

## APPLICATIONS

- Depth or level measurement in wells and open waters
- Ground water level measurement

## SPECIAL FEATURES

- The sensor adopts the most advanced micro-processor technology with comprehensive linear error compensation and temperature error compensation to assure the highest precision of measuring result.
- The probe adopts full potting condensation-preventing technology, safe and reliable dual-seal design and fully welding technology with solid stainless steel body to assure long term stability and permanent air tightness.
- Signal transmitting module adopts transient voltage resistance protective circuits to assure operation regularly even under the harsh surge voltage environment.
- The seal of the cable adopts intensive cone plug sealing design to assure the long working life even under large mechanical load conditions during the installation and long-term use.



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## Description

LB350series Submersible level transmitter is designed for dealing with the most severe demanding level measurement conditions. It is the optimal choice to satisfy all of high demand level measuring applications.

#### Main parameters

|                    |                                |
|--------------------|--------------------------------|
| Pressure types     | gauge pressure                 |
| Measuring range    | 0 - 100M                       |
| Output signal      | 4-20mA, 4-20mA+HART, customer  |
| Reference accuracy | ±0.5% URL, optional ±0.05% URL |

#### Measuring medium

Liquid

#### Field of application

Pressure, level

#### Approvals

CE

#### Technical specifications

##### Measuring range and limit

| Nominal value | Smallest calibratable span | Lower range limit (LRL) | Upper range limit (URL) | Static pressure limit | High pressure side overload limit | Low pressure side overload limit |
|---------------|----------------------------|-------------------------|-------------------------|-----------------------|-----------------------------------|----------------------------------|
| 6kPa          | 200Pa                      | -6kPa                   | 6kPa                    | 25MPa                 | 25MPa                             | 16MPa                            |
| 40kPa         | 400Pa                      | -40kPa                  | 40kPa                   | 40MPa                 | 25MPa                             | 16MPa                            |
| 250kPa        | 2.5kPa                     | -250kPa                 | 250kPa                  | 40MPa                 | 25MPa                             | 16MPa                            |
| 1MPa          | 10kPa                      | -500kPa                 | 1MPa                    | 40MPa                 | 25MPa                             | 16MPa                            |
|               |                            |                         |                         |                       |                                   |                                  |
|               |                            |                         |                         |                       |                                   |                                  |

Adjust requirements: lower range value (LRV) and upper range value (URV) can be adjusted within the scope of the upper and lower range limit, when  $|URV| \geq |LRL|$ , needs  $|URV| \geq$  smallest calibratable span  
when  $|URV| \leq |LRL|$ , needs  $|LRL| \geq$  smallest calibratable span

#### Standard specifications and reference conditions

Test standard: IEC60770; zero based-calibration span, linear output, silicone oil filling, 316L stainless steel isolation diaphragm.

#### Performance specifications

The overall performance including but not limited to **【Reference accuracy】**, **【Environment temperature effects】**, **【Static pressure effects】** and other comprehensive error

Typical accuracy:  $\pm 0.1\%$ ,  $\pm 0.25\%$ ,  $\pm 0.5\%$  URL

Stability:  $\pm 0.2\%$  URL/5 years

#### Reference accuracy

Including linearity, hysteresis and repeatability. calibration temperature:  $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$

|                        |                       |                 |                                            |
|------------------------|-----------------------|-----------------|--------------------------------------------|
| Linear output accuracy | TD $\leq 10$ (note 1) | $\pm 0.1\%$ URL | Nominal value<br>6kPa、40kPa<br>250kPa、1MPa |
|                        | MAX                   | $\pm 0.5\%$ URL |                                            |

Square root output accuracy is 1.5 times linear output accuracy

Note 1: TD is Turn down,  
when  $|URV| \geq |LRV|$ ,  $TD = URL / |URV|$   
when  $|URV| \leq |LRV|$ ,  $TD = URL / |LRV|$

#### Ambient temperature effects

|                                                        |                        |
|--------------------------------------------------------|------------------------|
| Within the range $-20-80^{\circ}\text{C}$ total impact | $\pm(0.1+0.1TD)\%$ URL |
|--------------------------------------------------------|------------------------|

#### Static pressure effects

|                      |                          |
|----------------------|--------------------------|
| Effect on zero       | $\pm 0.15TD\%$ URL/10MPa |
| Effect on full scale | $\pm 0.2\%$ URL/10MPa    |

#### Power supply effects

When power supply voltage is within 10.5/16.5-55VDC, zero and span change should not more than  $\pm 0.005\%$  URL/V

#### Mounting position effects

Install error less than 400Pa, which can be corrected by PV=0 reset.

