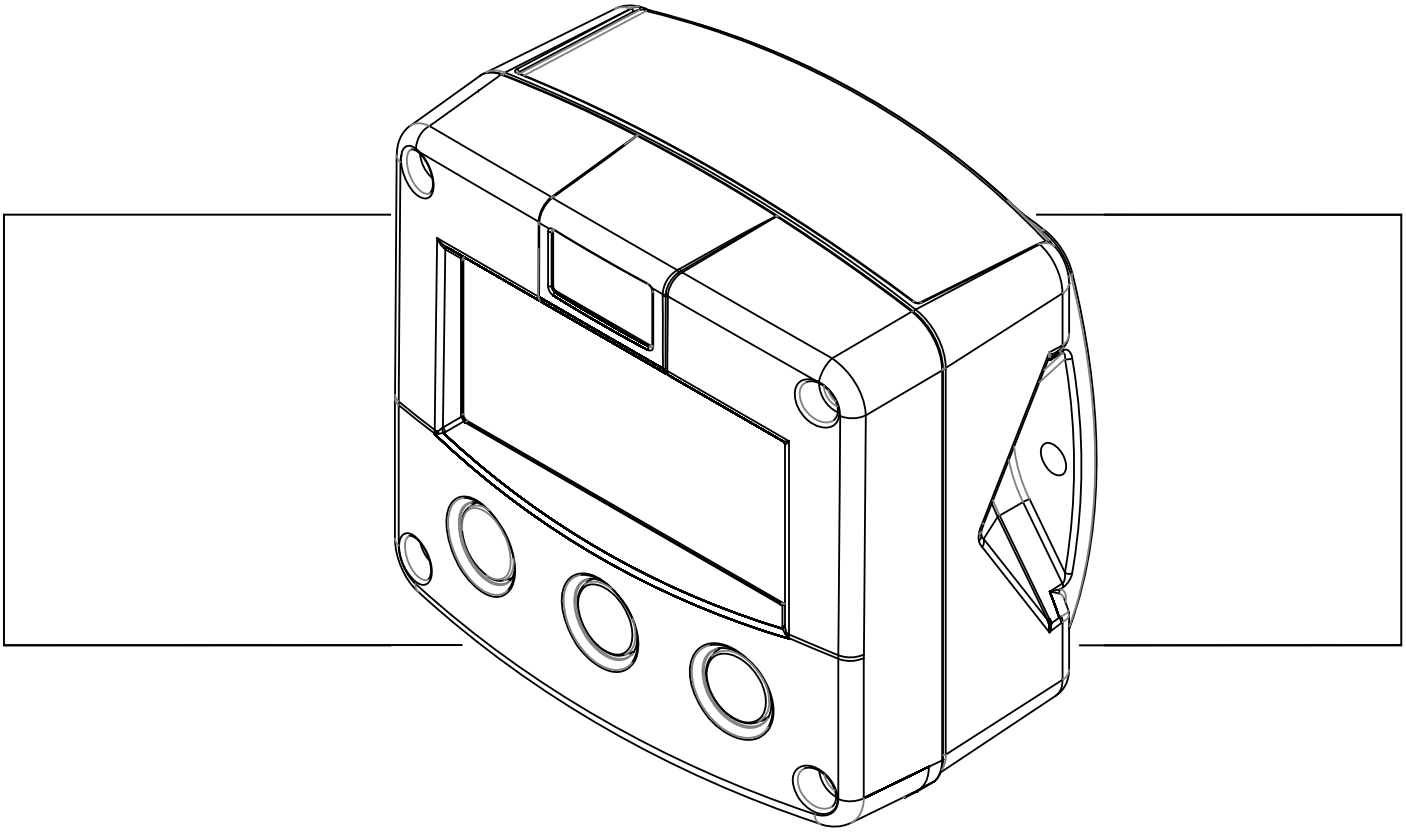
F073-T

LEVEL MONITOR

WITH HIGH / LOW LEVEL ALARMS



Signal input sensor: resistance array

Alarm output: one level alarm

Options: Intrinsically Safe

F-Series - Field mounted indicators for safe and hazardous areas. More info: www.fluidwell.com/fseries

SAFETY INSTRUCTIONS

- Any responsibility is lapsed if the instructions and procedures as described in this manual are not followed.

- LIFE SUPPORT APPLICATIONS: The F073-T is not designed for use in life support appliances, devices, or systems where malfunction of the product can reasonably be expected to result in a personal injury. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify the manufacturer and supplier for any damages resulting from such improper use or sale.

- Electro static discharge does inflict irreparable damage to electronics! Before installing or opening the unit, the installer has to discharge himself by touching a well-grounded object.

- This unit must be installed in accordance with the EMC guidelines (Electro Magnetic Compatibility).

- Do connect a proper grounding to the aluminum casing as indicated if the F073-T has been supplied with the 115-230V AC power-supply type PM. The green / yellow wire between the back-casing and removable terminal-block may never be removed.

- Intrinsically Safe applications: follow the instructions as mentioned in Chapter 5 and consult “Fluidwell F0..-..-XI - Documentation for Intrinsic Safety”.

DISPOSAL

- At the end of its life this product should be disposed of according to local regulations regarding waste electronic equipment. If a battery is present in this product it should be disposed of separately. The separate collection and recycling of your waste equipment will help to conserve natural resources and ensure that it is recycled in a manner that protects the environment.

SAFETY RULES AND PRECAUTIONARY MEASURES

- The manufacturer accepts no responsibility whatsoever if the following safety rules and precautions instructions and the procedures as described in this manual are not followed.
- Modifications of the F073-T implemented without preceding written consent from the manufacturer, will result in the immediate termination of product liability and warranty period.
- Installation, use, maintenance and servicing of this equipment must be carried out by authorized technicians.
- Check the mains voltage and information on the manufacturer's plate before installing the unit.
- Check all connections, settings and technical specifications of the various peripheral devices with the F073-T supplied.
- Open the casing only if all leads are free of potential.
- Never touch the electronic components (ESD sensitivity).
- Never expose the system to heavier conditions than allowed according to the casing classification (see manufacture's plate and chapter 4.2.).
- If the operator detects errors or dangers, or disagrees with the safety precautions taken, then inform the owner or principal responsible.
- The local labor and safety laws and regulations must be adhered to.

ABOUT THE OPERATION MANUAL

This operation manual is divided into two main sections:

- The daily use of the unit is described in chapter 2 "Operation". These instructions are meant for users.
- The following chapters and appendices are exclusively meant for electricians/technicians. These provide a detailed description of all software settings and hardware installation guidance.

This operation manual describes the standard unit as well as most of the options available. For additional information, please contact your supplier.

A hazardous situation may occur if the F073-T is not used for the purpose it was designed for or is used incorrectly. Please carefully note the information in this operating manual indicated by the pictograms:

A "**warning**" indicates actions or procedures which, if not performed correctly, may lead to personal injury, a safety hazard or damage of the F073-T or connected instruments.


Caution !

A "**caution**" indicates actions or procedures which, if not performed correctly, may lead to personal injury or incorrect functioning of the F073-T or connected instruments.


Note !

A "**note**" indicates actions or procedures which, if not performed correctly, may indirectly affect operation or may lead to an instrument response which is not planned.

Hardware version	:	03.03.xx
Software version	:	03.06.xx
Manual	:	HF073TEN_v0403_05 Atex_IECEx_CSA_FM
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Information in this manual is subject to change without prior notice. The manufacturer is not responsible for mistakes in this material or for incidental damage caused as a direct or indirect result of the delivery, performance or use of this material.

CONTENTS MANUAL

1. INTRODUCTION

1.1. SYSTEM DESCRIPTION OF THE F073-T

Functions and features
The level monitor model F073-T is a microprocessor driven instrument designed to display level, percentage or the height as well as the monitoring of the level for high / low values.
This product has been designed with a focus on:

- ultra-low power consumption to allow long-life battery powered applications (type PB / PC),
- intrinsic safety for use in hazardous applications (type XI),
- several mounting possibilities with aluminum or GRP enclosures for harsh industrial surroundings,
- alarm transmitting possibilities with one switch output.

Sensor input
This manual describes the unit with a resistive array input type, known as "-T version". This version is capable of reading resistive array sensors such as a reed chain. Other versions are available to process a 0(4) – 20 mA or a 0 – 10V sensor signal.
One resistive array (preferably ≤ 20kΩ) can be connected to the F073-T.

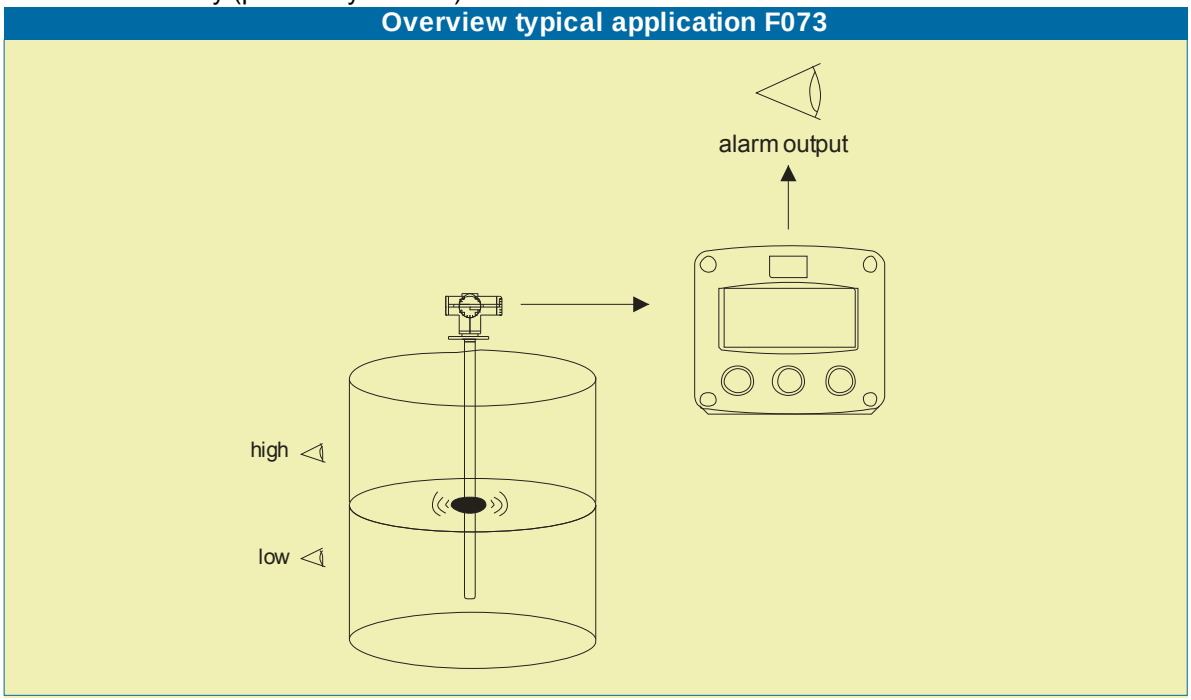


Fig. 1: Typical application for the F073-T with reed chain

Configuration of the unit
The F073-T has been designed to be implemented in many types of applications. For that reason, a SETUP-level is available to configure your F073-T according to your specific requirements.
It includes several important features, such as Span, measurement units, display options etc. All setting are stored in EEPROM memory and will not be lost in the event of power failure. To extend the battery-life time, please use of the power-management functions as described in chapter 3.2.3.

