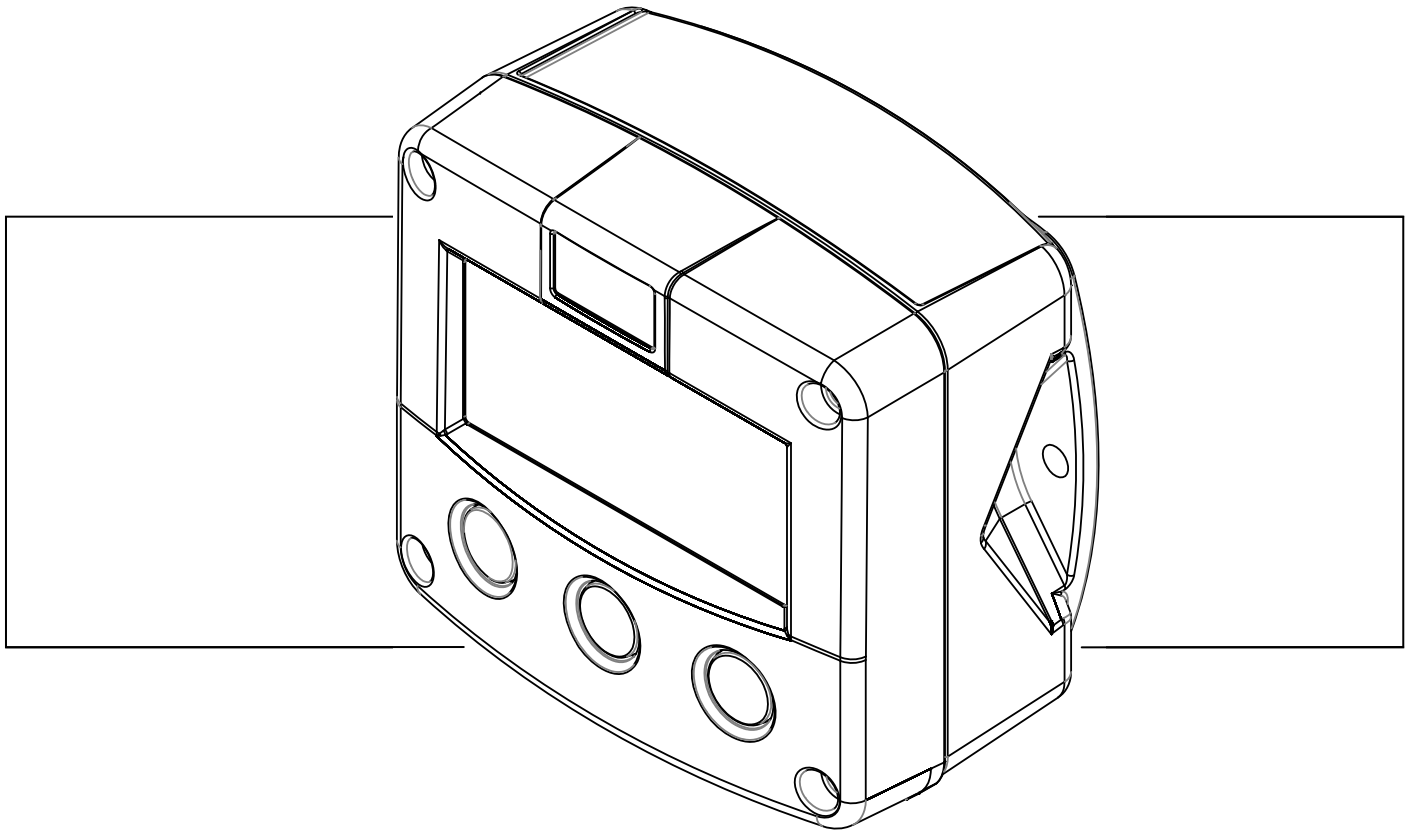
F173-A-OS-PD

LEVEL INDICATOR WITH LINEARISATION

AND HIGH / LOW LEVEL ALARMS



Signal input sensor: (0)4-20mA

Signal outputs: (04-20mA/ 0-10V ref. level

Alarm outputs: maximum four level alarms

CE

SAFETY INSTRUCTIONS

- **Any responsibility is lapsed if the instructions and procedures as described in this manual are not followed.**
- **LIFE SUPPORT APPLICATIONS: The F173-A-OS 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 F173-A-OS 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.**

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 F173-A-OS 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 F173-A-OS 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". This instruction is meant for users.
- The following chapters and appendices are exclusively meant for electricians/technicians. These provide an extensive description of all software settings and installing the hardware.

