Dinel®

INSTRUCTION MANUAL

ULTRASONIC LEVEL METERS ULM–70

Read carefully the instructions published in this manual before the first use of the level meters. Keep the manual at a safe place. The manufacturer reserves the right to implement changes without prior notice.

CONTENTS

Safety

All operations described in this instruction manual have to be carried out only by trained personnel or an accredited person. Warranty and post warranty service must be exclusively carried out by the manufacturer.

Improper use, installation or set-up of the level meter can result in crashes in the application (overfilling of the tank or damage of system components).

The manufacturer is not responsible for improper use, losses of work caused by either direct or indirect damage, and for expenses incurred during installation or use of the level meter.

Measuring principle

The ULM® ultrasonic level meters are compact measurement devices including an electroacoustic converter and an electronic module. Using the electroacoustic converter, the level meters transmit the sequence of ultrasonic pulses that spread towards the surface level. The converter recuperates reflected acoustic waves that are subsequently processed in the electronic module. The intelligent evaluation block filters out interfering signals, compares the cleaned received signal with the false reflection map (e.g. from mixers, ladders, reinforcement etc.) and selects a suitable reflection (echo). Based on the period during which the individual pulses spread towards the surface level and back and based on the measured temperature in the tank, the instant distance to the surface level is calculated. According to the level height, the level meter output is set and the measured value is displayed on the display.

Range of applications

For continuous non-contact level measurement of liquids (water solutions, sewerage water, etc.), mash and paste materials (sediments, sticks, resins etc.) in closed or open vessels, sumps, reservoirs and open channels. In case the level of bulk-solid materials is measured, the measurement range is reduced.

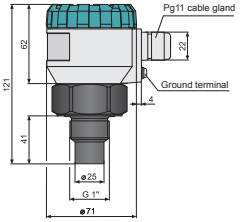
The level meters can continuously measure levels of bulk-solid materials with a low concentration of dust particles. Consult the manufacturer on recommended use of the level meter for bulk-solid materials.

Features of variants

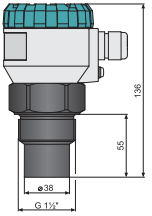
ULM–70_–02–I	***Measuring range from 0.15m to 2m,*** plastic PVDF transmitter, mechanical connection with thread G 1".
ULM–70_–06–I	***Measuring range from 0.25m to 6m,*** plastic PVDF transmitter, mechanical connection with thread G 1 ½".
ULM–70_–10–I	***Measuring range from 0.4m to 10m,*** plastic PVDF transmitter, mechanical connection with HDPE polyethylene flange (version "N") or aluminium alloy flange (version "Xi").
ULM–70_–20–I	***Measuring range from 0.5m to 20m,*** plastic PVDF transmitter, mechanical connection with aluminium alloy flange.

Dimensional drawings

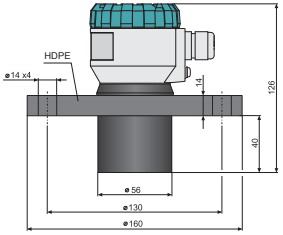
ULM–70_–02–I



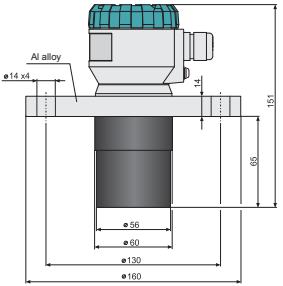
ULM–70_–06–I



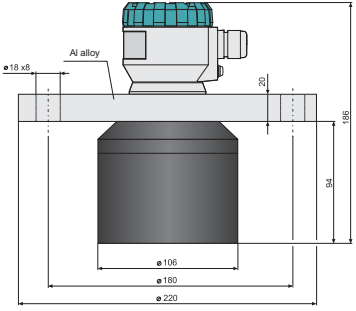
ULM–70N–10–I



ULM–70Xi–10–I



ULM–70_–20–I



Installation instructions

- Install the level meter in the **vertical position** into the upper lid of the tank or reservoir using a welding flange, a fastening nut or a flange so that the level meter axis can be perpendicular to the surface level of the measured liquid (Fig. 1).
- The min. **dimensional parameters** to install the level meter into a lid or a ceiling of a tank are given in Fig. 3.
- When installing in an **open channel** (reservoir, drain etc.), install the level meter onto a bracket as close as possible to the expected max. level.
- In connection with the measurement principle, no signals **reflected** in the area immediately under the level meter can be evaluated (dead zone). **The dead zone** (Fig. 2) determines the min. distance possible between the level meter and the highest surface level. The min. distances to the medium are given in the chapter "Technical specifications" (p. 24).
- It is necessary to install the level meter so that the bin level cannot **interfere** with the dead zone when filled up to the maximum. If the measured level interferes with the dead zone, the level meter will not work properly.

