# WIO400
# Water in oil sensor

INSTALLATION MANUAL Rev. 1.26

111881-924 Rev. 1.26 WIO400 Installations manual

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# Contents


Contents ..... 2
Introduction ..... 3
Pin assignment of the terminal box connector for customer ..... 5
Pin assignment of the terminal box connector for WIO-sensor ..... 6
Pin assignment of the WIO400 sensor ..... 8
WIO-sensor cable specification ..... 9
Cable requirements for EMC ..... 9
Cable installation ..... 10
Terminal box wiring example 1 (230 Vac) ..... 12
Terminal box wiring example 2 (24Vdc) ..... 12
Terminal box wiring example 3 (24Vdc) ..... 13
Installation of 1 Terminal Box with 1 display ..... 13
Drilling distances for the terminal box ..... 16
Installation of WIO Sensor into pipe using PTFE seal tape ..... 17
WIO Sensor dimensions in mm ..... 18
Terminal box dimensions in mm ..... 19

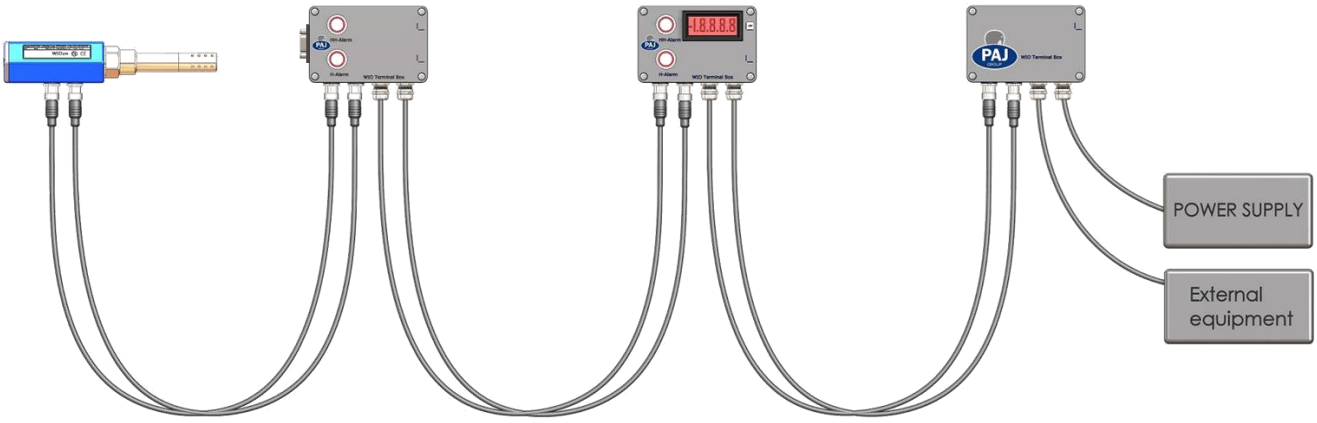
# Introduction

Only use the manufacturer specified cable for connecting the WIO-sensor with the terminal box.

The connections of the external cables are based on the special IP66- cable glands for the power supply, relay contacts, and analog outputs, respectively.

Connecting the devices must be performed only by qualified and trained professionals! All external power supplies, including circuits connected to the relay contacts, must be disconnected and verified de-energised before installation or maintenance.

The WIO-Sensor can be extended with up to three terminal boxes.




The distance between the boxes and sensor shall not be longer than 50 meters.

Only the last connected box can be connected to the power supply and the analog output, as shown in the figure above.



