S9M

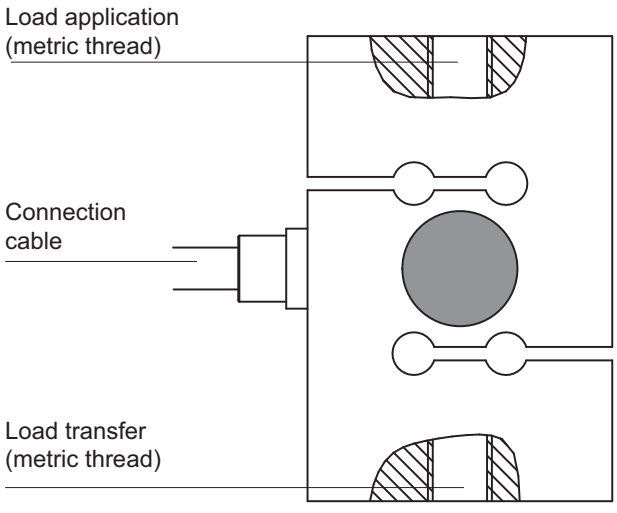
Force Transducer

Special features

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

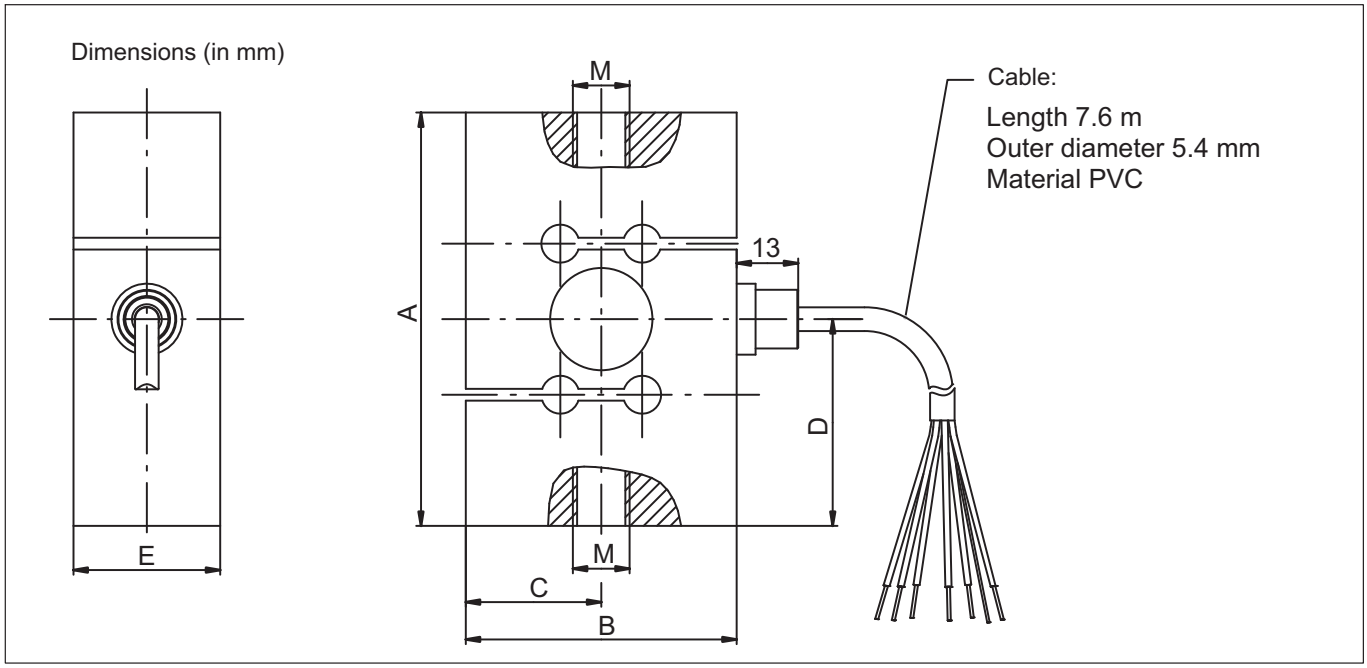
Data sheet

Principle of the S9M force transducer



Design 5 kN … 50 kN

Dimensions



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

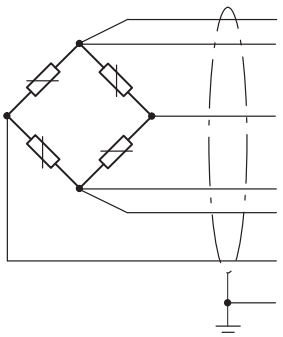
Specifications

Type			S9M						
Nominal (rated) force:	F_{nom}	kN	**0.5**	**1**	**2**	**5**	**10**	**20**	**50**
Accuracy									
Accuracy class			0.02						
Relative reproducibility and repeatability errors without rotation	b_{rg}	%	0.02						
Rel. reversibility error	v		0.02						
Non-linearity	d_{lin}		0.02						
Relative creep	d_{crf+E}		0.02						
Temperature effect on sensitivity	TC_S	%/10K	0.02						
Temperature effect on zero signal	TC_0		0.02						
Electrical characteristics									
Nominal (rated) sensitivity	C_{nom}	mV/V	2						
Relative zero signal error	$d_{s,0}$	%	5						
Sensitivity error	d_c		0.25						
Tensile/compressive sensitivity variation	d_{zd}		0.1						
Input resistance	R_i	Ω	389 ±15						
Output resistance	R_o		350 ±1.5						
Insulation resistance	R_{is}	Giga Ω	>2						
Operating range of the excitation voltage	$B_{u,gt}$	V	0.5….12						
Reference excitation voltage	U_{ref}		5						
Connection			6-wire circuit						
Temperature									
Reference temperature	T_{ref}	°C	+23						
Nominal temperature range	$B_{t,nom}$		-10…+70						
Operating temperature range	$B_{t,g}$		-30…+85						
Storage temperature range	$B_{t,S}$		-30…+85						