#### Vibration effects

According to IEC61298-3,  $< 0.1\%$  URL

#### Output signal

Two wire 4-20 mA output with digital communications, linear or square root output programmable, HART protocol is superimposed on the 4-20mA signal.

#### Damping time

|                                                                                               |
|-----------------------------------------------------------------------------------------------|
| Total damping time constant: equal to the sum of damping time of amplifier and sensor capsule |
| Damping time of amplifier : 0-100S adjustable                                                 |
| Damping time of sensor capsule (isolation sensor diaphragm and silicon filling oil) ≤0.2S     |
| Startup after power off: ≤6S                                                                  |
| Normal services after data recovery : ≤31S                                                    |

#### Weight

Net weight: about 4 kg ( without mounting bracket and process connection adaptor )

#### Environment condition

| Items                                 | Operational condition                                        |
|---------------------------------------|--------------------------------------------------------------|
| Working temperature                   | -40-85°C, LCD display unit:<br>-20-70°C                      |
| Storage temperature                   | -40-110°C, integrated LCD display :-<br>40-85°C              |
| Media temperature                     | Silicone oil filling:-40-120°C<br>Inert oil filling:-10-80°C |
| Working humidity                      | 5-100%RH@40°C                                                |
| Protection class                      | IP67                                                         |
| Dangerous condition                   | II 1/2G ExiaIICT4 (PB330)                                    |
| *Please consult engineers for details |                                                              |

#### EMC environment

| NO. | Test items                                                           | Basic standards | Test conditions                                          | Performance level |
|-----|----------------------------------------------------------------------|-----------------|----------------------------------------------------------|-------------------|
| 1   | Radiated interference                                                | CISPR22         | 30MHz-1000MHz                                            | OK                |
| 2   | Conducted interference (DC power sport)                              | CISPR22         | 0.15MHz-30MHz                                            | OK                |
| 3   | Electrostatic discharge immunity test (ESD)                          | IEC61000-4-2    | 4kV(Contact ),8kV(Air)                                   | B(Note2)          |
| 4   | Immunity to radio frequency EM-fields                                | IEC61000-4-3    | 10V/m(80MHz-1GHz)                                        | A(Note1)          |
| 5   | Power frequency magnetic field Immunity test                         | IEC61000-4-8    | 30A/m                                                    | A(Note1)          |
| 6   | Electrical fast transient / Burst Immunity Test                      | IEC61000-4-4    | 2kV(5/50ns,100kHz)                                       | B(Note2)          |
| 7   | Surge immunity requirements                                          | IEC61000-4-5    | 1kV(Line to line)<br>2kV(Line to ground)<br>(1.2us/50us) | B(Note2)          |
| 8   | Immunity to conducted disturbances induced by radio frequency fields | /IEC61000-4-6   | 3V(150kHz-80MHz)                                         | A(Note1)          |

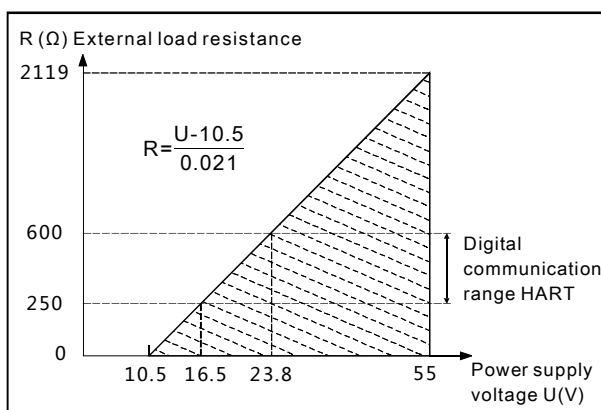
(Note 1)Performance level A: The performance within the limits of normal technical specifications.