WIO Standard ¾” (ISO 228-1 G¾”), Short

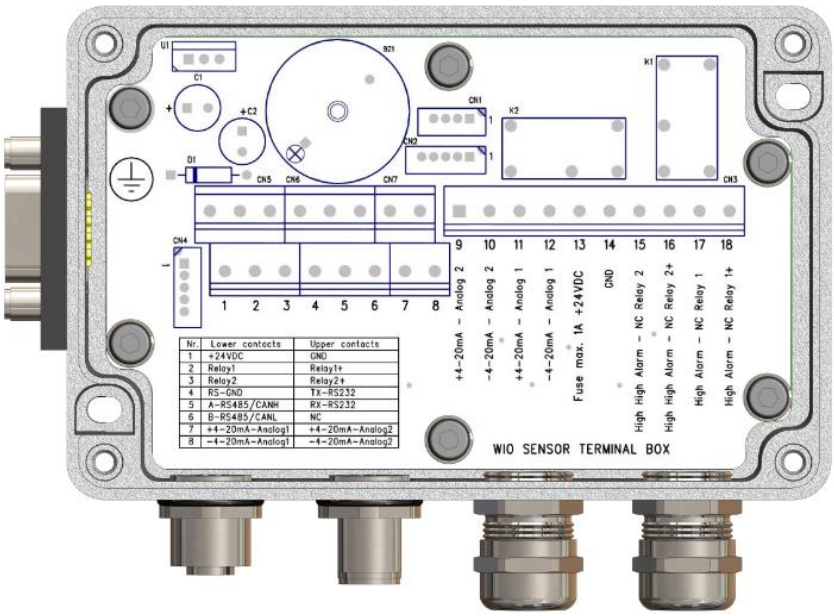


WIO Standard ½” (ISO 228-1 G½”), Short



WIO Ball Valve pipe, Long

# Pin assignment of the terminal box connector for customer

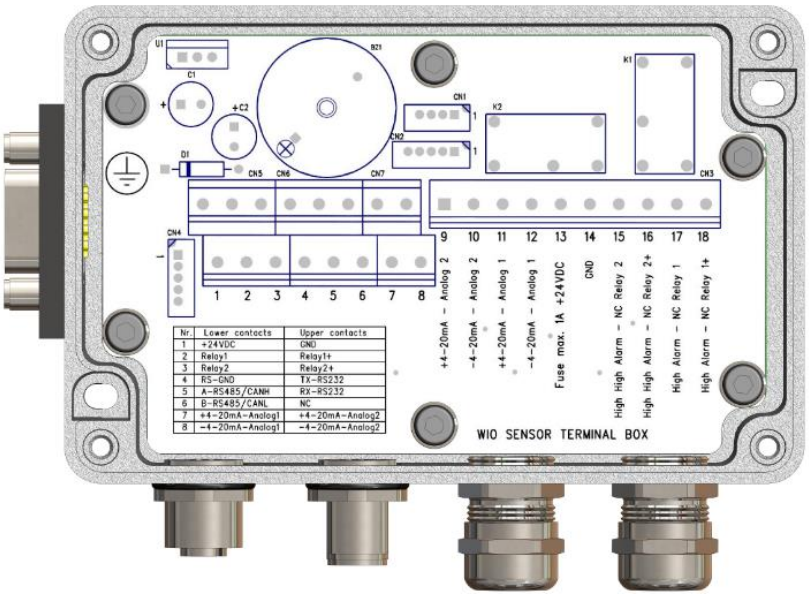



To sensor Power and Alarms

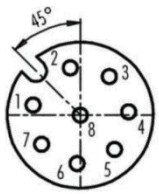
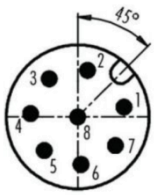
There is only one connector, CN3, for using of the terminal box contacts

| Contact-No. | Description |
|---|---|
| 9 | +4 – 20 mA positive analog output signal for indication of temperature in oil.<br>**The jumper should only be removed if the analog signal is used in following unit or external device. Otherwise this contact is connected to contact no. 10.** |
| 10 | -4 – 20 mA return analog signal for indication of temperature in oil.<br>**The jumper should only be removed if the analog signal is used in following unit or external device. Otherwise this contact is connected to contact no. 9.** |
| 11 | +4 – 20 mA positive analog output signal for indication of Aw or PPM in oil.<br>**The jumper should only be removed if the analog signal is used in following unit or external device. Otherwise this contact is connected to contact no. 12.** |
| 12 | -4 – 20 mA return analog signal for indication of Aw or PPM in oil.<br>**The jumper should only be removed if the analog signal is used in following unit or external device. Otherwise this contact is connected to contact no. 11.** |
| 13 | Power supply, 24VDC ±10% and with max. residual voltage ripple 10% |
| 14 | Power supply ground terminal contact |
| 15 | Relay contact for HH alarm |
| 16 | Relay contact for HH alarm |
| 17 | Relay contact for H alarm |
| 18 | Relay contact for H alarm |

# Pin assignment of the terminal box connector for WIO-sensor

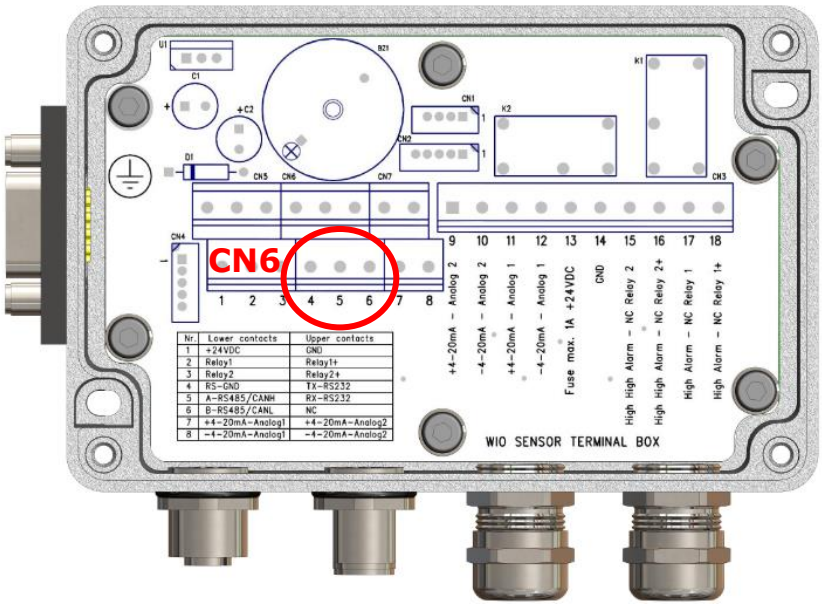



To sensor Power and Alarms

| 8 pole Connectors pin layout | | | | | | | |
|---|---|---|---|---|---|---|---|
| Female | | | | Male | | | |
| Female illustration | Assignment | | | Male illustration | Assignment | | |
|  | 1 | White | Relay1 |  | 1 | White | +4-20mA - Analog1 |
| | 2 | Brown | Relay1+ | | 2 | Brown | -4-20mA - Analog1 |
| | 3 | Green | Relay2 | | 3 | Green | +4-20mA – Analog2 |
| | 4 | Yellow | Relay2+ | | 4 | Yellow | -4-20mA – Analog2 |
| | 5 | Gray | +24 VDC | | 5 | Gray | A-RS485 |
| | 6 | Pink | GND | | 6 | Pink | B-RS485 |
| | 7 | Blue | NC | | 7 | Blue | RS-GND |
| | 8 | Red | NC | | 8 | Red | NC |

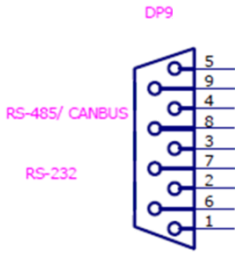
# Pin assignment of D-Sub9 and CN6 connector

Communication




To sensor

Power and Alarms

| D-Sub9 connector pin layout | | | |
|---|---|---|---|
| Illustration | Assignment | | |
|  | 1 | NC | - |
| | 2 | NC | - |
| | 3 | NC | - |
| | 4 | NC | - |
| | 5 | NC | RS-GND |
| | 6 | NC | - |
| | 7 | Blue | B-RS485 |
| | 8 | NC | - |
| | 9 | White | A-RS485 |



## CN6 terminal, only for OK T&T!

| Contact-No. | Description |
|---|---|
| 4, Lower | RS-GND, Isolated Grounding for RS-485 communication |
| 5, Lower | A-RS485, Terminal A for RS-485 communication |
| 6, Lower | B-RS485, Terminal A for RS-485 communication |

