

# Model LV36

## Submersible Liquid Level Transducers and Transmitters with Flush Diaphragm



### Description

Fully made from 316L stainless steel, model LV36 liquid level transducer and transmitter is designed to be submerged in dilute liquid for level measurement. The working principle of LV36 is to measure static pressure created by liquid column corresponding to the liquid level to be measured. The measuring reference of LV36 can be either absolute pressure or gauge pressure, depending on whether or not the atmospheric pressure needs to be included in measurement. Therefore, when LV36 is installed in liquid, it is suitable for a wide variety of level measuring applications. For this purpose the environmental protection of LV36 meets IP68 requirements.

This model is integrated with an 101B(a19G) pressure sensor from BCM SENSOR. The pressure sensor is designed with a flush diaphragm, which can be protected by a metal filter to prevent from being damaged by gravel or covered by organic substances (e.g., weeds) in liquid medium. A stainless steel (SS) cap is employed at the front of LV36 to completely encapsulate the pressure sensor. Thanks to the flush diaphragm, when the SS cap can be taken off and the LV36 can be installed in a kind of viscous fluid, the LV36 can be used to measure the level of such the viscous fluid.

The standard measuring reference is gauge (or relative) pressure which is realized in LV36 by means of a stiff vent tube contained in the electric cable.

The measuring range of LV36 can be from 0~1 meter up to 0~200 meter water column (mH<sub>2</sub>O) of accuracy up to 0.25%fs (fs = full scale). In case of an LV36 transmitter, its output signal can be configured to either current loop (4~20 mA, standard), voltage output (1~5Vdc or 10%~90%Vs ratiometric), or digital protocol (I<sup>2</sup>C or SPI). The millivolt signal as a directly output from the Wheatstone bridge circuit is available when LV36 is ordered as a transducer.

### Features

- measuring ranges: 0~1mH<sub>2</sub>O, ..., 0~200mH<sub>2</sub>O
- output signal: 4~20mA (standard),  
10%~90%Vs ratiometric, 1~5V,  
I<sup>2</sup>C, SPI,  
transducer output (~60mV @5Vdc)
- accuracy: up to 0.25%fs
- filter for inlet of pressure medium available on request
- materials: 316L SS (pressure membrane), 316L SS (housing)
- construction: all stainless steel housing, rigid and robust
- environment protection: IP68



### Applications

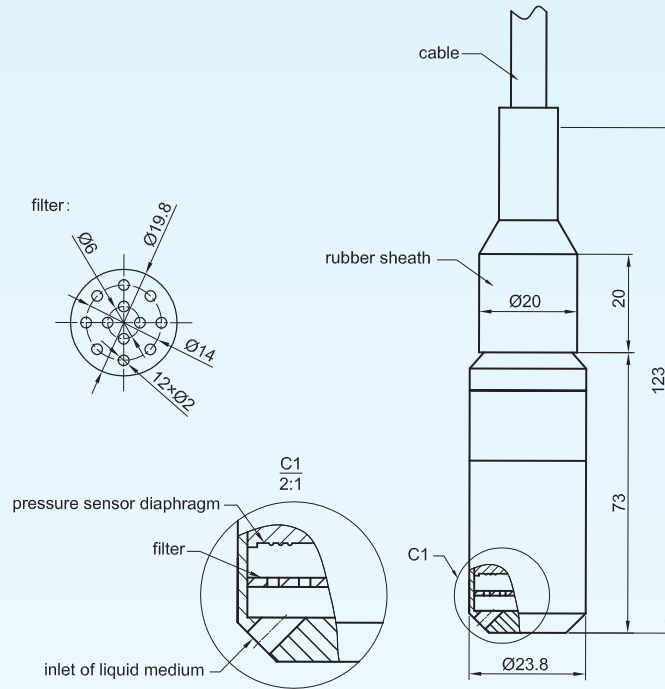
- liquid level measuring or monitoring via submerged in liquid
- river water or groundwater level monitoring
- level control in cisterns, diesel/petrol tanks, or chemical canister
- level monitoring in wastewater treatment

