Force

Miniature tension/compression force transducer For small measuring ranges from 10 N Model F2221

EHC

Applications

- Construction and apparatus
- Production lines, manufacturing plant
- Measurement and control facilities
- Special equipment and machinery construction
- Cable force measurements



Special features

- Measuring ranges 0 ... 10 N up to 0 ... 50 kN
- Standard calibration: tension/compression (positive in tension)
- Ease of assembly
- Small geometries
- Stainless steel version

Miniature tension/compression force transducer, model F2221

Description

Miniature tension/compression force transducers are designed for static and dynamic measurement tasks in the direct flux of force. They determine the tension and compression forces in a wide scope of applications. It is possible, for example, to measure the actual force in ropes and rods.

The force is applied to this tension/compression force transducer via threaded bolts, which are located on each side of the cylindrical body.

The measurement range starts with a rated force of 10 N.

Note

To prevent overload, it is advantageous to connect up the force transducer electrically during installation and to monitor the measured value. In mounting the force transducer torsion and bending moments have to be avoided.

The force must be applied axial to the centre. Torsion and bending moments must be avoided.

Option

- High temperature version up to 250 °C
- Cable amplifier 4 ... 20 mA or 0 ... 10 V output
- Other cable length

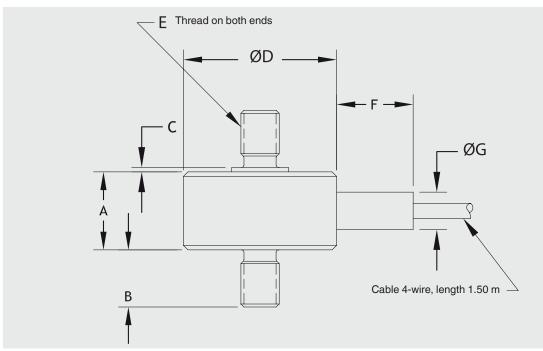
Specifications in accordance with VDI/VDE/DKD 2638

