



# **WIO500 and WIOI500**

## **Water in oil sensor**

Datasheet Rev. 1.09

111881-922 Rev. 1.09 WIO500 Datasheet

Date: 2017-07-05



## Technical data, Sensors



WIO Standard 3/4" (ISO 228-1 G3/4"), Short



WIO Standard 1/2" (ISO 228-1 G1/2"), Short



WIO Ball Valve pipe, Long

| <b>Output</b>                       |   |
|-------------------------------------|---|
| Analogue output (galvanic isolated) | 4 – 20 mA for $a_w$                     |
| Analogue output (galvanic isolated) | 4 – 20 mA for temperature (0°C – 100°C) |
| Max. Load (analogue output)         | < 500Ω                                  |
| Measurement Range (4 – 20 mA)       | 0,01 – 1,00 $a_w$                       |
| Accuracy (0,05-0,95 $a_w$ )         | ± 0,03 $a_w$                            |
| Accuracy (outside 0,05-0,95 $a_w$ ) | ± 0,05 $a_w$                            |
| Resolution                          | < 0,004 $a_w$                           |
| Digital output                      | Communication CANopen                   |
| Communication Protocol              | Modbus RTU                              |
| <b>Input</b>                        |   |
| Supply nominal voltage              | 24V DC ± 10%                            |
| Max. residual voltage ripple        | 10%                                     |
| Maximum Load current                | 200 mA                                  |
| Max. Power input                    | < 4,8 VA                                |



| <b>Relays</b>                  |                          |
|--------------------------------|--------------------------|
| Contact arrangement            | 2 x Normally Closed (NC) |
| Rated voltage                  | 60V                      |
| Rated current (40°C)           | 1A                       |
| Max. DC Load breaking capacity |                          |
| Relay 1                        | „High Alarm“             |
| Relay 2                        | „High High Alarm“        |
| Default High Alarm             | 0,50 a <sub>w</sub>      |
| Default High High Alarm        | 0,90 a <sub>w</sub>      |

| <b>Socket specification</b>  |  |
|------------------------------|--|
| Connector design             | 1x male socket, 1x female socket   |
| Connector locking system     | Screw-locking, M12x1   |
| Wire gauge                   | 0,25 mm <sup>2</sup>   |
| Contacts                     | 8 Pol  |
| Rated voltage                | 60V  |
| Rated current (40°C)         | 1A   |
| <b>Cable specification</b>   |  |
| Cable design                 | Multipair overall screened cable   |
| Outlet diameter              | 9,9 mm   |
| Voltage class                | 0,6/1kV  |
| Wires                        | 4x2 twisted pair   |
| Wire gauge                   | 0,75 mm <sup>2</sup>   |
| <b>Media for measurement</b> |  |
| Lubrication oil              | Grade SAE 30/TBN 5-10  |
| Max. Oil temperature         | 90°C   |
| Max. Oil pressure            | Sensor mounting method in application:<br>Ball valve mounted: Max. 10 Bar<br>Thread mounted: Max. 20 Bar |



| <b>Response times</b>                                 |  |
|---|--|
| Delay before valid data from start-up                 | < 30 s   |
| Delay before valid data from installation (first use) | 10 minutes   |
| <b>Device Failure Indication</b>                      |  |
| Analogue output                                       | < 2 mA   |
| <b>Manual test</b>                                    |  |
| Press sensor test button for 5 seconds                | High Alarm turns on for 5 seconds  |
| Press sensor test button for 10 seconds               | High Alarm turns off<br>High High Alarm turns on for 5 seconds                             |
| Press sensor test button for 15 seconds               | Normal operating and test button ignored   |
| <b>Miscellaneous</b>                                  |  |
| Ambient Temperature, running / storage                | 0 - 90°C / -30 - +95°C   |
| Relative humidity for running and storage             | 10% up to 95%, no condensation   |
| Re calibration  | Recommended with max 3 years interval  |
| Warranty  | 2 years  |
| <b>Approvals</b>                                      |  |
| Germanischer Loyd                                     | WIO products are EU approval under 75 965 - 09 HH date 2009-11-30                          |
| <b>Enclosure</b>                                      |  |
| Weight for WIO standard                               | 650 grams  |
| Weight for WIO Ball valve pipe                        | 790 grams  |
| Connection (mechanical)                               | ISO 228-1 G 1/2" or 3/4" thread<br>2 x 8-pole connectors, male and female,<br>M12x1 thread |
| Enclosure material                                    | Stainless Steel/Aluminum EN44100 (Former 4261)   |
| Protective type                                       | IP66   |