# Pin assignment of the WIO400 sensor

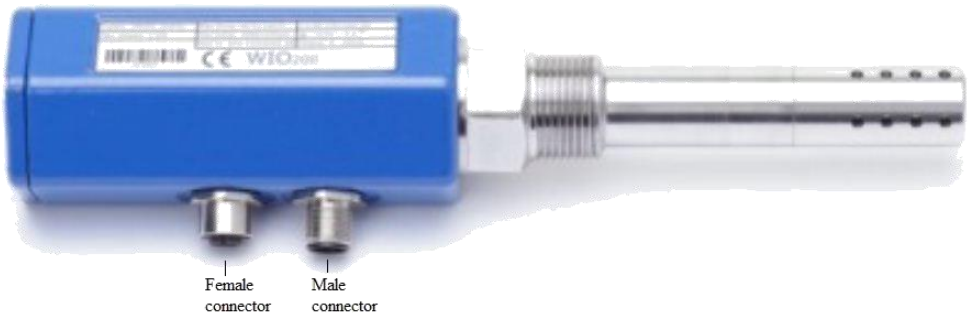
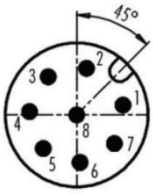
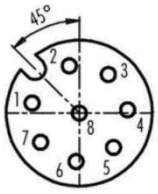
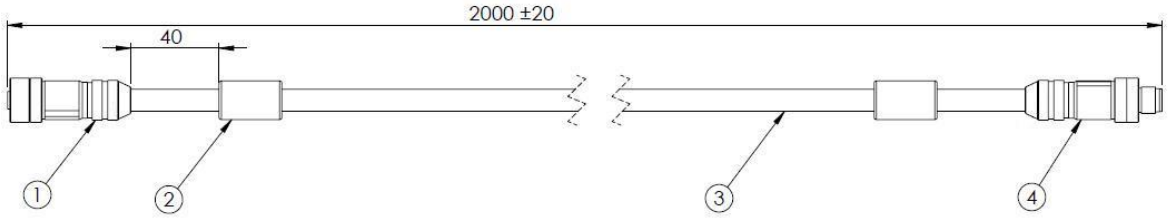
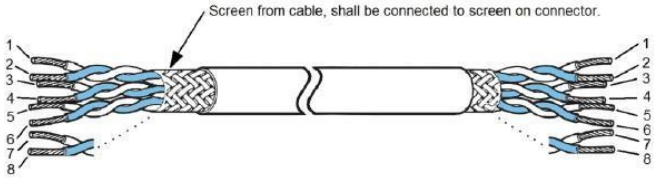



*Figure: WIO-sensor connectors*

| 8 pol. Connectors pin layout | | | | | | | |
|---|---|---|---|---|---|---|---|
| Male | | | | Female | | | |
| Male illustration | Assignment | | | Female illustration | Assignment | | |
|  | 1 | White | Relay1 |  | 1 | White | +4-20mA - Analog1 |
| | 2 | Brown | Relay1+ | | 2 | Brown | -4-20mA - Analog1 |
| | 3 | Green | Relay2 | | 3 | Green | +4-20mA – Analog2 |
| | 4 | Yellow | Relay2+ | | 4 | Yellow | -4-20mA – Analog2 |
| | 5 | Gray | +24 VDC | | 5 | Gray | A-RS485 |
| | 6 | Pink | GND | | 6 | Pink | B-RS485 |
| | 7 | Blue | NC | | 7 | Blue | RS-GND |
| | 8 | Red | NC | | 8 | Red | NC |

# WIO-sensor cable specification



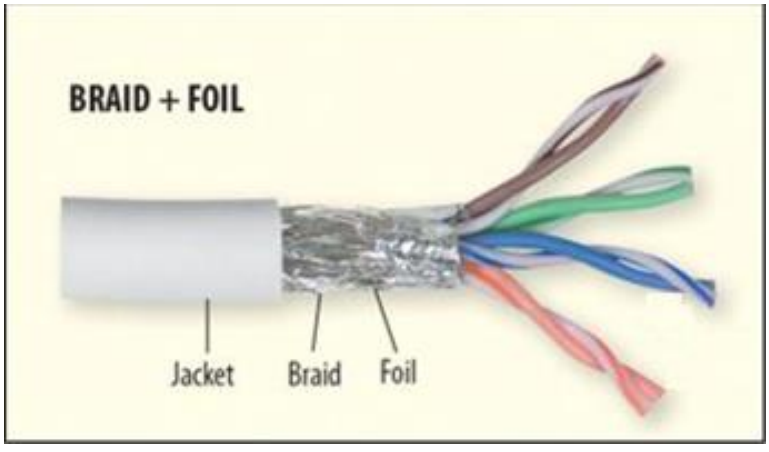

| 8 pol. Connectors pin layout | | | | | | |
|---|---|---|---|---|---|---|
| Female | | | Male | | | |
| A | Assignment | | B | Assignment | | |
| | Socket | Wire | | Plug | Wire | |
| | 1 | 1 | | 1 | 1 | |
| | 2 | 2 | | 2 | 2 | |
| | 3 | 3 | | 3 | 3 | |
| | 4 | 4 | | 4 | 4 | |
| | 5 | 5 | | 5 | 5 | |
| | 6 | 6 | | 6 | 6 | |
| | 7 | 7 | | 7 | 7 | |
| | 8 | 8 | | 8 | 8 | |

| Item No. | Description | Qty. |
|---|---|---|
| 1 | Female Plug | 1 |
| 4 | Ferrite Core | 2 |
| 2 | CL105 4x2x0.75-PO – 2m | 1 |
| 3 | Male Plug | 1 |

# Cable requirements for EMC

When connecting cables to the WIO sensor terminal boxes, PAJ Group recommends to use:

- ø6-12 mm cables (IP66 compliance)
- Cables with braided and foil shielding, with at least 85% coverage (EMC compliance).
- Ferrite beads with inner diameter appropriate to the chosen cable, 28 mm length, and ø17.5mm outer diameter, King Electronics supplier.

