MIKROELEKTRONIK GMBH

Intelligent Sensors & Measuring Systems

MI 400

Proximity switches
For hot environment up to 350/400°C

Installations- and operating manual

Version 1.0

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1 Introduction

The MI 400 proximity switch has been designed to operate in an environment at temperatures up to 350°C permanently, for a short time, the temperature could rise up to 400°C. Cable length is available from 3 m up to 20 m.

2 Safety

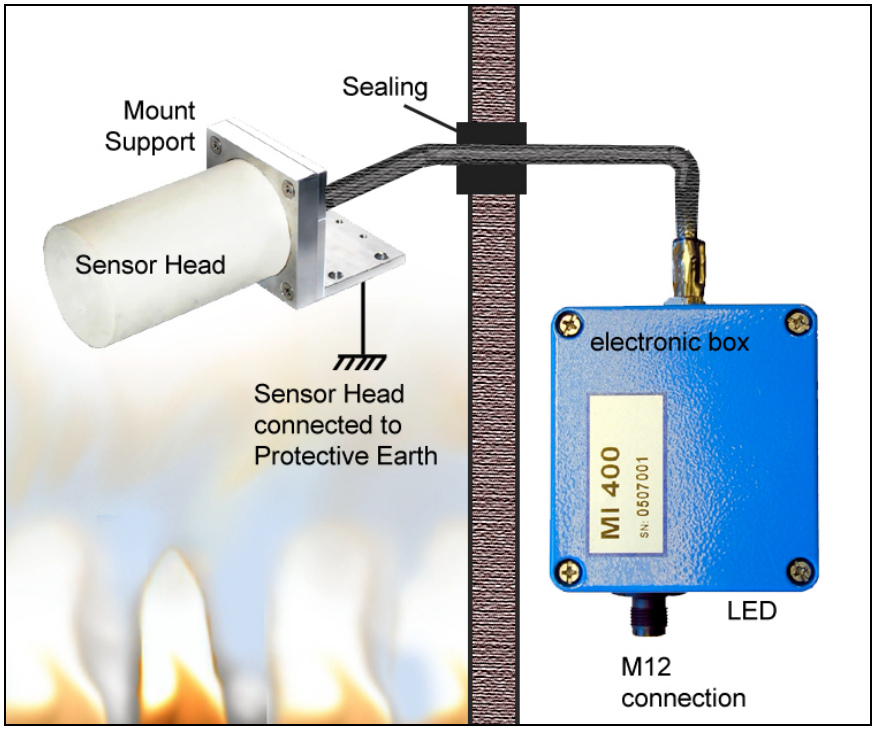
The Sensor head and cable form a matched "resonant circuit". The capacity of the cable is considered in the factory-installed adjustment of the electronics. The cable may not be cut and reconnected, shortened or extended.

Sensor head and electronic unit are attached, the connecting cable can not be detached. The assembly of additional connectors between sensor head and electronics is not allowed, the cable may not be cut and reconnected.

Voltage supply must not exceed 30 V, also not at short time.

3 Installation

overview



The sensor head is mounted in the hot area, and the cable is brought out from the hot area in the shortest way. The electronic system must be mounted in the cold area, outside the oven.

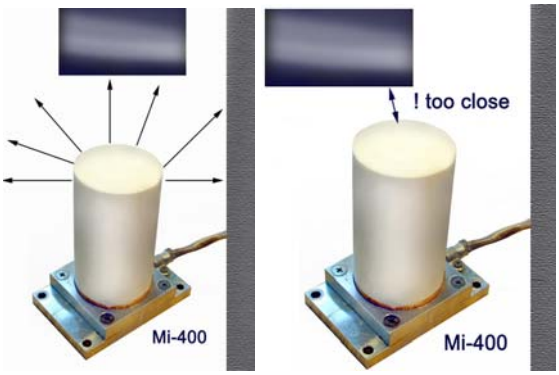
3.1 Sensor head

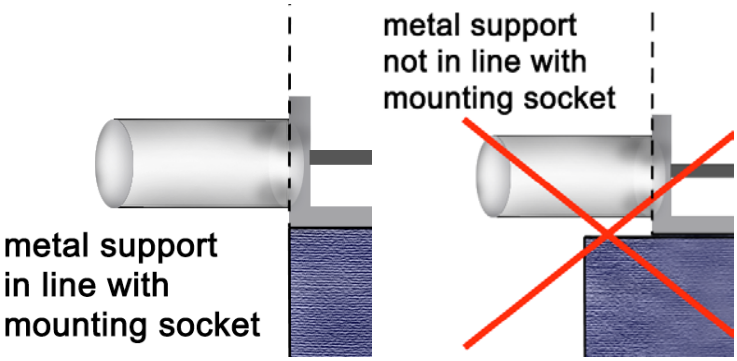
The Mi-400 sensor could be mounted onto a metallic surface. The mounting angle has four holes. Alternative, the sensor is shipped with a flat mounting plate. The mounting plate also has four holes.

