Model LV36
Submersible Liquid Level Transducers and Transmitters with Flush Diaphragm

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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 (mH2O) 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 (I2C or SPI). The millivolt signal as a directly output from the Wheatstone bridge circuit is available when LV36 is ordered as a transducer.

filter   cap

Features

- measuring ranges: 0~1mH2O, ..., 0~200mH2O
- output signal: 4~20mA (standard),
  10%~90%Vs ratiometric, 1~5V,
  I^2C, 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
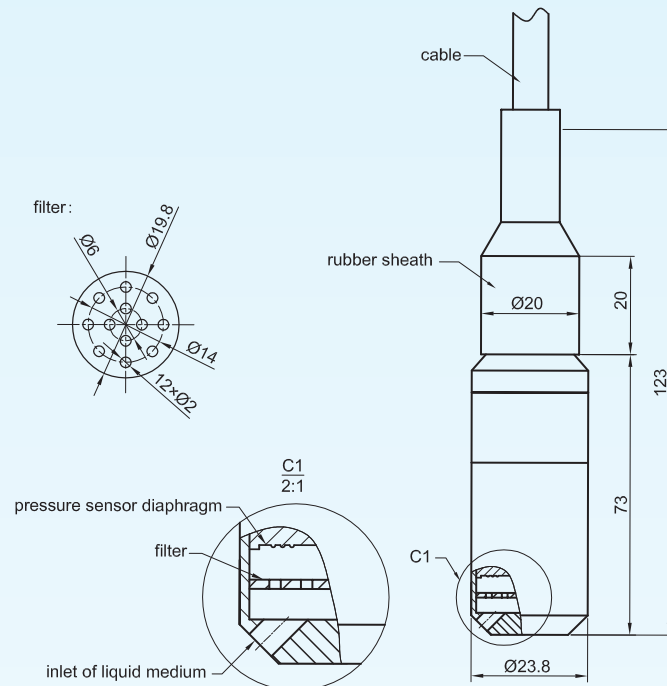- environment protection: IP68

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
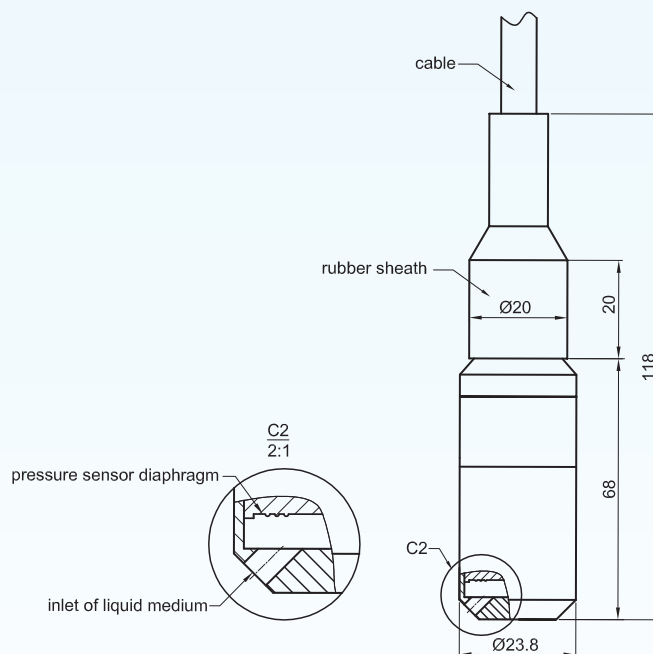
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Dimensions

cable

filter:

Ø19.8
Ø6
Ø14
12×Ø2

rubber sheath

Ø20

20

123

73

C1
2:1

pressure sensor diaphragm

filter

C1

inlet of liquid medium

Ø23.8

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

cable

rubber sheath

Ø20

20

118

68

C2
2:1

pressure sensor diaphragm

C2

inlet of liquid medium

Ø23.8

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

Note: All dimensions are in mm.

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with Flush Diaphragm

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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_2O	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	$\geqslant 60$, $\geqslant 40$ in case of $1mH_2O$ range	3
excitation	voltage	Vdc	5, ..., 10	
	current	mA	1, ..., 2	
zero offset		mV	$\leqslant \pm2$	
accuracy		%fs	±0.25, ±0.5 (standard)	4
long-term stability		%fs/year	$\leqslant \pm0.1$, $\leqslant \pm0.2$ in case ranges < $20mH_2O$	
input resistance		kΩ	5±3	
output resistance		kΩ	4.5±1.5	
insulation resistance		MΩ	$\geqslant 100$ @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	$\leqslant \pm0.75$ (> $20mH_2O$), $\leqslant \pm0.8$ (5, ..., $20mH_2O$), $\leqslant \pm1.2$ ($\leqslant 2mH_2O$)	3 & 5
temperature drift of span		mV	$\leqslant \pm0.75$ (> $20mH_2O$), $\leqslant \pm0.8$ (5, ..., $20mH_2O$), $\leqslant \pm1.2$ ($\leqslant 2mH_2O$)	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^2 + hysteresis^2 + repeatability^2).