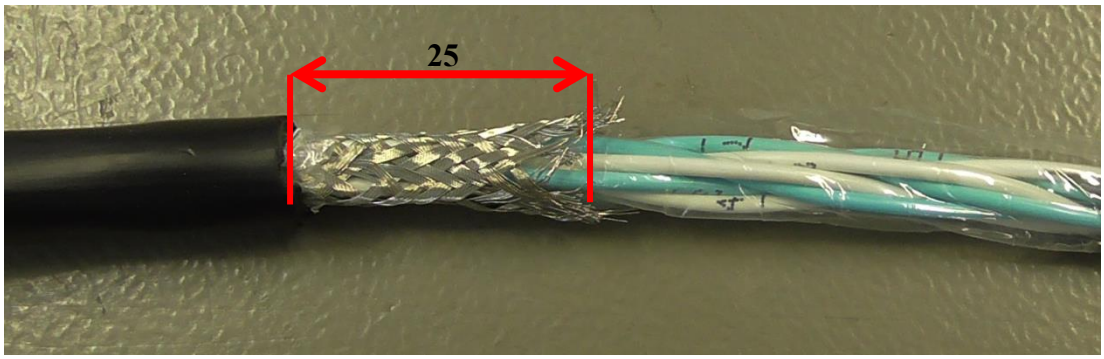


# Cable installation

Using cable specifications any different that the recommended ones may lead the product to be non-IP66 or EMC compliant. Also the cable shielding should be connected to the M20 glands in a specific way, in order to maintain EMC compatibility.

The pictures serve only demonstrational purposes. Actual installation may vary according to each terminal box and /or customer cables.

Remove cable insulation as needed to connect to the terminal box. Then cut cable shielding to 25mm.

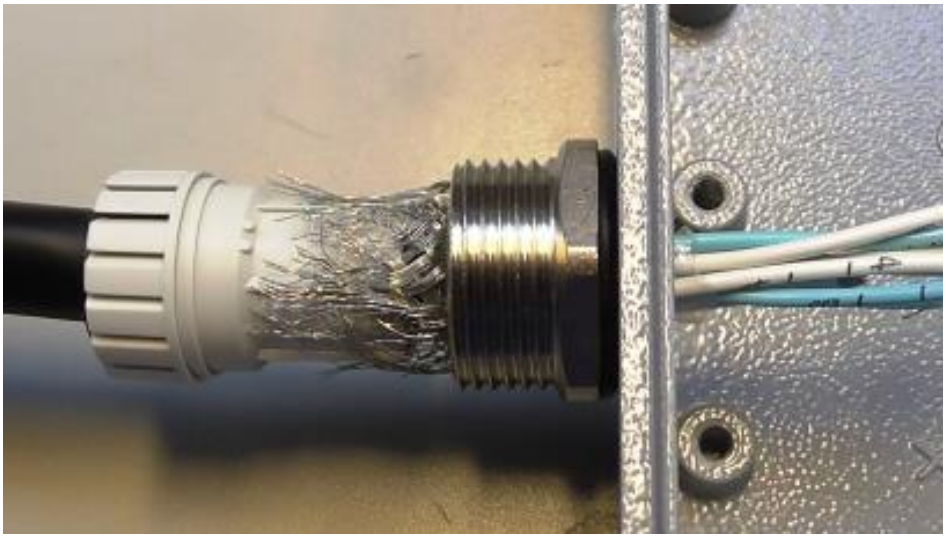



Remove the metal pressing nut from the M20 Gland and plastic pinch ring and install them on the cable. It is recommended to install a ferrite bead first, with the specifications mentioned earlier.

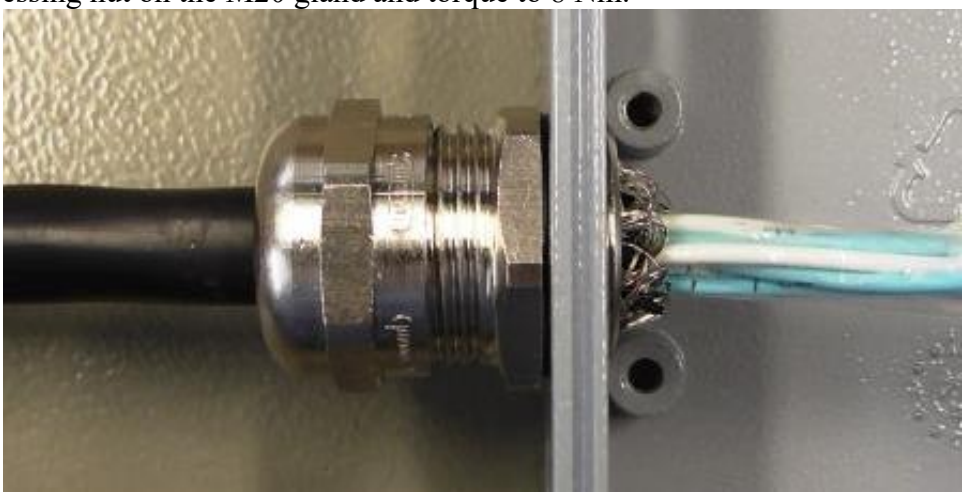


Roll the cable shielding back on the plastic pinch ring installed previously, then install the cable in the M20 gland. Ensure that the cable shield makes contact with the M20 gland evenly, in the 360° of the periphery.