## Technical Data, Terminal Boxes



| <b>Output</b>                     |  |
|-----------------------------------|--|
| Analogue output                   | See the specifications for sensor's analogue output          |
| Digital output                    | See the specifications for sensor's digital output           |
| <b>Input</b>                      |  |
| Supply nominal voltage            | 24V DC $\pm$ 10%   |
| Max. residual voltage ripple      | 10%  |
| Maximum Load current              | 200 mA   |
| Max. Power input                  | < 4,8 VA   |
| <b>Relays</b>                     |  |
| Contact arrangement               | 2 x Normally Open (NO)                                       |
| Rated voltage                     | 250 VAC  |
| Max. switching voltage            | 400VAC   |
| Rated current                     | 2A   |
| Breaking capacity max.            | 1250VA   |
| <b>Enclosure</b>                  |  |
| Weight                            | 650 grams  |
| Connection to sensor (mechanical) | 2 x 8-pole connectors, male and female, M12x1 thread         |
| Connection (mechanical)           | 2 x M20 gland, cable diameter 6 to 12 mm<br>1 x D-sub9, male |
| Enclosure material                | Aluminum   |
| Protective type                   | IP66   |
| Warranty                          | 2 years  |



## Technical Data Terminal Display Box



| <b>Output</b>  |  |
|--|--|
| Analogue output  | See the specifications for sensor's analogue output          |
| Digital output   | See the specifications for sensor's digital output           |
| <b>Input</b>   |  |
| Supply nominal voltage   | 24V DC $\pm$ 10%   |
| Max. residual voltage ripple   | 10%  |
| Maximum Load current   | 200 mA   |
| Max. Power input   | < 4,8 VA   |
| <b>Relays</b>  |  |
| Contact arrangement  | 2 x Normally Open (NO)                                       |
| Rated voltage  | 250 VAC  |
| Max. switching voltage   | 400VAC   |
| Rated current  | 2A   |
| Breaking capacity max.   | 1250VA   |
| <b>Display version - <math>a_w</math> (water activity from 0,01 to 1,00)</b> |  |
| Accuracy (0,05-0,95 $a_w$ )  | $\pm$ 0,03 $a_w$   |
| Resolution   | <0,004 $a_w$   |
| <b>Display version - PPM (H<sub>2</sub>O)</b>                                |  |
| Accuracy (0,05-0,95 $a_w$ )  | $\pm$ 30%  |
| Resolution   | 1 PPM  |
| <b>Enclosure</b>   |  |
| Weight   | 650 grams  |
| Connection to sensor (mechanical)  | 2 x 8-pole connectors, male and female, M12x1 thread         |
| Connection (mechanical)  | 2 x M20 gland, cable diameter 6 to 12 mm<br>1 x D-sub9, male |
| Enclosure material   | Aluminum   |
| Protective type  | IP66   |
| Warranty   | 2 years  |

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APPROVALS: ISO 9001, ISO 14001, ISO 13485, IEC 61340-51 & IPC-A-610 CLASS 3

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## Technical Data Terminal Box Alarm



| <b>Output</b>                     |  |
|-----------------------------------|--|
| Analogue output                   | See the specifications for sensor's analogue output          |
| Digital output                    | See the specifications for sensor's digital output           |
| <b>Input</b>                      |  |
| Supply nominal voltage            | 24V DC $\pm$ 10%   |
| Max. residual voltage ripple      | 10%  |
| Maximum Load current              | 200 mA   |
| Max. Power input                  | < 4,8 VA   |
| <b>Relays</b>                     |  |
| Contact arrangement               | 2 x Normally Open (NO)                                       |
| Rated voltage                     | 250 VAC  |
| Max. switching voltage            | 400VAC   |
| Rated current                     | 2A   |
| Breaking capacity max.            | 1250VA   |
| <b>Buzzer</b>                     |  |
| Oscillation frequency             | 3000 $\pm$ 500 Hz  |
| Sound pressure level              | 85db by open housing   |
| Tone                              | pulsed   |
| <b>Button with LED</b>            |  |
| Blink frequency                   | 2 Hz   |
| Color                             | RED  |
| <b>Enclosure</b>                  |  |
| Weight                            | 530 grams  |
| Connection to sensor (mechanical) | 2 x 8-pole connectors, male and female, M12x1 thread         |
| Connection (mechanical)           | 2 x M20 gland, cable diameter 6 to 12 mm<br>1 x D-sub9, male |
| Enclosure material                | Aluminum   |
| Protective type                   | IP66   |
| Warranty                          | 2 years  |