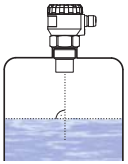


Fig. 1: Recommended installation in the tank

ULM–70–02;10	d > 1/12 c *(min. 200 mm)*
ULM–70–06	d > 1/8 c *(min. 200 mm)*
ULM–70–20	d > 1/10 c *(min. 200 mm)*

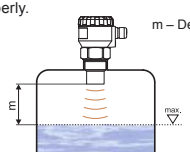


Fig. 2: Level meter dead zone

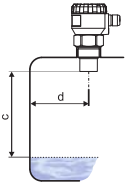
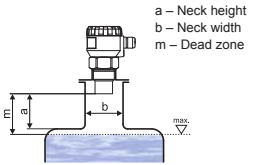


Fig. 3: Installation distance from the tank wall

- If the maximum surface level in the tank interferes with the dead zone, the level meter has to be mounted into a higher **installation neck**. In this way, the tank can be filled nearly up to the maximum volume. The inner neck surface has to be even and smooth (without edges and welded joints); the inner edge should be rounded where the ultrasonic wave leaves the pipe. The neck diameter should be as large as possible but the neck height should be as low as possible. Recommended dimensions of the input neck are given in Fig. 4.



ULM–70–02;06	a < 3 b b > 100 mm
ULM–70–10	a < 1,5 b b > 100 mm
ULM–70–20	a < 1,5 b b > 150 mm

Fig. 4: Possible installation of the installation neck

- During filling, mixing and other processes, **foam** can arise on the surface level of the measured liquid. The thick foam considerably absorbs the ultrasonic signal which might cause malfunction of the level meter (Fig. 5). For such cases, it is necessary to set up "SENSITIVITY" mode (p. 14) to "*high*" or contact the manufacturer if need.
- If the emitted acoustic signal of the level meter is affected by near objects (roughness on walls of the tank, various partitions, mixers etc.), it is necessary to map false reflections by activating the mode "TEACHING" (see p. 14). In case of installed mixers, it is necessary to put the mixers to position under the level meter (direct the mixer blade to the ultrasonic signal beam).

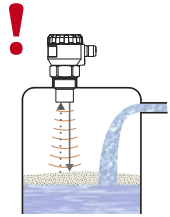


Fig. 5: Thick foam on the surface

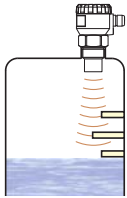


Fig. 6: False echo from obstacles in the tank

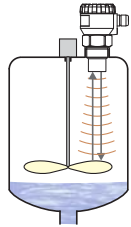


Fig. 7: False echo from the mixer blade

- Do not install the level meter in or above the **filling** point (Fig. 8).
- In case the level of bulk-solid materials is measured, the measurement range is reduced. We recommend to consult the use with the manufacturer.

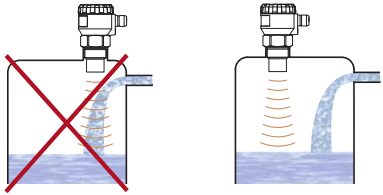


Fig. 8: Level meter installation outside the influence of filling

- The level meter must not be installed in places with direct **solar radiation** and must be protected against weather effects.
- If the installation in places with direct solar radiation is inevitable, it is necessary to mount a **shielding cover** above the level meter.
- It is suitable to run the cable under a cable bushing (obliquely down in slack) according to Fig. 10 to prevent **penetration of humidity**. Then the rain and condensing water can flow off freely.
- The cable bushing and connector have to be **sufficiently tightened** to prevent penetration of humidity.
- To lower the minimum distance to the measured medium, **a reflection board** made from solid, even and smooth material can be installed to the level meter. Then the tank can be filled nearly up to the maximum height. The solution is suitable for open tanks and reservoirs.
- Scattering or attenuation of the ultrasonic signal can result if the surface level has been **moderately stirred** or **rippled** (by a mixer, coming liquid etc.). It can result in reduction of the measurement range or unreliable function of the level meter (Fig. 12).
- **Rotating mixer blades can cause** that the surface is stirred, which results in false reflections of the ultrasonic signal from the surface level and unreliable operation of the level meter (Fig. 13).

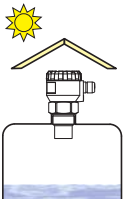


Fig. 9: Solar radiation shielding cover

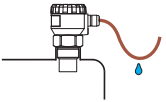


Fig. 10: Prevention to avoid intrusion of humidity

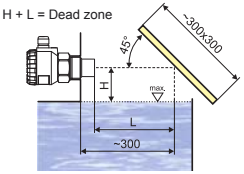


Fig. 11: Reflection board

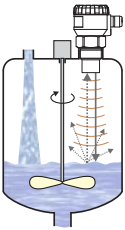


Fig. 12: Moderately stirred surface

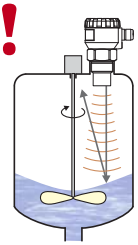


Fig. 13: Intensely stirred surface

Electrical connection

The ultrasonic level meter is designed to be connected to supply unit or to controller through a cable with the outer diameter of 6 ÷ 8 mm (recommended cross-section of cores 0.5 ÷ 0.75 mm^2) by means of bolted clips placed under display module. Connect the plus pole (+U) to the terminal (+), the minus pole to 0V to the terminal (-) and the shielding to the terminal (⏚) (only for shielded cables).

