EMSYST®

COLUMN FORCE SENSOR WITH BUILT-IN SIGNAL CONDITIONER EMS141

Special features

- Mechanical design identical to **EMS140** type
- Strain gauge measuring system
- Compression direction
- Built-in signal conditioner with voltage and current output
- Possibility to use both outputs simultaneously
- Power supply: 5 … 27 VDC

The EMS141 sensor is used for force measuring in the direction of compression. It has a built-in electronic signal conditioner which provides all standard output ranges, both voltage and current. It is also possible to use both outputs simultaneously.

Overview of models

Model	Output (Vout, Iout)	Power supply (Vcc)
EMS141 – U(0.5 … 4.5)	0.5 ... 4.5 V	5 ... 27 VDC
EMS141 – U(2 … 10)	2 ... 10 V	11.5 ... 27 VDC
EMS141 – I(4 … 20)	4 ... 20 mA	22 … 27 VDC

The version of the output as well as the range of the sensor must be specified in the order. After the setting in the factory, it is no longer possible to change these parameters.

It is possible to use both voltage and current output simultaneously during operation. However, it is practical used only for the output 2 … 10 V / 4 … 20 mA and the supply voltage 24 V. With other voltage outputs and smaller supply voltage, the current output is limited.

The adjustment of the sensor (within the permitted tolerances) is only possible for one output (either for voltage or for current). The output specified in the order is set.

2026-01

Specifications

Parameter	Value	Unit
Rated capacity (F_n)	20, 50, 100, 200	kN
Overload		
- *Safe*	130	% F_n
- *Ultimate*	150	% F_n
- *Permanent static load (recommended value)*	75	% F_n
- *Dynamic load (recommended value)*	50	% F_n
Output setting options		
- *Voltage output 1, range*	0.5 … 4.5	V
- *Voltage output 1, tolerance*	± 50	mV
- *Voltage output 2, range*	2 … 10	V
- *Voltage output 2, tolerance*	± 100	mV
- *Current output, range*	4 … 20	mA
- *Current output, tolerance*	± 0.2	mA
Output load impedance		
- *Voltage output (min)*	2	kΩ
- *Current output (max)*	500	Ω
Cut-off frequency of built-in amplifier (– 3 dB)	200	Hz
Max error		
- *Non-linearity*	0.25	% F.S.
- *Hysteresis*	0.25	% F.S.
Temperature range		
- *Nominal*	0 ... + 50	°C
- *Operating*	– 10 ... + 50	°C
Temperature drift		
- *ΔVout / ΔT (max)*	± 1.5	mV / °C
- *ΔIout / ΔT (max)*	± 3	µA / °C
Power supply (Vcc)		
- *Range*	5 … 27	VDC
- *Current consumption (max)*	40	mA
Power supply drift (Vcc = 5 V or 24 V)		
- *ΔVout / ΔVcc (max)*	± 20	mV / V
- *ΔIout / ΔVcc (max)*	± 40	µA / V
Connector		
- *Type*	M12, 4 pins	
Protection	IP54	

How to order

Common formula for ordering:

EMS141-U/I(output range) – force range

- Type of output:
  - EMS141-U – voltage output
  - EMS141-I – current output

- Voltage output ranges:
  - 0.5 … 4.5 V
  - 2 … 10 V

- Current output ranges:
  - 4 … 20 mA

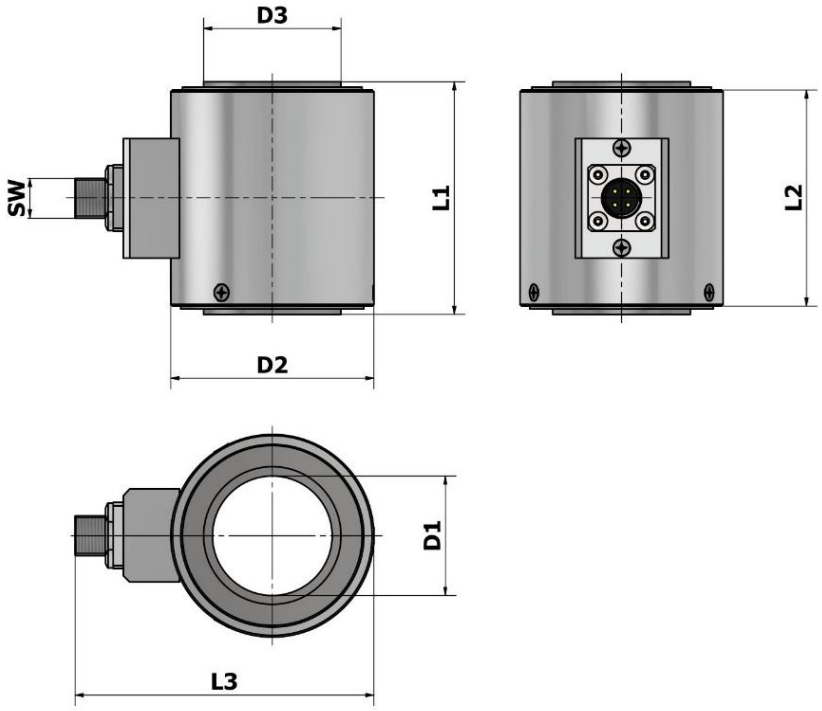
- Measured force range:
  - 20 kN, 50 kN, 100 kN, 200 kN

Examples:

20 kN sensor with voltage output 2 … 10V, order:
EMS141-U (2 … 10V) – 20 kN

100 kN sensor with current output, order:
EMS141-I (4 ± 20 mA) – 100 kN

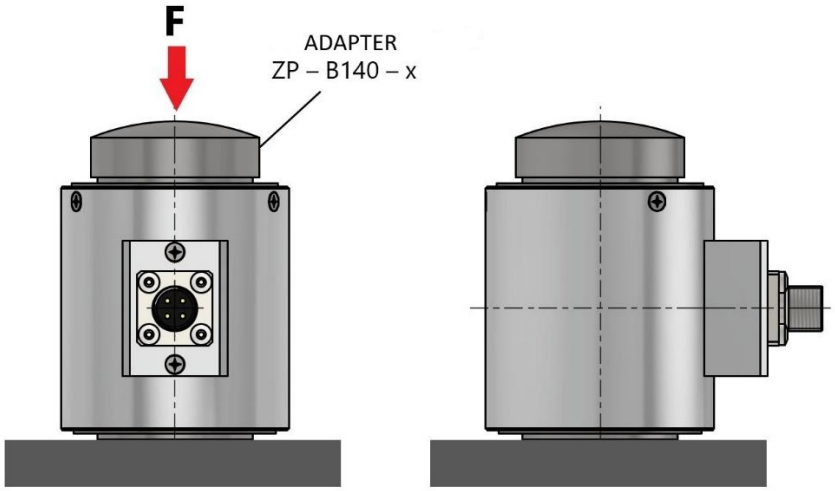
Outline dimensions



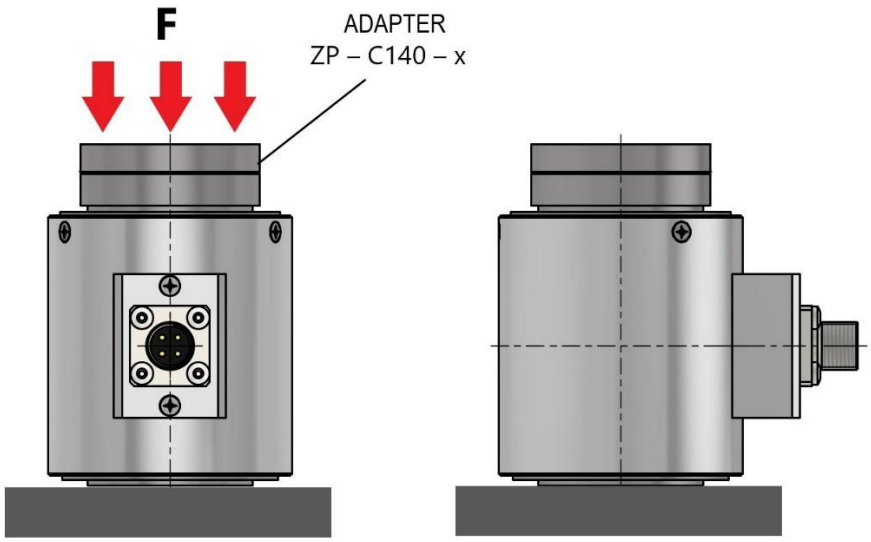
Rated capacity F_n kN	Dimensions in mm							Mass kg	Deflection, @ F_n (µm)
	D1	D2	D3	L1	L2	L3	SW		
20	16	36	18.6	50	45	63	M12x1	0.16	60
50	24	46	28.0	60	55	74	M12x1	0.26	80
100	36	61	41.4	70	65	90	M12x1	0.48	100
200	48	76	55.8	80	75	106	M12x1	0.86	120