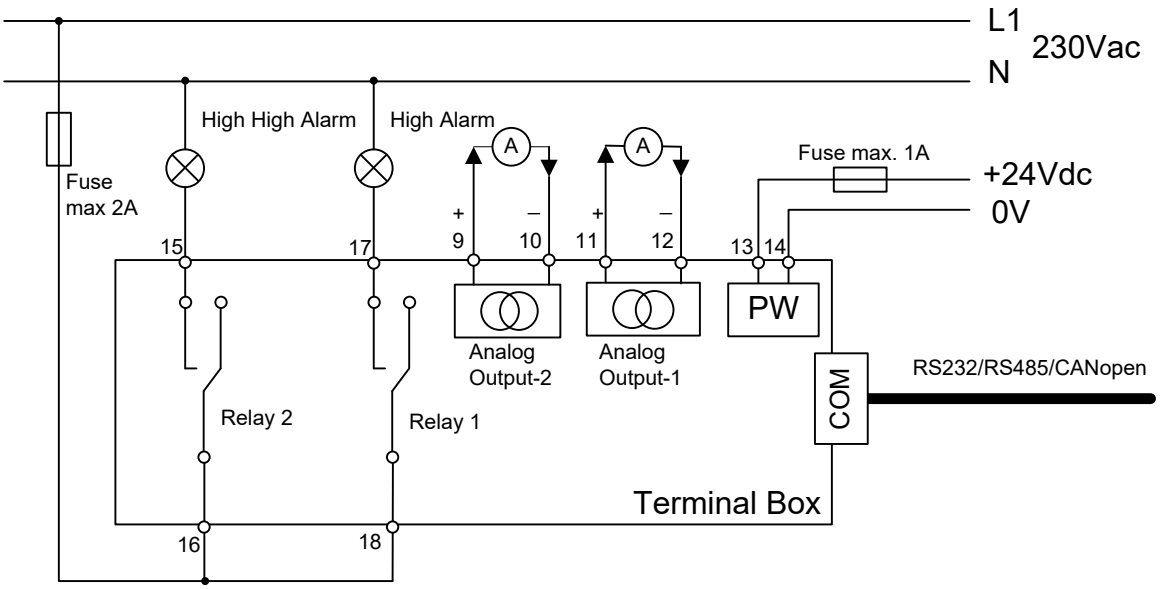
Install the pressing nut on the M20 gland and torque to 8 Nm.



These are the generic steps to be taken in order to ensure EMC compatibility of the WIO Sensor. They should be followed wherever cables go from the device itself to any of the users other devices.

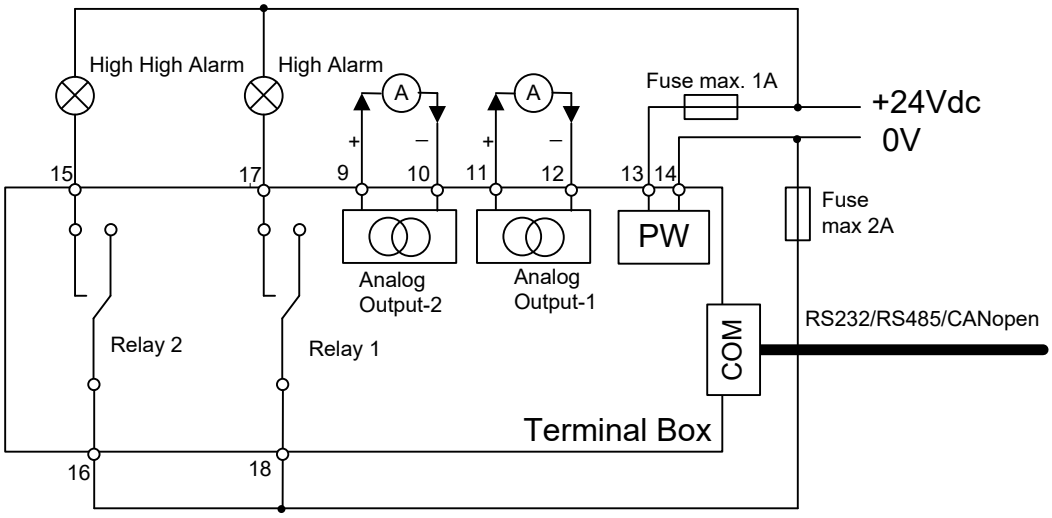
# Terminal box wiring example 1 (230 Vac)

This is a 230Vac setup, there is 230Vac on L1 & N. There is 24Vdc at Terminal Box 13 & 14. There is no alarm. The lamps are off, everything is OK.



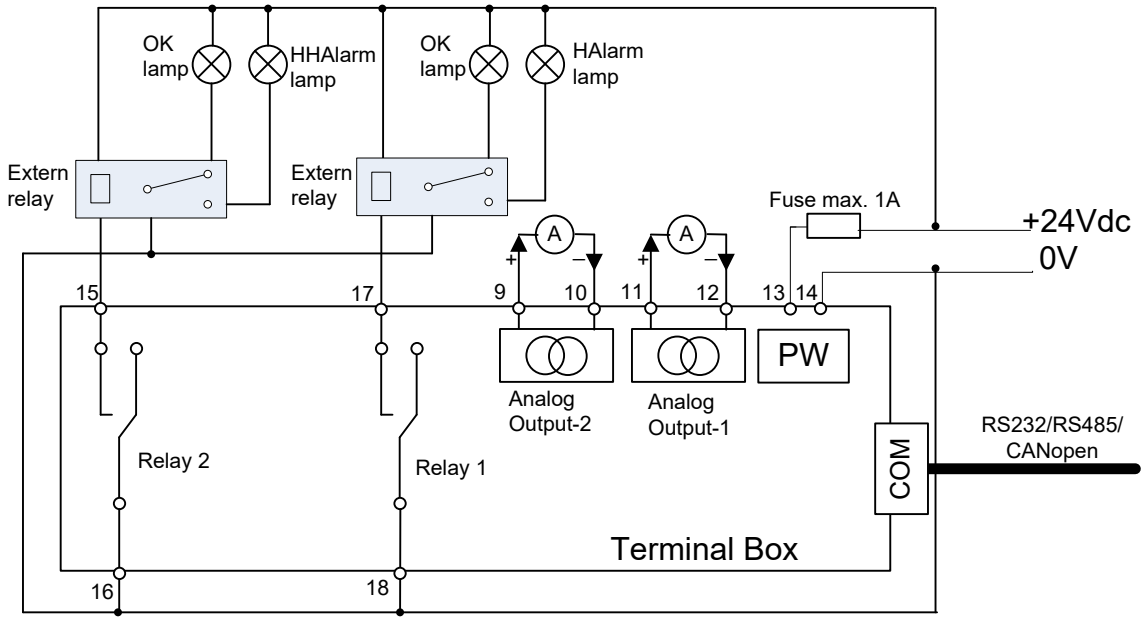

# Terminal box wiring example 2 (24Vdc)

This is a 24Vdc setup, there is no alarm. The lamps are off, everything is OK.