Display information
The unit has a large transflective LCD with all kinds of symbols and digits to display measuring units, status information, trend-indication and key-word messages.
Level and alarm values are displayed with the large 17mm digits while the smaller 8mm digits can be set to display either the height or percentage filled.

Options
The following options are available: intrinsic safety, power- and sensor-supply options, panel-mount, wall-mount and weather-proof enclosures, flame proof enclosure and LED backlight.

2. OPERATIONAL

2.1. GENERAL

Caution !

- *The F073-T may only be operated by personnel who are authorized and trained by the operator of the facility. All instructions in this manual are to be observed.*
- *Take careful notice of the " Safety rules, instructions and precautionary measures " in the front of this manual.*

This chapter describes the daily use of the F073-T. This instruction is meant for users / operators.

2.2. CONTROL PANEL

The following keys are available:

Fig. 2: Control Panel.

Functions of the keys

This key is used to program and save new values or settings.
It is also used to gain access to SETUP-level; please read chapter 3.

This key is used to SELECT the level alarm values.
The arrow-key ▲ is used to increase a value after PROG has been pressed or to configure the unit; please read chapter 3.

The arrow-key ▶ is used to select a digit after PROG has been pressed or to configure the unit; please read chapter 3.

2.3. OPERATOR INFORMATION AND FUNCTIONS

In general, the F073-T will always act at Operator level. The information displayed is dependent upon the SETUP-settings. The signal generated by the connected sensor is measured by the F073-T in the background, whichever screen refresh rate setting is chosen. After pressing a key, the display will be updated quickly during a 30 second period, after which the update frequency will slow-down again.

Fig. 3: Example of display information during process.

For the Operator, the following functions are available:

- **Display level (volume) / height or percentage**
  This is the main display information of the F073-T. After selecting any other information, it will always return to this main display automatically.
  Level (or volume) is displayed on the upper-line of the display and the percentage, height or nothing on the bottom line (depending on the configuration settings).
  When ------- is displayed, then the value is too high to be displayed. The arrows ▲▼ indicate the increase/decrease of the level trend.

- **Programming the level alarm values**

Note !

Note: *This function might not be accessible due to a configuration setting.*

When the **SELECT** key is pressed a few times, following level alarm values are displayed:
- low level alarm: enter here 40 USGAL for example,
- high level alarm: enter here 600 USGAL for example.

To change the alarm value, the following procedure must be executed:

1) press **PROG**: the word **PROGRAM** will flash or a pass code will be requested,
2) use ▶ to select the digits and ▲ to increase that value,
3) confirm the new alarm value by pressing **ENTER**.

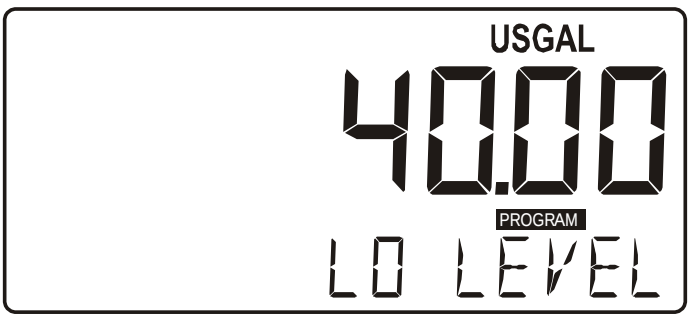


Fig. 4: Example of display information during programming minimum level.

When data is altered but **ENTER** has not been pressed yet, then the alteration can still be cancelled by waiting for 20 seconds or by pressing **ENTER** during three seconds: the former value will be reinstated.

2.4. OPERATOR ALARMS

- **Level alarm**
  When the actual level is outside the allowed range, an alarm message will be displayed indicating the type of alarm: `LO LEVEL`, `HI LEVEL`.
  The alarm is terminated automatically as soon as the level is within its range again.

- **Low-battery alarm**
  When the battery voltage drops, it must be replaced. At first `low-battery` will flash, but as soon as it is displayed continuously, the battery MUST be replaced shortly after!
  Only original batteries supplied by the manufacturer may be used, else the guarantee and liability will be terminated. The remaining lifetime after the first moment of indication is generally several days up to some weeks.

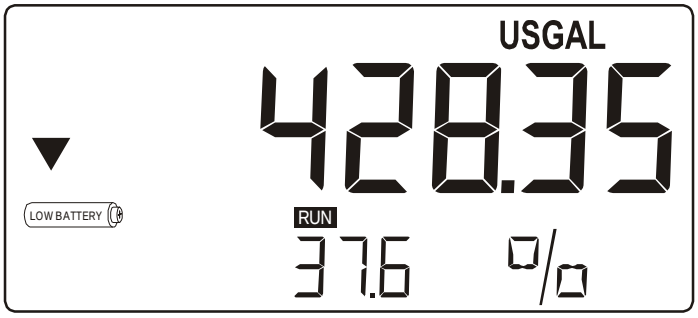


Fig. 5: Example of low-battery alarm.

- **Range error**
  As soon as the input value is 5% outside the calibrated measuring range, **ALARM** will be displayed. Meanwhile, the calibrated value will be displayed.
  After pressing the **SELECT** key, the reason of the alarm will be displayed: `LO RANGE` or `HI RANGE`.

- **Alarm 01-03**
  When **ALARM** is displayed, press **SELECT** to display the reason of the alarm: 1-3.
  Please consult Appendix B: Troubleshooting.

3. CONFIGURATION

3.1. INTRODUCTION

This and the following chapters are exclusively meant for electricians and non-operators. In these, an extensive description of all software settings and hardware connections are provided.

Caution !

- *Mounting, electrical installation, start-up and maintenance of the instrument may only be carried out by trained personnel authorized by the operator of the facility. Personnel must read and understand this Operating Manual before carrying out its instructions.*
- *The F073-T may only be operated by personnel who are authorized and trained by the operator of the facility. All instructions in this manual are to be observed.*
- *Ensure that the measuring system is correctly wired up according to the wiring diagrams. The housing may only be opened by trained personnel.*
- *Take careful notice of the "Safety rules, instructions and precautionary measures" in the front of this manual.*

3.2. PROGRAMMING SETUP-LEVEL

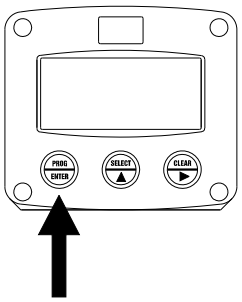
3.2.1. GENERAL

Configuration of the F073-T is done at SETUP-level. SETUP-level is reached by pressing the **PROG/ENTER** key for 7 seconds; at which time, both arrows ⬍ will be displayed. In order to return to the operator level, **PROG** will have to be pressed for three seconds. Alternatively, if no keys are pressed for 2 minutes, the unit will exit SETUP automatically.
SETUP can be reached at all times while the F073-T remains fully operational.

Note !

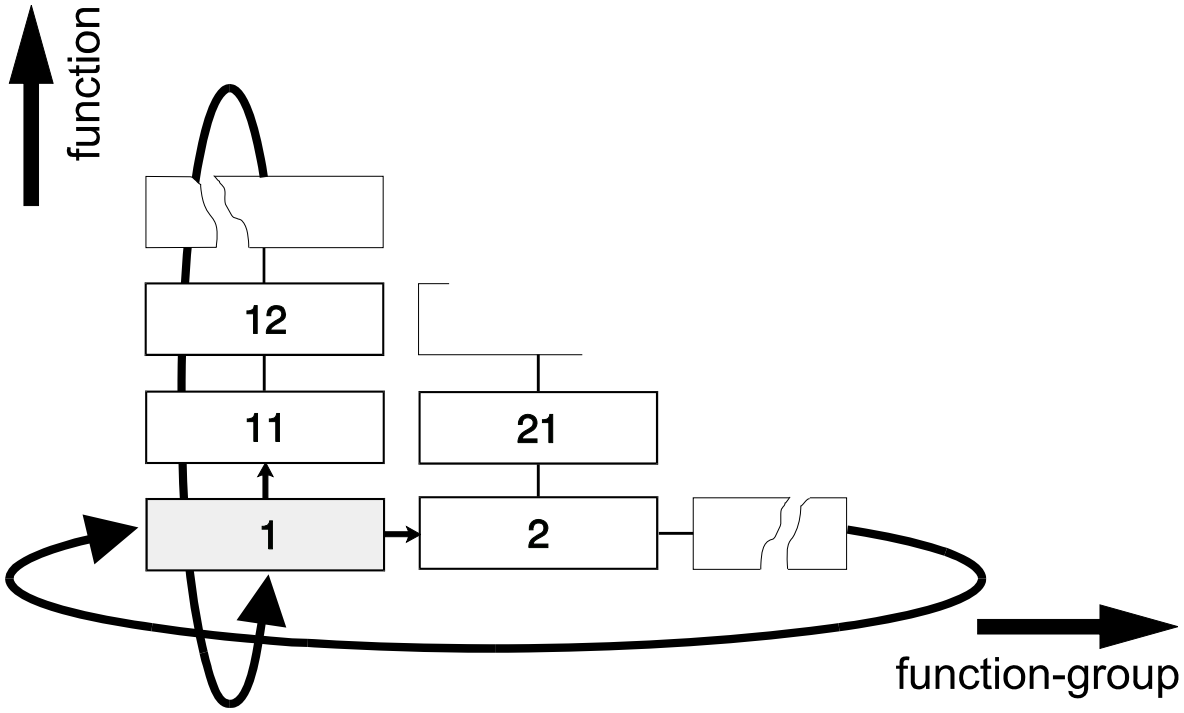
Note: *A pass code may be required to enter SETUP. Without this pass code access to SETUP is denied.*