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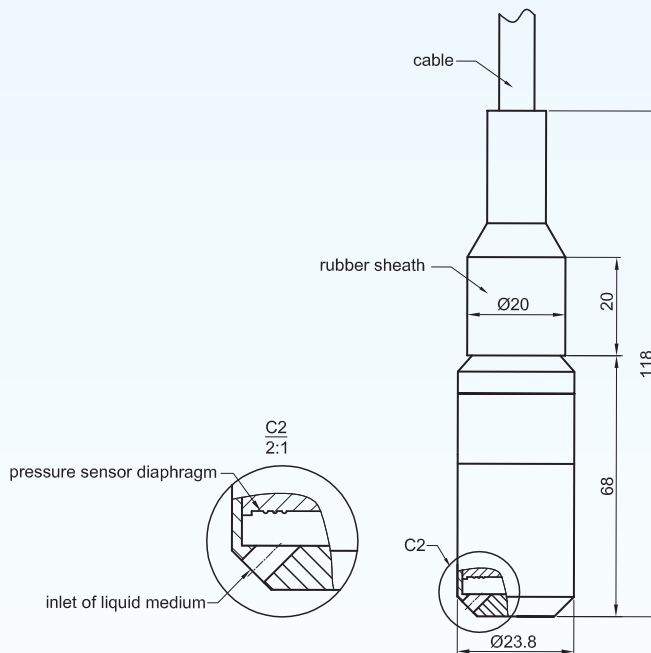
# Model LV36

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### Dimensions



**LV36 with filter**  
for liquid medium containing gravel or weeds in e.g., river water (standard)



**LV36 without filter**  
for pure liquid medium e.g., drinking water or diesel

Note: All dimensions are in mm.

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### Technical Data

#### 1) Transducers (i.e., with the millivolt output signal from the bridge circuit)

| Parameters                       |         | Units             | Specifications   | Notes |
|----------------------------------|---------|-------------------|--|-------|
| medium                           |         |                   | dilute liquid, viscous fluid, or fluid with particles compatible with 316L SS                        |       |
| nominal ranges                   |         | mH <sub>2</sub> O | 0~1, ~2, ~5, ~10, ~20, ~50, ~100, ~200   | 1     |
| pressure references              |         |                   | gauge (standard), absolute   |       |
| proof pressure                   |         | %fs               | 200  | 2     |
| burst pressure                   |         | %fs               | 300  |       |
| full scale output (fso)          |         | mV                | ≥ 60, ≥ 40 in case of 1mH <sub>2</sub> O range   | 3     |
| excitation                       | voltage | Vdc               | 5, ..., 10   |       |
|                                  | current | mA                | 1, ..., 2  |       |
| zero offset                      |         | mV                | ≤ ±2   |       |
| accuracy                         |         | %fs               | ±0.25, ±0.5 (standard)   | 4     |
| long-term stability              |         | %fs/year          | ≤ ±0.1, ≤ ±0.2 in case ranges < 20mH <sub>2</sub> O  |       |
| input resistance                 |         | kΩ                | 5±3  |       |
| output resistance                |         | kΩ                | 4.5±1.5  |       |
| insulation resistance            |         | MΩ                | ≥ 100 @250Vdc  |       |
| compensated temperature range    |         | °C                | 0 ~ 50   |       |
| operating temperature range      |         | °C                | -20 ~ +85  |       |
| storage temperature range        |         | °C                | -40 ~ +85  |       |
| temperature drift of zero offset |         | mV                | ≤ ±0.75 (> 20mH <sub>2</sub> O), ≤ ±0.8 (5, ..., 20mH <sub>2</sub> O), ≤ ±1.2 (≤ 2mH <sub>2</sub> O) | 3 & 5 |
| temperature drift of span        |         | mV                | ≤ ±0.75 (> 20mH <sub>2</sub> O), ≤ ±0.8 (5, ..., 20mH <sub>2</sub> O), ≤ ±1.2 (≤ 2mH <sub>2</sub> O) | 3 & 5 |
| process connection               |         |                   | submerged in pressure medium   |       |
| electrical interface             |         |                   | Φ7.3mm, 4-core shielded black PVC cable with/without a vent tube                                     | 6     |
| pressure diaphragm               |         |                   | 316L SS  |       |
| housing material                 |         |                   | 316L SS  |       |
| environment protection           |         |                   | IP68   |       |
| net weight (without cable)       |         | gram              | ~250   |       |

Notes: 1. For customized pressure ranges, consult BCM.

2. "fs" refers to full scale pressure.

