

# **PROCESS REFRACTOMETER PR-23**

**INSTRUCTION  
MANUAL**

IM-EN-PR23 Rev. 1.96



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# 1 Indicating transmitter DTR

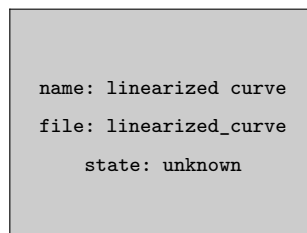
## 1.1 Indicating transmitter description

The Indicating transmitter DTR is a specialized computer designed to process data received from one or two sensors. The Indicating transmitter enclosure (Figure 1.1) contains a front panel with a backlit Liquid Crystal Display (LCD) and a keyboard. The front panel swings open to give access for connections and service. Knockout padlock provisions are included in the enclosure's both cover latches for locks to prevent unauthorized access.



**Figure 1.1** The Indicating transmitter enclosure

The sensors send the values of the refractive index  $n_D$  and the process temperature  $T$  to the DTR. The microprocessor system then linearizes the concentration reading (example in Figure 1.2), and performs an automatic temperature compensation.



**Figure 1.2** A linearized curve

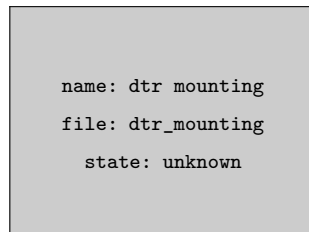
## 1.2 Mounting Indicating transmitter

The Indicating transmitter is mounted indoors, it should preferably be located in an easily accessible, well lit and dry area. Avoid vibration. Take interconnecting cable length into consideration when choosing the mounting location.

The enclosure is mounted vertically on an upright surface (wall) using four mounting feet, see Figure 1.3. The LCD is best viewed when approximately on the eye level of the user.

In sanitary installations, the recommendation is to use a DTR with stainless steel enclosure. If standard polycarbonate enclosure is used, it should be installed as remotely as practical from the product areas or connections.

Do not drill mounting holes in the enclosure as that will affect the protection class of the enclosure and damage the electronics.



**Figure 1.3** Indicating transmitter: dimensions (mm/in) and mounting feet measures

The LCD display has an operating temperature range of 0–50 °C and a storage temperature range of -20–60 °C.

The DTR does not have a built-in power switch. The system is always powered on when connected to a power source. Mounting an external power switch to control the DTR's power supply is recommended, Figure 1.6.

## 1.3 Electrical connections

### 1.3.1 Interconnecting cable

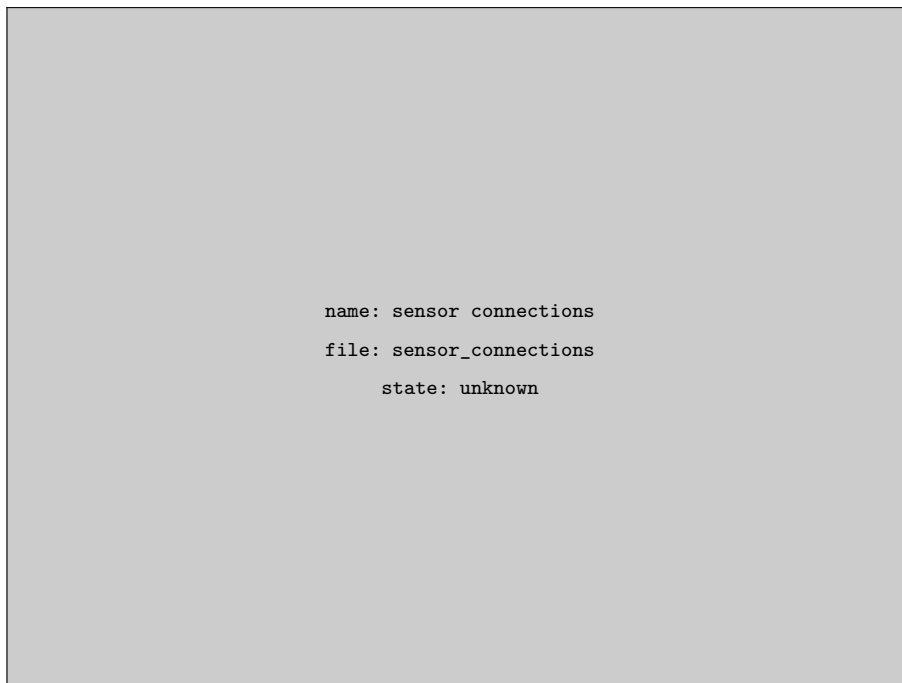
The cable contains a pair of twisted signal wires (1, 2) and a cable shield (3) (see Section 1.3.2 and Figure 1.7). Standard delivery is 10 meters (33 feet) of cable. The maximum length of an interconnecting cable is 200 m (660 ft). The signal wires (1, 2) are interchangeable (non-polarized). The cable shield is connected to the protective earth at the Indicating transmitter.

The junction box enables the use of customer's own cable as long as it meets IEC 61158M2 type A standard requirements, see Section ??, “”.