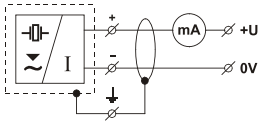


Fig. 14: Connection diagram of the level meter

Procedure to connect the cable to the level meter:

1. Unscrew the nut of the upper transparent lid.
2. Take the upper edge of the display module and take it out carefully by mild swinging up.
3. If you cannot grasp the module, you can use a small screwdriver. Insert it as far as the seam and use from several sides to slightly lift the module.
4. Release the cable bushing and thread the stripped supply cable in.
5. Connect the cable into the bolted clips according to the diagram in Fig. 14.
6. Assemble the level meter and connect the cable to the sequential unit.

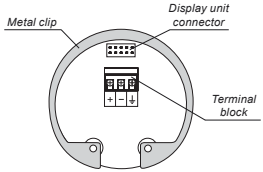


Fig. 15: Internal view of terminal block

Make the electric connection in **voltage-free state**!

The power supply can be a stabilized voltage supply unit of 18 ÷ 36V DC (version Xi - 30 V DC) that is included in evaluation or display unit.

Considering possible occurrence of **electrostatic charge** on non-conducting parts of the level meter, it is necessary to **ground** all level meters intended for environments **with risk of explosion** (ULM–70Xi–_ _–I). It will be done using a screw placed on the head of the level meter under the cable bushing.

Set-up elements

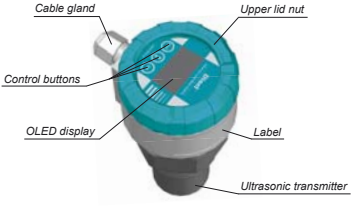


Fig. 16: Full view of ultrasonic level meter

Button OK *Symbol in the manual* **[OK]**

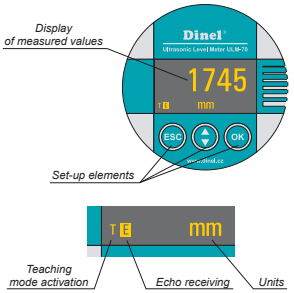
– Set-up mode access
– Confirmation of selected item in the menu
– Move the cursor in the line
– Saving of set-up data

Button ▲▼ *Symbol in the manual* **[↑↓]**

– Move in the menu
– Change of values

Button ESC *Symbol in the manual* **[ESC]**

– Cancelling of carried out changes
– Shift one level up



Status signalization

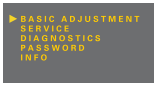
display	*function*
"NO ECHO"	**Lighting intermittently** – the level meter is not able to receive echo for a long time. Incorrect installation of the level meter
"DEAD ZONE"	**Lighting intermittently** – the measured level is in the "dead zone" of the level meter or the ultrasonic converter is dirty.
"NO PASSWORD"	**It will appear in the item "MENU"** – the level meter is protected using a password against unauthorised setting. Enter the correct password (see p. 17).
symbol "T" [1)]	**Lighting permanently** – "TEACHING" mode activation.
symbol "E" [1)]	**Lighting intermittently** – correct echo receiving (of the reflected signal) from the measured surface level.

[1)] *symbol appears in the lower left corner of the display*

Operation

Set the level meter using 3 buttons placed on the display module (see Chapter Set-up elements). After 5 min. of inactivity, the level meter automatically returns back to the measurement mode. If the password is active, the level meter will be also locked. The values that have not been confirmed using the button **[OK]** will not be saved! After the meter is locked, you cannot change the setting! When you attempt to edit, the words "NO PASSWORD" will appear on the display. How to unlock the level meter is given on page 17.

Basic settings



Before the first starting, you must carry out the basic configuration of the level meter. The settings are accessible in the basic menu under the item "BASIC ADJUSTMENT".

"AUTO MIN" (Automatic setting of the 4mA limit)

After the mode is enabled, the actual measured level will be set as the min. level. The 4mA value will be assigned to the level meter output. The setting is recommended only if the tank can be flooded up to the required min. height.

