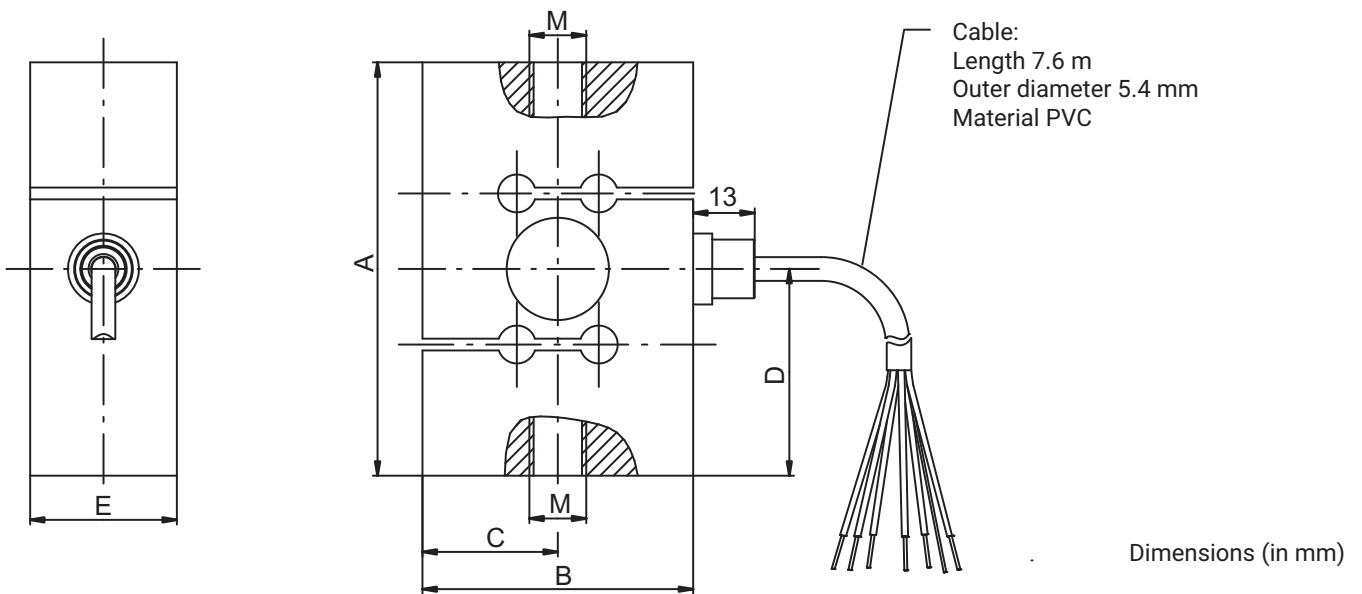
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## PRINCIPLE OF THE S9M FORCE TRANSDUCER



