

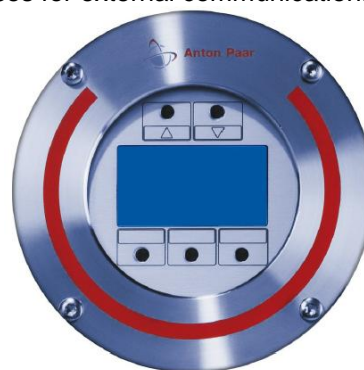
## Remote Operating Terminal (ROT) Operating Terminal (OT)



The **Remote Operating Terminal (ROT)** and the **Operating Terminal (OT)** are flexible evaluation units for Anton Paar Smart Sensors (e.g. Carbo 510, L-Vis 510). The OT is delivered directly mounted on the Smart Sensor. The ROT is separated from the Smart Sensor and is an own unit. It will be mounted either on a wall, pipe or optionally in an electronic panel. The communication between a Smart Sensor and the OT/ROT uses the Anton Paar CANopen bus system. This fieldbus system allows a cable length of up to 250 m between the Smart Sensor and the ROT. The OT/ROT provides several interfaces for external communication.



Remote Operating Terminal (ROT)



Operating Terminal (OT)

### Material numbers

|  |       |
|--|-------|
| Remote Operating Terminal for Smart Sensor | 94636 |
|--|-------|

| Interface boards            |       |
|-----------------------------|-------|
| Analog/Digital board OT/ROT | 96952 |
| PROFIBUS DP board OT/ROT    | 93948 |
| PROFINET IO board OT/ROT    | 97346 |
| EtherNet/IP board OT/ROT    | 97347 |
| Modbus TCP board OT/ROT     | 97348 |
| DeviceNet board OT/ROT      | 93950 |

#### Hints:

- One interface board must be ordered to operate the Smart Sensor with Operating Terminal or the Remote Operating Terminal.
- Only one of the interface board can be mounted in the housing of the Smart Sensor with Operating Terminal or the Remote Operating Terminal.

| Options  |        |
|--|--------|
| Panel Installation for Remote Operating Terminal   | 95150  |
| Connector Set 4-pole (instead of cable gland)  | 94633  |
| Connector Set CAN (instead of cable gland)   | 96554  |
| Cable for CAN-Bus 2 x 2 x 0.22 mm <sup>2</sup><br>shielded, twisted-pair, braid with drain wire<br>wave impedance (1 MHz): 126 Ω<br>conductor resistance: 186 Ω/km | 94268  |
| T-fitting for PROFIBUS DP  | 79478  |
| T-fitting for DeviceNet  | 134756 |
| Terminating plug M12, 4-pole for PROFIBUS  | 80985  |
| Terminating plug M12, 5-pole for CANopen / DeviceNet   | 83999  |
| Female Connector 5-pole, shieldable, B-coded (PROFIBUS)  | 17043  |
| Male Connector 5-pole, shieldable, B-coded (PROFIBUS)  | 17044  |
| Power supply AC 100-240 V, DC 24 V 3.75 A  | 79719  |
| Female connector, 5 pole shieldable (DeviceNet)  | 18848  |
| Cable connector, 5 pole, shieldable (DeviceNet)  | 42013  |

Hint: Additional information about the options see page 8.