ACTUAL LEVEL: Actual distance in mm
DISP: Display of measured values on the display
U: Unit selection (mm, cm, m, l, m^3,mA, %)

1. Fill up the tank up to the required level.
2. Press the button **[OK]** to access the basic menu. Use the same button to select the item "BASIC ADJUSTMENT" and then "AUTO MIN".
3. Now the item "AUTO MIN" is displayed. The level meter assigns the 4mA value for the measured value automatically.
4. Using the buttons **[OK]** and **[↑↓]**, set the values to display on the display "DISP" and select the units "U".
5. After the setting is completed, save the data using the button **[OK]**. By repeated pressing the button **[ESC]**, you leave the menu and the display of the level meter and return back to the measurement mode.

"AUTO MAX" (Automatic setting of 20 mA limit)

After the mode is enabled, the actual measured level will be set as the max. level. The 20mA value will be assigned to the level meter output. The setting is recommended only if the tank can be flooded up to the required max. height.

ACTUAL LEVEL: Actual distance in mm
DISP: Display of measured values on the display
U: Unit selection (mm, cm, m, l, m^3,mA, %)

1. Fill up the tank up to the required level.
2. Press the button **[OK]** to access the basic menu. Use the same button to select the item "BASIC ADJUSTMENT" and then use **[↑ ↓]** and **[OK]** to select the item “AUTO MAX”.
3. Now the item "AUTO MAX" is displayed. The level meter assigns the 20mA value for the measured value automatically.
4. Using the buttons **[OK]** and **[↑ ↓]**, set the values to display on the display "DISP" and select the units "U".
5. After the setting is completed, save the data using the button **[OK]**. By repeated pressing the button **[ESC]**, you leave the menu and the display of the level meter and return back to the measurement mode.

"MANUAL MIN and MANUAL MAX" (Manual setting of limits)

In these items, you can define min. or max. level, to which you can assign an optional output current in the range of 4÷20mA. This is recommended to carry out if the final value of the min. and max. level is known but it is not possible to flood the tank up to these limits.

For convenience, it is suitable to assign 4mA current to the min. value and 20mA current to the max. value.

OUTPUT: Setting of output current (4 ÷ 20mA)

LEVEL: Setting of distance of the level from the front of the level meter in mm

DISP: Display of measured values on the display

U: Unit selection (mm, cm, m, l, m^3,mA, %)

1. Press the button **[OK]** to access the basic menu. Use the same button to select the item "BASIC ADJUSTEMENT". Then use the button **[↑ ↓]** and **[OK]** to select the item "MANUAL MIN" or "MANUAL MAX".
2. Now the item "MANUAL MIN" or "MANUAL MAX" is displayed (as selected). Using the buttons **[OK]** and **[↑ ↓]**, set the output current "OUTPUT" and distance for the defined current "LEVEL", display of the value on the display "DISP" and unit selection "U".
3. After the setting is completed, save the data using the button **[OK]**. By repeated pressing the button **[ESC]**, you leave the menu and the display of the level meter and return back to the measurement mode.

"DAMPING" (Speed of the measurement response)

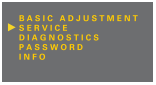
Setting of the speed of the measurement response. The function can be used to suppress deviations of the displayed values in case of quick or step changes of the level (e.g. stirred surface). The response time of the subsequent measurement will be longer and the level meter will react to quick changes with a defined delay.

The damping time can be set in the interval from 0 to 99 sec.

1. Press the button **[OK]** to access the basic menu. Use the same button to select the item "BASIC ADJUSTEMENT". Then use the button **[↑ ↓]** and **[OK]** to select the item "DAMPING".
2. Now the item "DAMPING" is displayed. Using the buttons **[OK]** and **[↑ ↓]**, set the damping time (0-99 sec.).
3. After the setting is completed, save the data using the button **[OK]**. By repeated pressing the button **[ESC]**, you leave the menu and the display of the level meter and return back to the measurement mode.

Advanced settings

In the supplemented configuration, you can set parameters of sensitivity, mapping of false reflections, temperature difference compensation, behaviour in case of fault conditions or HART communication. Here, you can set the sensor into the initial state or reset it as well.



The settings are accessible in the basic menu under the item "SERVICE".

"SENSITIVITY" (Level meter sensitivity)

The setting is defined in three steps of the level meter sensitivity.

"*low*" – Low sensitivity in case of surrounding interferences affecting the measurement.

"*medium*" – Medium sensitivity (suitable for most applications).

"*high*" – High sensitivity for measured mediums partly absorbing the ultrasonic signal (bulk-solid mat., foams)

You can set the sensitivity in three degrees: "low", "medium" and "high".

"TEACHING" (Mapping of false reflections)

The mode serves for suppressing false reflections resulting from reflection of the ultrasonic signal from roughnesses on walls of the tank, various partitions, mixers or other obstacles. The sensor starting this mode detects false reflections and save them in the memory. Then these false reflections will not affect the subsequent measurement (they are masked).

Before starting the mode, empty the tank under the level of the last obstacle in the tank.