Recommended installation

Loading using ball adapter



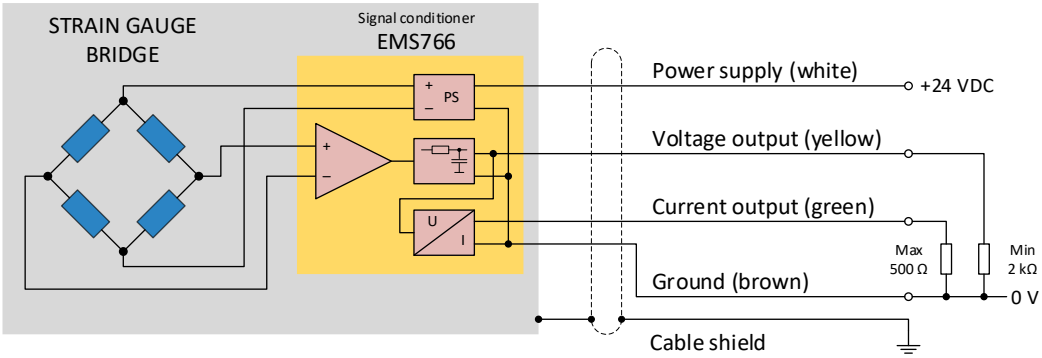
Loading using spherical washers



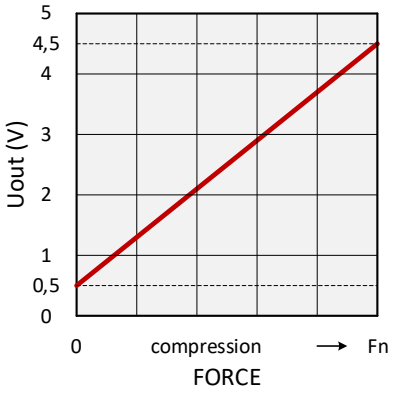
Type of sensor	Adapter type B [1]	Adapter type C [2]
EMS140 – 20 kN	ZP – B140 – 20	ZP – C140 – 20
EMS140 – 50 kN	ZP – B140 – 50	ZP – C140 – 50
EMS140 – 100 kN	ZP – B140 – 100	ZP – C140 – 100
EMS140 – 200 kN	ZP – B140 – 200	ZP – C140 – 200

Notes:
1. The adapter is pressed with a flat surface (the contact is point – like).
2. The force must be applied evenly over the entire surface of the adapter.

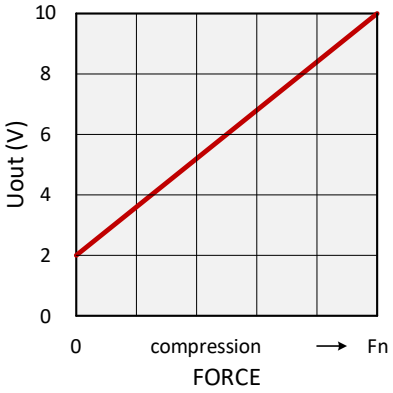
Wiring diagram



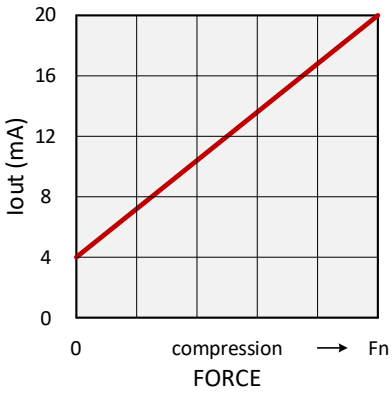
Output characteristics



U(0.5 … 4.5 V)



U(2 … 10 V)



I(4 … 20) mA

Legal information