3. Measured at 5Vdc excitation.

4. Accuracy = sqrt (non-linearity<sup>2</sup> + hysteresis<sup>2</sup> + repeatability<sup>2</sup>).

5. Calculated as the maximum change of output signal over the compensated temperature range.

6. The vent tube is provided in the cable if the pressure reference is gauge (relative) pressure. The cable will not be equipped with the vent tube if the pressure reference is absolute.

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## Submersible Liquid Level Transducers and Transmitters with Flush Diaphragm



### 2) Transmitters (i.e., with the configured output signal, e.g., 4~20mA)

| Parameters                            |                | Units             | Specifications  | Notes |
|---------------------------------------|----------------|-------------------|---|-------|
| medium                                |                |                   | dilute liquid, viscous fluid, or any liquid/fluid compatible with 316L SS                             |       |
| nominal ranges (i.e., full scale, fs) |                | mH <sub>2</sub> O | 0~1, ~2, ~5, ~10, ~20, ~50, ~100, ~200  | 1     |
| measuring reference                   |                |                   | gauge (standard), absolute  |       |
| safe overload limit                   |                | %fs               | 200   | 2     |
| ultimate overload limit               |                | %fs               | 300   |       |
| output signal                         | current loop   | mA                | 4~20 (standard)   |       |
|                                       | voltage output | Vdc               | 10%~90%Vs ratiometric, 1~5  |       |
|                                       | digital output |                   | I <sup>2</sup> C, SPI   |       |
| power supply (Vs)                     | current loop   | Vdc               | 12, ..., 30   |       |
|                                       | voltage output | Vdc               | 3, ..., 5 for 10%~90%Vs ratiometric output; 12, ..., 30 for 1~5V output                               |       |
|                                       | digital output | Vdc               | 3, ..., 5   |       |
| accuracy                              |                | %fs               | ±0.25, ±0.5 (standard)  | 3     |
| long-term stability                   |                | %fs/year          | ≤ ±0.1, ≤ ±0.2 in case ranges < 20mH <sub>2</sub> O   |       |
| load resistance                       | current loop   | Ω                 | 250, ..., 900   |       |
|                                       | voltage output | Ω                 | ≥ 5000  |       |
| insulation resistance                 |                | MΩ                | ≥ 500 @100Vdc   |       |
| compensated temperature range         |                | °C                | 0 ~ 50  |       |
| operating temperature range           |                | °C                | -20 ~ +85   |       |
| storage temperature range             |                | °C                | -40 ~ +85   |       |
| temperature drift of zero offset      |                | %fso              | ≤ ±0.5 (> 20mH <sub>2</sub> O), ≤ ±0.75 (5, ..., 20mH <sub>2</sub> O), ≤ ±1.25 (≤ 2mH <sub>2</sub> O) | 4     |
| temperature drift of span             |                | %fso              | ≤ ±0.5 (> 20mH <sub>2</sub> O), ≤ ±0.75 (5, ..., 20mH <sub>2</sub> O), ≤ ±1.25 (≤ 2mH <sub>2</sub> O) | 4     |
| process connection                    |                |                   | submerged in pressure medium  |       |
| electrical interface                  |                |                   | Φ7.3mm, shielded black PVC cable with/without a vent tube   | 5&6&7 |
| pressure diaphragm                    |                |                   | 316L SS   |       |
| housing material                      |                |                   | 316L SS   |       |
| environment protection                |                |                   | IP68  |       |
| net weight (without cable)            |                | gram              | ~250  |       |

Notes: 1. For customized pressure ranges, consult BCM.

2. "fs" refers to full scale pressure.

3. Accuracy =  $\sqrt{\text{non-linearity}^2 + \text{hysteresis}^2 + \text{repeatability}^2}$ .

4. Calculated as the maximum change of output signal over the compensated temperature range.

5. Number of cores in the cable depends on the output signal:

2-core: 4~20mA output;

3-core: 10%~90%Vs or 1~5V output;

4-core: I<sup>2</sup>C or SPI bus.

6. The vent tube is provided in the cable if the pressure reference is gauge (relative) pressure. The cable will not be equipped with the vent tube if the pressure reference is absolute.

7. For cable length ≤ 0.5m, the output can be I<sup>2</sup>C bus without other interface;

For cable length = 1m, ..., 15m, an RS-232 interface is applied to realize I<sup>2</sup>C bus.

For cable length > 15m, an RS-485 interface is applied to realize I<sup>2</sup>C bus.