### 1.3.2 Connecting sensor

Sensor connector may not be connected or disconnected when the circuits are energized. Switch OFF the power from Indicating transmitter DTR external power switch before disconnecting the sensor cable from the sensor. After connecting sensor cable back to the sensor you can switch power back on.

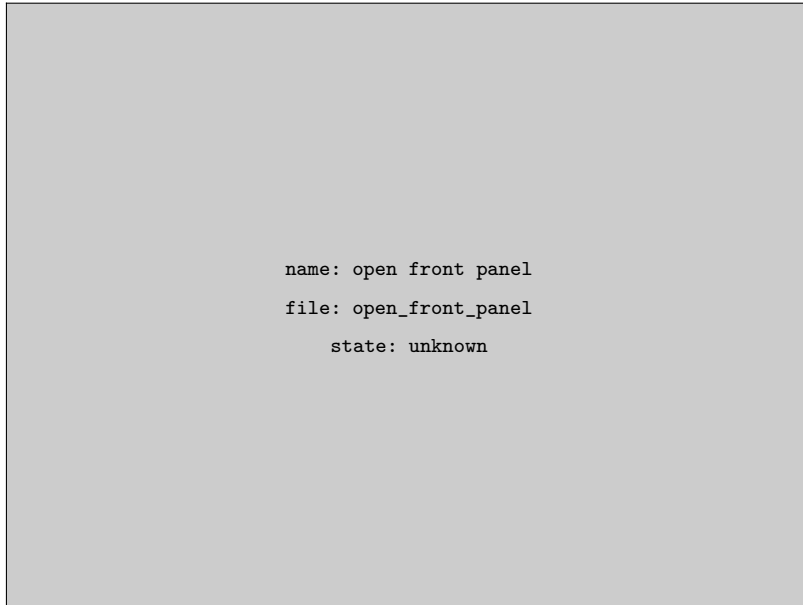
1. Remove the four screws holding the Sensor nameplate (Figure 1.4). The terminal strip is under the nameplate.
2. Connect the signal wires to terminal (1) and (2), and the cable shield to terminal (3).
3. Tighten up cable gland. Screw nameplate back on.



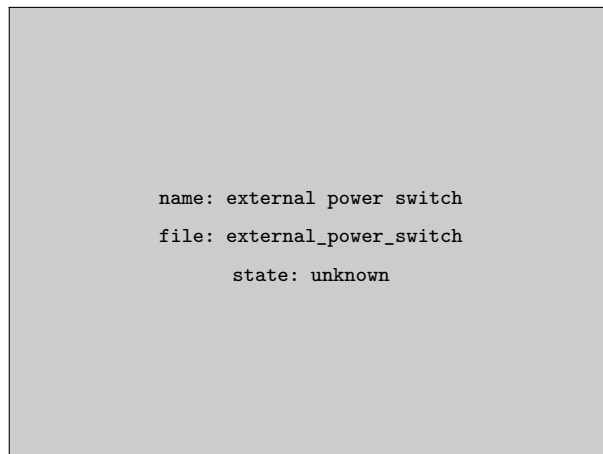
**Figure 1.4** Sensor electrical connections

### 1.3.3 Connecting the Indicating transmitter

All the electrical terminals of the Indicating transmitter are behind the Front panel. To access them, first open the enclosure cover. Then loosen the front panel screw (Figure 1.5) and swing open the Front panel. All terminals are now accessible.

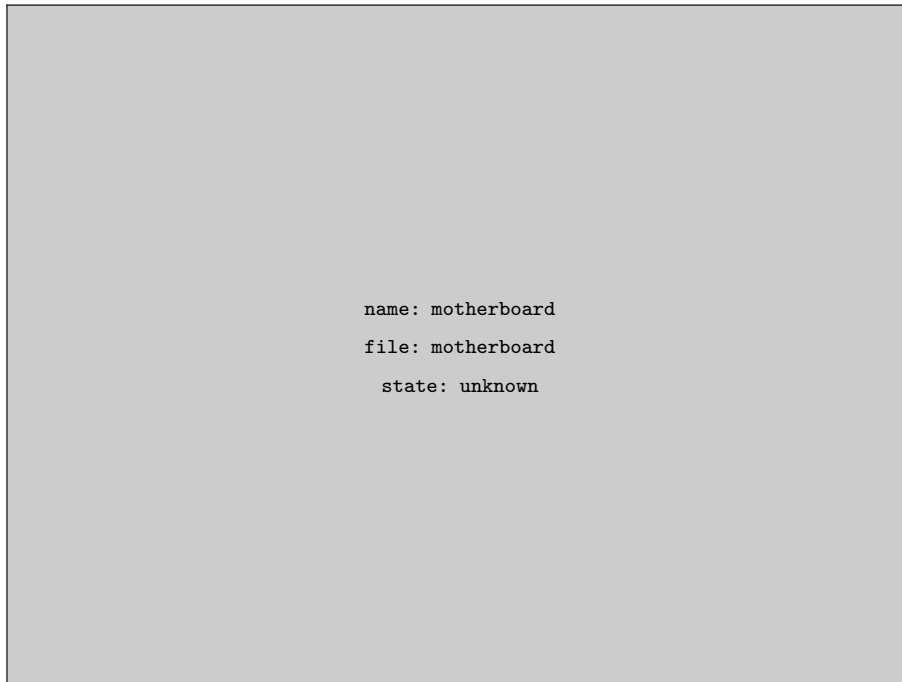


**Figure 1.5** Opening the Front panel of the Indicating transmitter



**Figure 1.6** The recommended external power switch, spare part nr PR-10900. The ratings of the switch are 10A/230V.

**Check that the power is off before opening the Front panel.** If the *green power indicator light* (Figure 1.5) is on, there is still power in the system. To completely turn the power off, use the external power switch. The external power switch shall be installed in accordance with the local installation requirements.