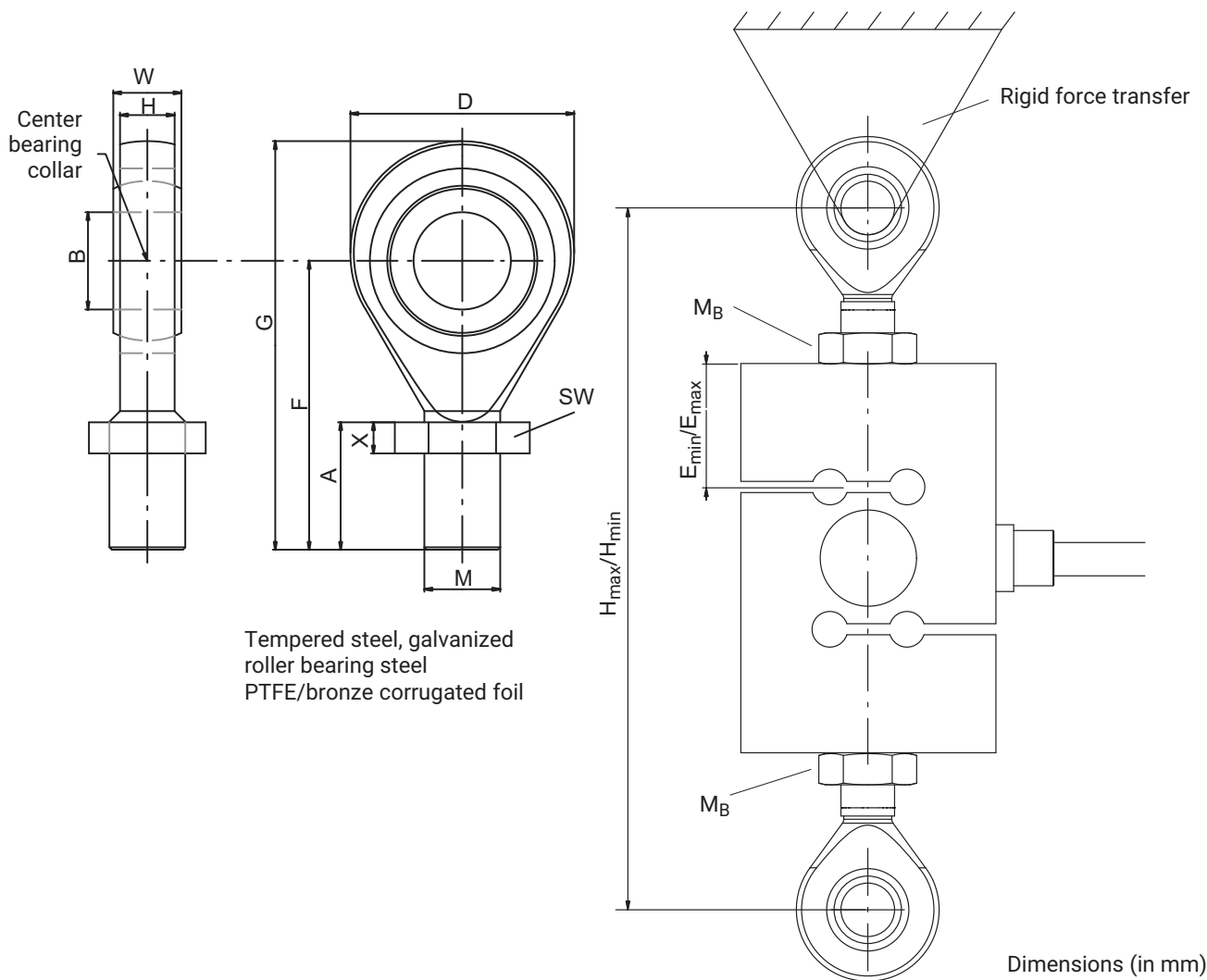
## DIMENSIONS

### Force transducer S9M



Type	A	B	C	D	E	M
S9M/500 N	62	50.8	25.4	31	24	M8
S9M/1 kN	62	50.8	25.4	31	24	M8
S9M/2 kN	87.3	57.2	28.6	43.7	24	M12
S9M/5 kN	87.3	57.2	28.6	43.7	31	M12
S9M/10 kN	87.3	57.2	28.6	43.7	31	M12
S9M/20 kN	100	69.8	34.9	50	31	M24x2
S9M/50 kN	100	76.2	38.1	50	36.5	M24x2

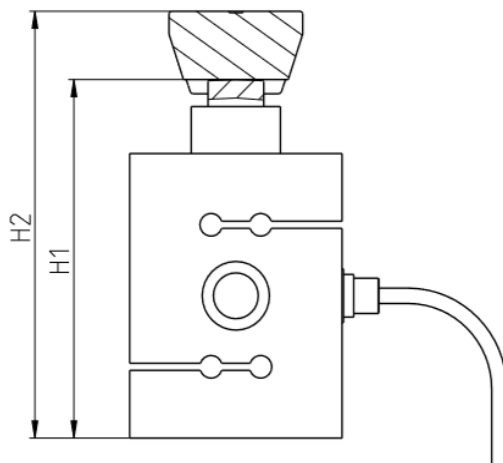
## Knuckle eyes for tensile loading



Nominal (rated) force:	Knuckle eye	Weight (kg)	A	$\varnothing B$ H7	D	F	G	H	M	W	X	SW
0.5 kN ... 1 kN	1-U1R/200KG/ZGW	0.05	16.5	8	24	32	44	9	M8	12	6.5	13
2 kN ... 10 kN	1-U2A/1T/ZGUW	0.1	33	12	32	54	70	12	M12	16	7	19
20 kN ... 50 kN	1-U2A/5T/ZGUW	0.4	57	25	60	94	124	22	M24x2	31	10	36

Nominal (rated) force:	Knuckle eye	$H_{min}$	$H_{max}$	$E_{min}$	$E_{max}$	$M_B$ (N·m)
0.5 kN	1-U1R/200KG/ZGW	110	118	4	8	15
1 kN	1-U1R/200KG/ZGW	110	118	4	8	15
2 kN	1-U2A/1T/ZGUW	156	174	11	20	50
5 kN	1-U2A/1T/ZGUW	158	174	11	19	50
10 kN	1-U2A/1T/ZGUW	158	174	11	19	50
20 kN	1-U2A/5T/ZGUW	231	263	13	29	200
50 kN	1-U2A/5T/ZGUW	241	265	12	24	500