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 F173-A-OS 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 destruction of the F173-A-OS or connected instruments.

A "**caution**" indicates actions or procedures which, if not performed correctly, may lead to personal injury or incorrect function of the F173-A-OS or connected instruments.

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	:	02.01.xx
Software version	:	02.01.xx
Manual	:	HF173AOSEN_v0501_04
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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 F173-A-OS

Functions and features
The level indicator model F173-A-OS is a microprocessor driven instrument designed to display the linearized level and percentage as well as monitoring the level with four alarm values for a low-low, low, high and high-high level. This product has been designed with a focus on:

- ultra-low power consumption,
- ability to process all types of signals,
- several mounting possibilities with aluminum or GRP enclosures for harsh industrial surroundings,
- transmitting possibilities with analog, alarm and communication (option) outputs.

Sensor input
This manual describes the unit with one analog (0)4-20mA input for the level sensor "-A version". Other versions are available to process 0-10V or resistive signals.
To power the sensor, several options are available.

Standard outputs

- The F173-A-OS has four configurable alarm outputs in the form of normally open relay contacts. The functionality of the outputs can be user defined.
- Configurable passive linear (0)4-20mA / 0-10V analog output with 10-bits resolution mirroring the actual level. The minimum and maximum signal output can be tuned.

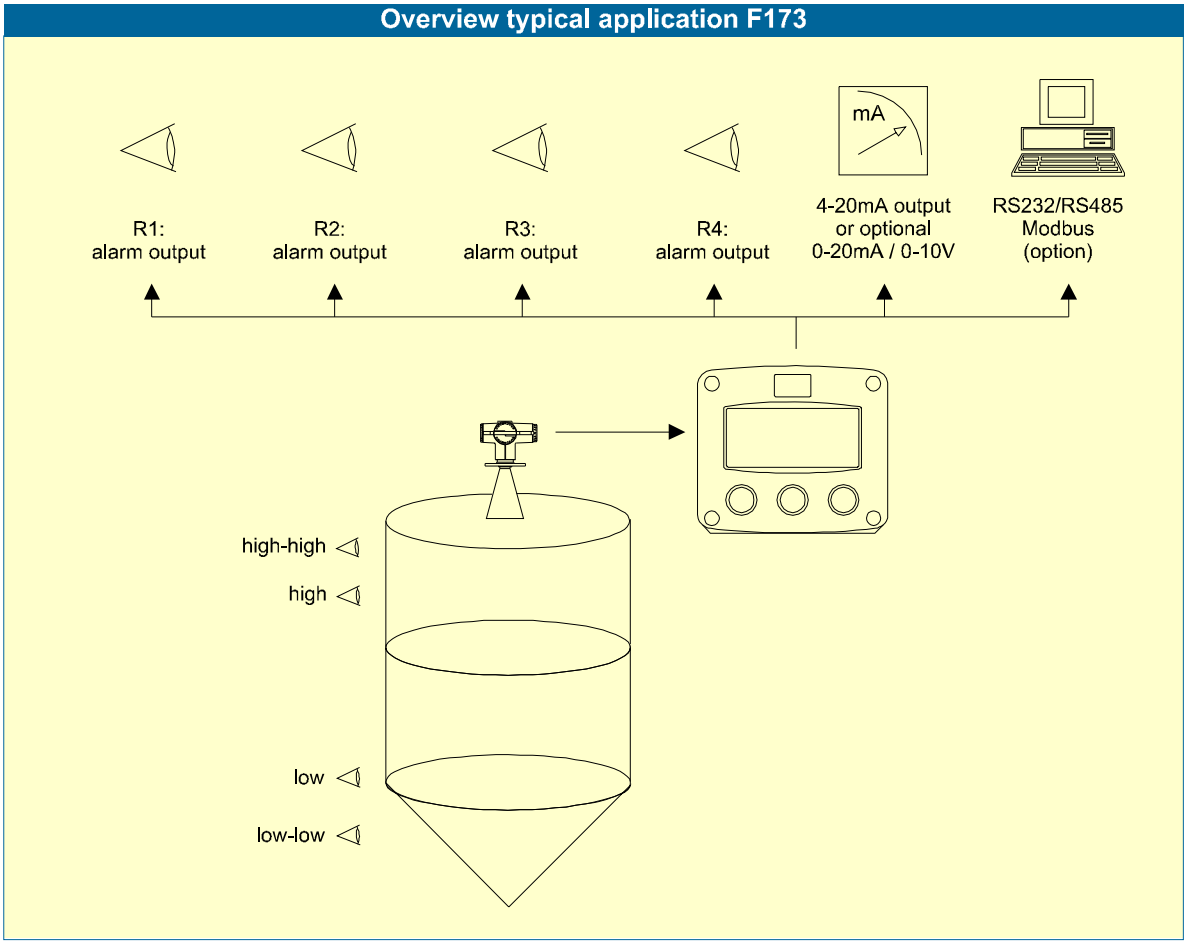


Fig. 1: Typical application for the F173-A-OS.

Configuration of the unit
The F173-A-OS was designed to be implemented in many types of applications. For that reason, a SETUP-level is available to configure your F173-A-OS according to your specific requirements. SETUP includes several important features, such as Span, measurement units, signal settings etc. All setting as are stored in EEPROM memory and will not get lost in case of power break-down or empty battery.
To extend the battery-life time (option), please make 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.

Options
Following options are available: isolated or active 4-20mA / 0-10V / 0-20mA analog output, full Modbus communication RS232/485, mechanic relays, power- and sensor-supply options, panel-mount, wall-mount and weather-proof enclosures, flame proof enclosure.

2. OPERATIONAL

2.1. GENERAL

Caution !

- *The F173-A-OS 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 F173-A-OS. 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 get access to SETUP-level; please read chapter 3.