If there are no above obstacles in the tank, it is not necessary to start this mode

1. Press the button **[OK]** to access the basic menu. Press the button **[↑↓]** to select the item "SERVICE" and press the button **[OK]** to confirm. In the next menu use the buttons **[↑↓]** and **[OK]** to select the item "TEACHING".
2. Now the item "TEACHING" is displayed. Press the button **[OK]** to set the value "LEVEL DISTANCE" – the expected distance of the sensor front from the medium surface level. If you do not know the level distance exactly, set a smaller value (in the tolerance field according to Fig. 17.).
3. After the value of "LEVEL DISTANCE" is set, use the button **[OK]** to start the mode "TEACHING" (mapping of false reflections). During the mapping process, the word "RUNNING" is displayed on the display.
4. The mapping of false reflections is completed after the word "DONE" is displayed. Then you can leave the menu by pressing the button **[ESC]**.

Mapping of false reflections lasts 5...30 sec. according to the level meter type.

In case of installed mixers, it is necessary to position the mixers under the level meter (direct the mixer blade to the ultrasonic signal beam).

*Note: If there are **significant obstacles** in the upper half of the tank, **multiple false reflections** can occur especially in closed tanks. In such cases it is necessary to reduce the level in the tank as much se possible to correctly mask these possible multiple false reflections.*

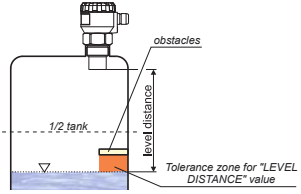


Fig. 17: The "Level distance" zone

"MEDIUM TEMPERATURE" (Temperature compensation)

If the temperature of the measured substance (liquid) in the tank is different from the temperature where the level meter is installed (see the mode "DIAGNOSTICS", p. 17), it is necessary to compensate the temperature because of accuracy of the measurement. After the medium temperature is set, the level meter calculates an average value (from the medium temperature and the temperature where the level meter is installed) and uses this average temperature for calculation of the level position.

Inactive compensation (initial state), the word "NO" appears on the display.

"FAILURE MODE" (Fault conditions)

It defines the output current of the level meter when the measured medium level is in the dead zone ("DEAD ZONE") or outside the measurement range in case of echo loss ("NO ECHO").

NO ECHO: Current in case of echo loss (3.75mA)

DEAD ZONE: Dead zone current (22mA)

The values can be set in three steps - 3.75mA, 22mA and LAST (last measured data).

"HART" (HART address setting)

HART mode (point to point, multidrop) and multidrop mode address setting. Up to 15 units can be connected to one two-wired cable in the multidrop mode.

In case of the address "00", the point to point mode is enabled. The range from "01" to "15" is reserved for addresses in the multidrop mode.

"FACTORY DEFAULT" (Default factory setting)

To reset the initial values of the level meter set by the manufacturer, press the button **[OK]** (see the Factory default table, p. 25)

After you press the button **[OK]**, "*RUNNING*" will be displayed for about 3 sec. After the initial values are set, "*DONE*" will be appear on the display.

"RESET" (Level meter restart)

Complete restart of the level meter. The same effect has also a short-time interruption of the supply voltage. To enable the resetting, press the button **[OK]**.

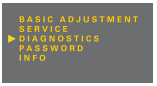
During the restart process, "*RUNNING*" will be displayed. Then the level meter will be automatically turned off and on.

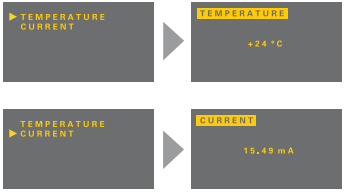
Additional functions

Additional functions include modes to display temperature in the tank or to find out the actual flowing current in the loop. Besides, to lock modifications using a password and information about the level meter version. All of the functions are accessible from the main menu.

"DIAGNOSTICS" (Diagnostic information)

It contains information about the actual temperature inside the tank (or about the compensated temperature) "TEMPERATURE" and current flowing through the loop "CURRENT". If the temperature compensation ("MEDIUM TEMPERATURE") is activated, the corrected temperature is displayed.



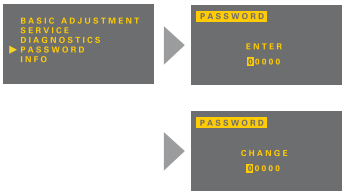


The temperature is measured inside the tank where the level meter is installed.
If the temperature of the measured medium is different, we recommend you to carry out the temperature compensation "MEDIUM TEMPERATURE" because of accuracy (see p. 15). Then the displayed temperature is an average value from the temperature set in the "MEDIUM TEMPERATURE" and the actual temperature measured by the sensor.

"PASSWORD " (Lock the level meter)

You can set any digital combination to lock the level meter and prevent an unauthorised person from setting.