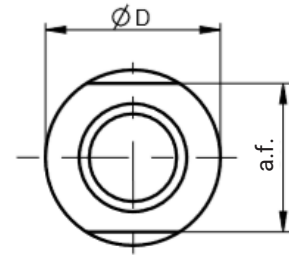
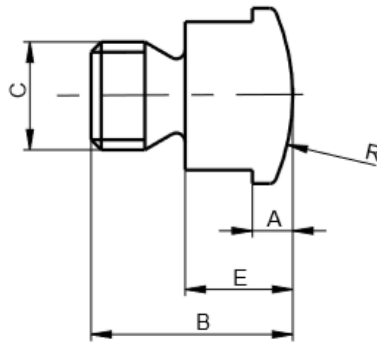
## Load button and thrust piece for compressive loading



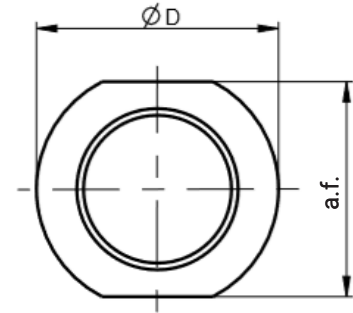
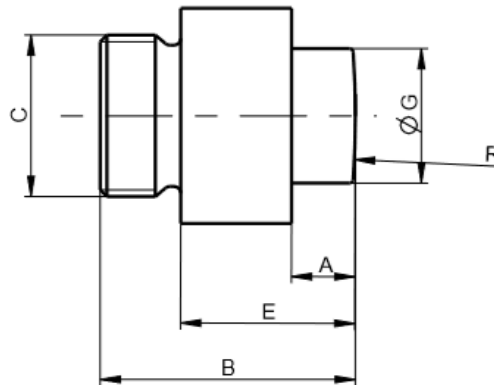
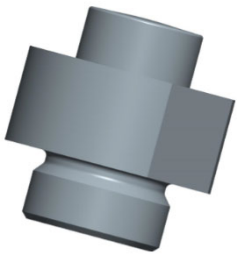
Measuring range [kN]	Measuring body [mm]	H1 [mm]	H2 [mm]	Tightening torque of load button
0.5	62	70	89	25
1	62	70	89	25
2	87.3	96.3	120.3	60
5	87.3	93.3	120.3	60
10	87.3	96.3	120.3	60
20	100	126	150	100
50	100	126	150	100

## Load button

for S9M/50 N ... 10 kN



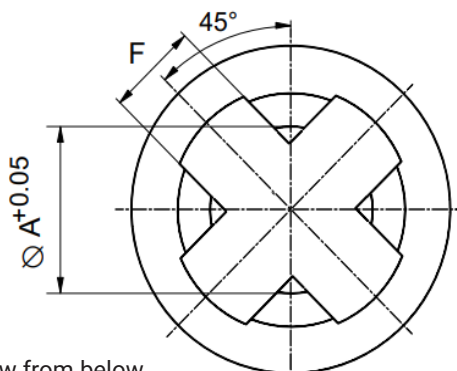
for S9M/20 kN ... 50 kN



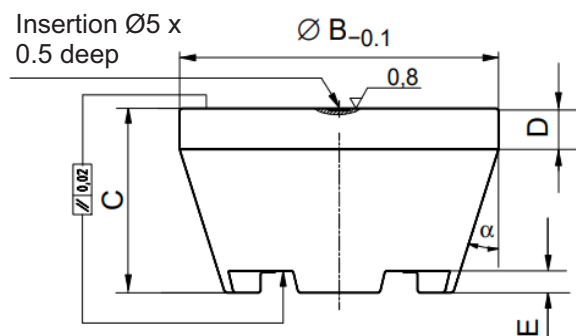
Type	Load button Ordering number	A [mm]	B [mm]	C [mm]	ØD <sup>-0.05</sup> <sub>-0.10</sub> [mm]	E [mm]	ØG [mm]	a.f.	R [mm]
S9M/500N-1kN	1-U1R/200kg/ZL	3	15	M8	13	8	-	11	16
S9M/2kN-10kN	3-9202.0140	3	20	M12	20	9	-	17	40
S9M/20kN-50kN	1-ZLM24F	9.5	38	M24	36	26	20	32	140