(Note 2)Performance level B: Temporary reduction or loss of functionality or performance, it can restore itself. The actual operating conditions, storage and data will not be changed.

#### Power supply

| Item                  | Operating conditions                                 |
|-----------------------|------------------------------------------------------|
| Standard/flame proof  | 10.5-55VDC                                           |
| HART protocol         | 16.5-55VDC,communication<br>load resistance 250Ω     |
| Load resistance       | 0-2119Ω for operation,<br>250-600Ω for HART protocol |
| Transmission distance | <1000 meters                                         |
| Power consumption     | ≤500mW@24VDC,20.8mA                                  |

#### Power supply and load requirements



#### Specific menu

#### Transmission module type

| Output signal | Local control         | Remote control |
|---------------|-----------------------|----------------|
| 4-20mA+HART   | LCD/3 buttons on body | HART           |
| 4-20mA        | LCD/3 buttons on body | -              |

#### LCD display unit

| Display mode | Details                                                                                      |
|--------------|----------------------------------------------------------------------------------------------|
| PV           | Process variable shows on main screen, percentage and progress bar shows on secondary screen |
| mA           | Current shows on main screen, percentage and progress bar shows on secondary screen          |
| %            | Percentage shows on main screen, percentage and progress bar shows on secondary screen       |

#### Unit

| Unit                                         | Definition                     |
|----------------------------------------------|--------------------------------|
| kPa                                          | Kilopascal                     |
| MPa                                          | Megapascals                    |
| bar                                          | Bar                            |
| psi                                          | Pounds per square inch         |
| mmHg                                         | Millimetre(s) of mercury@0°C   |
| mmH2O                                        | Millimeter of water@4°C        |
| mH2O                                         | Meter of water@4°C             |
| inH2O                                        | Inches of water@4°C            |
| ftH2O                                        | Feet of water@4°C              |
| inHg                                         | Inches of mercury@0°C          |
| mHg                                          | Meter mercury column@0°C       |
| TORR                                         | Torr                           |
| mbar                                         | Millibar                       |
| g/cm2                                        | Gram per square centimeter     |
| kg/cm2                                       | Kilogram per square centimeter |
| Pa                                           | PA                             |
| ATM                                          | Standard atmospheric pressure  |
| mm                                           | Millimeter(Note 1)             |
| m                                            | Meter(Note1)                   |
| Note 1: length unit need mark medium density |                                |

#### Measuring menu set

| Mark | State                   |
|------|-------------------------|
| URV  | Upper range value, 20mA |
| LRV  | Lower range value, 4mA  |

#### Damping time

| Units | Setting range |
|-------|---------------|
| S     | 0-100         |

#### Analog output type

| Parameters        | Output type |
|-------------------|-------------|
| mA LINER          | Linearity   |
| mA $\sqrt{\quad}$ | Square root |

#### Alarm signal

| Parameters | Alarm signal |
|------------|--------------|
| ALARM NO   | None         |
| ALARM H    | 20.8mA       |
| ALARM L    | 3.8mA        |

#### Fix output

| Parameters | Fix output value |
|------------|------------------|
| FIX/C NO   | None             |
| 3.8000     | 3.8000mA         |
| 4.0000     | 4.0000mA         |
| 8.0000     | 8.0000mA         |
| 12.000     | 12.000mA         |
| 16.000     | 16.000mA         |
| 20.000     | 20.000mA         |
| 20.800     | 20.800mA         |

#### Quick menu

| Parameter               | Instruction                                                                                             |
|-------------------------|---------------------------------------------------------------------------------------------------------|
| PV=0                    | Set current output to zero value, used to correct the error caused by static pressure and installation. |
| Zero adjustment         | 4mA re-range with pressure                                                                              |
| Span adjustment         | 20mA re-range with pressure                                                                             |
| Restore factory setting | Restore backup data when error                                                                          |