Rated force F _{nom} N 10/20/50/100/2000/5000/10,000/20,000/30,000/50,000/ Relative linearity error d _{lin}	Model F2221	
Tension or compression ±0.15 % Fnom tp to 1.000 N Relative deviation of zero signal d _{S,0} ±2 % Fnom ±2 % Fnom Relative repeatability error in unchainged mounting position b _{rg} ±0.1 % Fnom with 10 N ±0.1 % Fnom from 2.000 N Temperature effect on zero signal TK ₀ ±0.1 % Fnom more 20 N ±0.1 % Fnom from 20 N Temperature effect on zero signal TK ₀ ±0.1 % /10 K Emperature effect on characteristic value TK _c Force limit F _L 150 % Fnom 500 % Fnom Emperature effect on zero signal TK Breaking force F _B > 300 % Fnom Stainless steel Stainless steel Rated temperature range B _{T, nom} 15 71 °C (15 250 °C) Others on request Others on request Operating temperature Tref 23 °C 23 °C Output signal (rated output) C _{nom} 2,0 mV/V (10 N with 1,5 mV/V) Encore Input-/output resistance R _e /R _a 350 Ω Stainless Insulation resistance > 2 GΩ 2 Vitage supply DC 5 V with 50 N, DC 10 V from 100 N for mV/V output without amplifier DC 12 28 V or output 0(4) 20 mA, DC 0 10 V without amplifier DC 12	Rated force F _{nom} N	10 / 20 / 50 / 100 / 200 / 500 / 1,000 / 2,000 / 5,000 / 10,000 / 20,000 / 30,000 / 50,000
±0.20 % F _{nom} from 2,000 N Relative deviation of zero signal d _{S,0} ±2 % F _{nom} Relative repeatability error in unchainged mounting position b _{rg} ±0.1 % F _{nom} with 10 N ±0.05 % F _{nom} from 20 N Temperature effect on zero signal TK ₀ ≤±0.1 %/10 K Temperature effect on characteristic value TK _c ≤±0.1 %/10 K Force limit F _L 150 % F _{nom} Breaking force F _B >300 % F _{nom} Permissible oscillation stress acc. to DIN 50100 F _{rb} 70 % F _{nom} Material Stainless steel Relet emperature range B _{T, nom} 51 … 71 °C (15 … 250 °C) Others on request Operating temperature T _{ref} 23 °C Qutput signal (rated output) C _{nom} 20 mV/V (10 N with 1,5 mV/V) Input-/output resistance P _e /R _a 350 Ω Insulation resistance >2 GΩ Voltage supply 20 GO V (10 N with 5 N, DC 10 V from 100 N for mV/V output without amplifier DC 5V with 50 N, DC 10 V from 100 N for mV/V output without amplifier DC 12 … 28 V for output 0(4) … 20 mA, DC 0 … 10 V	Relative linearity error d _{lin}	
Relative repeatability error in unchained mounting position b _{rg} ±0.1 % F _{norm} with 10 N ±0.05 % F _{norm} from 20 N Temperature effect on zero signal TK ₀ ≤±0.1 %/10 K Temperature effect on characteristic value TK _c ≤±0.1 %/10 K Force limit F _L 150 % F _{norm} Breaking force F _B >300 % F _{norm} Permissible oscillation stress acc. to DIN 50100 F _{rb} 70 % F _{norm} Naterial Stainless steel Rated temperature range B _{T, norm} 54 +121 °C Operating temperature range B _{T, 6} -54 +121 °C Reference temperature T _{ref} 23 °C Output signal (rated output) C _{nom} 2,0 mV/V (10 N with 1,5 mV/V) Input-/output resistance R _e /R _a 350 Ω Insulation resistance > 2 GΩ Electrical connection Cable (PTFE) 1.5 m, open wires, 4-wire Voltage supply DC 5 V with 50 N, DC 10 V from 100 N for mV/V output with out amplifier DC 12 28 V for output 0(4) 20 mA, DC 0 10 V Protection (acc. to IEC/EN 60529) IP65	Tension or compression	
mounting position b _{rg} ≠0.05 % F _{nom} from 20 N Temperature effect on zero signal TK ₀ ≤±0.1 %/10 K Temperature effect on characteristic value TK _c ≤±0.1 %/10 K Force limit F _L 150 % F _{nom} Breaking force F _B >300 % F _{nom} Permissible oscillation stress acc. to DIN 50100 F _{rb} 70 % F _{nom} Material Stainless steel Rated temperature range B _{T, nom} 51 … 71 °C (15 … 250 °C) Others on request Operating temperature T _{ref} 23 °C Output signal (rated output) C _{nom} 20 °C Input-/output resistance R _e /R _a 350 Ω Insulation resistance >2 GΩ Electrical connection >2 GΩ without amplifier DC 5 V with 50 N, DC 10 V from 100 N for mV/V output with cable amplifier DC 5 V with 50 N, DC 0 10 V with cable amplifier DC 12 … 28 V for output 0(4) … 20 mA, DC 0 … 10 V	Relative deviation of zero signal $d_{S, 0}$	±2 % F _{nom}