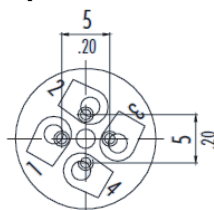


### Specifications Inputs/Outputs Analog/Digital board OT/ROT

|                  |   |  |
|------------------|---|--|
| 2 analog outputs | <b>Analog output</b>  | 4 – 20 mA (active), galvanically isolated  |
|                  | <b>Error current</b>  | 2 mA   |
|                  | <b>Max. load resistance</b>   | < 600 Ω  |
|                  | <b>Accuracy</b>   | 0.1% of maximal value (= 0.02 mA) at 25° C   |
|                  | <b>Temperature coefficient</b>  | max. 125 ppm/K, typical 50 ppm/K   |
|                  | <b>Resolution</b>   | 14 bit   |
|                  | <b>Filter</b>   | Low pass filter 4. order   |
|                  | <b>Filter cut-off frequency</b>   | 70 Hz  |
|                  | <b>Cable specification</b>  | cable shielded and twisted pair<br>recommended type: LiYCY, shield on one side   |
| Digital output   | <b>Function</b>   | limit monitoring or error status   |
|                  | <b>Digital output</b>   | active or passive (depending on requirements)  |
|                  | <b>Digital output active</b>  | The digital output provides an internal auxiliary voltage of DC 15 V (galvanically isolated) with a maximum output current of 30 mA to operate a signal lamp, relay or similar components.   |
|                  | <b>Digital output passive</b>   | external power supply necessary  |
|                  | <b>Power supply</b>   | DC 15 V to DC 30 V   |
|                  | <b>Nominal current</b>  | 0.5 A  |
|                  | <b>Maximum current</b>  | 1 A  |
|                  | <b>Breaking current</b>   | 2 A (after 50 μs)  |
|                  | <b>Max. internal resistance</b>   | 2 Ω  |
|                  | <b>Cable specification</b>  | shielded cable, recommended type: LiYCY<br>shield on one side  |
|                  | <b>Hints</b>  | - Digital output and digital input have a common ground.<br>- If the digital output is used passive, the ground potential of the auxiliary voltage must be equal to the ground potential of the digital output.<br>- Cabling see instruction manual. |
| Digital input    | <b>Function</b>   | start/stop the Smart Sensor or freeze measuring values   |
|                  | <b>Digital input</b>  | passive, galvanically isolated   |
|                  | <b>Power supply</b>   | DC 15 V to DC 30 V   |
|                  | <b>Level</b>  | maximal voltage for the status "0": DC 5 V<br>minimal voltage for the status "1": DC 15 V  |
|                  | <b>Frequency</b>  | max. 100 Hz  |
|                  | <b>Input current</b>  | max. 4.5 mA (@ V <sub>in</sub> = DC 30 V)  |
|                  | <b>Input impedance</b>  | > 5 kΩ   |
|                  | <b>Cable specification</b>  | shielded cable, recommended type: LiYCY<br>shield on one side  |
| <b>Hints</b>     | - Digital output and digital input have a common ground.<br>- Cabling see instruction manual. |  |

### Recommended pin assignment for option connector set 4-pole

|              | Power supply | AO    | DI/DO   |
|--------------|--------------|-------|---------|
| <b>Pin 1</b> | DC 24 V +    | AO1 + | DI      |
| <b>Pin 2</b> | not used     | AO1 – | DO      |
| <b>Pin 3</b> | DC 24 V -    | AO2 + | DIO +   |
| <b>Pin 4</b> | not used     | AO2 – | DIO GND |



Hint: If all inputs/outputs are used, 3 connector sets must be ordered.

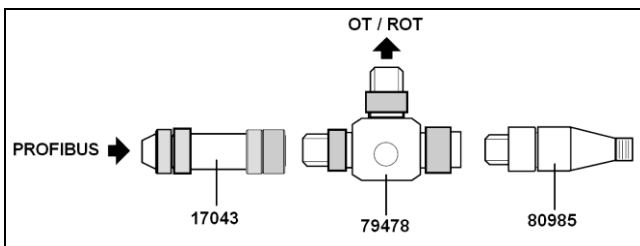
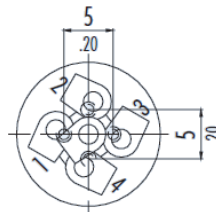
## Specifications PROFIBUS DP board OT/ROT