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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Model LV36
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$_2$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^{2}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 otuput	
	digital output	Vdc	3, ..., 5	
accuracy		%fs	±0.25, ±0.5 (standard)	3
long-term stability		%fs/year	$\leqslant$ ±0.1, $\leqslant$ ±0.2 in case ranges < 20mH$_2$O	
load resistance	current loop	Ω	250, ..., 900	
	voltage output	Ω	$\geqslant$ 5000	
insulation resistance		MΩ	$\geqslant$ 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	$\leqslant$ ±0.5 (> 20mH$_2$O), $\leqslant$ ±0.75 (5, ..., 20mH$_2$O), $\leqslant$ ±1.25 ($\leqslant$ 2mH$_2$O)	4
temperature drift of span		%fso	$\leqslant$ ±0.5 (> 20mH$_2$O), $\leqslant$ ±0.75 (5, ..., 20mH$_2$O), $\leqslant$ ±1.25 ($\leqslant$ 2mH$_2$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 (non-linearity^2 + hysteresis^2 + 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^{2}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 $\leqslant$0.5m, the output can be I^{2}C bus without other interface;

   For cable length = 1m, ..., 15m, an RS-232 interface is applied to realize I^{2}C bus.

   For cable length > 15m, an RS-485 interface is applied to realize I^{2}C bus.

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Model LV36
Submersible Liquid Level Transducers and Transmitters with Flush Diaphragm

Ordering Information

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

position (pos.) 1: model							
LV36							

pos. 2: nominal ranges vs calibration ranges (^)

0/1mH2O	0/10mH2O	0/100mH2O
0/2mH2O	0/20mH2O	0/200mH2O
0/5mH2O	0/50mH2O	

(^): 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.

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.

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.

pos. 3: pressure referene

G: gauge pressure (standard)   A: absolute pressure

pos. 4: output signal

40mV for range of 1mH₂O, 60mV for other ranges

pos. 5: accuracy

0.25%fs   0.5%fs (standard)

pos. 6: filter

WF = with filter (standard)
NF = no filter

pos. 7: electrical interface

7.3/PVC/& = Ø7.3mm shielded black PVC cable of "&" meter length

&: Cable length in meters, which Buyer has to define in Ordering Code (&&).
= 1.5: 1.5 meter cable
= 3.5: 3.5 meter cable
= 150: 150 meter cable
= 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.

Example: "7.3/PVC/5.5" refers to "Ø7.3mm shielded PVC cable of 5.5 meter length".

pos. 8: customized specifications

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.

pos.1	pos. 2	pos. 3	pos. 4	pos. 5	pos. 6	pos. 7	pos. 8

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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.

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

position (pos.) 1: model

LV36

pos. 2: nominal ranges vs measuring ranges (^^)

0/1mH2O	0/10mH2O	0/100mH2O
0/2mH2O	0/20mH2O	0/200mH2O
0/5mH2O	0/50mH2O	

(^^): 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.

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.

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.

pos. 3: pressure referene

G: gauge pressure (standard)   A: absolute pressure

pos. 4: output signal

4/20mA (standard)	1/5V	10%/90%Vs	I2C(^^^)	SPI(^^^)

(^^^): 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.

pos. 5: accuracy

0.25%fs   0.5%fs (standard)

pos. 6: filter

WF = with filter (standard)
NF = no filter

pos. 7: electrical interface

7.3/PVC/& = Ø7.3mm shielded black PVC cable of "&" meter length

&: Cable length in meters, which Buyer has to define in Ordering Code (&&).
= 1.5: 1.5 meter cable
= 3.5: 3.5 meter cable
= 150: 150 meter cable
= 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.

Example: "7.3/PVC/5.5 refers to "Ø7.3mm shielded PVC cable of 5.5 meter length".

pos. 8: customized specifications

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.

pos.1	pos. 2	pos. 3	pos. 4	pos. 5	pos. 6	pos. 7	pos. 8

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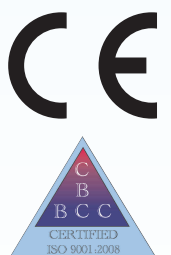
  LV36-1/8mDiesel(850kg/m3)-G-10%/90%Vs-0.5%fs-NF-7.3/PVC/11/Molex0430250600-(*)-(**)

  (*) = 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.

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

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