Characteristic mechanical quantities									
Maximum operating force	F_G	% of F_{nom}	150						
Force limit	F_L		150						
Breaking force	F_B		200			300			200
Limit torque	$M_{G, perm}$	Nm	25		50	90		150	
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
General information									
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						

Pin assignment of plug and cable connection

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

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



(gray)	Sensing element (-)
(black)	Excitation voltage (-)
(white)	Measurement signal (+)
(blue)	Excitation voltage (+)
(green)	Sensing element (+)
(red)	Measurement signal (-)
(-)	Shielding/drain wire, connected to enclosure ground

Versions and ordering numbers

Code	**Measuring range**	**Stock item ordering number**
500N	500 N	1-S9M/500N-1
001K	1 kN	1-S9M/1kN-1
002K	2 kN	1-S9M/2kN-1
005K	5 kN	1-S9M/5kN-1
010K	10 kN	1-S9M/10kN-1
020K	20 kN	1-S9M/20kN-1
050K	50 kN	1-S9M/50kN-1

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

All preferred types with 7.6 m cable, open ends and without TEDS.

The ordering number for the preferred types is 1-S9M/xxxN-1

The ordering number for customer-specific designs is K-S9M-Mont

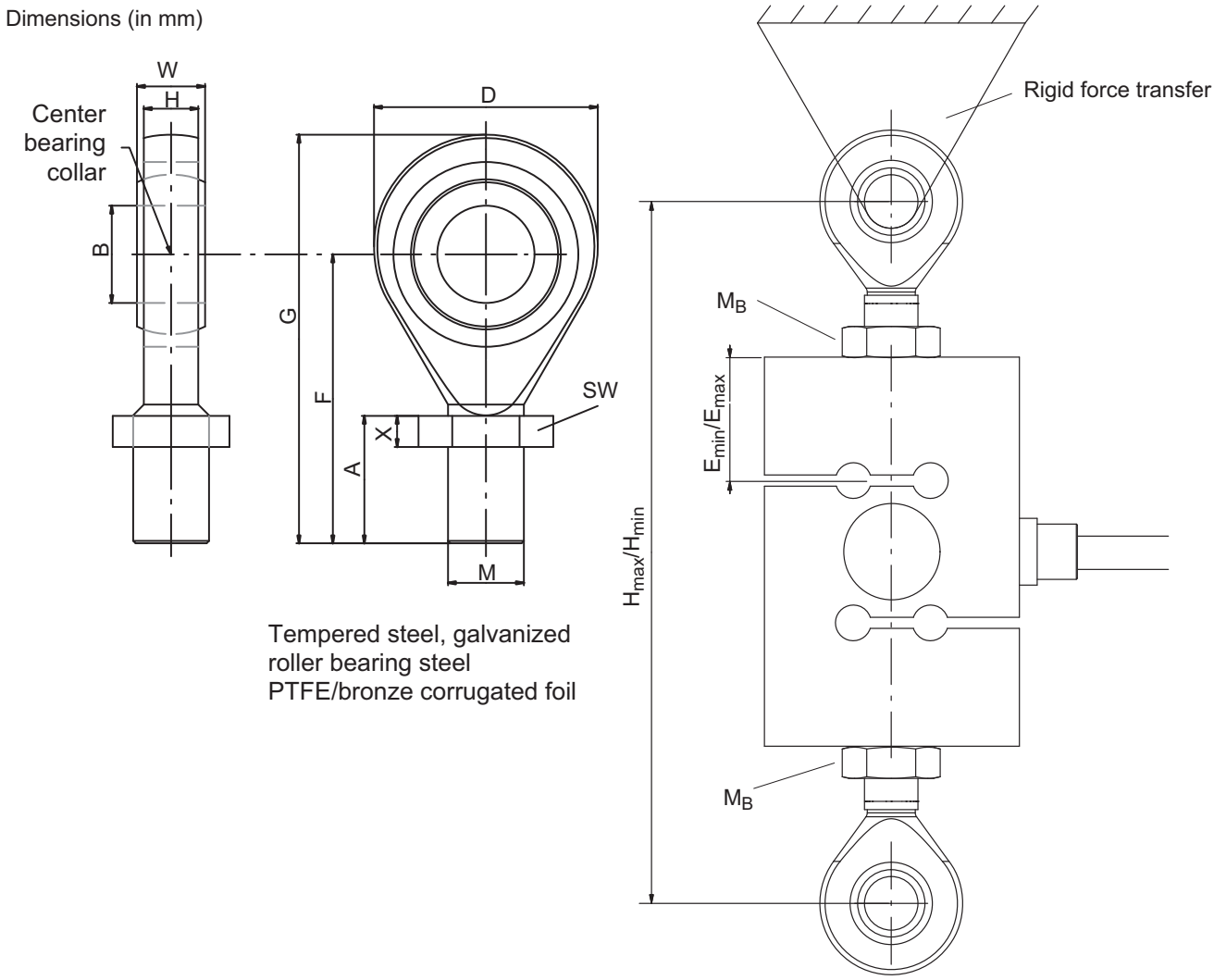
Cable length	**Plug**	**Transducer identification**
01M5 1.5m	Y Free ends	S Without TEDS
03M0 3m	F D-Sub (for Scout 55, many MGC+s, etc.)	T With TEDS
06M0 6m	Q Sub-HD (for many Quantum modules)	
07M6 7.6 m	N ME3106PEMV	
	P CON P1016 (for industrial amplifiers of the Somat XR series)	