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## Submersible Liquid Level Transducers and Transmitters with Flush Diaphragm



### Ordering Information

#### 1) Transducers (i.e., with the millivolt output signal from the bridge circuit)

|  |               |                   |               |                      |               |               |               |
|--|---------------|-------------------|---------------|----------------------|---------------|---------------|---------------|
| <b>position (pos.) 1: model</b>  |               |                   |               |                      |               |               |               |
| LV36   |               |                   |               |                      |               |               |               |
| <b>pos. 2: nominal ranges vs calibration ranges (^)</b>  |               |                   |               |                      |               |               |               |
| 0/1mH2O  |               | 0/10mH2O          |               | 0/100mH2O            |               |               |               |
| 0/2mH2O  |               | 0/20mH2O          |               | 0/200mH2O            |               |               |               |
| 0/5mH2O  |               | 0/50mH2O          |               |                      |               |               |               |
| <p>(^): Any nominal range as listed above is a designed range or a physical capacity of a transducer to measure, which is also called full scale (fs) of this transducer. When Buyer purchases a transducer to measure water level, Buyer has to indicate its nominal range in Ordering Code. A right transducer is selected if its nominal range just covers the measuring range in Buyer's application. The measuring range is a range of physical quantity which Buyer wants to measure or monitor with the selected transducer, and must be either within or maximum equal to the nominal range of this transducer.</p> <p>For example, if Buyer wants to purchase a transducer to measure or monitor water level from 1 meter to 4.5 meter, he needs to purchase a transducer of the nominal range of 0/5mH2O from the list because this nominal range does suitably cover the measuring range in Buyer's application. To do so, he has to indicate 0/5mH2O in Ordering Code for "pos. 2". As a result, when using this transducer in his application Buyer will obtain an output signal of "~12" when the measured water level is 1 mH2O while "~54mV" when the measured level is 4.5 mH2O. When Buyer purchases a transducer not to measure water level but to measure other liquid level, Buyer has to indicate the liquid density together with the measuring range for "pos. 2" in Ordering Code, rather than transducer's nominal range. For example, suppose the measuring range in Buyer's application is still from 1 meter to 4.5 meter but the liquid is not water but diesel of density 850 kg/m3. In this case Buyer needs still to purchase a transducer of the nominal range of 0/5mH2O but he has to indicate in Ordering Code both the measuring range of his application and the density of diesel for "pos. 2", that is, he must indicate 1/4.5mDiesel(850kg/m3) for "pos. 2" in Ordering Code. After having this done, with the selected transducer Buyer will obtain an output of "~10" when the diesel level is 1 meter while "~46mV" when the measured diesel level is 4.5 meter.</p> <p>The calibration data of output signals corresponding to the measuring range can be requested as a customized specification (see "pos. 8") and supplied as additional service with the purchased transducer.</p> |               |                   |               |                      |               |               |               |
| <b>pos. 3: pressure referene</b>   |               |                   |               |                      |               |               |               |
| G: gauge pressure (standard)   |               |                   |               | A: absolute pressure |               |               |               |
| <b>pos. 4: output signal</b>   |               |                   |               |                      |               |               |               |
| 40mV for range of 1mH <sub>2</sub> O, 60mV for other ranges  |               |                   |               |                      |               |               |               |
| <b>pos. 5: accuracy</b>  |               |                   |               |                      |               |               |               |
| 0.25%fs  |               | 0.5%fs (standard) |               |                      |               |               |               |
| <b>pos. 6: filter</b>  |               |                   |               |                      |               |               |               |
| WF = with filter (standard)  |               |                   |               |                      |               |               |               |
| NF = no filter   |               |                   |               |                      |               |               |               |
| <b>pos. 7: electrical interface</b>  |               |                   |               |                      |               |               |               |
| 7.3/PVC/& = Ø7.3mm shielded black PVC cable of "&" meter length  |               |                   |               |                      |               |               |               |
| &: Cable length in meters, which Buyer has to define in Ordering Code (&&).<br>= 1.5: 1.5 meter cable<br>= 3.5: 3.5 meter cable<br>= 150: 150 meter cable<br>= 200: 200 meter cable  |               |                   |               |                      |               |               |               |
| &&: BCM SENSOR suggests Buyer had better define the cable length at least 0.5m longer than the measuring range of liquid when purchasing LV36.<br>Example: "7.3/PVC/5.5" refers to "Ø7.3mm shielded PVC cable of 5.5 meter length".  |               |                   |               |                      |               |               |               |
| <b>pos. 8: customized specifications</b>   |               |                   |               |                      |               |               |               |
| If Buyer wants one or more customized specifications, he can indicate "(*), (**), (***)" as the code(s) at the end of the Ordering Code, and further define what is (are) the specific customized specification(s) for "*" (and "**", "**", ...). If there is no customized specification, the "pos. 8" is omitted. For precise understanding how to define "pos. 8", refer to the Examples of Ordering Code below.  |               |                   |               |                      |               |               |               |
| <b>pos.1</b>   | <b>pos. 2</b> | <b>pos. 3</b>     | <b>pos. 4</b> | <b>pos. 5</b>        | <b>pos. 6</b> | <b>pos. 7</b> | <b>pos. 8</b> |