1. Use the buttons **[OK]** and **[↑ ↓]** in the menu "PASSWORD" to select the mode "ENTER" for entering the password or the mode "CHANGE" for changing the password (when activated, the words are displayed inversely). Press the button **[OK]** once again to confirm the selection. You can change the password only when the level meter is unlocked. Otherwise, the words "NO PASSWORD" will be displayed.
2. Now you can edit the password. The actual edited item is displayed inversely. Press the button **[OK]** to move to the next position (clockwise direction); the button **[↑ ↓]** serves to change the values (0 ... 9).
3. After the operation is completed, confirm the edited data by pressing the button **[OK]**.



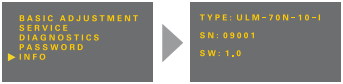
Display of status information to confirm data:
"YES" – correctly edited password
"NO" – incorrectly edited password
"OK" – the passw. saved (only in case of "CHANGE")
The password is automatically hidden after it is edited or changed ("00000" will appear).

To deactivate the password, edit the numerical combination "00000" in the mode "CHANGE".

If the password is lost, contact the manufacturer.

"INFO" – (Type data)

Information about the type, serial number and production date of the level meter.



ST: Level meter type
SN: Serial number
SW: Firmware version

HART COMMUNICATION PROTOCOL

Universal communication interface for data communication of peripheral devices with the level meter. Data transmission runs through the same line as the 4 ÷ 20mA current loop without impact on analog communication.

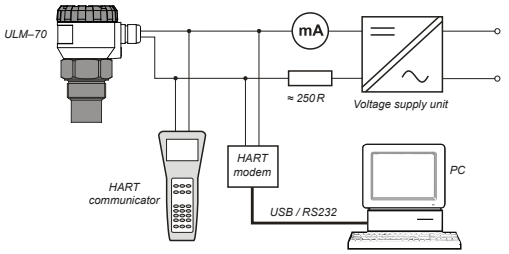


Fig. 18: Typical PLC/mA configuration with HART

ORDER CODE

ULM–70 □ – □□ – □

- Output type: ***I*** *- Current*
- Maximum range: ***02*** *- 0.15 ... 2 m*
  06 *- 0.25 ... 6 m*
  10 *- 0.4 ... 10 m*
  20 *- 0.5 ... 20 m*
- Performance: ***N*** *- Normal - usable in non-explosive areas only*
  Xi *- Ex. proof - suitable for explosive areas*

ACCESSORIES

Standard – included in the price of the level meter

- 1x Seal (only for ULM–70_–02–I, 06–I)

Optional – for extra charge

- Stainless fixing nut UM–G1" (for ULM–70_–02–I)
- Stainless fixing nut UM–G1½" (for ULM–70_–06–I)

Safety, protection, compatibility and explosion proof

The level meter ULM–70 is equipped with protection against reverse polarity and output current overload.

Protection against dangerous contact is secured by low safety voltage that complies with EN 33 2000-4-41.

Electromagnetic compatibility according to EN 55022/B, EN 61326/Z1 and EN 61000-4-2 to 6.

Explosion proof of ULM–70Xi type complies with the following standards: EN 60079-0 : 2007; EN 60079-11 : 2007 ; EN 60079-26 : 2007 and examined by FTZÚ-AO 210 Ostrava - Radvanice certificate No.: FTZÚ 09 ATEX 0277X.

Use, manipulation and maintenance

The level meter does not require any personnel for its operation. Follow-up displaying device is used to inform the technological entity operating personnel on the measured substance level height during the operation.

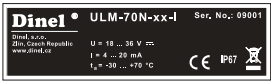
Maintenance of this equipment consists in verification of integrity of the level meter and of the supply cable. Depending on the character of the substance measured, we recommend to verify at least once per year the clarity of the ultrasound transducer emitting field and to clean it, respectively. In case any visible defects are discovered, the manufacturer or reseller of this equipment must be contacted immediately.

It is forbidden to perform any modifications or interventions into the ULM–70 level meter without manufacturer's approval. Potential repairs must be carried out by the manufacturer or by a manufacturer authorized service organization only.

Installation, commissioning, operation and maintenance of the ULM–70 level meter has to be carried out in accordance with this instruction manual; the provisions of regulations in force regarding the installation of electrical equipment have to be adhered to.