K-S9M-MONT	**010K**	**03M0**	Q	**T**

The example above shows an S9M with 10kN capacity, 3 m cable, a fitted plug for the Quantum system, and TEDS.
TEDS is only possible when a plug is fitted. TEDS and open ends cannot be combined.

Mounting aids

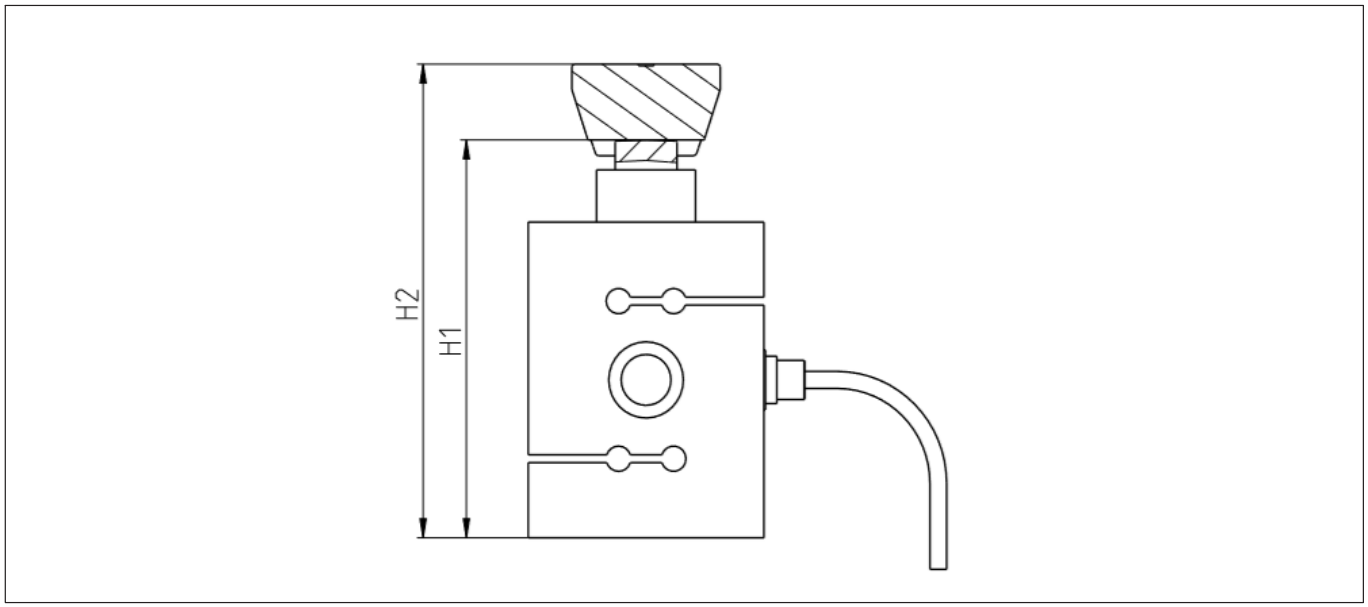
Force application parts for tensile loading