|   |                            |   |      |       |       |       |     |      |      |      |       |
|---|----------------------------|---|------|-------|-------|-------|-----|------|------|------|-------|
| <b>PROFIBUS DP data</b>                             | <b>Protocol</b>            | PROFIBUS DP<br>EN 50170-2, IEC 61158  |      |       |       |       |     |      |      |      |       |
|   | <b>Physical layer</b>      | RS485 (EIA-485)<br>linear bus with termination at both ends,<br>branch line 0.3 m |      |       |       |       |     |      |      |      |       |
|   | <b>Data rate</b>           | 9600 bit/s bis 12 Mbit/s<br>(automatic baud rate detection)                       |      |       |       |       |     |      |      |      |       |
| <b>Maximum line lengths at different data rates</b> | <b>Data rate [kbit/s]</b>  | 9,6   | 19,2 | 45,45 | 93,75 | 187,5 | 500 | 1500 | 3000 | 6000 | 12000 |
|   | <b>Line length [m]</b>     | 1200  | 1200 | 1200  | 1200  | 1000  | 400 | 200  | 100  | 100  | 100   |
| <b>Specifications PROFIBUS cable</b>                | <b>Cable specification</b> | PROFIBUS cable type A (IEC 61158)   |      |       |       |       |     |      |      |      |       |
|   | <b>Impedance</b>           | 135 Ω to 165 Ω (at 3 to 20 MHz)   |      |       |       |       |     |      |      |      |       |
|   | <b>Capacitance</b>         | < 30 pF/m   |      |       |       |       |     |      |      |      |       |
|   | <b>Loop resistance</b>     | < 110 Ω/km  |      |       |       |       |     |      |      |      |       |
|   | <b>Core diameter</b>       | > 0,64 mm   |      |       |       |       |     |      |      |      |       |
|   | <b>Core cross section</b>  | > 0,34 mm <sup>2</sup>  |      |       |       |       |     |      |      |      |       |

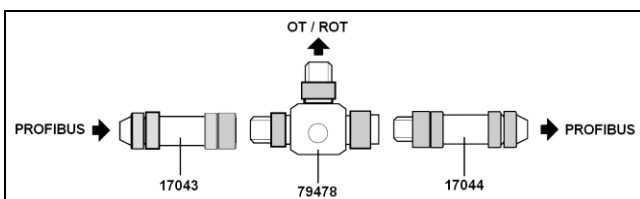
Hint: The current GSD file is on the USB stick (delivered with the PROFIBUS DP board).

### Pin assignment and connection diagram for option male connector / female connector / T-fitting / terminating plug (not included in delivery)

|              |   |
|--------------|---|
| <b>Pin 1</b> | Supply voltage of the terminating resistors |
| <b>Pin 2</b> | Data line A                                 |
| <b>Pin 3</b> | Data transmission potential                 |
| <b>Pin 4</b> | Data line B                                 |
| <b>Pin 5</b> | Shield (not used)                           |



Smart Sensor is the last device in the bus



Smart Sensor is not the last device in the bus

#### Hints:

- The female socket is already mounted on the OT/ROT on delivery.
- Figures see page 8.

# Remote Operating Terminal (ROT) Operating Terminal (OT)



**Anton Paar**

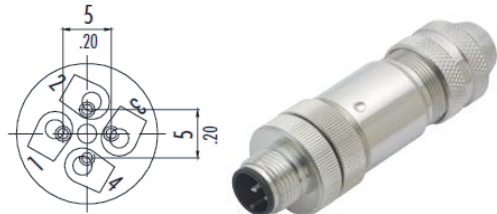
**Specifications**      **PROFINET IO board OT/ROT**  
**EtherNet/IP board OT/ROT**  
**Modbus TCP board OT/ROT**

|                                     |                            |  |
|-------------------------------------|----------------------------|--|
| <b>Fieldbuses based on Ehternet</b> | <b>Data rate</b>           | 100 Mbit/s   |
|                                     | <b>Maximum line length</b> | 100 m  |
| <b>Ethernet specifications</b>      | <b>Cable specification</b> | Shielded 4-wire Cat5 cable ("Twisted pair") or optical fiber |
|                                     | <b>Switches</b>            | Full duplex transfer, auto crossover, auto negotiation       |