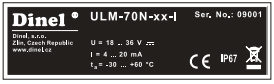
Marking of labels

Level meters label data
ULM–70N–02–I and **ULM–70N–06–I**:



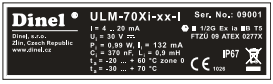
- Symbol of producer: logo Dinel®
- Internet address: www.dinel.cz
- Level meter type: ULM–70N–02–I, ULM–70N–06–I
- Serial number: Ser. No.: xxxxx - (from the left: production year, serial production number)
- Supply voltage: $U_i = 18 \div 36\,V$
- Output current range: $I = 4 \div 20\,mA$
- Ambient temperature range: t_a = -30 ... +70°C
- Protection class: IP67
- Compliance mark: CE
- Electro-waste take-back system mark:

Level meters label data
ULM–70N–10–I and **ULM–70N–20–I**:



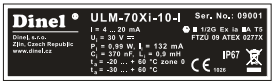
- Symbol of producer: logo Dinel®
- Internet address: www.dinel.cz
- Level meter type: ULM–70N–10–I, ULM–70N–20–I
- Serial number: Ser. No.: xxxxx - (from the left: production year, serial production number)
- Supply voltage: $U_i = 18 \ldots 36\,V$
- Output current range: $I = 4 \div 20\,mA$
- Ambient temperature range: t_a = -30 ... +60°C
- Protection class: IP67
- Compliance mark: CE
- Electro-waste take-back system mark:

Level meters label data
ULM–70Xi–02–I and **ULM–70Xi–06–I**:



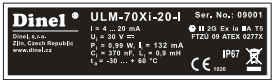
- Symbol of producer: logo Dinel®
- Internet address: www.dinel.cz
- Level meter type: ULM–70Xi–02–I, ULM–70Xi–06–I
- Serial number: Ser. No.: xxxxx - (from the left: production year, serial production number)
- Output current range: $I = 4 \div 20\,mA$
- Limit operating parameters: $U_i = 30\,V$, $I_i = 132\,mA$; $P_i = 0{,}99\,W$; $C_i = 370\,nF$; $L_i = 0{,}9\,mH$
- Ambient temperature range for the zone 0: t_a = -20 to +60°C
- Ambient temperature range: t_a = -30 ... +70°C
- Label of non-explosive device: ; Performance: II 1/2G Ex ia IIB T5
- Number of certificate of intrinsically safety: FTZÚ 09 ATEX 0277X
- Protection class: IP67
- Compliance mark: CE, No. of authorized person examining control of system quality:1026
- Electro-waste take-back system mark:

Level meters label data
ULM–70Xi–10–I:



- Symbol of producer: logo Dinel®
- Internet address: www.dinel.cz
- Level meter type: ULM–70Xi–10–I
- Serial number: Ser. No.: xxxxx - (from the left: production year, serial production number)
- Output current range: $I = 4 \div 20\,mA$
- Limit operating parameters: $U_i = 30\,V ⎓$, $I_i = 132\,mA$; $P_i = 0{,}99\,W$; $C_i = 370\,nF$; $L_i = 0{,}9\,mH$
- Ambient temperature range for the zone 0: t_a = -20 to +60°C
- Ambient temperature range: t_a = -30 ... +60°C
- Label of non-explosive device: ⍟; Performance: II 1/2G Ex ia IIA T5
- Number of certificate of intrinsically safety: FTZÚ 09 ATEX 0277X
- Protection class: IP67
- Compliance mark: CE, No. of authorized person examining control of system quality:1026
- Electro-waste take-back system mark: 🗑

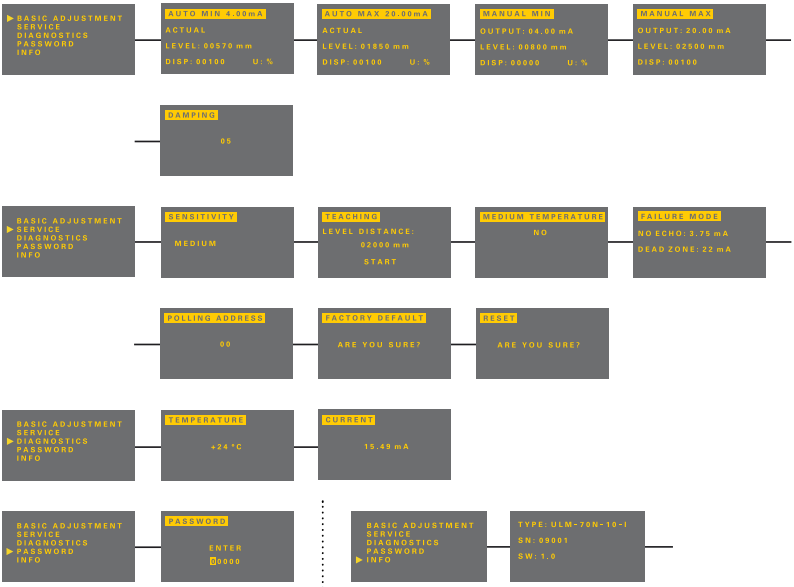
Level meters label data
ULM–70Xi–20–I:



- Symbol of producer: logo Dinel®
- Internet address: www.dinel.cz
- Level meter type: ULM–70Xi–20–I
- Serial number: Ser. No.: xxxxx - (from the left: production year, serial production number)
- Output current range: $I = 4 \div 20\,mA$
- Limit operating parameters: $U_i = 30\,V ⎓$, $I_i = 132\,mA$; $P_i = 0{,}99\,W$; $C_i = 370\,nF$; $L_i = 0{,}9\,mH$
- Ambient temperature range for the zone 1: t_a = -20 to +60°C
- Ambient temperature range: t_a = -30 ... +60°C
- Label of non-explosive device: ⍟; Performance: II 2G Ex ia IIA T5
- Number of certificate of intrinsically safety: FTZÚ 09 ATEX 0277X
- Protection class: IP67
- Compliance mark: CE, No. of authorized person examining control of system quality:1026
- Electro-waste take-back system mark: 🗑

Note: Real label size is 70x20mm.