This key is used to SELECT other display information or to increase a value.
The arrow-key ▲ is used to configure the unit; please read chapter 3.

This key is used to SELECT other display information or to select a digit.
The arrow-key ▶ is used configure the unit; please read chapter 3.

2.3. OPERATOR INFORMATION AND FUNCTIONS

In general, the F173-A-OS will always act function at Operator level. The information displayed is dependant up on the SETUP-settings. The sensor signal will be measured by the F173-A-OS in the background, whichever screen refresh rate setting is chosen. After pressing a key, the display will be updated very quickly during a 30 second period, after which it will slow-down again.

Fig. 3: Example of display information during process.

For the Operator, the following functions are available:

- **Display level**
  This is the main display information of the F173-A-OS. After selecting any other information, it will always return to this main display automatically. The contents or percentage is displayed with 17mm digits on the upper line. On the bottom line, the measuring unit will be displayed. When "-------" is shown, then the level value is too high to be displayed.
  The arrows ▲▼ indicate the increase/decrease of the level trend.
  After pressing select, a second window is available with percentage or contents (depending on the setup configuration).

- **Programming the high / low level alarm values**

  Remark: this function might not be accessible: it depends on the configuration of the unit..

  When the SELECT-key is pressed a few times, the alarm values for low and high level will be displayed. To change the alarm value, following procedure must be execute:

  1) press PROG: the word "PROGRAM" will be flashing,
  2) use ▶ to select the digits and ▲ to increase that value,
  3) set the new alarm value by pressing ENTER.

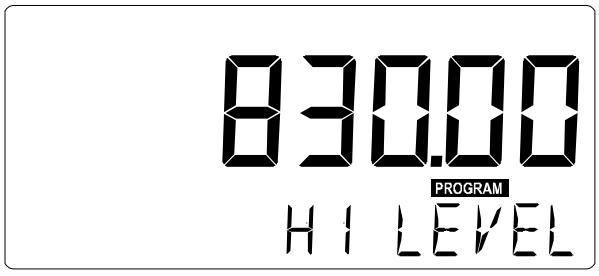


Fig. 4: Example display information during programming maximum level.

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 for a few seconds: the former value will be reinstated.

- **Level alarm**
  When the actual level is outside the allowed range, an alarm message will be displayed at the bottom line of the display indicating the type of alarm: "LO LEVEL ", "HI LEVEL" or "HI-LO LEVEL".
  The alarm is terminated automatically as soon as the level is in its range again. Due to the setup configuration it might be that the level is outside it's range without an immediate alarm.

- **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.

- **Alarm 01-04:**
  When "alarm" is displayed, please consult Appendix B: problem solving.