To enter SETUP-level:



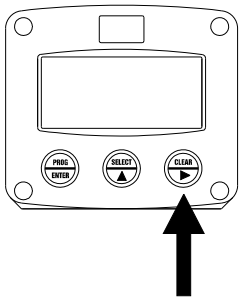
Press PROG/ENTER for 7 seconds

Matrix structure SETUP-level:

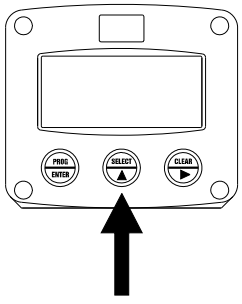


SCROLLING THROUGH SETUP-LEVEL

Selection of function-group and function:
SETUP is divided into several function groups and functions.



Select function-group with CLEAR ▶

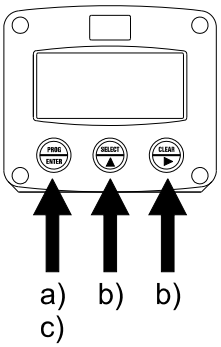


Select function with SELECT ▲

Each function has a unique number, which is displayed below the word **SETUP** at the bottom of the display. The number is a combination of two digits. The first digit indicates the function-group and the second digit the sub-function. Additionally, each function is expressed with a keyword.

After selecting a sub-function, the next main function is selected by scrolling through all "active" sub-functions (e.g. 1▲, 11▲, 12▲, 13▲, 14▲, 1▶, 2▶, 3▲, 31 etc.). The **CLEAR** button can be used to jump one step back if you missed the desired function.

To change or select a value:



a) press PROG ENTER briefly; **PROGRAM** will start flash

b) select or enter value with SELECT ▲ and / or CLEAR ▶

c) press PROG ENTER to confirm the value / selection.

To change a value, use ▸ to select the digits and ▲ to increase that value.
If the new value is invalid, the increase sign ▲ or decrease-sign ▼ will be displayed while you are programming.

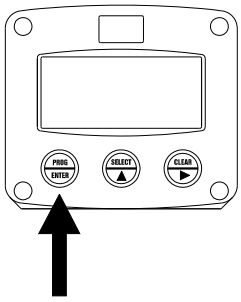
To select a setting, ▲ is used to select in one direction and ▸ can be used to select in the other direction.

When data is altered but **ENTER** is not pressed, then the alteration can still be cancelled by waiting for 20 seconds or by pressing **ENTER** for three seconds: the PROG-procedure will be left automatically and the former value reinstated.

Note !

Note: *alterations will only be set after* ***ENTER*** *has been pressed!*

To return to OPERATOR-level:



Press PROG ENTER for 3 seconds

In order to return to the operator level, **PROG** will have to be pressed for three seconds. Also, when no keys are pressed for 2 minutes, **SETUP** mode will be left automatically.

3.2.2. OVERVIEW FUNCTIONS SETUP LEVEL

SETUP FUNCTIONS AND VARIABLES			
1	**LEVEL**		
	11	UNIT	L - m3 - kg - lb - GAL - USGAL - bbl - no unit
	12	DECIMALS	0 - 1 - 2 - 3 (Ref: displayed value)
	13	SPAN	0.001 to 999,999 unit
	14	OFFSET	-999,999 to +999,999 unit
2	HEIGHT		
	21	UNIT	mm - cm - m - mtr - inch - ft - mmwk - mmwc - cmwk - cmwc - mwk - mwc - inwc - ftwc - mbar - bar - psi - no unit.
	22	DECIMALS	0 - 1 - 2 (Ref: displayed value)
	23	SPAN	0.01 to 999,999 unit
	24	OFFSET	-999,999 to +999,999 unit
3	ALARM		
	31	EMPTY	default - no relays - ignore
	32	ALARM LOW	-999,999 to +999,999 unit
	33	ALARM HIGH	-999,999 to +999,999 unit
	34	DELAY ALARM LOW	0.1 - 999.9 seconds
	35	DELAY ALARM HIGH	0.1 - 999.9 seconds
	36	ALARM OUTPUT	high - low – hi_lo - off
4	DISPLAY		
	41	UNDER	height - percentage - off
	42	SET ALARM	operator - setup
	43	BACKLIGHT (optional)	off - green - amber
	44	BACKLIGHT ALARM	off - on - flash
	45	BL. BRIGHTNESS	1 - 5
5	POWER MANAGEMENT		
	51	LCD UPDATE	fast - 1 sec - 3 sec - 15 sec - 30 sec - off
	52	BATTERY MODE	operational - shelf
6	SENSOR		
	61	FILTER	00 - 99
	62	CUT-OFF	0.0 - 99.9%
	63	CALIBRATE LOW	default - calibrate - calibrate set
	64	CALIBRATE HIGH	default - calibrate - calibrate set
7	OTHERS		
	71	TYPE / MODEL	F073-T
	72	SOFTWARE VERSION	03.06.xx
	73	SERIAL NO.	xxxxxxx
	74	PASS CODE	0000 - 9999
	75	TAGNUMBER	0000000 - 9999999

3.2.3. EXPLANATION OF SETUP-FUNCTIONS

1 - LEVEL	
MEASUREMENT UNIT **11**	**SETUP** 11 determines the measurement unit for the displayed level (volume) and alarm values. The following units can be selected: `L - m3 - kg - lb. - GAL - USGAL - bbl - _ (no unit).` Alteration of the measurement unit will have consequences for operator and SETUP-level values. Please note that the Span (**SETUP** 13) has to be adapted as well; the calculation is not done automatically.
DECIMALS **12**	This setting determines for level and the alarm values the number of digits following the decimal point. The following can be selected: `00000 - 1111.1 - 2222.22 - 3333.333`
SPAN **13**	With the span, the sensor signal is converted to a quantity. The **span for level** (volume) is determined on the basis of the **selected measurement unit** at 100% signal. Enter the span in whole numbers (decimals are set with **SETUP** 12). The more accurate the span, the more accurate the functioning of the system will be. **Example 1** **Calculating the span for level (volume)** *Let us assume that the sensor generates 100% signal at a level of 2,481.3 Liters, the selected unit is "Liters".* *The span is 2481.3* *Enter `24813` for **SETUP** 13 and `1` for **SETUP** 12.* **Example 2** **Calculating the span for level (volume)** *Let us assume that the sensor generates 100% signal at a level of 652.31 USGAL, the selected unit is USG.* *The span is 652.31.* *Enter `652.31` for **SETUP** 13 and `2` for **SETUP** 12.*
OFFSET **14**	Enter here the "not measured" quantity which is below the sensor. Also, a negative offset can be entered: to do so press the middle and right button simultaneously.

2 - HEIGHT

If desired the height of the level column can be calculated and displayed.

MEASUREMENT UNIT **21**	**SETUP** 21 determines the measurement unit for height. The following units can be selected: `mm - cm - m - mtr - inch - ft - mmwk - mmwc - cmwk – cmwc - mwk - mwc - inwc - ftwc - mbar - bar - psi - no unit.` Alteration of the measurement unit will have consequences for operator and SETUP-level values. Please note that the Span (**SETUP** 23) has to be adapted as well; the calculation is not done automatically.
DECIMALS **22**	This setting determines for height the number of digits following the decimal point. The following can be selected: `00000 - 1111.1 - 2222.22`
SPAN **23**	With the span, the sensor signal is converted to a height. The **span for height** is determined on the basis of the **selected measurement unit** at 100% signal. The more accurate the span, the more accurate the functioning of the system will be : **Example** **Calculating the span for height** *Let us assume that the sensor generates 100% signal at a level of 2,481.3 cm, the selected unit is "cm".* *The span is 2481.3* *Enter `2481.3` for* **SETUP** *23.*
OFFSET **24**	Enter here the "not measured" height which is below the sensor. Also, a negative offset can be entered: to do so press the middle and right button simultaneously.

3 - ALARM

Note !

With these settings, it is determined how the level will be monitored and the functionality of the transistor output (terminals 7-8) be determined.

EMPTY **31**	When the level is zero (or the offset value **SETUP** 15), then it is possible to ignore or disable the level monitoring. The following settings can be selected: `DEFAULT`: in case of a low-level alarm and zero level, it will switch the alarm output and indicate the alarm on the display. `NO RELAY`: in case of a low-level alarm and zero level, it won't switch the alarm output but will indicate the alarm on the display only. `IGNORE`: in case of a low-level alarm and zero level, it won't switch the alarm output and nothing will be indicated on the display.
ALARM LOW LEVEL **32**	The low alarm is set with this setting. An alarm will be generated as long as the actual level is below this value. Entering `0.0` disables this function.
ALARM HIGH LEVEL **33**	The high alarm is set with this setting. An alarm will be generated as long as the actual level is above this value. Entering `0.0` disables this function.
DELAY TIME ALARM LOW LEVEL **34**	An alarm generated by **SETUP** 32 `low` can be ignored during X-time period. If the actual level is still incorrect after this delay time, then an alarm will be generated.
DELAY TIME ALARM HIGH LEVEL **35**	An alarm generated by **SETUP** 33 `high` can be ignored during X-time period. If the actual level is still incorrect after this delay time, then an alarm will be generated.
ALARM OUTPUT TRANSISTOR / RELAY **36**	A transistor output is available to transmit alarm conditions. Assign with this function the type of alarm to be transmitted: `hi` - `lo` - `hi_lo` (both alarms) - `off` (no alarm)

4 - DISPLAY	
UNDER **41**	The small 8mm digits can be set to display: `height - percentage - off`
SET ALARM **42**	This function determines if the level alarm values can be set at both Operator level and SETUP-level or SETUP-level only. If `SETUP` has been selected, the alarm values are still visible for the Operator but cannot be changed.
The functions below will only effect the optional LED-backlight.	
BACKLIGHT (OPTION) **43**	If a LED backlight has been supplied, the color can be selected. Following selections are available: `OFF - GREEN - AMBER`
BACKLIGHT ALARM (OPTION) **44**	In case the F073-T generates a level alarm, the backlight can be set to change to red. Following selections are available: `OFF`: during level alarm the color is according to setting 43 `ON`: during level alarm the color is red. `FLASH`: during level alarm the color flashes red and the color as set with **SETUP** 43.
BRIGHTNESS (OPTION) **45**	The brightness of the backlight can be set in following range: `1 - 5` `1` is minimum and `5` is maximum brightness.