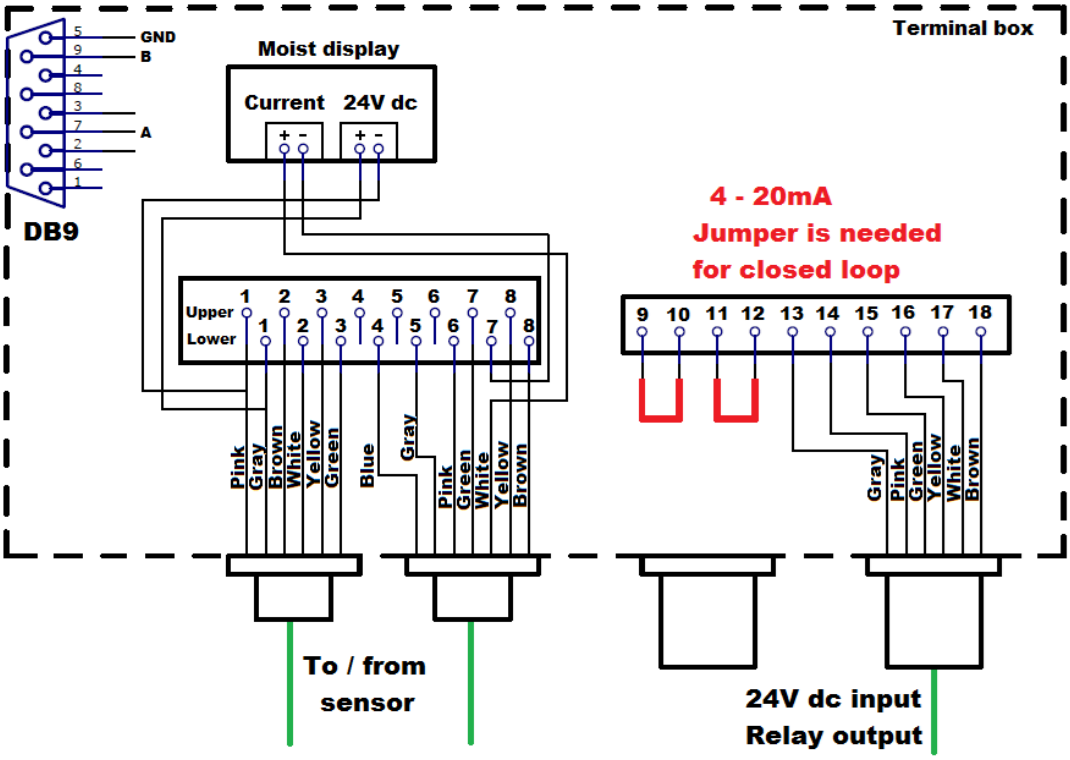


# Terminal box wiring example 3 (24Vdc)

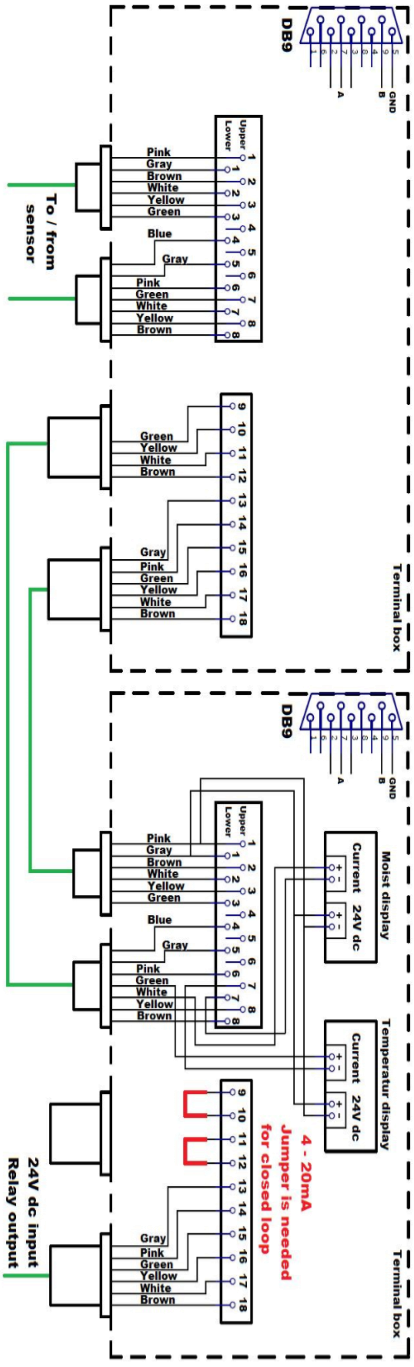
This is a 24Vdc setup, there is no alarm. The OK lamps are lit and everything is OK.