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 F173-A-OS 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

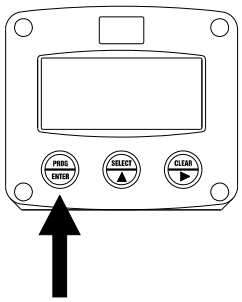
3.2.1. GENERAL

Configuration of the F173-A-OS 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 F173-A-OS remains fully operational.

Note !

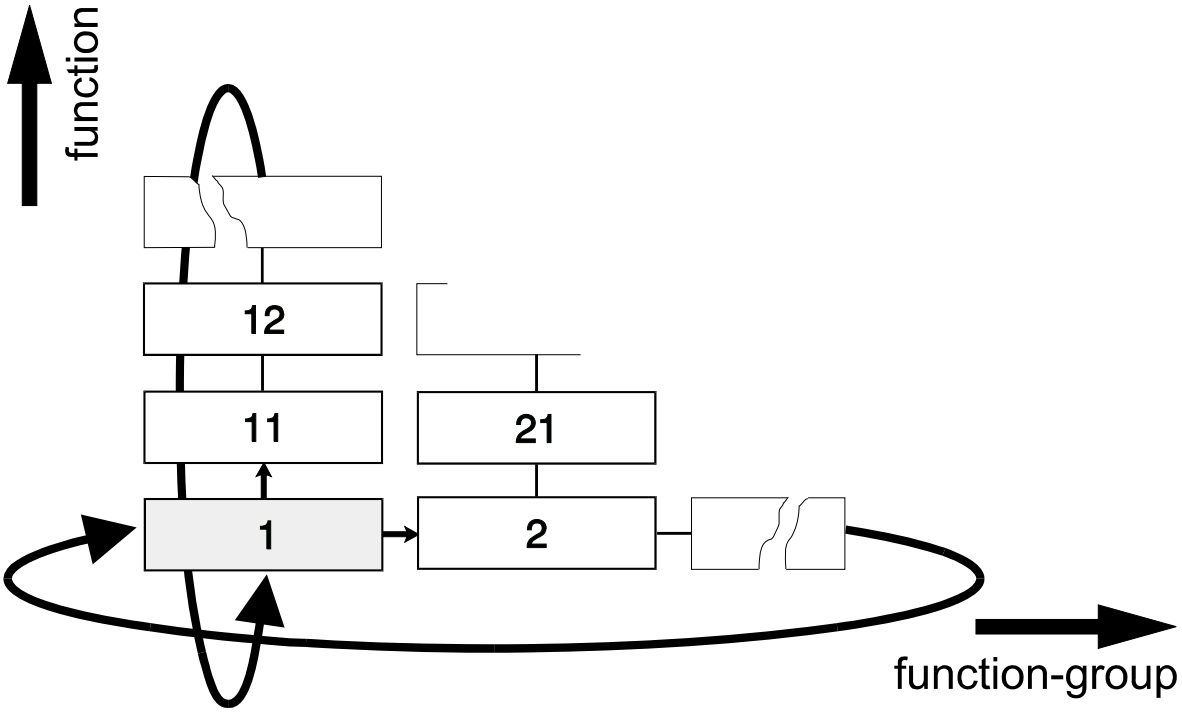
Note: *A password may be required to enter SETUP. Without this password access to SETUP is denied.*

To enter SETUP-level:



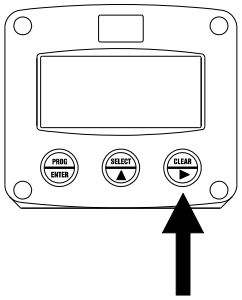
Press PROG/ENTER for 7 seconds

Matrix structure SETUP-level:

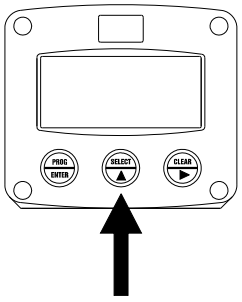


SCROLLING THROUGH SETUP-LEVEL

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



Select function-group with CLEAR ▶

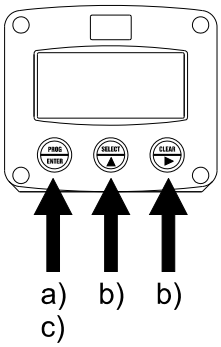


Select function with SELECT ▲

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 figures. The first figure indicates the function-group and the second figure the function. Additionally, each function is expressed with a keyword.

After selecting a sub-function, the next main function is selected after scrolling through all "active" sub-functions (e.g. 1▲, 11▲, 12▲, 13▲, 14▲, 1▶, 2▶, 3▲, 31 etc.).