5 - POWER MANAGEMENT	
When used with the internal battery option, the user can expect reliable measurement over a long period of time. The F073-T has several smart power management functions to extend the battery life time significantly. Two of these functions can be set:	
LCD NEW **51**	The calculation of the display-information influences the power consumption significantly. When the application does not require a fast display update, it is **strongly advised** to select a slow refresh rate. Please understand that NO information will be lost; the input signal will be processed and the output signal will be generated in the normal way. The following can be selected: `Fast - 1 sec - 3 sec - 15 sec - 30 sec - off.` **Example battery life-time:** *battery life-time with a FAST update: about 3 years.* *battery life-time with a 1 sec update: about 5 years.* ***Note:** after a button has been pressed by the operator - the display refresh rate will always switch to `FAST` for 30 seconds. When `OFF` is selected, the display will be switched off after 30 seconds and will be switched on as soon as a button has been pressed.*
BATTERY-MODE **52**	The unit has two power modes: `operate` and `shelf`. After `shelf` has been selected, the unit can be stored for several years; it will not process the sensor signal; the display is switched off but all settings are stored. In this mode, power consumption is extremely low. To wake up the unit again, press **SELECT** twice.

Note !

6 - SENSOR

FILTER
61

Note !

The resistive signal of a sensor mirrors the actual level. This signal is measured several times a second by the F073-T. The value measured is a "snap-shot" of the real level as it will be fluctuating. With the help of this digital filter a stable and accurate reading can be obtained while the filter level can be set to a desired value.
The filter principal is based on three input values: the filter level (`01-99`), the last measured resistive value and the last average value. The higher the filter level, the longer the response time on a value change will be.
Below, several filter levels with their response times are indicated:

FILTER VALUE	RESPONSE TIME ON STEP CHANGE OF RESISTIVE VALUE. TIME IN SECONDS			
	50% INFLUENCE	75% INFLUENCE	90% INFLUENCE	99% INFLUENCE
01	filter disabled	filter disabled	filter disabled	filter disabled
02	0.3 seconds	0.5 seconds	1.0 seconds	1.8 seconds
03	0.5 seconds	1.0 seconds	1.5 seconds	3 seconds
05	1.0 seconds	1.8 seconds	2.8 seconds	5.3 seconds
10	1.8 seconds	3.5 seconds	5.6 seconds	11 seconds
20	3.5 seconds	7.0 seconds	11 seconds	23 seconds
30	5.3 seconds	10 seconds	17 seconds	34 seconds
50	8.8 seconds	17 seconds	29 seconds	57 seconds
75	13 seconds	26 seconds	43 seconds	86 seconds
99	17 seconds	34 seconds	57 seconds	114 seconds

CUT-OFF
62

To ignore e.g. vibration due to an empty tank, a low-level cut-off can be set as percentage over the full range of 100% signal. When the resistive value is below required with this setting, the signal will be ignored.
The cut-off value can be programmed in the range 0.0 - 99.9%.

CALIBR. LOW / 0%
63

With this setting it is possible to calibrate the input value for 0% as the signal from the sensor might not reflect its reference value at level zero. This function will measure the provided resistance value at level zero.

Note !

- *Warning: be very sure that the offered signal is correct before the calibration is executed as this function has major influences on the accuracy of the system!*

WARNING

After pressing **PROG**, three settings can be selected:

- `CALIBRATE:` with this setting, the input will be calibrated with the actual 0% value. After pressing enter, `CAL SET` will be displayed as soon as the calibration is completed. From that moment, the resistive value must be more than the calibrated value for the signal to be processed.
- `DEFAULT:` with this setting, the manufactures value is re-installed.
- `CAL SET:` to select the last calibrated value.

Continued next page >>>

6 - SENSOR (CONTINUED)	
CALIBR. HIGH / 100% **64**	With this setting it is possible to calibrate the input value for 100% as the signal from the sensor might not reflect it's reference value at maximum level. This function will measure the provided resistance value at maximum level. ▪ *Warning: be very sure that the offered signal is correct before the calibration is executed as this function has major influences on the accuracy of the system!* After pressing **PROG**, three settings can be selected: ▪ `CALIBRATE:` with this setting, the input will be calibrated with the actual 0% value. After pressing enter, `CAL SET` will be displayed as soon as the calibration is completed. From that moment, the resistive value must be more than the calibrated value for the signal to be processed. ▪ `DEFAULT:` with this setting, the manufactures value is re-installed. ▪ `CAL SET:` to select the last calibrated value.

7 - OTHERS	
TYPE OF MODEL **71**	For support and maintenance it is important to have information about the characteristics of the F073-T. Your supplier will ask for this information in the case of a serious breakdown or to assess the suitability of your model for upgrade considerations.
VERSION SOFTWARE **72**	For support and maintenance it is important to have information about the characteristics of the F073-T. Your supplier will ask for this information in the case of a serious breakdown or to assess the suitability of your model for upgrade considerations.
SERIAL NUMBER **73**	For support and maintenance it is important to have information about the characteristics of the F073-T. Your supplier will ask for this information in the case of a serious breakdown or to assess the suitability of your model for upgrade considerations.
PASS CODE **74**	The SETUP menu can be pass code protected. This protection is disabled with value 0000 (zero). Up to and including 4 digits can be programmed, for example 1234.
TAGNUMBER **75**	For identification of the unit and communication purposes, a unique tag number of maximum 7 digits can be entered.

4. INSTALLATION

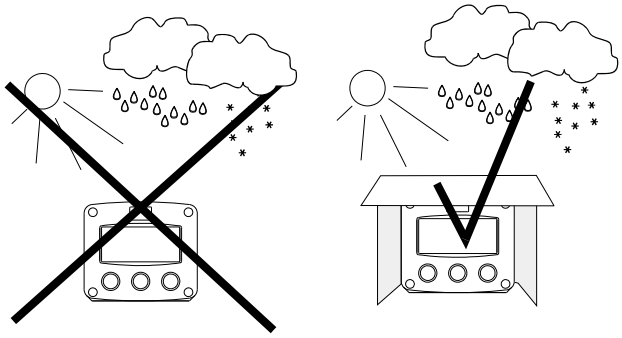
4.1. GENERAL DIRECTIONS

- *Mounting, electrical installation, start-up and maintenance of this instrument may only be carried out by trained personnel authorized by the operator of the facility. Personnel must read and understand this Operating Manual before carrying out its instructions.*
- *The F073-T may only be operated by personnel who are authorized and trained by the operator of the facility. All instructions in this manual are to be observed.*

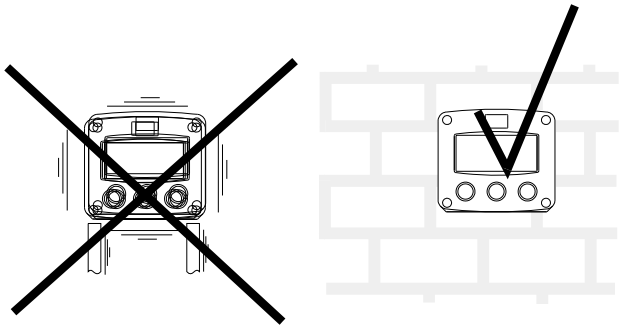
Caution !

- *Ensure that the measuring system is correctly wired up according to the wiring diagrams. Protection against accidental contact is no longer assured when the housing cover is removed or the panel cabinet has been opened (danger from electrical shock). The housing may only be opened by trained personnel.*
- *Take careful notice of the "Safety rules, instructions and precautionary measures" in the beginning of this manual.*

4.2. INSTALLATION / SURROUNDING CONDITIONS



Take the relevant IP classification of the casing into account (see manufactures plate). Even an IP67 (NEMA 4X) casing should NEVER be exposed to strongly varying (weather) conditions.
When panel-mounted, the unit is IP65 (NEMA 4)!
When used in very cold surroundings or varying climatic conditions, take the necessary precautions against moisture by placing a dry sachet of silica gel, for example, inside the instrument case.



Mount the F073-T on a solid structure to avoid vibrations.