## Technical Data Terminal Box Alarm Buzzer



| <b>Output</b>  |   |
|--|---|
| Analogue output  | See the specifications for sensor's analogue output |
| Digital output   | See the specifications for sensor's digital output  |
| <b>Input</b>   |   |
| Supply nominal voltage   | 24V DC $\pm$ 10%                                    |
| Max. residual voltage ripple   | 10%   |
| Maximum Load current   | 200 mA  |
| Max. Power input   | < 4,8 VA  |
| <b>Relays</b>  |   |
| Contact arrangement  | 2 x Normally Open (NO)                              |
| Rated voltage  | 250 VAC   |
| Max. switching voltage   | 400VAC  |
| Rated current  | 2A  |
| Breaking capacity max.   | 1250VA  |
| <b>Display version - <math>a_w</math> (water activity from 0,01 to 1,00)</b> |   |
| Accuracy (0,05-0,95 $a_w$ )  | $\pm$ 0,03 $a_w$                                    |
| Resolution   | <0,004 $a_w$  |
| <b>Display version - PPM (H<sub>2</sub>O)</b>                                |   |
| Accuracy (0,05-0,95 $a_w$ )  | $\pm$ 30%   |
| Resolution   | 1 PPM   |
| <b>Buzzer</b>  |   |
| Oscillation frequency  | 3000 $\pm$ 500 Hz                                   |
| Sound pressure level   | 85db by open housing                                |
| Tone   | pulsed  |





| <b>Button with LED</b>            |  |
|-----------------------------------|--|
| Blink frequency                   | 2 Hz   |
| Color                             | RED  |
| <b>Enclosure</b>                  |  |
| Weight                            | 650 grams  |
| Connection to sensor (mechanical) | 2 x 8-pole connectors, male and female, M12x1 thread         |
| Connection (mechanical)           | 2 x M20 gland, cable diameter 6 to 12 mm<br>1 x D-sub9, male |
| Enclosure material                | Aluminum   |
| Protective type                   | IP66   |
| Warranty                          | 2 years  |



## Technical Data Terminal Box Alarm Buzzer



| <b>Output</b>  |   |
|--|---|
| Analogue output  | See the specifications for sensor's analogue output |
| Digital output   | See the specifications for sensor's digital output  |
| <b>Input</b>   |   |
| Supply nominal voltage   | 24V DC $\pm$ 10%                                    |
| Max. residual voltage ripple   | 10%   |
| Maximum Load current   | 200 mA  |
| Max. Power input   | < 4,8 VA  |
| <b>Relays</b>  |   |
| Contact arrangement  | 2 x Normally Open (NO)                              |
| Rated voltage  | 250 VAC   |
| Max. switching voltage   | 400VAC  |
| Rated current  | 2A  |
| Breaking capacity max.   | 1250VA  |
| <b>Display version - <math>a_w</math> (water activity from 0,01 to 1,00)</b> |   |
| Accuracy (0,05-0,95 $a_w$ )  | $\pm$ 0,03 $a_w$                                    |
| Resolution   | <0,004 $a_w$  |
| <b>Display version - PPM (H<sub>2</sub>O)</b>                                |   |
| Accuracy (0,05-0,95 $a_w$ )  | $\pm$ 30%   |
| Resolution   | 1 PPM   |
| <b>Display version - °C</b>  |   |
| Accuracy   | $\pm$ 2°C   |
| Resolution   | 0,01 °C   |



| <b>Buzzer</b>                     |  |
|-----------------------------------|--|
| Oscillation frequency             | 3000±500 Hz  |
| Sound pressure level              | 85db by open housing   |
| Tone                              | pulsed   |
| <b>Button with LED</b>            |  |
| Blink frequency                   | 2 Hz   |
| Color                             | RED  |
| <b>Enclosure</b>                  |  |
| Weight                            | 750 grams  |
| Connection to sensor (mechanical) | 2 x 8-pole connectors, male and female, M12x1 thread         |
| Connection (mechanical)           | 2 x M20 gland, cable diameter 6 to 12 mm<br>1 x D-sub9, male |
| Enclosure material                | Aluminum   |
| Protective type                   | IP66   |
| Warranty                          | 2 years  |