Temperature effect on characteristic value TK _c ≤ ±0.1 %/10 K Force limit F _L 150 % F _{nom} Breaking force F _B > 300 % F _{nom} Permissible oscillation stress acc. to DIN 50100 F _{rb} 70 % F _{nom} Material Stainless steel Rated temperature range B _{T, nom} 15 71 °C (15 250 °C) Others on request Operating temperature range B _{T, G} -54 +121 °C Reference temperature T _{ref} 23 °C Output signal (rated output) C _{nom} 2,0 mV/V (10 N with 1,5 mV/V) Input-/output resistance R _e /R _a 350 Ω Insulation resistance > 2 GΩ Voltage supply with oatle amplifier DC 5 V with 50 N, DC 10 V from 100 N for mV/V output with cable amplifier DC 12 28 V for output 0(4) 20 mA, DC 0 10 V		
For ce limit F_L 150 % F_{nom} Breaking force F_B > 300 % F_{nom} Permissible oscillation stress acc. to DIN 50100 F_{rb} 70 % F_{nom} MaterialStainless steelRated temperature range $B_{T, nom}$ 15 71 °C (15 250 °C) Others on requestOperating temperature range $B_{T, G}$ -54 +121 °CReference temperature T_{ref} 23 °COutput signal (rated output) C_{nom} 2,0 mV/V (10 N with 1,5 mV/V)Input-/output resistance R_e/R_a 350 Ω Insulation resistance> 2 G Ω Electrical connectionCable (PTFE) 1.5 m, open wires, 4-wireVoltage supplyDC 5 V with 50 N, DC 10 V from 100 N for mV/V outputwith cable amplifierDC 12 28 V for output 0(4) 20 mA, DC 0 10 VProtection (acc. to IEC/EN 60529)IP65	Temperature effect on zero signal TK_0	≤ ±0.1 %/10 K
Breaking force Fg> 300 % FnomPermissible oscillation stress acc. to DIN 50100 Frb70 % FnomMaterialStainless steelRated temperature range BT, nom15 71 °C (15 250 °C) Others on requestOperating temperature range BT, G-54 +121 °CReference temperature Tref23 °COutput signal (rated output) Cnom2,0 mVV (10 N with 1,5 mV/V)Input-/output resistance Re/Ra350 ΩInsulation resistance> 2 GΩElectrical connectionCable (PTFE) 1.5 m, open wires, 4-wireVoltage supplywith out amplifierDC 5 V with 50 N, DC 10 V from 100 N for mV/V outputwith cable amplifierDC 12 28 V for output 0(4) 20 mA, DC 0 10 VProtection (acc. to IEC/EN 60529)IP65	Temperature effect on characteristic value TK_{C}	≤ ±0.1 %/10 K
Permissible oscillation stress acc. to DIN 50100 F _{rb} 70 % F _{nom} Material Stainless steel Rated temperature range B _{T, nom} 15 71 °C (15 250 °C) Others on request Operating temperature range B _{T, G} -54 +121 °C Reference temperature T _{ref} 23 °C Output signal (rated output) C _{nom} 2,0 mV/V (10 N with 1,5 mV/V) Input-/output resistance R _e /R _a 350 Ω Issulation resistance > 2 GΩ Electrical connection Cable (PTFE) 1.5 m, open wires, 4-wire Voltage supply DC 5 V with 50 N, DC 10 V from 100 N for mV/V output with cable amplifier DC 12 28 V for output 0(4) 20 mA, DC 0 10 V Protection (acc. to IEC/EN 60529) IP65	Force limit F _L	150 % F _{nom}
DIN 50100 FrbInternational Content of Co	Breaking force F _B	> 300 % F _{nom}
Rated temperature range B _{T, nom} 15 71 °C (15 250 °C) Others on requestOperating temperature range B _{T, G} -54 +121 °CReference temperature T _{ref} 23 °COutput signal (rated output) C _{nom} 2,0 mV/V (10 N with 1,5 mV/V)Input-/output resistance R _e /R _a 350 ΩInsulation resistance> 2 GΩElectrical connectionCable (PTFE) 1.5 m, open wires, 4-wireVoltage supplywithout amplifierDC 5 V with 50 N, DC 10 V from 100 N for mV/V outputwith cable amplifierDC 12 28 V for output 0(4) 20 mA, DC 0 10 VProtection (acc. to IEC/EN 60529)IP65		70 % F _{nom}