4.3. DIMENSIONS- ENCLOSURE

Aluminum enclosures:

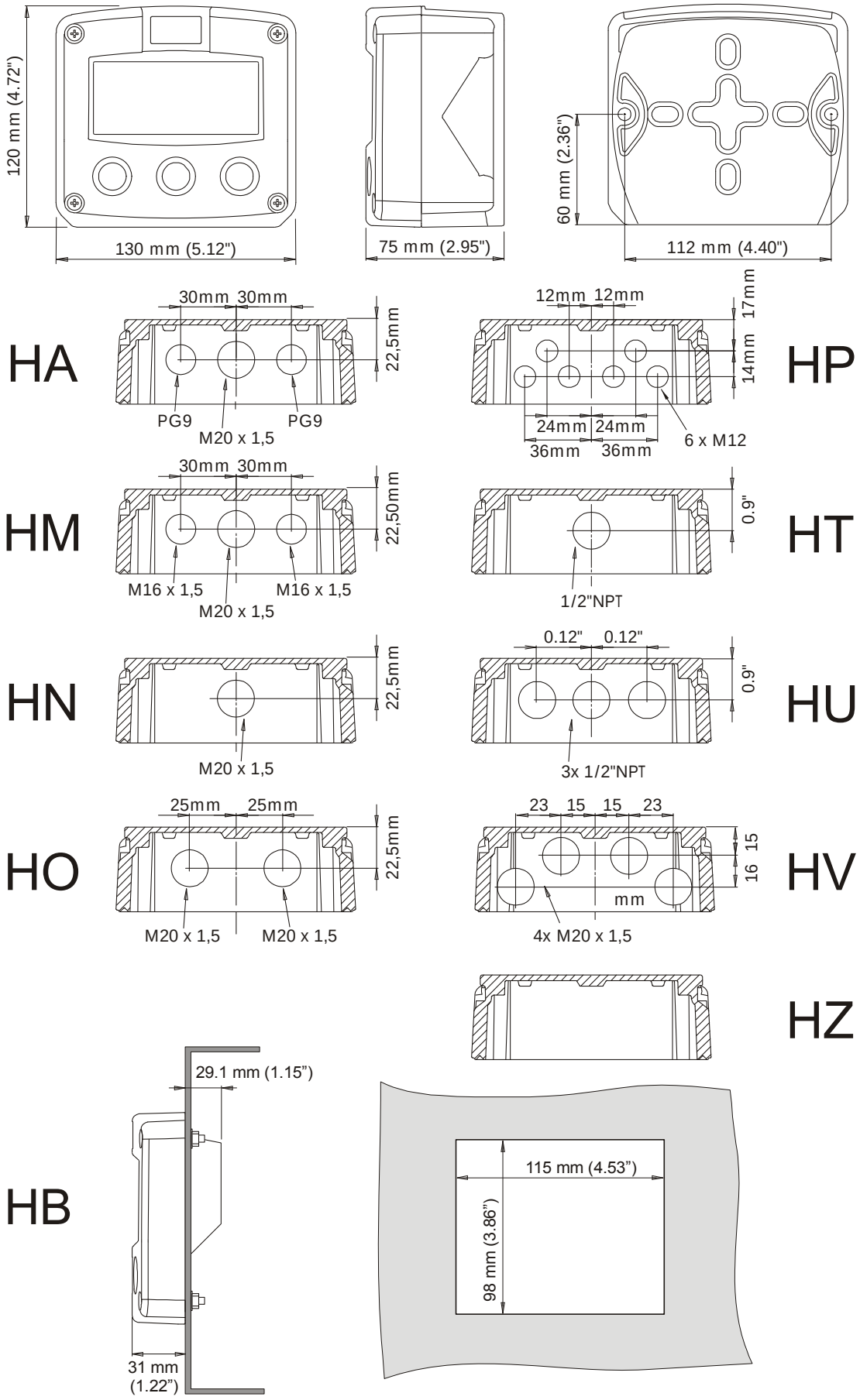
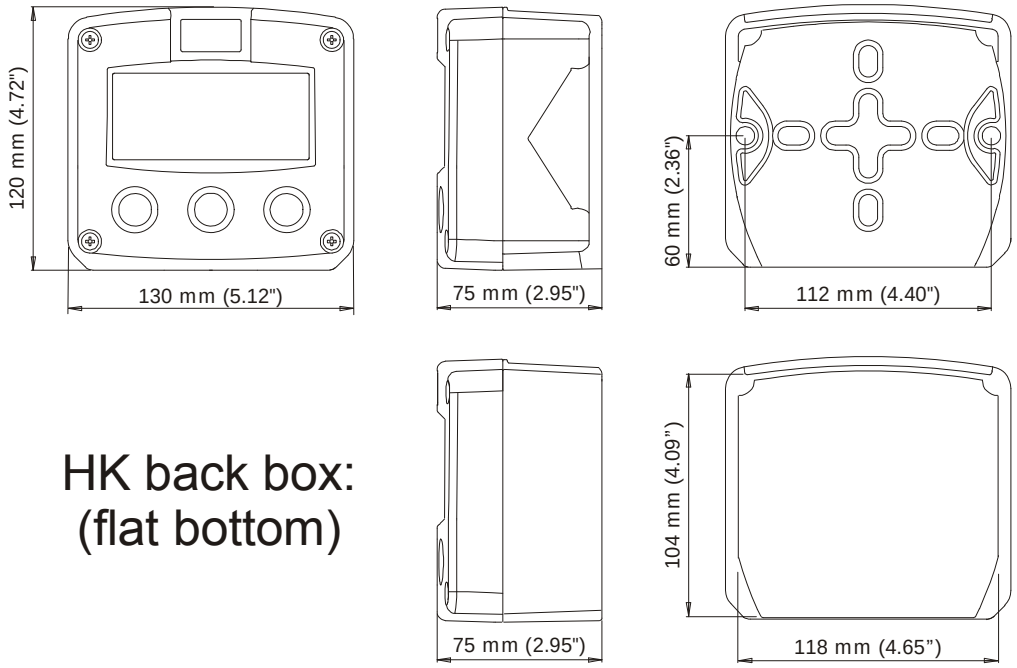
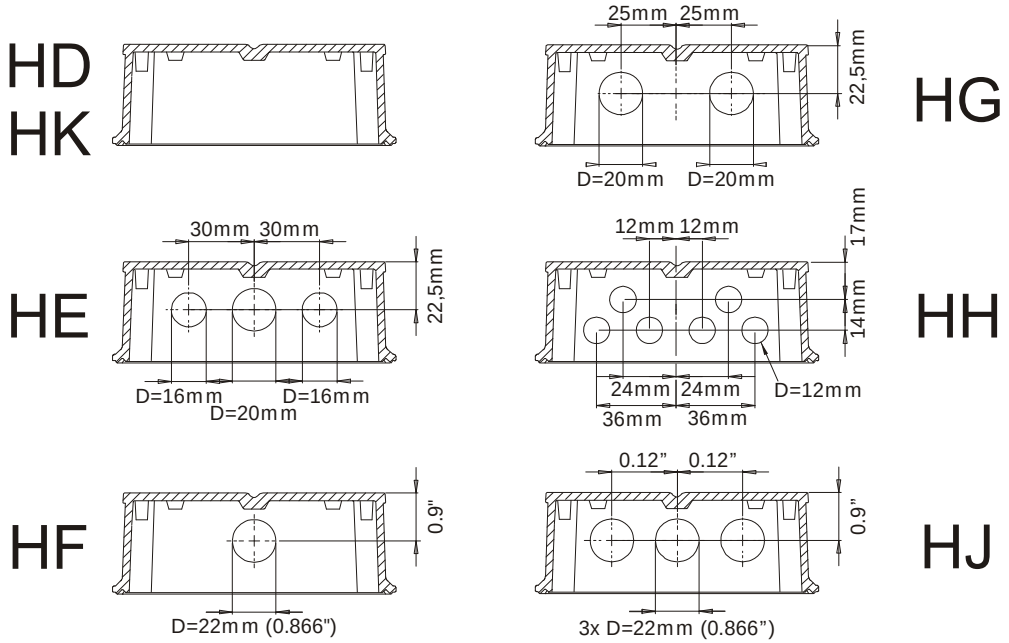


Fig. 6: Dimensions Aluminum enclosures.

GRP enclosures:





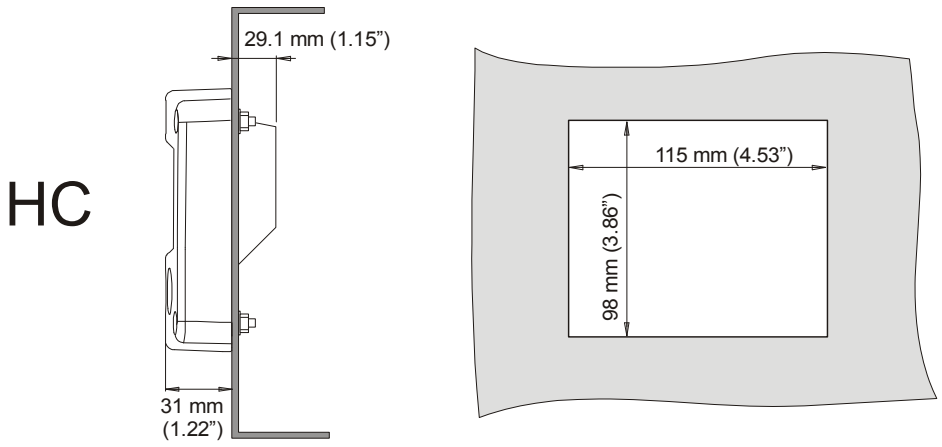


Fig. 7: Dimensions GRP enclosures.

4.4. INSTALLING THE HARDWARE

4.4.1. INTRODUCTION

- *Electro static discharge does inflict irreparable damage to electronics! Before installing or opening the unit, the installer has to discharge himself by touching a well-grounded object.*

- *This unit must be installed in accordance with the EMC guidelines (Electro Magnetic Compatibility).*

- *Do ground the aluminum casing properly as indicated, if the F073-T has been supplied with the 115-230V AC power-supply type PM. The green / yellow wire between the back-casing and removable terminal-block may never be removed.*

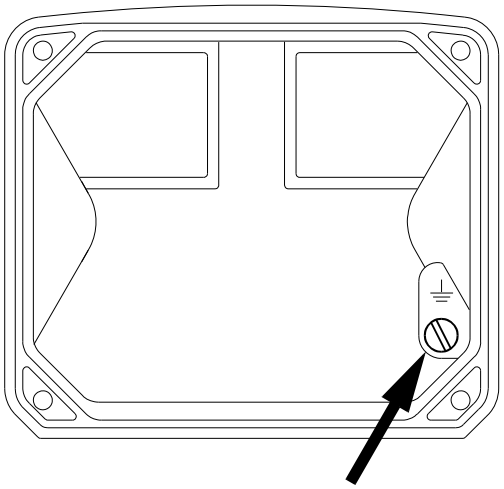


Fig. 8: Grounding aluminum enclosure with option PM 115-230V AC.

