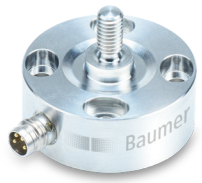
Force sensors

DLMx0-SO

Compact force sensors for industrial applications



Operating instructions

Baumer
Passion for Sensors

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Safety

Intended use
This product is a precision device and serves the identification of items, objects or physical measurements and the preparation or provision of measured values as electric variables for the superordinate system. Unless specifically labeled, this product may not be used in explosive environments. The product is not intended for end users. Potentially additionally applicable EU directives must be verified by the device manufacturer.

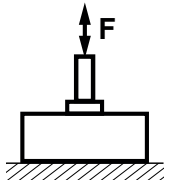
Start-up
Assembly, installation and calibration of this product may only be performed by a specialist.

Installation
Only use intended fasteners and accessories for the installation. Outputs not in use may not be wired. Cable outputs with unused wires must be insulated. Do not go below permissible cable bending radii. The system must be switched off before electrically connecting the product. If required, shielded cables must be used to prevent electro-magnetic interference. If the customer assembles plug connections to shielded cables, then EMC-version plug connections should be used. The cable shield must be connected to a large area of the plug housing.

Delivery

Article	Quantity
Sensor	1
Gewindeeinsatz	4

Structure and function



The sensor is screwed on both sides to a machine element and measures the applied force. Changes to the force are measured on the spring body by resistance strain gauges and converted into an electric signal. The measurement signal of the sensor is positive with a tensile force. The output signal is proportionate to the force.

Signal word

CAUTION A situation that could lead to material damage.

Transportation and storage

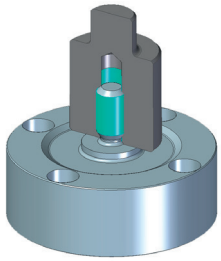
CAUTION

- ► Damage to the sensor by dropping.
- ► Do not drop the sensor when unpackaged.
- ► Check the packaging and sensor for damages.
- ► In case of damage: do not use the sensor.
- ► Transport and/or store the sensor in unopened original packaging only.
- ► Store the sensor secure from impacts. Storage temperature: –40 … +85 °C

Installation on the main thread

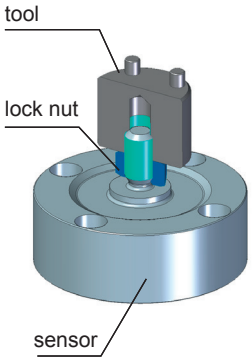
Baumer «Screw-on» force sensors are suitable for tensile and compressive force measurement in rough industrial settings. Installation of the force sensors takes place in two steps. For the installation on the main thread there are generally four different options available.

Installation options



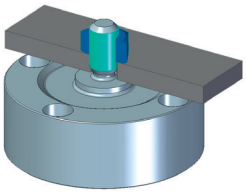
Tool/counter piece is installed at the catch
Make sure that the thread length of the counter piece is deep enough. Use a torque wrench for the installation on the main thread.

	DLM20-SO	DLM30-SO	DLM40-SO
Thread on the counter piece	M4	M6	M12
Min. thread depth in mm for the main thread	9	13	25
Tightening torque in Nm on the main thread	1	5	38



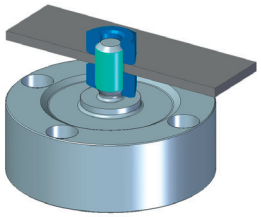
Tool/counter piece is bolted and fixed with a lock nut
Make sure that the thread length of the counter piece is deep enough. Use a torque wrench for the installation of the lock nut on the main thread.

	DLM20-SO	DLM30-SO	DLM40-SO
Thread on the counter piece	M4	M6	M12
Min. thread depth in mm for the main thread	5	7	12
Nut height in mm	2.2	3.2	6
Tightening torque in Nm on the main thread	1	5	38



Tool/plate with through hole is fixed full contact with a lock nut
The maximum thickness of the plate must not be exceeded. Use a torque wrench for the installation of the lock nut on the main thread

	DLM20-SO	DLM30-SO	DLM40-SO
Main thread	M4	M6	M12
Diameter of the through hole in mm	4.5	6.6	13.5
Height of the lock nut in mm	2.2	3.2	6
Tightening torque in Nm on the main thread	1	5	38
Max. tool/plate thickness in mm	5	8	17



Tool/plate with through hole is fixed by a locknut on both sides
The maximum thickness of the plate must not be exceeded. Use a torque wrench for the installation of the lock nut on the main thread.