#### Sensor select instruction

| Code | Nominal value | Description                                          |
|------|---------------|------------------------------------------------------|
| 1    | 6kPa          | Range -6-6kPa, smallest calibratable span 200Pa      |
| 2    | 40kPa         | Range -40-40kPa, smallest calibratable span 400Pa    |
| 3    | 250kPa        | Range -250-250kPa, smallest calibratable span 2.5kPa |
| 4    | 1MPa          | Range -0.1-1MPa, smallest calibratable span 10kPa    |
|      |               |                                                      |
|      |               |                                                      |

| Code | Position      | Instruction                               |
|------|---------------|-------------------------------------------|
| S    | Diaphragm     | SS 316L                                   |
| H    | material      | Hastelloy C                               |
| S    | Fluid filling | Silicon oil, temperature limit: -45-205°C |
| D    |               | Inert oil, temperature limit: -45-160°C   |
| S    | Sensor seal   | O-ring, FKM, temperature limit: -20-200°C |

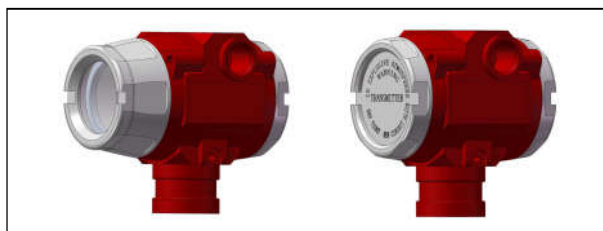
#### Diaphragm(S/H)



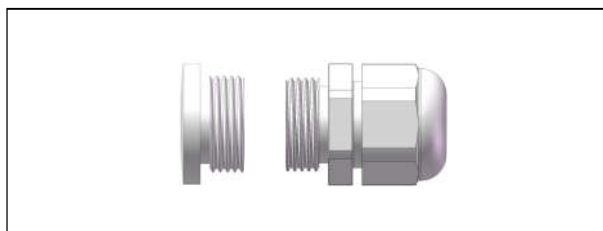
#### Electrical connection select instruction

| Code | Item                  | Description                                                                                                          |
|------|-----------------------|----------------------------------------------------------------------------------------------------------------------|
| T1   | Electrical connection | Aluminum-alloy terminal, 2 cable entry M20*1.5(F), red body, white cover                                             |
| R1   | Cable entry protector | Waterproof connector M20X1.5 one side, blind plug another side, PVC material, 6-8mm diameter cable only, IP67        |
| R2   |                       | Flame proof, 1/2 NPT(F) one side, blind plug another side, stainless steel material, 6-8mm diameter cable only, IP67 |
| R3   |                       | Flame proof, M20X1.5(F) one side, blind plug another side, stainless steel material, 6-8mm diameter cable only, IP67 |

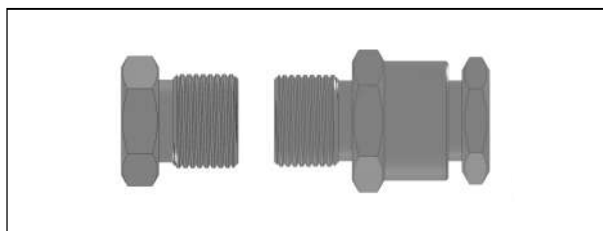
#### Housing (T1)



#### Standard cable entry protective adaptor(R1)



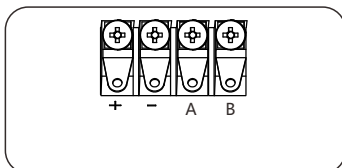
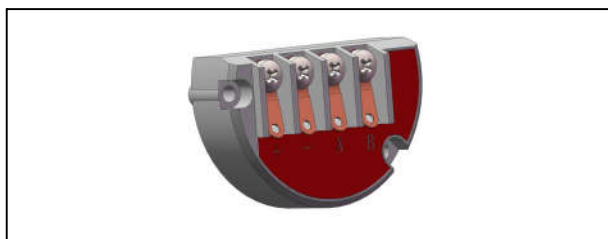
#### Flame proof cable entry protective adaptor(R2/R3)