# Installation of 1 Terminal Box with 1 display

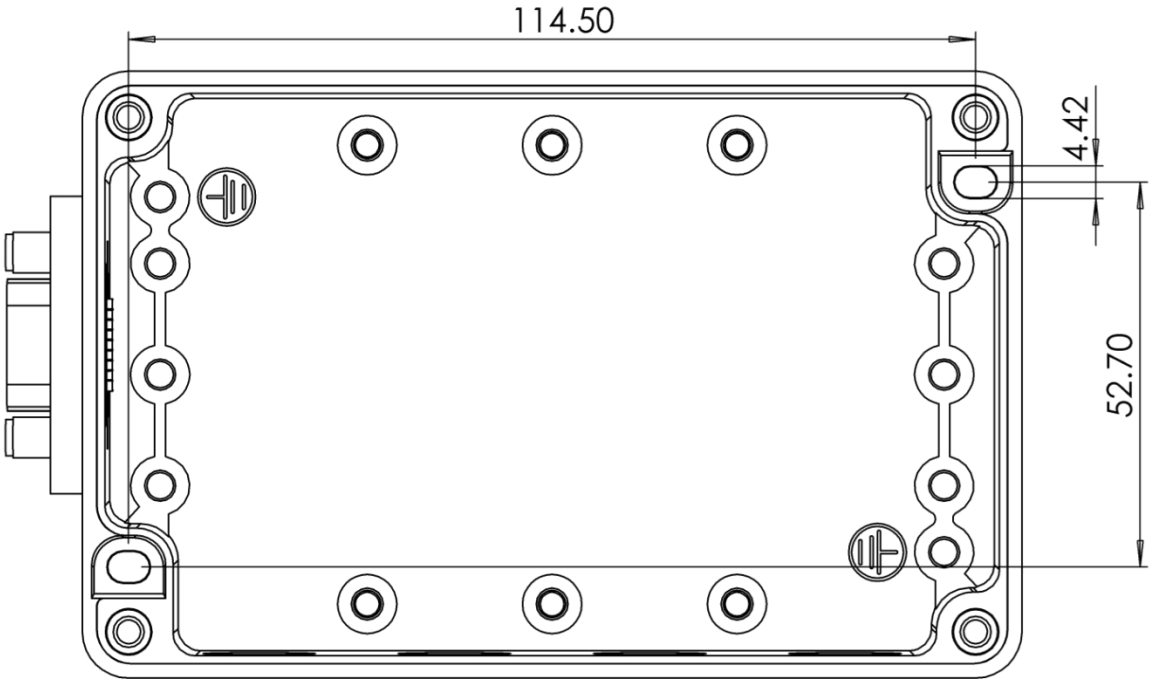


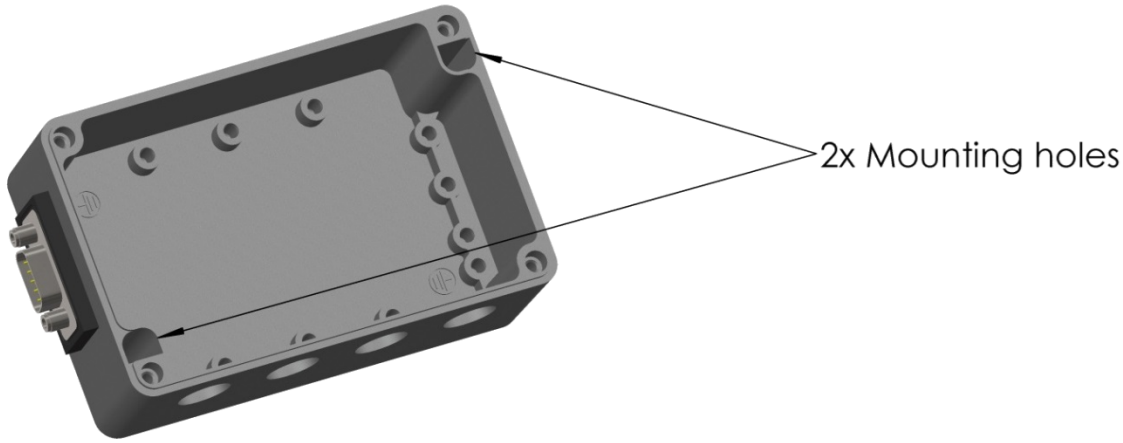

(Installation of 2 Terminal Boxes with 2 displays)




**More examples are shown in the user manual.**

# Drilling distances for the terminal box

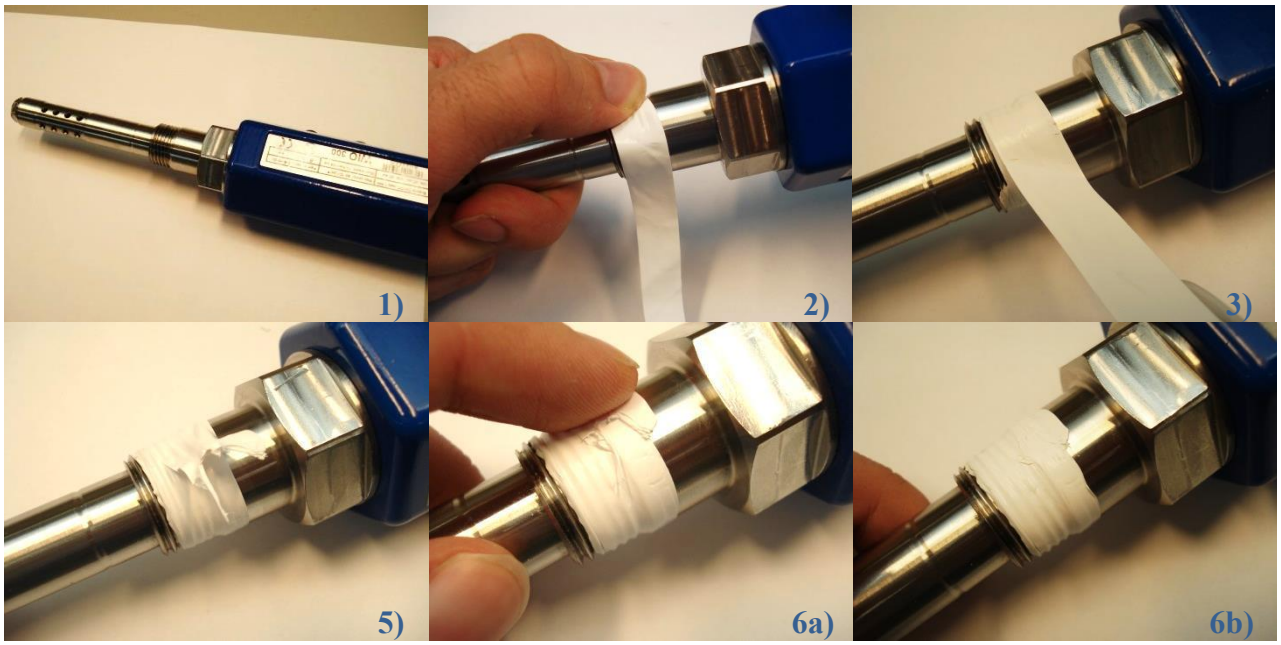


# Installation of WIO Sensor into pipe using PTFE seal tape

Our recommended seal tape is Unipak's TOPSEAL product, which is attached to the sensor shipment if requested.