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### Examples of Ordering Code

- standard transducer:  
**LV36-0/10mH2O-G-60mV-0.5%fs-WF-7.3/PVC/10.5**  
**LV36-1/8mH2O-G-60mV-0.5%fs-WF-7.3/PVC/11**  
**LV36-1/8mDiesel(850kg/m3)-G-60mV-0.5%fs-NF-7.3/PVC/11**
- customized transducer:  
**LV36-1/8mDiesel(850kg/m3)-G-60mV-0.5%fs-NF-7.3/PVC/11/Molex0430250600-(\*)**  
(\* ) = An Molex plug of P/N 0430250600 has to be attached at the end of cable.  
**LV36-1/8mDiesel(850kg/m3)-G-60mV-0.5%fs-NF-7.3/PVC/11/Molex0430250600-(\*)-(\*\*)**  
(\* ) = An Molex plug of P/N 0430250600 has to be attached at the end of cable.  
(\*\* ) = The calibration data of output signals corresponding to the measuring range of levels has to be supplied with the purchased transducer.

To be continued in the next page is Ordering Information of transmitter.

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### 2) Transmitters (i.e., with the configured output signal, e.g., 4~20mA)

|   |               |                   |               |                      |               |               |               |
|---|---------------|-------------------|---------------|----------------------|---------------|---------------|---------------|
| <b>position (pos.) 1: model</b>   |               |                   |               |                      |               |               |               |
| LV36  |               |                   |               |                      |               |               |               |
| <b>pos. 2: nominal ranges vs measuring ranges (^)</b>   |               |                   |               |                      |               |               |               |
| 0/1mH2O   |               | 0/10mH2O          |               | 0/100mH2O            |               |               |               |
| 0/2mH2O   |               | 0/20mH2O          |               | 0/200mH2O            |               |               |               |
| 0/5mH2O   |               | 0/50mH2O          |               |                      |               |               |               |
| <p>(^): Any nominal range as listed above is a designed range or a physical capacity of a corresponding transmitter to measure, which is also called the full scale (fs) of this transmitter. When Buyer purchases a transmitter, Buyer has to indicate the measure range of his application in Ordering Code, rather than the transmitter's nominal range. A right transmitter is selected if its nominal range just covers the measuring range of Buyer's application. The measuring range is a range of physical quantity which Buyer wants to measure or monitor with the selected transmitter, and must be either within or maximum equal to the nominal range of this transmitter.</p> <p>For example, if Buyer wants to purchase a transmitter of 4~20mA output to measure or monitor water level from 1 meter to 4.5 meter, he needs to purchase a transmitter of the nominal range of 0/5mH2O from the list because this nominal range does suitably cover the measuring range in Buyer's application. To do so, he has to indicate the measuring range of 1/4.5mH2O for "pos. 2" in Ordering Code. As a result, when using this transmitter in his application Buyer will obtain an output signal of "4mA" when the measured level is 1 mH2O while "20mA" when the measured level is 4.5 mH2O. When Buyer purchases a transmitter not to measure water level but to measure other liquid level, Buyer has to indicate not only the measuring range but also the density of liquid for "pos. 2" in Ordering Code. For example, suppose the measuring range in Buyer's application is still from 1 meter to 4.5 meter but the liquid is not water but diesel of density 850 kg/m3. In this case, Buyer needs still to purchase the transmitter of the nominal range of 0/5mH2O but he has to indicate 1/4.5mDiesel(850kg/m3) for "pos. 2" in Ordering Code. After this is done, the selected transmitter will be calibrated by BCM SENSOR with the same density of diesel in order for Buyer to obtain the output of "4mA" when the diesel level is 1 meter while "20mA" when the measured diesel level is 4.5 meter.</p> <p>The calibration data of output signals corresponding to the measuring range can be requested as a customized specification (see "pos. 8") and supplied as additional service with the purchased transmitter.</p> |               |                   |               |                      |               |               |               |