FOR INSTALLATION, PAY EMPHATIC ATTENTION TO:

- Separate cable glands with effective IP67 (NEMA4X) seals for all wires.
- Unused cable entries: ensure that you fit IP67 (NEMA4X) plugs to maintain rating.
- A reliable ground connection for both the sensor, and if applicable, for the metal casing. (above)
- An effective screened cable for the input signal, and grounding of it's screen to the "⊥ " terminal or at the sensor itself, whichever is appropriate to the application.

4.4.2. TERMINAL CONNECTORS WITH POWER SUPPLY - TYPE : PB / PD / PX

For Intrinsically Safe applications: read chapter 5.

The following terminal connectors are available:

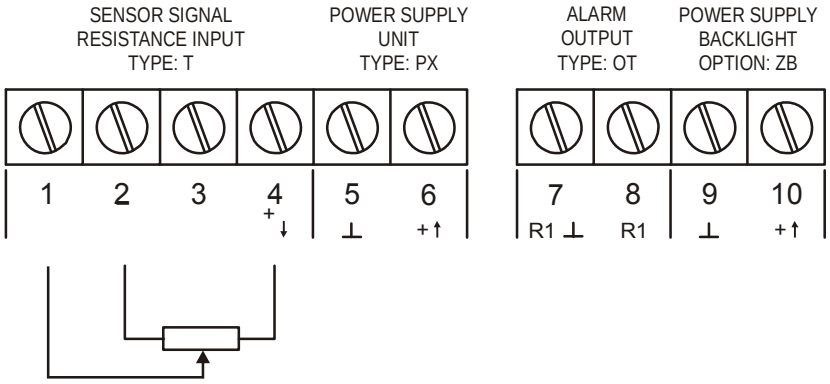
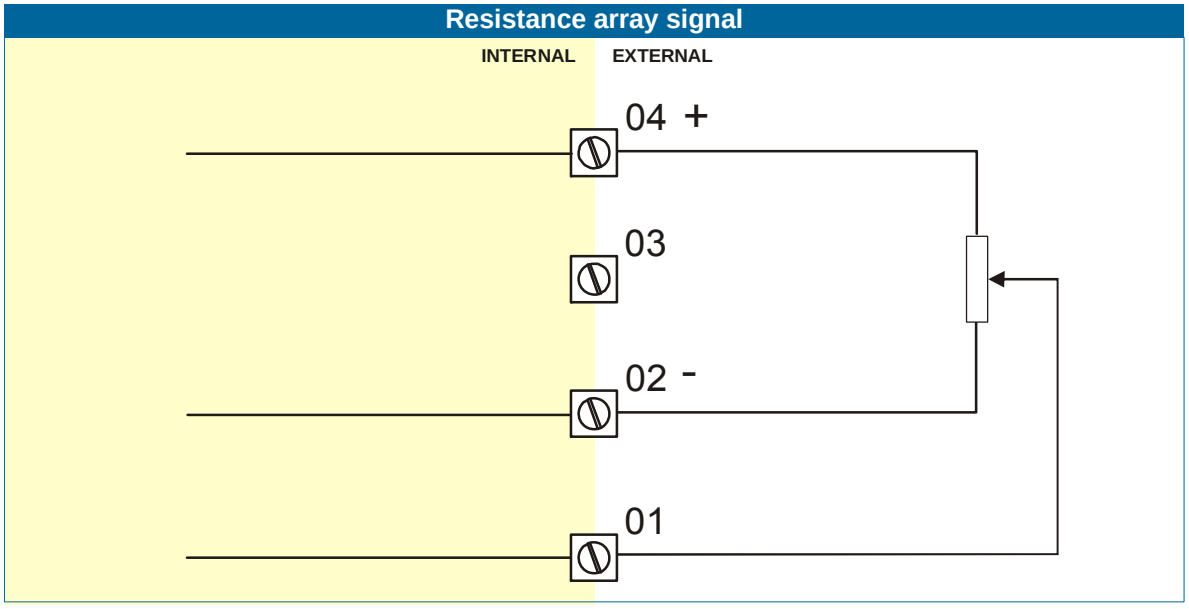


Fig. 9: Overview of terminal connectors F073-T-(PB / PD / PX) and options.

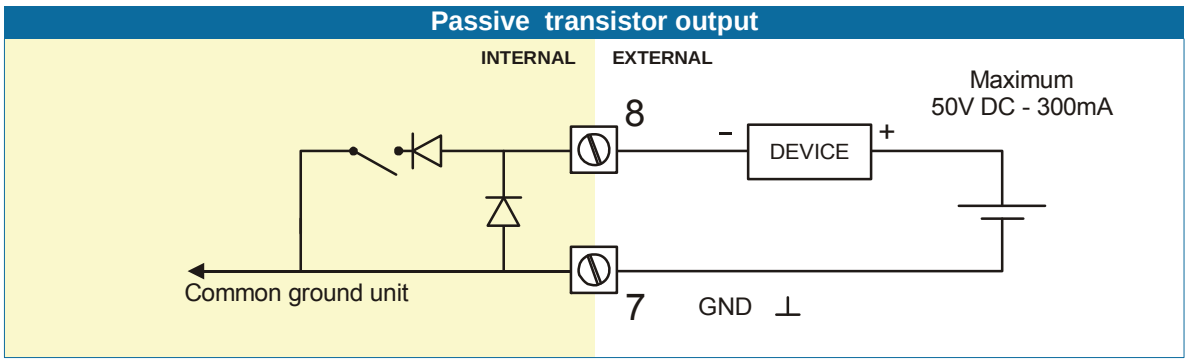
REMARKS: TERMINAL CONNECTORS:

Terminals 1-2; Sensor input – type T:
The F073-T requires a resistance array signal which will be processed once a second. The input is not isolated.



Terminal 5-6: POWER SUPPLY UNIT - type PX:
To power the unit an internal battery can be used (type PB) and / or an external DC power supply of 8-30V DC (type PX).
Connect the "**-**" to terminal 5 and the "**+**" to terminal 6. When power is applied to these terminals, the optional internal battery will be disabled / enabled automatically to extend the battery life time.

Terminal 7-8; alarm output – type OT:
With **SETUP** 36, the function of this output is set to a low and / or high level alarm.
A passive transistor output is available with this option. Max. driving capacity 300mA@50V DC.



Terminal 9-10: power supply backlight - type ZB (option):
To power the backlight, a voltage in the range 20-30V DC has to be connected.
Maximum current 30mA. Connect the "**-**" to terminal 9 and the "**+**" to terminal 10.

4.4.3. TERMINAL CONNECTORS WITH POWER SUPPLY - TYPE : PF / PM

Not available yet.

5. INTRINSICALLY SAFE APPLICATIONS

5.1. GENERAL INFORMATION AND INSTRUCTIONS

- *Mounting, electrical installation, start-up and maintenance of this device may only be carried out by trained personnel authorized by the operator of the facility. Personnel must read and understand this Operating Manual before carrying out its instructions.*
- *This device may only be operated by personnel who are authorized and trained by the operator of the facility. All instructions in this manual are to be observed.*
- *Ensure that the measuring system is correctly wired up according to the wiring diagrams. Protection against accidental contact is no longer assured when the housing cover is removed or the cabinet has been opened (danger of electric shock). The housing may only be opened by trained personnel.*
- *Take careful notice of the " Safety rules, instructions and precautionary measures " in the front of this manual.*

Caution !

Safety Instructions

- *Certificates, safety values, control drawing and declaration of compliance can be found in the document named: "Fluidwell F0..-T-XI - Documentation for Intrinsic Safety".*
- *For installation under ATEX directive: this intrinsically safe device must be installed in accordance with the Atex directive 94/9/EC and the product certificate KEMA 05ATEX1168 X.*
- *For installation under IECEx scheme: this intrinsically safe device must be installed in accordance the product certificate IECEx KEM 08.0006X.*
- *For installation under FM: this intrinsically safe device must be installed in accordance with the Certificate / Project ID: 3033306.*
- *The control drawing number FWCD-0001 can be found in the document named: "Fluidwell F0..-T-XI - Documentation for Intrinsic Safety".*
- *The control drawing number FWCD-0002 can be found in the document named: "Fluidwell F0..-T-PL-XI - Documentation for Intrinsic Safety".*
- *Exchange of Intrinsically Safe battery FWLiBAT-00x with certificate number KEMA 03ATEX1071 U or IECEx KEM 08.0005U is allowed in Hazardous Area. See paragraph 5.4. for battery replacement instructions.*

WARNING

Please note

- *Special conditions for safe use mentioned in both the certificate and the installation instructions must be observed for the connection of power to both input and / or output circuits.*
- *When installing this device in hazardous areas, the wiring and installation must comply with the appropriate installation standards for your industry.*
- *Study the following pages with wiring diagrams per classification.*

Note !

Serial number and year of production
This information can be looked-up on the display: setup function (par. 3.2.2.).

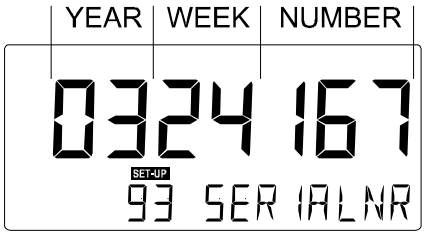


Fig. 10: Example serial number.