## Thrust piece

Always use together with the load button for compressive loads



View from below



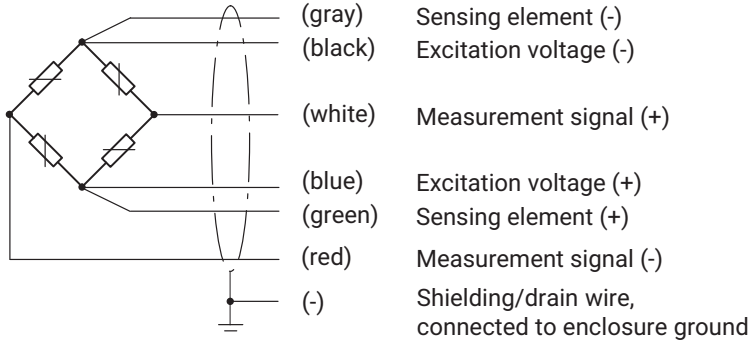
Dimensions (in mm; 1 mm = 0.03937 inches)

Type	Thrust piece Ordering number	Weight (kg)	ØA	ØB	C	D	E	F	α
S9M/500N-1kN	1-EDO3/1kN	approx. 0.2	13.2	37	22	6	3	8	18°
S9M/2kN-10kN	1-EDO4/50kN	0.34	20.2	48	29	8	5	12	18°
S9M/20kN-50kN	1-EDO4/50kN	0.34	20.2	48	29	8	5	12	18°

## PIN ASSIGNMENT OF PLUG AND CABLE CONNECTION

Nominal (rated) force:	$F_{nom}$	kN	0.5	1	2	5	10	20	50
<b>Cable</b>	6-wire cable, PVC insulation								
<b>Cable length</b>	m		7.6 m (standard), also available: 1.5 m; 3 m and 6 m						

### Cable assignment (6-wire configuration)



With this cable assignment, the output voltage at the measuring amplifier is positive in the pressure direction when the transducer is loaded.

## SPECIFICATIONS

Type			S9M						
Nominal (rated) force	$F_{nom}$	kN	0.5	1	2	5	10	20	50
<b>Accuracy</b>									
<b>HBK accuracy class</b>			0.02						
<b>Relative reproducibility and repeatability errors without rotation</b>	$b_{rg}$	%	0.02						
<b>Rel. reversibility error</b>	$v$		0.02						
<b>Non-linearity</b>	$d_{lin}$		0.02						
<b>Relative creep</b>	$d_{crf+E}$		0.02						
<b>Temperature effect on sensitivity</b>	$TC_S$		0.02						
<b>Temperature effect on zero signal</b>	$TC_0$	%/10K	0.02						
<b>Electrical characteristics</b>									
<b>Nominal (rated) sensitivity</b>	$C_{nom}$	mV/V	2						
<b>Relative zero signal error</b>	$d_{s,0}$	%	5						
<b>Sensitivity error</b>	$d_c$		0.25						
<b>Tensile/compressive sensitivity variation</b>	$d_{zd}$		0.1						
<b>Input resistance</b>	$R_i$	$\Omega$	389 ±15						
<b>Output resistance</b>	$R_o$		350 ±1.5						
<b>Insulation resistance</b>	$R_{is}$	Giga $\Omega$	>2						
<b>Operating range of the excitation voltage</b>	$B_{u,gt}$	V	0.5...12						
<b>Reference excitation voltage</b>	$U_{ref}$		5						
<b>Connection</b>			6-wire circuit						
<b>Temperature</b>									
<b>Reference temperature</b>	$T_{ref}$	$^{\circ}C$	+23						
<b>Nominal temperature range</b>	$B_{t,nom}$		-10...+70						
<b>Operating temperature range</b>	$B_{t,g}$		-30...+85						
<b>Storage temperature range</b>	$B_{t,S}$		-30...+85						

Type			S9M							
Nominal (rated) force	$F_{nom}$	kN	0.5	1	2	5	10	20	50	
<b>Characteristic mechanical quantities</b>										
Maximum operating force	$F_G$	% of $F_{nom}$	150							
Force limit	$F_L$		150							
Breaking force	$F_B$		200			300			200	
Limit torque	$M_{G\ max}$	Nm	25		50	90		150		
Bending moment limit	$M_{b\ max}$	Nm	16	13	65.8	465	468	600	118	
Static lateral limit force	$F_q$	% of $F_{nom}$	10							
Nominal (rated) displacement	$s_{nom}$	mm	0.35	0.4	0.35	0.1	0.2	0.2	0.4	
Fundamental frequency	$f_G$	kHz	0.6	0.9	1	1.7	2.1	2.3	2.5	
Relative permissible oscillatory stress	$F_{rb}$	% of $F_{nom}$	100							70
<b>General information</b>										
Degree of protection per EN 60529			IP68 (test condition 1 m water column / 100 hours)							
Spring element material			Stainless steel in accordance with EN 10088-1							
Measuring point protection			Hermetically welded enclosure							