To change or a select a value or 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.

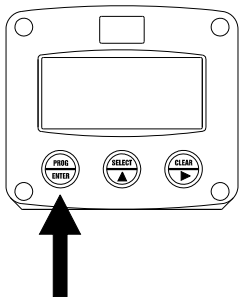
To change a value, use ▶ to select the digits and ▲ to increase that value.
To select a setting, both ▲ and ▶ can be used.
When the new value is not valid, the increase sign ▲ or decrease-sign ▼ will be displayed while you are programming.

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 will be left automatically.

3.2.2. OVERVIEW FUNCTIONS SETUP LEVEL

SETUP FUNCTIONS AND VARIABLES			
1	**LEVEL**		
	11	UNIT	mL - L - m3 - mg - g - kg - ton - GAL - bbl - lb - cf - REV - no unit
	12	DECIMALS	0 - 1 - 2 - 3 (Ref: displayed value)
	13	SPAN	0.000001 - 999,999 unit
	14	DECIMALS SPAN	0 - 6
	15	OFFSET	-999,999 - +999,999 units
2	**ALARM**		
	21	EMPTY	default - no relays - ignore
	22	ALARM LOW-LOW	0000.000 - 999,999
	23	ALARM LOW	0000.000 - 999,999
	24	ALARM HIGH	0000.000 - 999,999
	25	ALARM HIGH-HIGH	0000.000 - 999,999
	26	DELAY ALARM low-low	0.1 - 999.9 seconds
	27	DELAY ALARM LOW	0.1 - 999.9 seconds
	28	DELAY ALARM HIGH	0.1 - 999.9 seconds
	29	DELAY ALARM high-high	0.1 - 999.9 seconds
3	**DISPLAY**		
	31	FUNCTION	span - percentage
	32	ALARM SET	operator - setup
4	**POWER MANAGEMENT**		
	41	LCD UPDATE	fast - 1 sec - 3 sec - 15 sec - 30 sec - off
	42	BATTERY MODE	operational - shelf
5	**SENSOR**		
	51	FILTER	00 - 99
	52	CUT-OFF	0.0 - 99.9%
	53	CALIBRATE LOW	(0)4mA
	54	CALIBRATE HIGH	20mA
6	**LINEARISATION**		
	61	% / M-FACTOR 1	0.01% – 99.99% / 0 – 9.999999
	62	% / M-FACTOR 2	0.01% – 99.99% / 0 – 9.999999
	..	..	……..
	6F	% / M-FACTOR 15	0.01% – 99.99% / 0 – 9.999999
	6G	LINEARISATION	enable / disable
7	**ANALOG**		
	71	OUTPUT	disable - enable
	72	LEVEL MINIMUM	000.000 - 999,999
	73	LEVEL MAXIMUM	000.000 - 999,999
	74	CUT-OFF	0.0 - 9.9%
	75	TUNE MIN - 4mA / 0V	0 - 9,999
	76	TUNE MAX- 20mA / 10V	0 - 9,999
	77	FILTER	00 - 99
8	**RELAYS**		
	81	OUTPUT R1	low-low - low - high - high-high - all - off
	82	OUTPUT R2	low-low - low - high - high-high - all - off
	83	OUTPUT R3	low-low - low - high - high-high - all - off
	84	OUTPUT R4	low-low - low - high - high-high - all - off
9	**COMMUNICATION**		
	91	SPEED / BAUDRATE	1200 - 2400 - 4800 - 9600
	92	ADDRESS	1 - 255
	93	MODE	RTU - off
A	**OTHERS**		
	A1	TYPE / MODEL	F173-A
	A2	SOFTWARE VERSION	----------
	A3	SERIAL NO.	----------
	A4	PASSWORD	0000 - 9999
	A5	TAGNUMBER	0000000 - 9999999