Label information resistive array input type - F0..T-XI (inside and outside the enclosure)

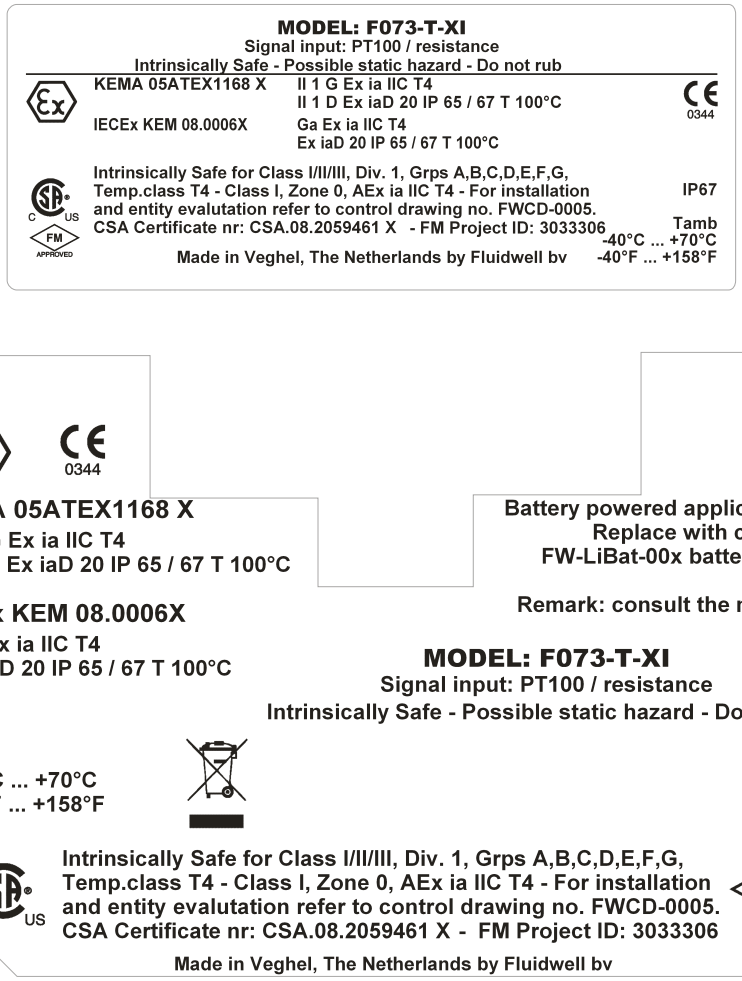


Fig. 11: Label information Intrinsically Safe application.

5.2. TERMINAL CONNECTORS INTRINSICALLY SAFE APPLICATIONS

Terminal connectors F073-T-(PC / PX)-OT-XI-(ZB):

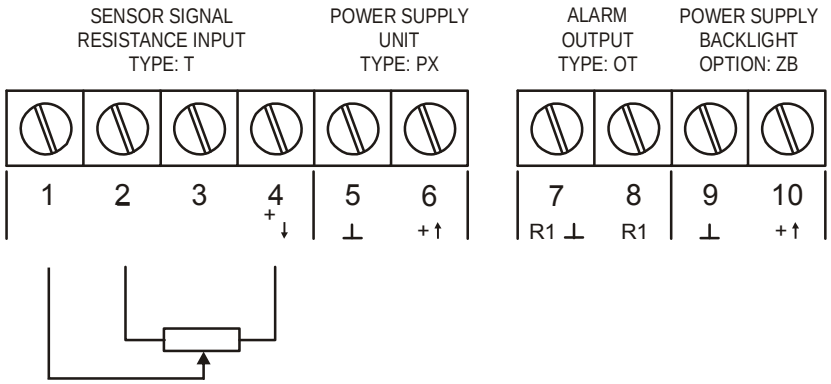


Fig. 12: Overview terminal connectors XI - Intrinsically Safe applications.

Remarks power supply options:
Type PC: offers – in addition to type PX – an internal Intrinsically Safe lithium battery. This ATEX certified battery (FW-LiBATT-xxx) may be exchanged in hazardous area.
Type PX: as standard, all intrinsically safe products are supplied with terminal 5 and 6 to power the product externally.

5.3. CONFIGURATION EXAMPLE INTRINSICALLY SAFE APPLICATIONS

Configuration example

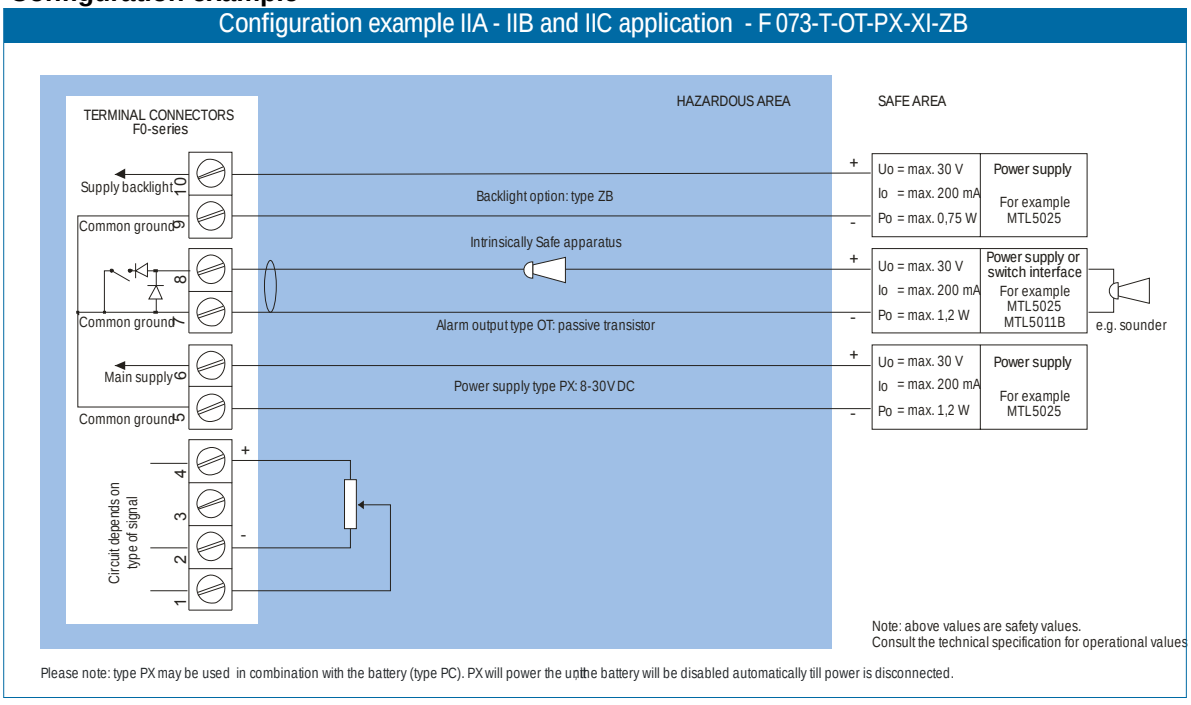


Fig. 13: Configuration example Intrinsically Safe.

5.4. BATTERY REPLACEMENT INSTRUCTIONS

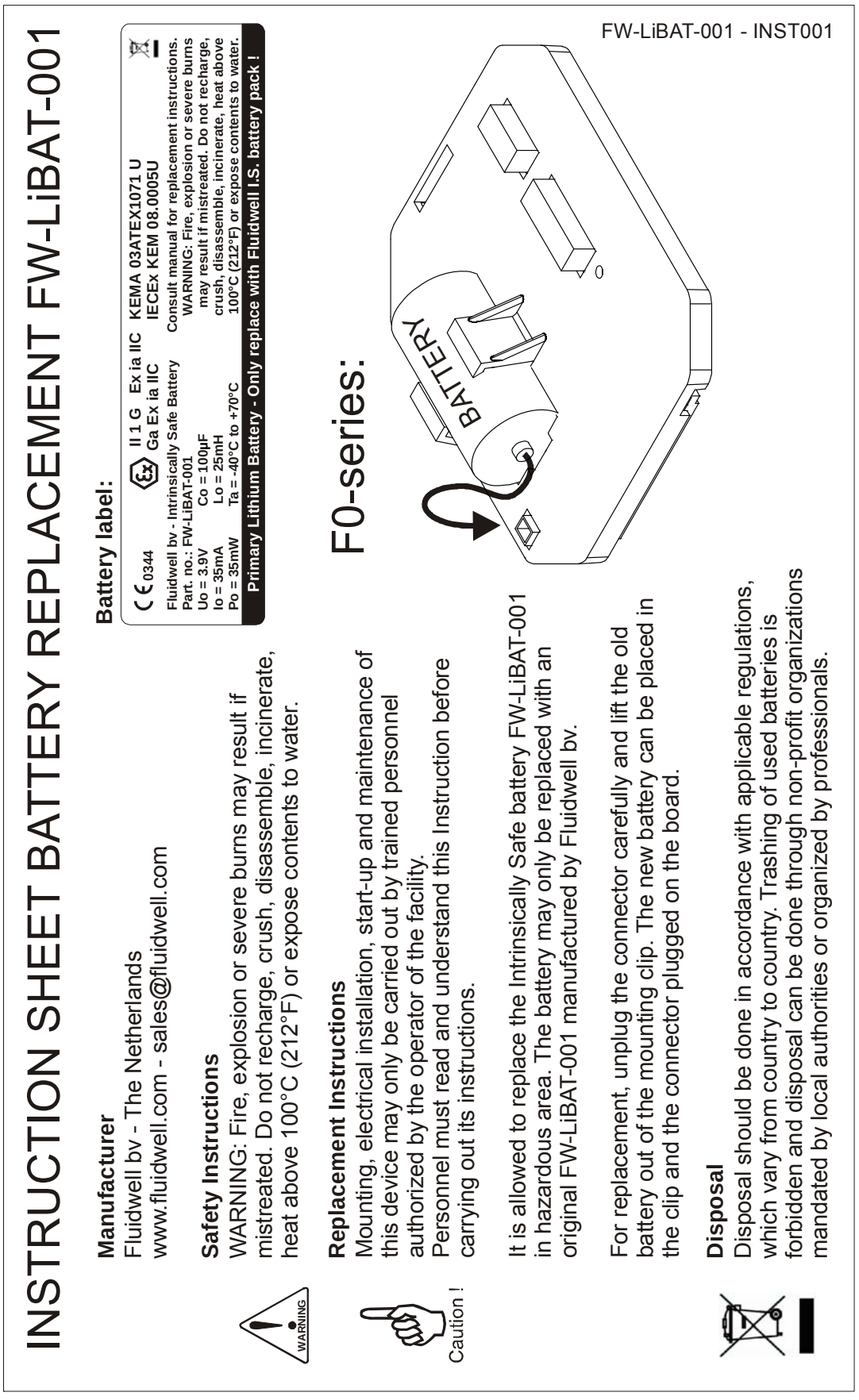


Fig. 14: Battery replacement instructions Intrinsically Safe Battery.