#### Transmission module

| Code | Items         | Description                                    |
|------|---------------|------------------------------------------------|
| 1    | Output signal | 4-20mA two wire, power supply: 10.5-55VDC      |
| 2    |               | 4-20mA+HART two wire, power supply: 16.5-55VDC |
| 3    | Display       | Without display                                |
| 4    |               | With LCD display                               |

#### Terminals ( N1)



| CODE | 2-wire  | 3-wire  | 4-wire  | Modbus-RTU/RS485 |
|------|---------|---------|---------|------------------|
| +    | 24V+    | 24V+    | 24V+    | 24V+             |
| -    | signal+ | 24V-    | 24V-    | 24V-             |
| A    |         | signal+ | signal+ | A+               |
| B    |         |         | signal- | B-               |

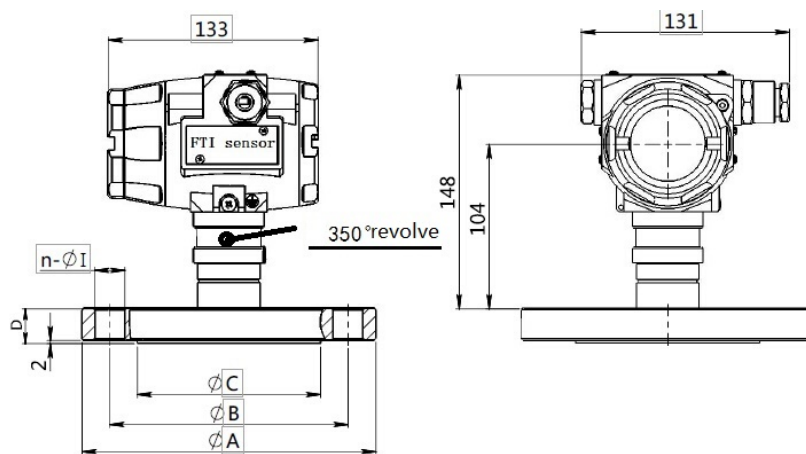
#### Process connection adaptor

| Code | Item                       | Description                                                                                 |
|------|----------------------------|---------------------------------------------------------------------------------------------|
| 1    | Process connection adaptor | Adaptor, M20*1.5 (M) with pressure-guided pipe $\Phi 14*2*30$ , SS304, apply to H-structure |
| 2    |                            | Adaptor, 1/2-14NPT(F), SS 304, apply to H-structure                                         |

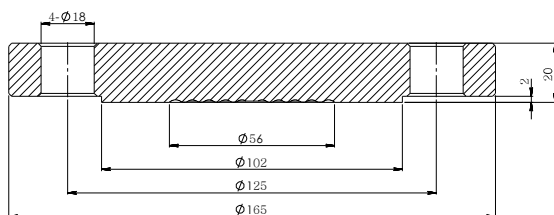
#### Brackets

| Code | Items          | Details                                                                 |
|------|----------------|-------------------------------------------------------------------------|
| 1    | Fixed mounting | Pipe mounting bent bracket, 2" pipe, carbon steel, apply to H-structure |
| 2    |                | Plate mounting bent bracket, carbon steel, apply to H-structure         |
| 3    |                | Pipe mounting flat bracket, 2" pipe, carbon steel, apply to H-structure |

Drawing and dimension with display(C)(unit:mm)



DN50PN10~PN40



(.mm)

#### Factory settings and parameters

| Item               | Menu mark | Factory setting value       |
|--------------------|-----------|-----------------------------|
| Tag position       | None      | 0(No specific settings)     |
| Analog output type | mA        | Liner(No specific settings) |
| Display mode       | DISP      | PV(No specific settings)    |
| Alarm signal       | ALARM     | No(No specific settings)    |

| Item                   | Menu mark | Factory setting value   |
|------------------------|-----------|-------------------------|
| Damping value          | DAMP      | 0(No specific settings) |
| 4mA Lower range value  | LRV       | According to the order  |
| 20mA Upper range value | URV       | According to the order  |
| Process unit           | U         | According to the order  |

Disclaimer: all the data used in the product description is not legally binding. Relevant technical details may be changed due to further improve