## VERSIONS AND ORDERING NUMBERS

Nominal (rated) force	Stock item ordering number	<p>The ordering numbers shown in gray are preferred types. They can be delivered rapidly.</p> <p>All preferred types are supplied with 7.6 m cable, open cable ends and without TEDS.</p> <p>The ordering number for the preferred types is 1-S9M/xxxN-1</p> <p>The ordering number for customer-specific designs is K-S9M-MONT-...</p> <p>The ordering number example <b>K-S9M-MONT-010K-03M0-Q-T</b> shown below is a: S9M, nominal (rated) force of 10 kN, cable length of 3 m, with fitted plug for the Quantum system and TEDS.</p>
500 N	1-S9M/500N-1	
1 kN	1-S9M/1kN-1	
2 kN	1-S9M/2kN-1	
5 kN	1-S9M/5kN-1	
10 kN	1-S9M/10kN-1	
20 kN	1-S9M/20kN-1	
50 kN	1-S9M/50kN-1	

Nominal (rated) force	Cable length	Plug	Transducer identification
500 N <b>500N</b>	1.5m <b>01M5</b>	Free ends <b>Y</b>	Without TEDS <b>S</b>
1 kN <b>001K</b>	3m <b>03M0</b>	D-SUB plug, 15-pin <b>F</b>	With TEDS <b>T</b>
2 kN <b>002K</b>	6m <b>06M0</b>	HD-SUB plug, 15-pin <b>Q</b>	
5 kN <b>005K</b>	7.6 m <b>07M6</b>	Plug ME3106PEMV <b>N</b>	
10 kN <b>010K</b>		ODU plug, 14-pin <b>P</b>	
20 kN <b>020K</b>		M12 plug, 8-pin <b>M</b>	
50 kN <b>050K</b>			

### Order example

<b>K-S9M-MONT-</b>	<b>010K-</b>	<b>03M0-</b>	<b>Q-</b>	<b>T</b>
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<b>Plug version</b>	<p>The KMR+ comes as standard without the plug fitted. In this case, the cable is suitably prepared (insulated cable ends, shielding ready for fitting). We can fit the following plugs if you wish:</p> <p>Y = Free ends, no plug fitted</p> <p>F = D-sub-HD15, 15-pin, for connection to MGC+ (e.g. AP01), Scout</p> <p>Q = HD-sub-HD15, 15-pin, for connection to many HBK measuring amplifiers of the Quantum series (MX410, MX440, MX840)</p> <p>N = MS plug, for connection to HBK measuring amplifiers such as MGC+ (AP03), DMP or DK38</p> <p>P = ODU plug, 14-pin, degree of protection IP68, for connection to all HBK measuring amplifiers from the SomatXR series that are suitable for measuring full bridge circuits.</p> <p>M = M12 plug, 8-pin, suitable for measuring amplifiers digiBOX and DSE</p>
<b>Transducer identification</b>	<p>TEDS (integrated electronic data sheet) as per IEEE1451.4.</p> <p>If the relevant amplifier electronics are provided, the measurement chain will parameterize itself automatically.</p> <p>TEDS is only possible when a plug is fitted, open ends and TEDS cannot be combined.</p>

## ACCESSORIES

Accessories not included in the scope of supply.

Description		Ordering number
Knuckle eyes for tensile loading	S9M 500 N and 1 kN	1-U1R/200KG/ZGW
	S9M 2 kN ... 10 kN	1-U2A/1T/ZGUW
	S9M 20 kN and 50 kN	1-U2A/5T/ZGUW
Load button for compressive loading	S9M 500 N and 1 kN	1-U1R/200kg/ZL
	S9M 2 kN ... 10 kN	3-9202.0140
	S9M 20 kN and 50 kN	1-ZLM24F
Thrust piece for compressive loading	S9M 500 N and 1 kN	1-EDO3/1kN
	S9M 2 kN ... 10 kN	1-EDO4/50kN
	S9M 20 kN and 50 kN	1-EDO4/50kN
Ground cable (400 mm long)		1-EEK4
Ground cable (600 mm long)		1-EEK6
Ground cable (800 mm long)		1-EEK8

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