6. MAINTENANCE

6.1. GENERAL DIRECTIONS

- *Mounting, electrical installation, start-up and maintenance of the instrument may only be carried out by trained personnel authorized by the operator of the facility. Personnel must read and understand this Operating Manual before carrying out its instructions.*
- *The F073-T may only be operated by personnel who are authorized and trained by the operator of the facility. All instructions in this manual are to be observed.*


Caution !

- *Ensure that the measuring system is correctly wired up according to the wiring diagrams. Protection against accidental contact is no longer assured when the housing cover is removed or the panel cabinet has been opened (danger from electrical shock). The housing may only be opened by trained personnel.*
- *Take careful notice of the " Safety rules, instructions and precautionary measures " in the front of this manual.*

The F073-T does not require special maintenance unless it is used in low-temperature applications or surroundings with high humidity (above 90% annual mean). It is the users responsibility to take all precautions to dehumidify the internal atmosphere of the F073-T in such a way that no condensation will occur, for example by placing dry silica-gel sachet in the casing just before closing it. Furthermore, it is required to replace or dry the silica gel periodically as advised by the silica gel supplier.

Battery life-time:
It is influenced by several issues :

- Display update: fast display update uses significantly more power.
- Alarm output.
- Low temperatures; the available power will be less due to battery chemistry.


Note !

Note: *It is strongly advised to use only necessary functions.*

Check periodically:
- The condition of the casing, cable glands and front panel.
- The input/output wiring for reliability and aging symptoms.
- The process accuracy. As a result of wear and tear, re-calibration of the sensor might be necessary. Do not forget to re-enter any subsequent span alterations.
- The indication for low-battery.
- Clean the casing with soapy-water. Do not use any aggressive solvents as these might damage the coating.

6.2. REPAIR

This product cannot be repaired by the user and must be replaced with an equivalent certified product. Repairs should only be carried out by the manufacturer or his authorized agent.

APPENDIX A: TECHNICAL SPECIFICATION

GENERAL

Display	
Type	High intensity reflective numeric and alphanumeric LCD, UV-resistant.
Digits	Seven 17mm (0.67") and eleven 8mm (0.31"). Various symbols and measuring units.
Refresh rate	User definable: 8 times/sec - 30 secs.
Type ZB (option)	Tri-color configurable LED-backlight - green, amber with red flashing during alarm. Intensity adjustable from the keyboard.

Enclosures	
General	Die-cast aluminum or GRP (Glassfibre Reinforced Polyamide) enclosure with Polycarbonate window, silicone and EPDM gaskets. UV stabilized and flame retardant material.
Control Keys	Three industrial micro-switch keys. UV-resistant silicone keypad.
Painting	Aluminum enclosure only: UV-resistant 2-component industrial painting.
Panel-mount enclosures	Dimensions: 130 x 120 x 60mm (5.10" x 4.72" x 2.38") – LxHxD.
Classification	IP65 / NEMA4
Panel cut-out	115 x 98mm (4.53" x 3.86") LxH.
Type HC	GRP panel-mount enclosure
Type HB	Aluminum panel-mount enclosure
Field/wall-mount enclosures	Dimensions: 130 x 120 x 75mm (5.10" x 4.72" x 2.95") – LxHxD.
Classification	IP67 / NEMA4X
Aluminum enclosures	
Type HA	Drilling: 2x PG9 – 1x M20.
Type HM	Drilling: 2x M16 – 1x M20.
Type HN	Drilling: 1x M20.
Type HO	Drilling: 2x M20.
Type HP	Drilling: 6x M12.
Type HT	Drilling: 1x ½"NPT.
Type HU	Drilling: 3x ½"NPT.
Type HV	Drilling: 4x M20
Type HZ	No drilling.
GRP enclosures	
Type HD	No drilling.
Type HE	Drilling: 2x 16mm (0.63") – 1x 20mm (0.78").
Type HF	Drilling: 1x 22mm (0.87").
Type HG	Drilling: 2x 20mm (0.78").
Type HJ	Drilling: 3x 22mm (0.87").
Type HH	Drilling: 6x 12mm (0.47").
Type HK	Flat bottom - no drilling.
ABS enclosure	
Type HS	Silicone free ABS enclosure with EPDM and PE gaskets. UV-resistant polyester keypad. (no drilling)

Operating temperature	
Operational	-40°C to +80°C (-40°F to +178°F).
Intrinsically Safe	-40°C to +70°C (-40°F to +158°F).

Power requirements	
Type PB	Lithium battery - life-time depends upon settings - up to 5 years.
Type PC	Intrinsically Safe lithium battery - life-time depends upon settings - up to 5 years.
Type PD	16-30 V DC. Power consumption max. 1 Watt.
Type PX	8-30 V DC (also available with PB / PC). Power consumption max. 0.3 Watt.
Type ZB	20-30V DC. Power consumption max. 1 Watt. Note: with type PF / PM: internally powered.
Note I.S. application	for intrinsically safe applications, consult the safety values in the certificate.

Sensor excitation	
Type PB / PC / PX	Sensor supply not available.
Type PD	As connected power supply voltage (internally linked)

Terminal connections	
Type:	Removable plug-in terminal strip. Wire max. 1.5mm2 and 2.5mm2

Data protection	
Type	EEPROM backup of all setting. Data retention at least 10 years.
Pass code	Configuration settings can be pass code protected.

Hazardous area (option)	
Intrinsically safe Type XI	ATEX approval: II 1 G Ex ia IIC T4 II 1 D Ex iaD 20 IP 65 / 67 T 100°C IECEx approval: Ga Ex ia IIC T4 Ex iaD 20 IP 65 / 67 T 100°C CSA / FM approval : IS Class I/II/III, Division 1 Groups A to G T4 Class I zone 0 AEx ia IIC T4
Explosion proof Type XF	ATEX approval ref.: <EX> II 2 GD EEx d IIB T5. Weight appr. 15kg. Dimensions of enclosure: 350 x 250 x 200mm (13.7" x 9.9" x 7.9") LxHxD.

Environment	
Electromagnetic compatibility	Compliant ref: EN 61326 (1997), EN 61010-1 (1993)
Low voltage directive	Compliant ref: EN60950.

INPUTS

Sensor	
Type T	Resistance array (preferably ≤ 0-20kOhm) / (PT100)
Accuracy type T	Error ≤ 0.5% FS (depends on accuracy resistance array)
Span	0.000010 - 999,999 with variable decimal position.
Offset	-999,999 to +999,999 units.
Update time	Once a second.
Voltage drop	2.6 Volt.
Load impedance type T	1MOhm
Relationship	Linear calculation.

OUTPUTS

Transistor output	
Function	high, low or high and low level alarm.
Type OT	One passive transistor output - not isolated. Max. load 50V DC - 300mA

OPERATIONAL

Operator functions	
Displayed functions	• level. • height or percentage (or no indication). • alarm value's low - high level. • alarm value's can be entered (this function can be disabled).

Level	
Digits	6 digits.
Units	L, m3, GAL, USGAL, KG, lb, bbl, no unit.
Decimals	0 - 1 - 2 or 3.

Height	
Digits	6 digits.
Units	mm - cm - m - mtr - inch - ft - mmwk - mmwc - cmwk - cmwc - mwk - mwc - inwc - ftwc - mbar - bar - psi - no unit.
Decimals	0 - 1 or 2.

Percentage	
Digits	3 digits.
Decimals	1.

Alarm values	
Digits	6 digits.
Units	According to selection for level.
Decimals	According to selection for level.
Type of alarm	low and high level alarm. Includes delay time alarm and configurable alarm output.

APPENDIX B: TROUBLESHOOTING

In this appendix, several problems are included that can occur when the F073-T is going to be installed or while it is in operation.

Level displays "0 / zero" while a higher signal is available:
Check:
- **SETUP** 13 / 23: is the span correct?
- **SETUP** 14 / 24: is the offset value correct?
- **SETUP** 63 / 64: is the sensor input signal correctly calibrated?

The pass code is unknown:
If the pass code is not 1234, there is only one possibility left: call your supplier.

Range error
- Range error (`LO RANGE` or `HI RANGE`): the input value is at least 5% above or below the calibrated measurement range **SETUP** 63, 64. Do recalibrate the input if desired.

ALARM
When the alarm flag starts to blink an internal alarm condition has occurred. Press the **SELECT** button several times to display the 4-digit error code. The codes are:

0001: irrecoverable display-data error: data on the display might be corrupted.
0002: irrecoverable data-storage error: the programming cycle might have gone wrong: check programmed values.
0003: error 1 and error 2 occurred simultaneously

The alarm condition will almost certainly be handled internally and if all mentioned values still appear correct, no intervention by the operator is needed. If the alarm occurs more often or stays active for a longer time, please contact your supplier.

INDEX OF THIS MANUAL

LIST OF FIGURES IN THIS MANUAL

NOTES

LIST OF CONFIGURATION SETTINGS			
SETTING	DEFAULT	DATE:	DATE:
1 - LEVEL		Enter your settings here	
11 unit	L		
12 decimals	000000		
13 span	000001 L		
14 offset	000000 L		
2 - HEIGHT			
21 unit	m		
22 decimals	000000		
23 span	000001 m		
24 offset	000000 m		

SETTING	DEFAULT	DATE:	DATE:
3 - ALARM		Enter your settings here	
31 level zero	default		
32 alarm value low	0		
33 alarm value high	0		
34 delay time alarm low	0.0 sec		
35 delay time alarm high	0.0 sec		
36 alarm output	hi_lo		
4 - DISPLAY			
41 under	height		
42 set rate min/max	operator level		
43 backlight	off		
44 backlight alarm	off		
45 brightness	5		
5 - POWER MANAGEMENT			
51 LCD-new	1 sec.		
52 mode	operational		
6 - SENSOR			
61 filter	01 (off)		
62 cut-off %	00.0%		
63 calibrat. low-0%	default		
64 calibrat. high-100%	default		
7 - OTHERS			
71 model	F073-T	F073-T	F073-T
72 software version	03.06.____	03.06.____	03.06.____
73 serial number	_ _ _ _ _ _ _	_ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _
74 pass code	0000		
75 tagnumber	0000000		

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