Hint:    The current GSDML file is on the USB stick (delivered with the PROFINET IO board).  
The current EDS file is on the USB stick (delivered with the Ethernet/IP board)

## Pin assignment male connector (included in delivery)

|              | <b>PROFINET IO, EtherNet/IP, Modbus TCP</b> |
|--------------|---|
| <b>Pin 1</b> | Tx +  |
| <b>Pin 2</b> | Rx +  |
| <b>Pin 3</b> | Tx -  |
| <b>Pin 4</b> | Rx -  |

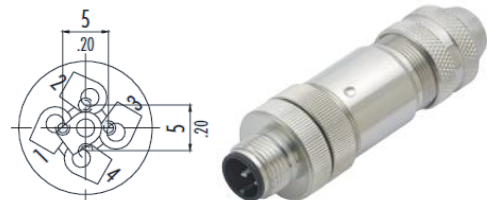


## Specifications CAN interface

|  |   |   |
|--|---|---|
| <b>Anton Paar CANopen specifications</b> | <b>Function</b>                                 | communication with Anton Paar Smart Sensor  |
|  | <b>Protocol</b>                                 | CAN 2.0 A   |
|  | <b>Maximum length of the entire CAN network</b> | 250 m (at 250 kbit/s)   |
|  | <b>Stubs</b>                                    | maximum 1 m   |
|  | <b>Cable specification</b>                      | PROFIBUS/CAN cable 2 x 2 x 0.22 mm <sup>2</sup> (acc. DIN 19245 and EN 50170) e.g. material number 94268 shield on one side |

## Pin assignment for option connector set CAN

|              |                |
|--------------|----------------|
| <b>Pin 1</b> | Shield         |
| <b>Pin 2</b> | V + (not used) |
| <b>Pin 3</b> | V - (CAN_GND)  |
| <b>Pin 4</b> | CAN_H          |
| <b>Pin 5</b> | CAN_L          |



## Specifications DeviceNet board OT/ROT

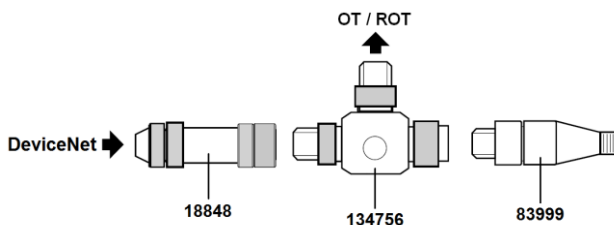
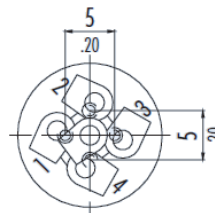
|                                     |  |                    |               |                            |
|-------------------------------------|--|--------------------|---------------|----------------------------|
| <b>Spezifications<br/>DeviceNet</b> | <b>Data rate</b>   | 125/250/500 kBit/s |               |                            |
|                                     | <b>Number of nodes</b>   | max. 64            |               |                            |
|                                     | <b>Core length per Physical layer</b>  | 125 kBit/s: < 500m |               |                            |
|                                     |  | 250 kBit/s: < 250m |               |                            |
|                                     |  | 500 kBit/s: < 100m |               |                            |
|                                     | <b>Stubs</b>   | <b>Baud Rate</b>   | <b>Length</b> | <b>Total length of all</b> |
|                                     |  | 500 kBit/s         | < 5m          | < 25m                      |
| 250 kBit/s                          |  | < 10m              | < 50m         |                            |
|                                     | 125 kBit/s   | < 20m              | < 100m        |                            |
| <b>Terminating resistance</b>       | 120 Ω  |                    |               |                            |
| <b>Cable specification</b>          | PROFIBUS/CAN cable 2 x 2 x 0,22 mm <sup>2</sup> (acc. DIN 19245 and EN 50170) e. g. material number 94268 shield on one side |                    |               |                            |

Hint:

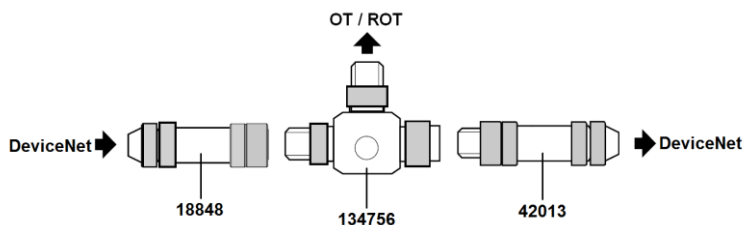
- The current EDS file is on the USB stick (delivered with the DeviceNet board).
- Stubs must not be furnished with a terminating resistance

## Pin assignment and connection diagram for option male connector / female connector / T-fitting / terminating plug (not included in delivery)

|              |            |
|--------------|------------|
| <b>Pin 1</b> | Shield     |
| <b>Pin 2</b> | V + (24 V) |
| <b>Pin 3</b> | V - (GND)  |
| <b>Pin 4</b> | CAN_H      |
| <b>Pin 5</b> | CAN_L      |



Smart Sensor is the last device in the bus



Smart Sensor is not the last device in the bus

Hints:

- The female socket is already mounted on the OT/ROT on delivery.
- Figures see page 8