Follow the steps as seen below:




1) Clean the sensor thread by removing any dirt or metal scraps.
2) Place the end of the tape on the second thread from the end of pipe, and hold it there with a finger.
3) Begin to wrap the tape tightly around sensor pipe, parallel to the thread. The direction of application has to be the opposite to the direction the pipe will be turned.
4) Wraps has to be done in a fashion, so the tape gets thicker on the opposite end, creating a better seal when turned into the pipe. 4-6 turns are recommended.
5) Break the tape from the roll by gripping it between thumb and forefinger and pulling sharply, it breaks easily.
6) Smooth the loose end over the threads.

WIO Sensor is now ready to be inserted into pipe.

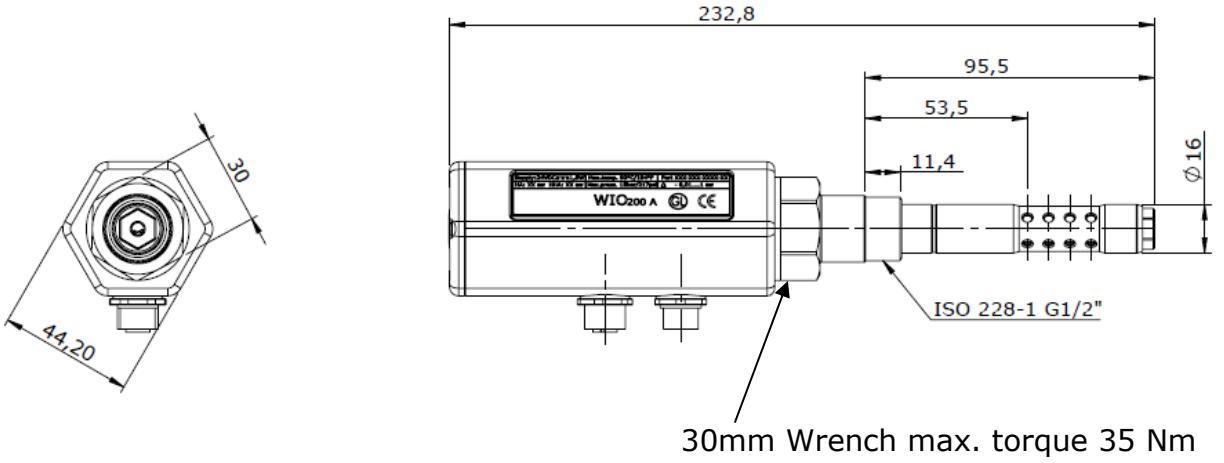
Data of seal tape:

**TOPSEAL** (12 m x 12 mm x 0.10 mm). HD. (density: 1.3 g/ cm3).
Temperature resistant from -200°C to +260°C.

| | | Item no. | VVS-no. | RSK-no. | NRF-no. | LVI-no. |
|---|---|---|---|---|---|---|
| Topseal | (10/250 stk./krt.) | 1000700 | 271406112 | 4054040 | 9507760 | 3265367 |

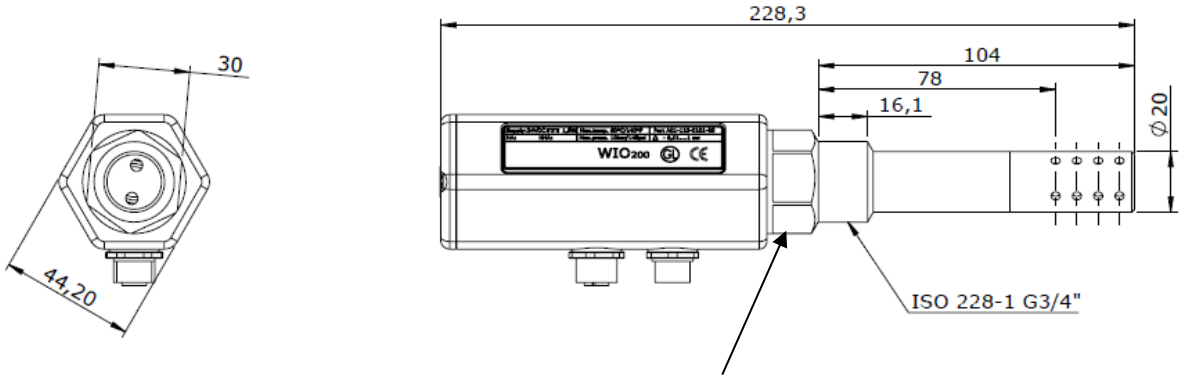
# WIO Sensor dimensions in mm

**WIO Standard ½" thread Sensor, Short** dimensions in mm:



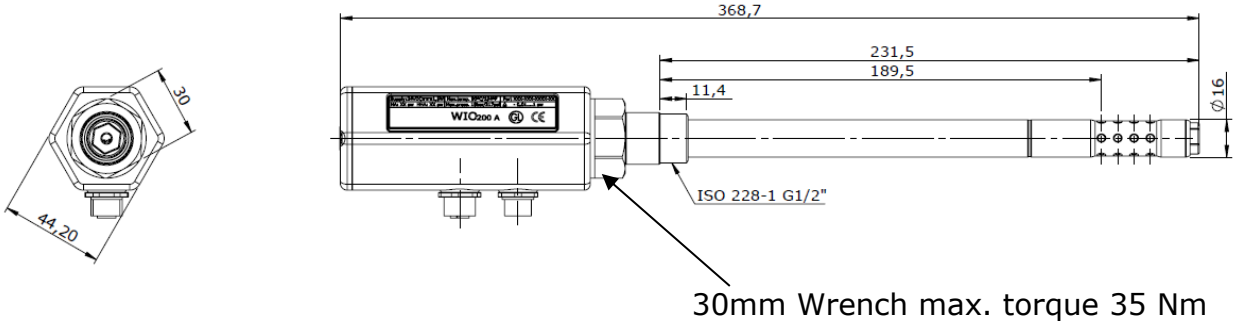

30mm Wrench max. torque 35 Nm

**WIO Standard ¾" thread Sensor, Short** dimensions in mm:




30mm Wrench max. torque 35 Nm

**WIO Ball Valve pipe ½" thread Sensor, Long** dimensions in mm:




30mm Wrench max. torque 35 Nm

# Terminal box dimensions in mm