MENU STRUCTURE



Technical specifications

Measuring range [1]	ULM–70_–02–I ULM–70_–06–I ULM–70_–10–I ULM–70_–20–I	0.15 ... 2 m 0.25 ... 6 m 0.4 ... 10 m 0.5 ... 20 m
Supply voltage	ULM–70N–_ _–I ULM–70Xi–_ _–I	18 ... 36 V DC 18 ... 30 V DC
Output		4 ... 20 mA (limit values 3.9 ... 20.5 mA), HART
Resolution		< 1 mm
Accuracy (within the total range)		0.15 %
Temperature error		max. 0.04% / K
Beamwidth (-3 dB)	ULM–70_–02; 10–I ULM–70_–06–I ULM–70_–20–I	10° 14° 12°
Ambient temperature range	ULM–70_–02 ; 06–I ULM–70_–10 ; 20–I	-30 ... +70°C -30 ... +60°C
Short-time temperature stress resistance		+90°C / 1 hour
Max. operation overpressure (on transmission surface)		0.1 MPa
Sensitivity		3 steps (low – medium – high)
Damping		0 ... 99 sec.
Measuring period		1 ... 4 sec.
Data between power supply rise time and full emission output		30 sec.
Additional technical data [2] (only for variant Xi) – Max. internal values		U_i=30 V DC; I_i=132 mA; P_i=0.99 W; C_i=370 nF; L_i=0.9 mH
Failure indication (echo loss, level in dead zone, internal failure)		Adjustable in modes: 3.75 mA ; 22 mA ; last measured value
Protection class		IP67
Mechanical connection	ULM–70_–02–I ULM–70_–06–I ULM–70N–10–I ULM–70Xi–10–I ULM–70_–20–I	screwing with thread G 1" screwing with thread G 1½" HDPE flange aluminium alloy flange aluminium alloy flange
Recommended cable		PVC 2 x 0.75 mm² (3 x 0.5 mm²)
Current output load resistance (U = 24 V DC)		R_{max} = 270 Ω [3]
Weight	ULM–70_–02–I ULM–70_–06–I ULM–70N–10–I ULM–70Xi–10–I ULM–70_–20–I	0.3 kg 0.4 kg 0.7 kg 1.2 kg 3.1 kg

[1] *In case the level of bulk-solid materials is measured, the measurement range is reduced.*
[2] *Allowed temperature range in the zone 0: -20°C ... +60°C; allowed pressure range in the zone 0: 80 ... 110 kPa.*
[3] *Including 250R resistor in case of HART connection.*

Area classification (according to EN 60079-10 and EN 60079-14)	
ULM–70N–_ _–I	Performance for non-explosive areas
ULM–70Xi–02–I ULM–70Xi–06–I	Explosive proof – suitable for explosive areas (combustible gases or vapours) Ex II 1/2G Ex ia IIB T5 with isolating repeater (IRU–420), the whole level meter – zone 1, front head part – zone 0
ULM–70Xi–10–I	Explosive proof – suitable for explosive areas (combustible gases or vapours) Ex II 1/2G Ex ia IIA T5 with isolating repeater (IRU–420), the whole level meter – zone 1, front head part – zone 0
ULM–70Xi–20–I	Explosive proof – suitable for explosive areas (combustible gases or vapours) Ex II 2G Ex ia IIA T5 with isolating repeater (IRU–420), the whole level meter – zone 1

Factory default				
	ULM–70_–02	***ULM–70_–06***	***ULM–70_–10***	***ULM–70_–20***
LEVEL MIN	150	250	400	500
LEVEL MAX	2000	6000	10000	20000
DAMPING	2	5	10	10
SENSITIVITY	MEDIUM	MEDIUM	MEDIUM	MEDIUM
MEDIUM TEMPERATURE	NO	NO	NO	NO
FAILURE MODE – NO ECHO	3,75 mA	3,75 mA	3,75 mA	3,75 mA
FAILURE MODE – DEAD ZONE	22 mA	22 mA	22 mA	22 mA
POOLING ADDRESS (HART)	00	00	00	00
PASSWORD	no password	no password	no password	no password

NOTES

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The latest version of this instruction manual can be found at www.dinel.cz
(version 02/2010)