Nominal (rated) force:	Knuckle eye	Weight (kg)	A	∅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

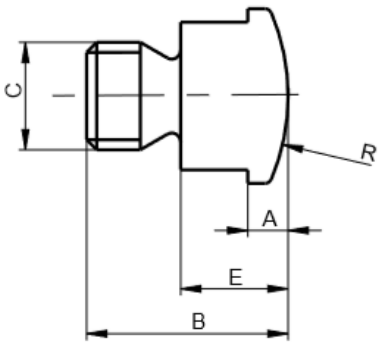
Force application parts for compressive loading
Load button and thrust piece

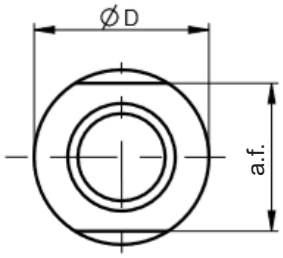


Measuring range [kN]	Measuring body [mm]	H1 [mm]	H2 [mm]	Tightening torque of load button
0.5	62	70	89	25
1	62	70	89	25
2	87.3	96.3	120.3	60
5	87.3	93.3	120.3	60
10	87.3	96.3	120.3	60
20	100	126	150	100
50	100	126	150	100

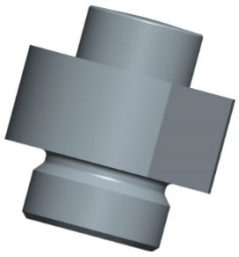
Load button

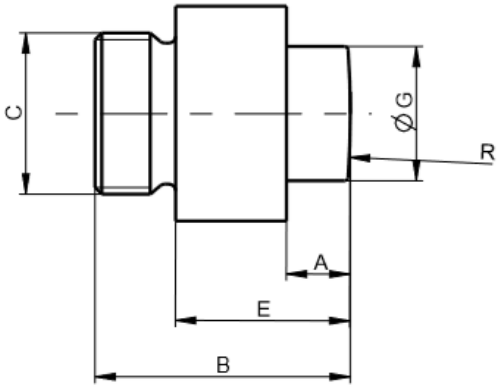
for S9M/50 N … 10 kN

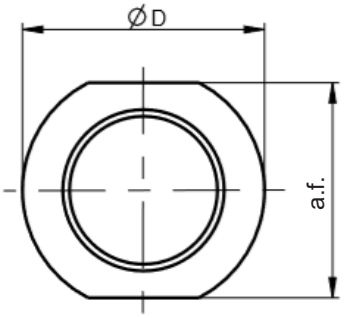




for S9M/20 kN … 50 kN



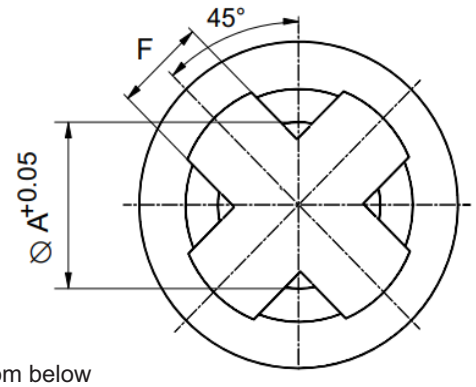




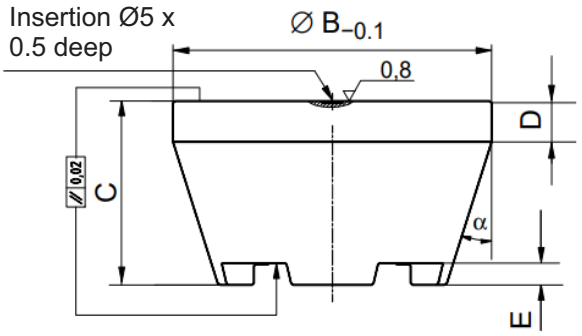
Type	Load button Ordering number	A [mm]	B [mm]	C [mm]	ØD $^{-0.05}_{-0.10}$ [mm]	E [mm]	ØG [mm]	a.f.	R [mm]
S9M/500N-1kN	1-U1R/200kg/ZL	3	15	M8	13	8	-	11	16
S9M/2kN-10kN	3-9202.0140	3	20	M12	20	9	-	17	40
S9M/20kN-50kN	1-ZLM24F	9.5	38	M24	36	26	20	32	140

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°

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B03096_04_E00_03 12.02.2021 HBM: public