**Figure 1.7** Motherboard of the  
Indicating transmitter for AC power





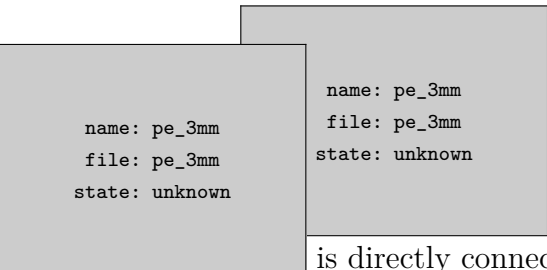
**Figure 1.8** Motherboard of the  
Indicating transmitter for 24V DC power

Description of the terminals on the H1 interface card PR-10701 and on the Transmitter motherboard PR-10600 (Figure 1.7):

<b>On H1</b>	
<b>A 1 2 3</b>	Connection for Sensor A, signal wires (1, 2), cable shield (3).
<b>B 1 2 3</b>	Connection for Sensor B, signal wires (1, 2), cable shield (3).
<b>On Motherboard</b>	
<b>11 12</b>	4–20 mA output 1, positive (11), negative (12), max. load 1000 Ohm, galvanically isolated.
<b>13 14</b>	4–20 mA output 2, positive (13), negative (14), max. load 1000 Ohm, galvanically isolated.
<b>21 22</b>	Relay 1, one contact output, max. 250 V AC, max. 3 A.
<b>23 24</b>	Relay 2, one contact output, max. 250 V AC, max. 3 A.
<b>31 32 33</b>	Power, L (31), N (32), protective earth (33), 100-240 V AC, 50–60 Hz. An external power switch (Figure 1.6) is recommended.
<b>41 42</b>	24V terminal for DTR internal use only. Connecting terminal to external 24V supply will void warranty. Connecting external devices to 24V terminal will void warranty.
<b>51 52 53 54 55</b>	Switch inputs: switch 1 (51), switch 2 (52), switch 3 (53), switch 4 (54) and common 3 volts for all inputs (55). The switch terminals are galvanically isolated.

### 1.3.4 Power terminals

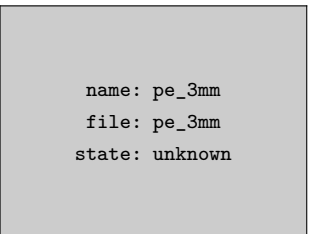
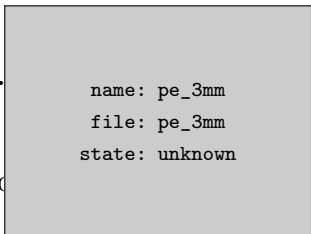
The primary AC power is supplied to the terminals marked **POWER** in the lower right corner of the transmitter motherboard (Figure 1.7). The three terminals are marked 31, 32, and 33 (protective earth). The power terminal 33/PE is directly connected to the exposed metal parts of the Indicating transmitter DTR. Wiring to the terminals shall be 1.5mm<sup>2</sup> minimum. The protective fuse in the building system shall comply with the local requirements.



to 31/32/33 marked in Figure 1.7). The three terminals are marked 31, 32, and 33 (protective earth).

### 1.3.5 Terminals for 24V DC power

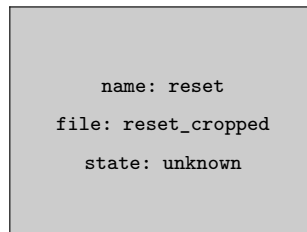
The 24V DC power is supplied to a terminal stripe marked **POWER** in the lower right corner of the transmitter motherboard (Figure 1.8). The three terminals are marked 41, 42, and 43 (protective earth). The power terminal 41 is directly connected to the exposed metal parts of the Indicating transmitter DTR.



The 24V DC power to this terminal stripe shall be supplied from a secondary circuit which is double or reinforced insulated from the mains supply within the limits for a limited-energy circuit (maximum 200 VA/U) according to the IEC 61010-1.

### 1.3.6 Reset button

It is possible to reset and restart both the Indicating transmitter DTR and the sensor(s) by pushing the reset button. The button is accessed through the cable hole in the front panel shield (see Figure 1.9 below). You need a thin stick or similar utensil, preferably of non-conducting material, to reach the reset button. After pressing the reset button, the display will black out for a few seconds. The instrument will be back to full operation within 30 seconds.



**Figure 1.9** Location of the reset button