## Technical data, WIOI (WIO Integrated)



| <b>Output</b>                       |  |
|-------------------------------------|--|
| Analogue output (galvanic isolated) | 4 – 20 mA for $a_w$<br>4 – 20 mA for temperature (0°C – 100°C) |
| Max. Load (analogue output)         | < 500Ω   |
| Measurement Range (4 – 20 mA)       | 0,01 – 1,00 $a_w$  |
| Accuracy (0,05-0,95 $a_w$ )         | ± 0,03 $a_w$   |
| Accuracy (outside 0,05-0,95 $a_w$ ) | ± 0,05 $a_w$   |
| Resolution                          | < 0,004 $a_w$  |
| Digital output                      | Communication CANopen  |
| Communication Protocol              | Modbus RTU   |
| <b>Input</b>                        |  |
| Supply nominal voltage              | 24V DC ± 10%   |
| Max. residual voltage ripple        | 10%  |
| Maximum Load current                | 200 mA   |
| Max. Power input                    | < 4,8VA  |



| <b>Relays</b>                  |  |
|--------------------------------|--|
| Contact arrangement            | 2 x Normally Open (NO)   |
| Rated voltage                  | 250VAC   |
| Max. switching voltage         | 400VAC   |
| Rated current                  | 2A   |
| Breaking capacity max.         | 1250VA   |
| Max. DC Load breaking capacity | <p>The graph plots DC voltage [Vdc] on the y-axis (ranging from 10 to 300) against DC current [A] on the x-axis (ranging from 0.1 to 20). A curve labeled 'resistive load' shows the relationship between voltage and current. The voltage is constant at 300V for currents up to approximately 0.2A, then decreases as current increases, reaching 30V at 5A.</p> |
| Relay 1                        | „High Alarm“   |
| Relay 2                        | „High High Alarm“  |
| Default High Alarm             | 0,50 a <sub>w</sub>  |
| Default High High Alarm        | 0,90 a <sub>w</sub>  |

| <b>Cable specification</b> |                                  |
|----------------------------|----------------------------------|
| Cable design               | Multipair overall screened cable |
| Outlet diameter            | 9,9 mm                           |
| Voltage class              | 0,6/1kV                          |
| Wires                      | 4x2 twisted pair                 |
| Wire gauge                 | 0,75 mm <sup>2</sup>             |

| <b>Media for measurement</b> |  |
|------------------------------|--|
| Lubrication oil              | Grade SAE 30/TBN 5-10  |
| Max. Oil temperature         | 90°C   |
| Max. Oil pressure            | Sensor mounting method in application:<br>Ball valve mounted: Max. 10 Bar<br>Thread mounted: Max. 20 Bar |

| <b>Response times</b>                                 |            |
|---|------------|
| Delay before valid data from start-up                 | < 30 s     |
| Delay before valid data from installation (first use) | 10 minutes |



| <b>Device Failure Indication</b>  |   |
|---|---|
| Analogue output   | < 2 mA  |
| <b>Manual test</b>  |   |
| Press sensor test-button for 5 seconds                                    | High Alarm turns on for 5 seconds   |
| Press sensor test-button for 10 seconds                                   | High Alarm turns off<br>High High Alarm turns on for 5 seconds                              |
| Press sensor test-button for 15 seconds                                   | Normal operating and test button ignored  |
| <b>Display version - a<sub>w</sub> (water activity from 0,01 to 1,00)</b> |   |
| Accuracy (0,05-0,95 a <sub>w</sub> )                                      | ± 0,03 a <sub>w</sub>   |
| Resolution  | <0,004 a <sub>w</sub>   |
| <b>Display version - PPM (H<sub>2</sub>O)</b>                             |   |
| Accuracy (0,05-0,95 a <sub>w</sub> )                                      | ±30%  |
| Resolution  | 1 PPM   |
| <b>Buzzer</b>   |   |
| Oscillation frequency   | 3000±500 Hz   |
| Sound pressure level  | 85db by open housing  |
| Tone  | pulsed  |
| <b>Button with LED</b>  |   |
| Blink frequency   | 2 Hz  |
| Color   | RED   |
| <b>Enclosure</b>  |   |
| Weight  | 4000 grams  |
| Connection (mechanical)   | ISO 228-1 G ½" or ¾" thread<br>2 x gland M20, cable diameter 6 to 12 mm<br>1 x D-sub9, male |
| Enclosure material  | Stainless Steel/Aluminum EN44100 (Former 4261)  |
| Protective type   | IP66  |