Others on requestOperating temperature range B _{T, G} -54 +121 °CReference temperature T _{ref} 23 °COutput signal (rated output) C _{nom} 2,0 mV/V (10 N with 1,5 mV/V)Input-/output resistance R _e /R _a 350 ΩInsulation resistance> 2 GΩElectrical connectionCable (PTFE) 1.5 m, open wires, 4-wireVoltage supplywithout amplifierDC 5 V with 50 N, DC 10 V from 100 N for mV/V outputwith cable amplifierDC 12 28 V for output 0(4) 20 mA, DC 0 10 VProtection (acc. to IEC/EN 60529)IP65	Material	Stainless steel
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Output signal (rated output) C _{nom} 2,0 mV/V (10 N with 1,5 mV/V)Input-/output resistance R _e /R _a 350 ΩInsulation resistance> 2 GΩElectrical connectionCable (PTFE) 1.5 m, open wires, 4-wireVoltage supplyDC 5 V with 50 N, DC 10 V from 100 N for mV/V outputwith cable amplifierDC 5 V with 50 N, DC 10 V from 100 N for mV/V outputProtection (acc. to IEC/EN 60529)IP65	Operating temperature range $B_{T, G}$	-54 +121 °C
Input-/output resistance Re/Ra350 ΩInsulation resistance> 2 GΩElectrical connectionCable (PTFE) 1.5 m, open wires, 4-wireVoltage supplywithout amplifierDC 5 V with 50 N, DC 10 V from 100 N for mV/V outputwith cable amplifierDC 12 28 V for output 0(4) 20 mA, DC 0 10 VProtection (acc. to IEC/EN 60529)IP65	Reference temperature T _{ref}	23 °C
Insulation resistance > 2 GΩ Electrical connection Cable (PTFE) 1.5 m, open wires, 4-wire Voltage supply without amplifier DC 5 V with 50 N, DC 10 V from 100 N for mV/V output with cable amplifier DC 12 28 V for output 0(4) 20 mA, DC 0 10 V Protection (acc. to IEC/EN 60529) IP65	Output signal (rated output) C _{nom}	2,0 mV/V (10 N with 1,5 mV/V)
Electrical connection Cable (PTFE) 1.5 m, open wires, 4-wire Voltage supply DC 5 V with 50 N, DC 10 V from 100 N for mV/V output with cable amplifier DC 12 28 V for output 0(4) 20 mA, DC 0 10 V Protection (acc. to IEC/EN 60529) IP65	Input-/output resistance R _e /R _a	350 Ω
Voltage supply DC 5 V with 50 N, DC 10 V from 100 N for mV/V output with out amplifier DC 12 28 V for output 0(4) 20 mA, DC 0 10 V Protection (acc. to IEC/EN 60529) IP65	Insulation resistance	> 2 GΩ
without amplifier DC 5 V with 50 N, DC 10 V from 100 N for mV/V output with cable amplifier DC 12 28 V for output 0(4) 20 mA, DC 0 10 V Protection (acc. to IEC/EN 60529) IP65	Electrical connection	Cable (PTFE) 1.5 m, open wires, 4-wire
with cable amplifier DC 12 28 V for output 0(4) 20 mA, DC 0 10 V Protection (acc. to IEC/EN 60529) IP65	Voltage supply	
Protection (acc. to IEC/EN 60529) IP65	without amplifier	DC 5 V with 50 N, DC 10 V from 100 N for mV/V output
	with cable amplifier	DC 12 28 V for output 0(4) 20 mA, DC 0 10 V
	Protection (acc. to IEC/EN 60529)	IP65
Weight 20 g up to 250 g depending on rated force	Weight	20 g up to 250 g depending on rated force

Approvals

Logo	Description	Country
CE	EU declaration of conformity ■ EMC directive ■ RoHS directive	European Union
EAC	EAC (Option) ■ EMC directive	Eurasian Economic Community

Dimensions in mm



Rated force	Dimensions in mm						
in N	ØD	А	В	С	E	F	ØG
10 / 20 / 50	19.1	11.43 ± 0.8	6.35	1.5 max.	M4 x 0.7	7.87	4.83
100 / 200 / 500	25.4	13.21	6.35	0.76	M5 x 0.8	12.7	6.35
1,000 / 2,000 / 5,000	25.4	13.21	9.65	0.76	M6 x 1.0	12.7	6.35
10,000	25.4	18.3	12.7	0.76	M10 x 1.5	12.7	6.35
20,000	31.8	23.9	16.0	0.76	M12 x 1.5	12.7	9.65
30,000 / 50,000	35.1	27.9	22.35	0.76	M20 x 1.5	12.7	9.65

Pin assignment

Electrical connection			
Excitation voltage (+)	Red		
Excitation voltage (-)	Black		
Signal (+)	White		
Signal (-)	Green		

Ordering information

Model / Rated force / Calibration direction / Connecting thread / Relative linearity error / Temperature range / Output signal / Electrical connection / Options

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