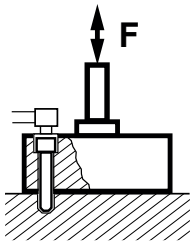
	DLM20-SO	DLM30-SO	DLM40-SO
Main thread	M4	M6	M12
Diameter of the through hole in mm	4.5	6.6	13.5
Height of the lock nut in mm	2.2	3.2	6
Tightening torque in Nm on the main thread	1	5	38
Max. tool/plate thickness in mm	2	3	7

Installation on the screw-on plate

The installation of the screw-on force sensors on the contact area is via four screws on a level and flat mechanically processed contact surface.
We recommend installation with a torque wrench and the following tightening torque for the applicable sensor dimension

Tightening torques Screw-on force sensor

DLM20-SO	DLM30-SO	DLM40-SO
0.2 Nm	1.5 Nm	6 Nm

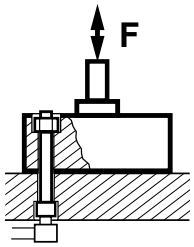


Installation from the top side

The following steps must be implemented during the installation of the force sensor from above:

1. Drill four thread holes with the appropriate diameter at a 90-degree angle into the desired installation surface. Observe the direction of the cable outlet.
2. Select the appropriate screws for your sensor with the required length.
3. Clean the installation surface from soiling such as oil and grease.

	DLM20-SO	DLM30-SO	DLM40-SO
Hole circle diameter in mm	21.0	30.0	47.0
Thread	M2	M4	M6
Min. thread depth in mm	4	6	10
Recommended screw length in mm	10	16	25
Strength class	6.8	8.8	10.9



Installation from the bottom side

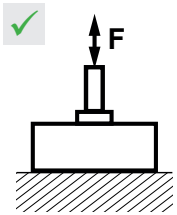
For the installation from the bottom side, the four threaded inserts included in the packaging must be used. The following steps must be implemented for the installation of the force sensor:

1. Drill four through holes with the appropriate diameter at a 90-degree angle into the desired installation surface. Observe the direction of the cable outlet.
2. Select the appropriate screws for your sensor with the required length.
3. Clean the installation surface from soiling such as oil and grease.
4. Place the thread inserts from above into the oval-shaped drill hole.

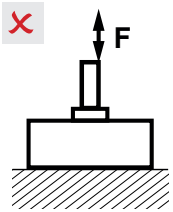
	DLM20-SO	DLM30-SO	DLM40-SO
Hole circle diameter in mm	21.0	30.0	47.0
Diameter of the through drill holes in mm	2.4	4.5	6.6
Strength class	6.8	8.8	10.9

Important

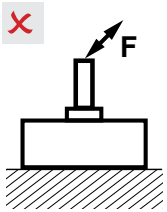
For reliable measurements, specific requirements for the installation surfaces and the force transmission must be complied with. It is recommended to mechanically treat the contact surface.



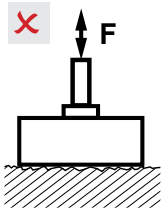
The force must be applied centrically.



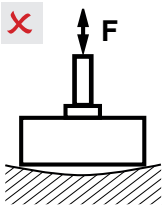
Non-centrical force application leads to linearity and sensitivity deviations.



The force must be applied axially. Non-axial force application leads to linearity and sensitivity deviations.



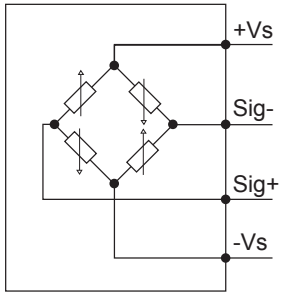
The sensor contact surface must be smooth. A too rough surface leads to linearity and sensitivity deviations



The sensor contact surface must be sufficiently rigid and may not deform under force. A too soft contact surface leads to sensitivity deviations and in extreme cases to a failure of the sensor.

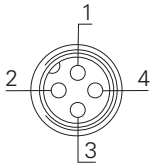
Electrical connection

The DLMx0-SO force sensors are passive force sensors without electronic amplifiers. The output signal is mV/V and proportionate to the force. The measurement bridge of the force sensors is structured as follows.

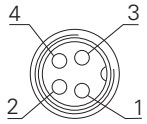


As standard, Baumer force sensors are equipped with 4-pin plugs. The DLM20 version features an M5 plug, the DLM30 and DLM40 versions an M8 plug.

DLM20



DLM30 and DLM40



Pin	
1	+Vs
2	Sig +
3	–Vs
4	Sig –

In addition, a constant voltage supply source is needed for reliable and repeatable measurements. Make sure to operate the force sensors in the operating voltage range. For passive force sensors, the operating voltage range is between 2 and 7 VDC (UL-Class 2).

Shielded cables are recommended for use with the force sensors.

Operation

- ► Make sure that the sensor is assembled correctly and only operated in the defined nominal force range.
- ► To minimize the effect of settlement, fully load the sensor 10 times, if possible.

Disposal



- ► Do not dispose of in household waste.
- ► Separate the materials and dispose according to national regulations.

Maintenance and repair

Preventive maintenance
Regular maintenance is not required.

Repair
- ► Do not repair the sensor yourself.
- ► Return a damaged sensor to Baumer.
  For contact addresses visit www.baumer.com.

Applicable documents

For general notes see the insert sheet.
For technical data see the data sheet:
www.baumer.com
For accessories see www.baumer.com