Caution: The sensors top cover is ceramic, inside, the sensor has also ceramic parts.
Avoid drop or shock!

The sensor is available with an angular mounting bracket or a flat mounting plate

For good function, beneath the sensor no metal should be present. In the neighbourhood of the sensor, 70 mm should be kept free of metal. The distance to other MI 400 proximity switches must be at least 150 mm.





The environment temperature and the operating voltage must be according to data sheet.

The sensor cable is sent through a hole in the wall of the oven. The remaining gap is sealed with an appropriate sealant material.

3.2 Electronic system

For electrical connection, the sensor cable can be detached from the sensor electronic system. A screw on terminal block In the electronic box makes the connections. When connecting the wires, make sure to make good contact. Otherwise the switching threshold may be shifted.

Pin out of terminal block:

Cable colour	Nr.
white-red	1
white (twisted pair with white-red)	2
Shield white-red	3
Shield white-blue	4
white-blue	5
white (twisted pair with white-blue)	6

The electronic system must be mounted in the cold area. It must not be mounted in the oven wall.

For electrostatic discharge protection, the electronic system must be grounded with protective earth. This can be done using Pin 5 of the M12-connector, which is connected to the case in the electronic box. Ungrounded operation is not allowed. Protective earth (PE) and GND (0V of supply) must be on the same potential.

The technical specification of environment temperature must be kept according to data sheet. The power supply must be equipped with over voltage protection.

3.3 Cable

The connecting cable must be installed firmly.

Caution: the sensor head Teflon connection cable is sensible against pressure!

Order a unit with cable longer than needed. Roll the remaining cable in the cold area with a radius of at least 10 inches, close to the electronic unit. Do strap the cable loose, avoid sharp edges. Teflon has a “cold flow”. Under pressure, the Teflon cable will be damaged, when under pressure for long time. A use in power chains is not allowed.

3.4 Electrical connection

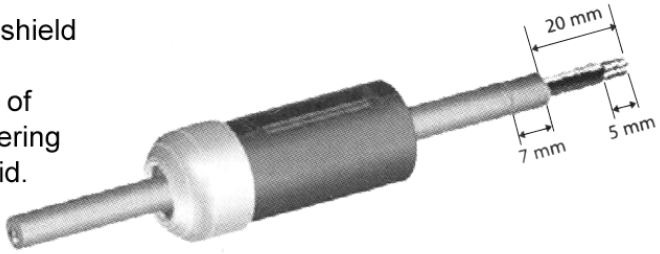
The electrical connection is made with the 5-pin M12-connector. There are M12-connectors with screw on terminals for easy mounting of the wires. Make sure, that the wires are connected safely, especially for protective earth.

Pin out of M12-connector:

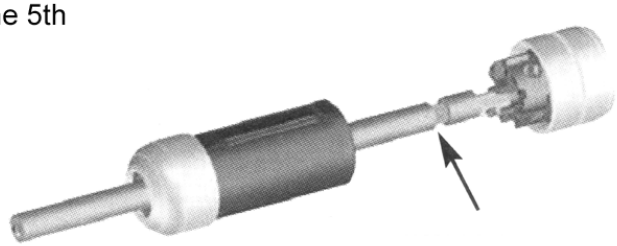
Pin Nr.	Function
1	+24 V supply power
2	Switching output (normally high)
3	GND (0 V)
4	Switching output (normally low)
5	PE (protective earth)

Mounting instructions for M12-connectors:

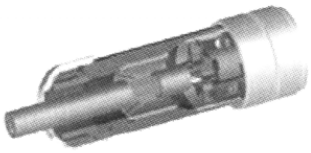
strip off cable cover and shield down to the leads (cut off braid) at a length of 20 mm. Incise cable covering at 7 mm down to the braid. Strip the individual leads at a length of 5mm. For 5 pin version shorten the 5th lead to 15 mm length and also strip 5 mm.