| <b>pos. 3: pressure referene</b>  |               |                   |               |                      |               |               |               |
| G: gauge pressure (standard)  |               |                   |               | A: absolute pressure |               |               |               |
| <b>pos. 4: output signal</b>  |               |                   |               |                      |               |               |               |
| 4/20mA (standard)   |               | 1/5V              |               | 10%/90%Vs            |               | I2C(^^^)      | SPI(^^^)      |
| <p>(^^^): If Buyer indicates 1/4.5mDiesel(850kg/m3) as the measuring range for "pos. 2" in Ordering Code, Buyer will obtain the output of "1638 counts" when the diesel level is 1 meter while "14746 counts" when the measured diesel level is 4.5 meter.</p>  |               |                   |               |                      |               |               |               |
| <b>pos. 5: accuracy</b>   |               |                   |               |                      |               |               |               |
| 0.25%fs   |               | 0.5%fs (standard) |               |                      |               |               |               |
| <b>pos. 6: filter</b>   |               |                   |               |                      |               |               |               |
| WF = with filter (standard)   |               |                   |               |                      |               |               |               |
| NF = no filter  |               |                   |               |                      |               |               |               |
| <b>pos. 7: electrical interface</b>   |               |                   |               |                      |               |               |               |
| 7.3/PVC/& = Ø7.3mm shielded black PVC cable of "&" meter length   |               |                   |               |                      |               |               |               |
| &: Cable length in meters, which Buyer has to define in Ordering Code (&&).<br>= 1.5: 1.5 meter cable<br>= 3.5: 3.5 meter cable<br>= 150: 150 meter cable<br>= 200: 200 meter cable   |               |                   |               |                      |               |               |               |
| &&: BCM SENSOR suggests Buyer had better define the cable length at least 0.5m longer than the measuring range of liquid when purchasing LV36.<br>Example: "7.3/PVC/5.5" refers to "Ø7.3mm shielded PVC cable of 5.5 meter length".   |               |                   |               |                      |               |               |               |
| <b>pos. 8: customized specifications</b>  |               |                   |               |                      |               |               |               |
| If Buyer wants one or more customized specifications, he can indicate "(*, (**, (***)" as the code(s) at the end of the Ordering Code, and further define what is (are) the specific customized specification(s) for "*" (and "**", "**", ...). If there is no customized specification, the "pos. 8" is omitted. For precise understanding how to define "pos. 8", refer to the Examples of Ordering Code below.   |               |                   |               |                      |               |               |               |
| <b>pos.1</b>  | <b>pos. 2</b> | <b>pos. 3</b>     | <b>pos. 4</b> | <b>pos. 5</b>        | <b>pos. 6</b> | <b>pos. 7</b> | <b>pos. 8</b> |

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### Examples of Ordering Code

- standard transmitter:

**LV36-0/10mH2O-G-4/20mA-0.5%fs-WF-7.3/PVC/10.5**

**LV36-1/8mH2O-G-4/20mA-0.5%fs-WF-7.3/PVC/11**

**LV36-1/8mDiesel(850kg/m3)-G-10%/90%Vs-0.5%fs-NF-7.3/PVC/11**

- customized transmitter:

**LV36-1/8mDiesel(850kg/m3)-G-10%/90%Vs-0.5%fs-NF-7.3/PVC/11/Molex0430250600-(\* )**

(\* ) = An Molex plug of P/N 0430250600 has to be attached at the end of cable.

**LV36-1/8mDiesel(850kg/m3)-G-10%/90%Vs-0.5%fs-NF-7.3/PVC/11/Molex0430250600-(\* )-(\*\* )**

(\* ) = An Molex plug of P/N 0430250600 has to be attached at the end of cable.

(\*\* ) = The calibration data of output signals corresponding to the measuring range of levels has to be supplied with the purchased transmitter.

The listed dimensions, specifications, and ordering information are subject to change without prior notice.

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