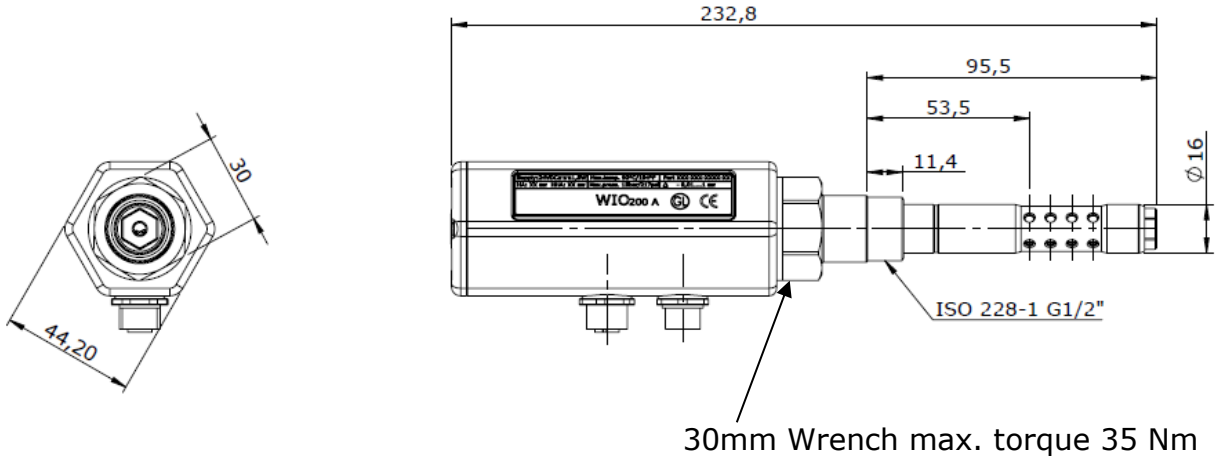


| <b>Miscellaneous</b>                      |   |
|---|---|
| Ambient Temperature, running / storage    | 0 - 90°C / -30 - +95°C  |
| Relative humidity for running and storage | 10% up to 95%, no condensation                                    |
| Re calibration                            | Recommended with max 3 years interval                             |
| Warranty                                  | 2 years   |
| <b>Approvals</b>                          |   |
| Germanischer Lloyd                        | WIO products are EU approval under 75 965 - 09 HH date 2009-11-30 |