shift isolation forward



screw on case



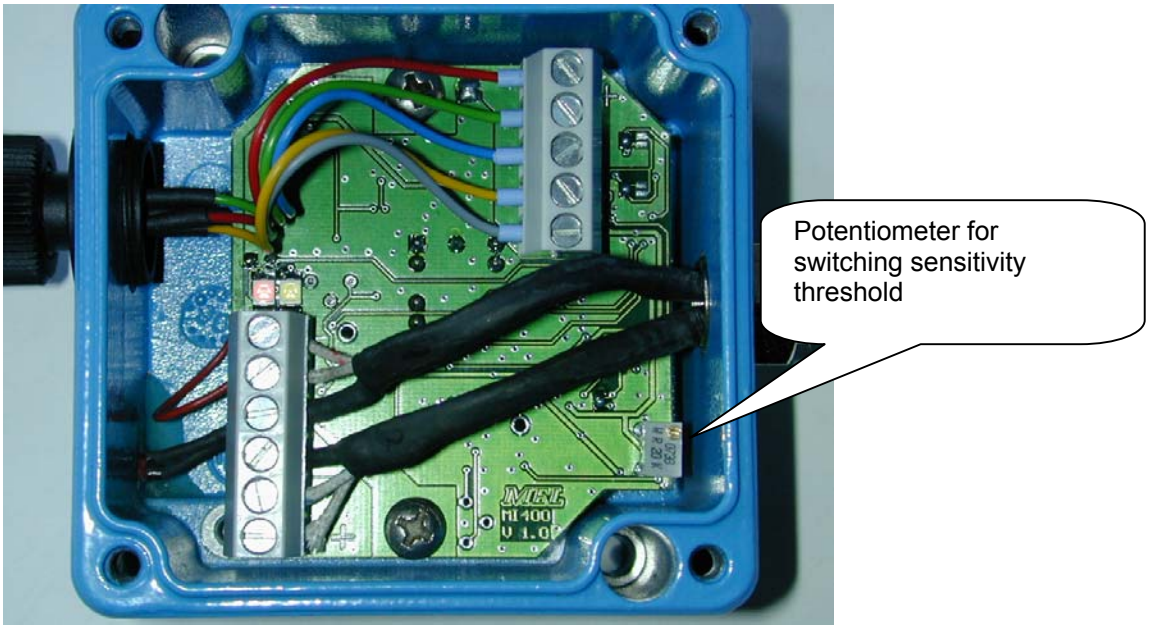
4 Adjustment

The MI 400 sensor has been pre-adjusted in the factory. In special case or for special requirement, the switching threshold can be adjusted. Adjustment may be necessary, when metal is present close to the sensor. The metal for detection should have **the dimension of at least 50 x 50 mm**. The bigger the metal, the bigger is the possible switching distance.

For metal targets less than 50 x 50 mm in size readjusting is needed but should taken out carefully taking into account the small temperature drift of the sensor. Metal targets under at least 35 x 35 mm in size will cause unpredictable switching behaviour at various temperatures and should not be used.

When readjusting, please consider that metal in the neighbourhood of the sensor could create variations by temperature. This could make another readjustment necessary**. Adjustment should be carried out at operating temperature!**

Adjustment is done with the potentiometer shown in the picture below. The other potentiometers must not be adjusted.



Adjustment procedure:

1. Place metal target at preferred switching distance
2. Turn the potentiometer counter-clockwise until the sensor led toggles from on to off
3. Turn the potentiometer clockwise until the sensor led switches on

When choosing the switching distance too high, temperature drift rises and the sensor may switch on even unconditionally. Temperature drift varies with the material and size of the metal target and the adjusted switching distance. When following the recommendations above the temperature drift should be under 5% of the switching distance. **Tests may be required for best setting.**

Between on and off, there is a hysteresis, which depends from the set threshold (typically < 1 mm).

5 Maintenance and repair

The electronic unit and the sensor head must not be exchanged with other units: do not mix serial numbers.
When exchange is required always exchange sensor head **and** electronic unit.
Send in both items for repair.

When packaging the sensor it is important not to twist or grind the sensor cable because this could cause irreparable damage with the sensor cable.