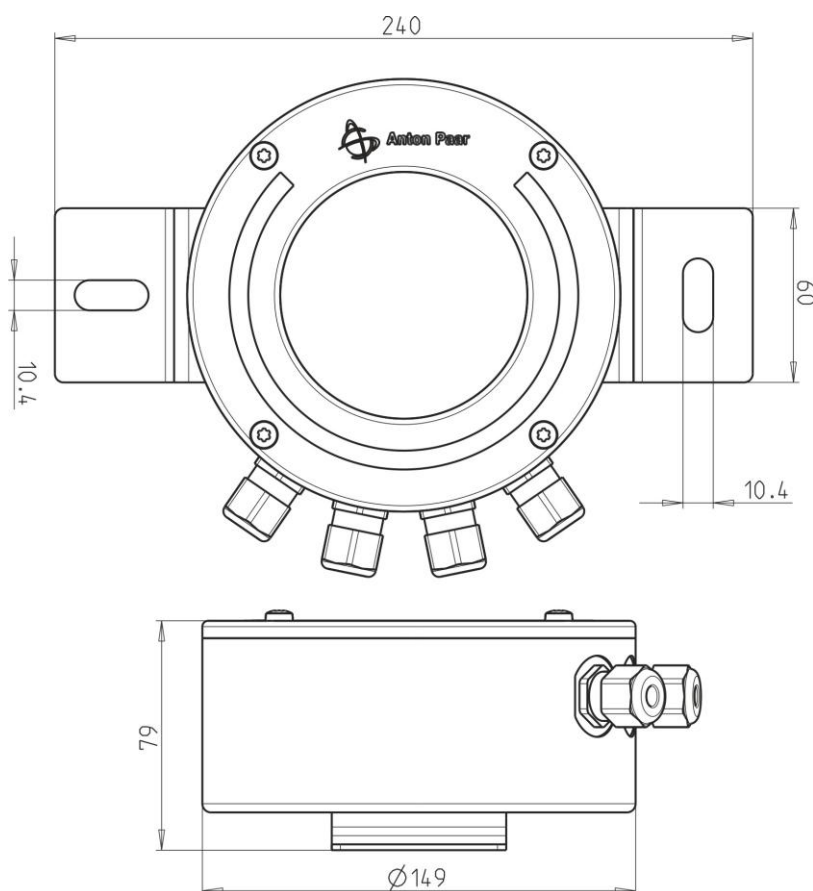


### Specifications Operating Terminal / Remote Operating Terminal

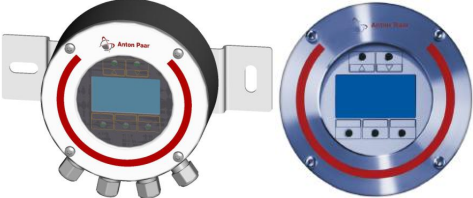
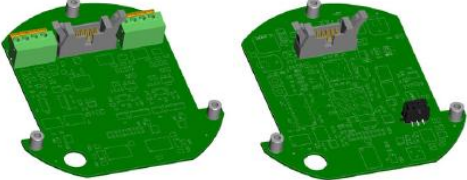
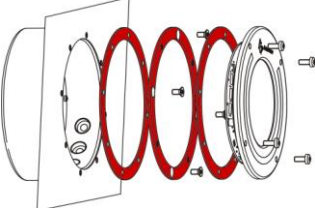

|  |                        |   |
|--|------------------------|---|
| Remote Operating Terminal                        | Housing material       | anodized aluminum   |
|  | Weight                 | approx. 2 kg  |
|  | Dimensions (L x B x H) | 240 mm x 149 mm x 79 mm                                     |
|  | Ambient temperature    | - 20 °C to + 40 °C  |
|  | Degree of protection   | IP67<br>IP65 with option panel installation                 |
|  | Relative humidity      | 0 to 90 % (non-condensing)                                  |
|  | Cable gland            | M16x1.5 D4.5-10 mm EMV                                      |
|  | Power consumption      | 5 W   |
|  | Power supply           | DC 24 V SELV -15%/+20%                                      |
| Operating Terminal and Remote Operating Terminal | Electrical connection  | spring type terminal  |
|  | Display system         | high-contrast LCD display with blue LED background lighting |
|  | Input system           | optical buttons   |

Hint: For further technical data on the Operating Terminal (OT) see data sheet / instruction manual of the individual Smart Sensor.

### Dimensions Remote Operating Terminal (ROT) [mm]



**Figures**

| Symbol  | Description   | Mat. No.   |
|---|---|--|
|    | <p>Remote Operating Terminal including the wall mounting device</p> <p>or</p> <p>Operating Terminal mounted on the Smart Sensor</p> | <p>94636 (ROT)</p> <p>Mat. No. of the Smart Sensor</p> |
|    | Analog/Digital board OT/ROT   | 93952  |
|   | PROFIBUS DP board OT/ROT  | 93948  |
|   | PROFINET IO board OT/ROT  | 97346  |
|   | EtherNet/IP board OT/ROT  | 97347  |
|   | Modbus TCP board OT/ROT   | 97348  |
|   | DeviceNet board OT/ROT  | 93950  |
|   | Option panel installation for Remote Operating Terminal (ROT)   | 95150  |
|  | Power supply AC 100-240 V, DC 24 V 3.75 A   | 79719  |



| Symbol  | Description  | Mat. No. |
|---|--|----------|
|    | Connector set 4-pole<br>(for Analog/Digital board or power supply)                             | 94633    |
|   | Connector set CAN<br>(for Anton Paar CAN interface)  | 96554    |
|    | T-fitting for PROFIBUS DP<br>(splitter for connecting the OT/ROT to PROFIBUS input and output) | 79478    |
|    | T-fitting for DeviceNet<br>(splitter for connecting the OT/ROT to DeviceNet input and output)  | 79478    |
|  | PROFIBUS terminating plug M12, 4-pole<br>(terminal resistor for the end of the PROFIBUS)       | 80985    |
|  | DeviceNet terminating plug, 5 pole<br>(terminating resistor CAN-open for DeviceNet)            | 83999    |
|  | Female Connector M12 715 5 pole B-Coded<br>(for the PROFIBUS input)                            | 17043    |
|   | Male Connector M12 715 5 pole B-Coded<br>(for the PROFIBUS output)                             | 17044    |
|  | Female connector, 5 pole shieldable (for the DeviceNet input)                                  | 18848    |
|   | Cable connector, 5 pole, shieldable (for the DeviceNet output)                                 | 42013    |
|  | Cable gland M16x1.5 D4.5-10 mm EMV<br>(already mounted on the ROT on delivery)                 | 90711    |