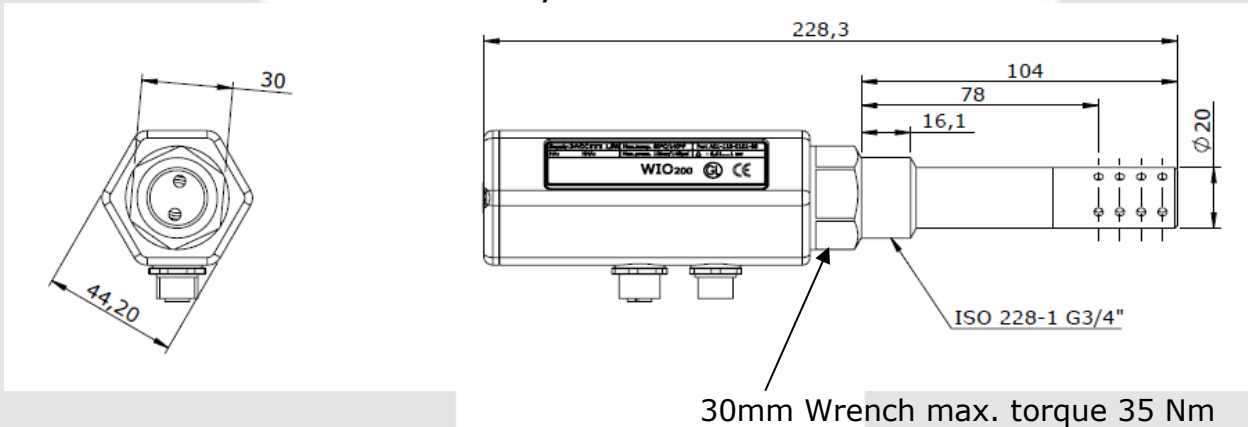


## WIO Sensors, dimensions in mm

### WIO Standard 1/2" thread Sensor, Short dimensions in mm:



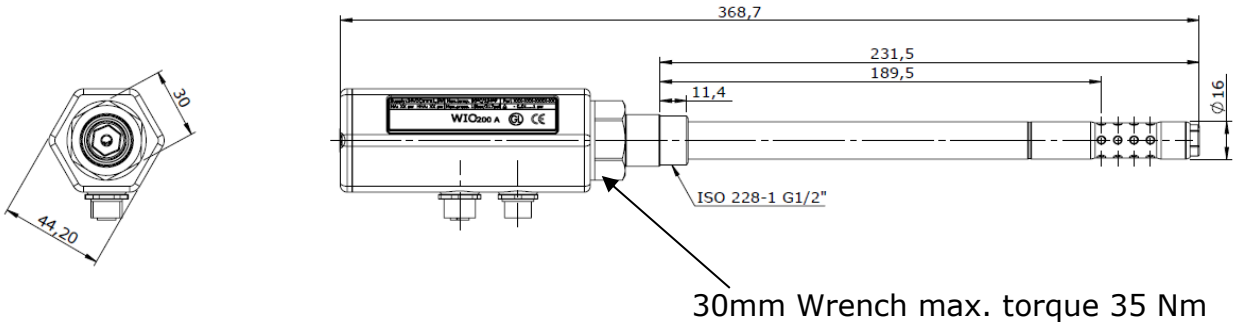
### WIO Standard 3/4" thread Sensor, Short dimensions in mm:



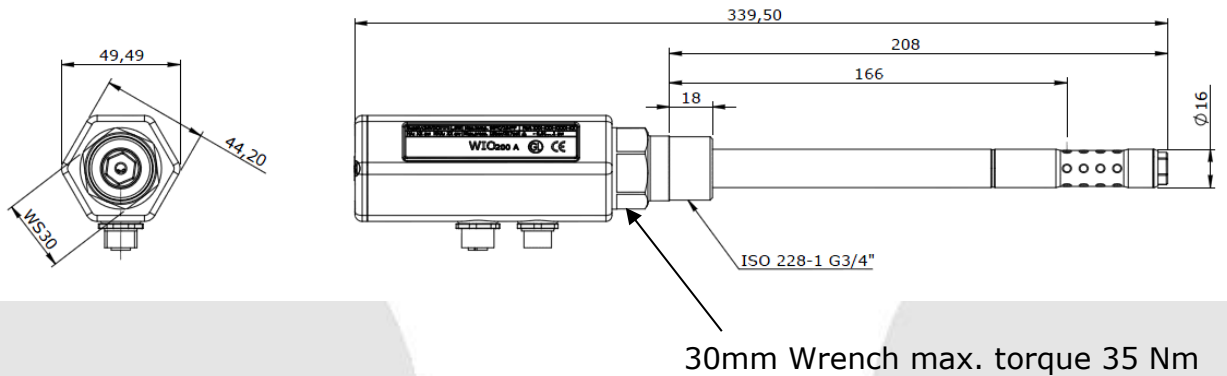




**WIO Ball Valve pipe 1/2" thread Sensor, Long dimensions in mm:**

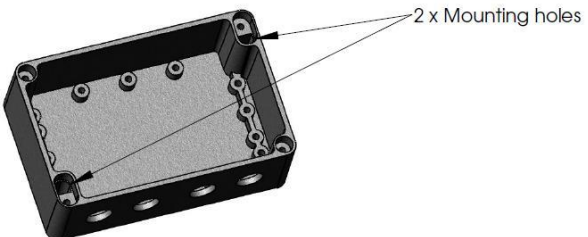
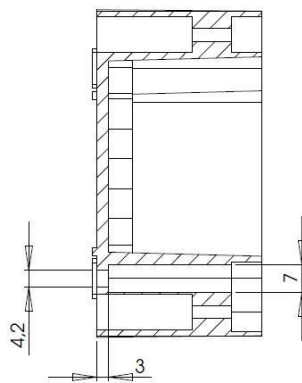
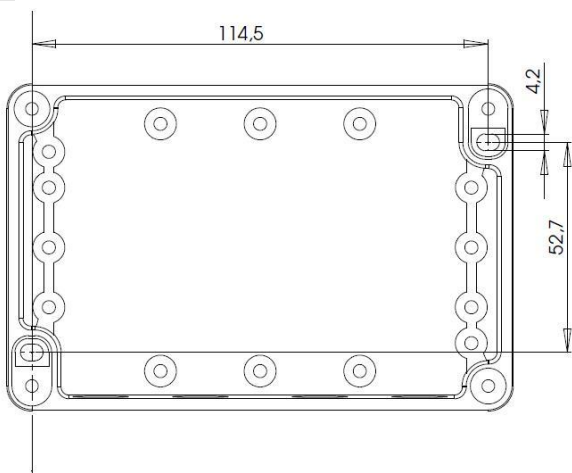
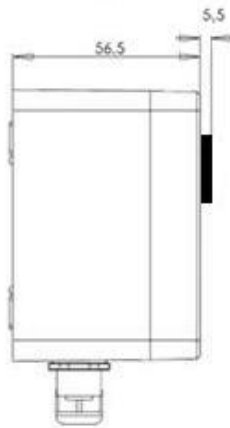
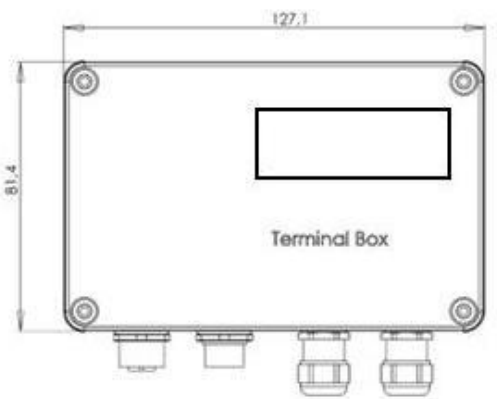
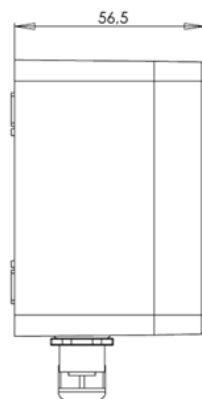
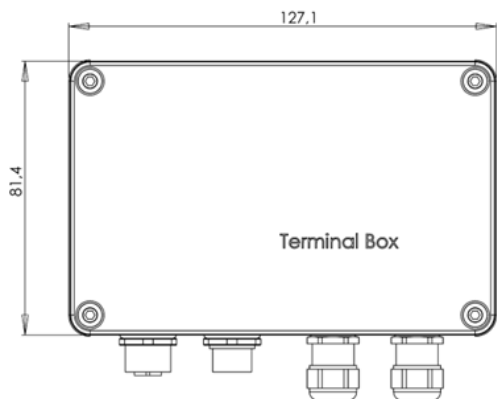


**WIO Ball Valve pipe 3/4" thread Sensor, Long dimensions in mm:**



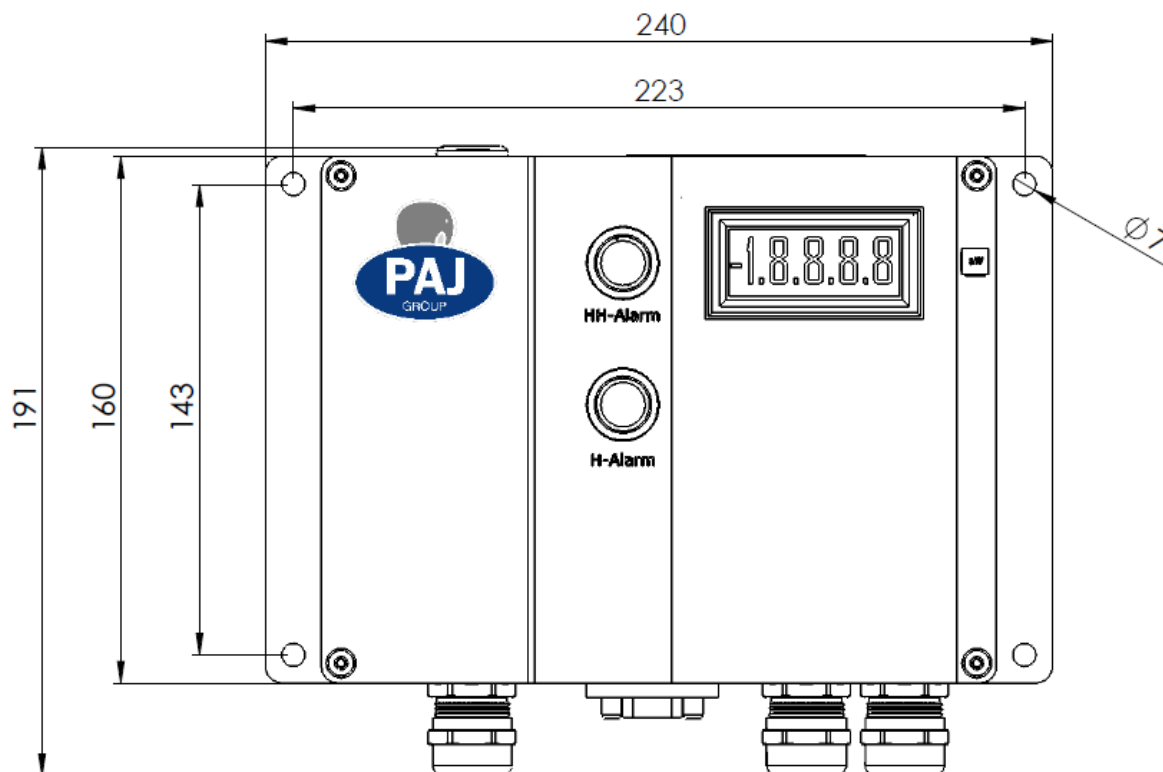


## Terminal box, dimensions in mm

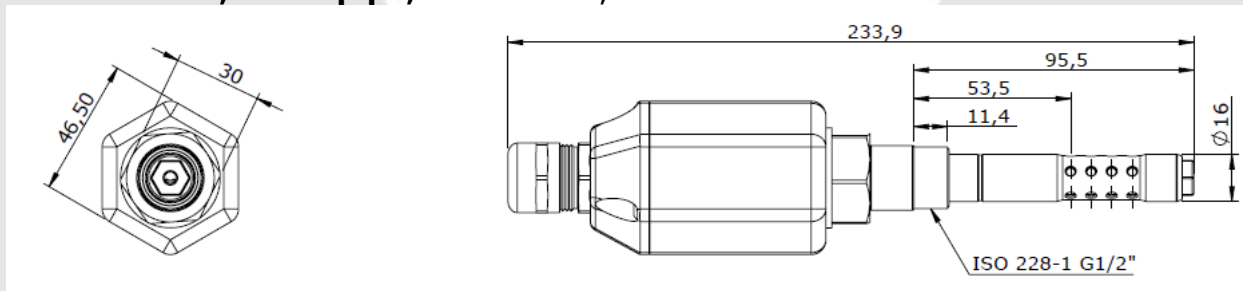




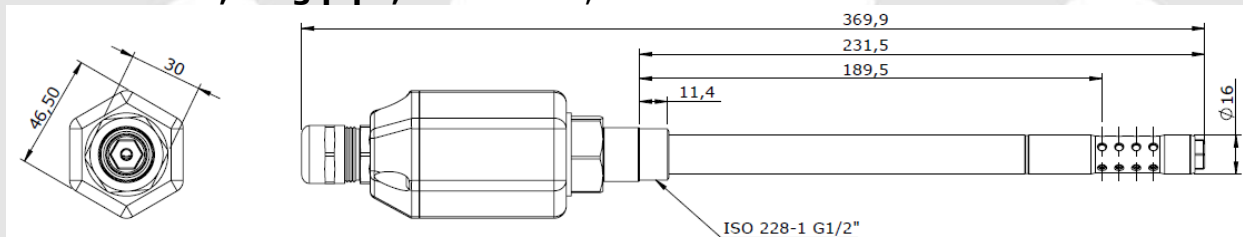
## WIO Integrated (WIOI), dimensions in mm



## WIOI Sensor, short pipe, 1/2" thread, dimensions in mm:



## WIOI Sensor, long pipe, 1/2" thread, dimensions in mm:



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APPROVALS: ISO 9001, ISO 14001, ISO 13485, IEC 61340-51 & IPC-A-610 CLASS 3

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**WIOI Sensor, long pipe, 3/4" thread, dimensions in mm:**