3.2.3. EXPLANATION SETUP-FUNCTIONS

1 - LEVEL	
MEASUREMENT UNIT **11**	SETUP - 11 determines the measurement unit for level. The following units can be selected: mL - L - m3 - mg - g - kg - ton - GAL - bbl - lb - cf - REV - no unit - scf - Nm3 - NL - P. Alteration of the measurement unit will have consequences for operator and SETUP-level values. Please note that the Span has to be adapted as well; the calculation is not done automatically.
DECIMALS **12**	This setting determines for level 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** is determined on the basis of the **selected measurement unit** at 20mA. Enter the span in whole numbers (decimals are set with SETUP 14). The more accurate the span, the more accurate the functioning of the system will be. **Example 1** **Calculating the span for level** *Let us assume that the sensor generates 20mA at a level of 2,481.3 Liters, the selected unit is "Liters".* *The span is 2481.3* *Enter for* SETUP *- 13: "24813" and for* SETUP *- 14 - decimals span "1".* **Example 2** **Calculating the span for level** *Let us assume that the sensor generates 20mA at a level of 652.31 USGAL, the selected unit is USG.* *The span is 652.31. Enter for SETUP - 13: "652.31 and for SETUP - 14 "2".*
DECIMALS SPAN **14**	This setting determines the number of decimals for Span (SETUP 13). The following can be selected: 0 - 1 - 2 - 3 - 4 - 5 - 6
OFF SET **15**	Enter here the "not measured" quantity which is below the sensor, in case a pressure transducer e.g. is used to measure the quantity. Also, a negative offset can be entered: do press the middle and right button simultaneously.

2 - ALARM

Note !

With these settings, it is determined how the level will be monitored and the functionality of the transistor / relay outputs be determined.
Please be aware that the alarm levels can be programmed at operator level as well. Moreover, the function be disabled (see setup 22 to 25).
Note: *for transistor / relay output functions: read SETUP 8 "relays".*

EMPTY **21**	When the level is zero, 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 level zero, it will switch the alarm output and indicate the alarm on the display. NO RELAY: in case of a low-level alarm and level zero, 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 level zero, it won't switch the alarm output and nothing will be indicated on the display.
ALARM VALUE LOW - LOW **22**	Sets the low-low alarm. An alarm will be generated as long as the level is lower as this value. Entering 0.0 disables the low-low alarm.
ALARM VALUE LOW **23**	Sets the low alarm. An alarm will be generated as long as the level is lower as this value. Entering 0.0 disables the low alarm.
ALARM VALUE HIGH **24**	Sets the high alarm. An alarm will be generated as long as the level is higher as this value. Entering 0.0 disables the high alarm.
ALARM VALUE HIGH - HIGH **25**	Sets the high-high alarm. An alarm will be generated as long as the level is higher as this value. Entering 0.0 disables the high-high alarm.
DELAY TIME ALARM LOW - LOW **26**	An alarm generated by SETUP 32 "low-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 LOW **27**	An alarm generated by SETUP 33 "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 **28**	An alarm generated by SETUP 34 "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.
DELAY TIME ALARM HIGH - HIGH **29**	An alarm generated by SETUP 35 "high-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.

3 - DISPLAY

Note !

FUNCTION **31**	The large 17mm digits can be set to display level (SPAN) or percentage. After pressing "SELECT" at operator level, the other information will always be displayed as well. *Important: this selection does influence the alarm values as well: if you select percentage, all alarms will have to be set as a percentage as well!!*
ALARM SET **32**	With this function it is determined if the operator can enter alarm values or not. If "SETUP" is selected, the operator is still able to read the values but can not change them.

4 - POWER MANAGEMENT

When used with the internal battery option (type PB / PC), the user may hold the concern of reliable measurement over a long period of time. The F173-A-OS has several smart power management functions to extend the battery life time significantly. Two of these functions can be set:

LCD NEW **41**	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 signal will be processed and the output-signals will be generated in the normal way. The following can be selected: Fast - 1 sec - 3 sec - 15 sec - 30 sec - off. **Example 3:** **Battery life-time** *battery life-time with FAST update: about 1 years.* *battery life-time with 1 sec update: about 3 years.* ***Note:** after a button has been pressed by the operator - the display refresh-rate will always be FAST during 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 **42**	The unit has two modes: operational or shelf. After "shelf" has been selected, the unit can be stored for several years; it will not process the signal, the display is switched-off but all settings and totals are stored. In this mode, power consumption is extremely low. To wake-up the unit again; press the SELECT-key twice.

Note !

5 - SENSOR

FILTER **51**	The analog output signal of a sensor does mirror the actual level. This signal is measured several times a second by the F173-A-OS. 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 analog 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 there response times are indicated:			
FILTER VALUE	RESPONSE TIME ON STEP CHANGE OF ANALOG 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

Continued next page >>>

5 – SENSOR (CONTINUED)

CUT-OFF
52

To ignore e.g. vibration, a low-level cut-off can be set as percentage over the full range of 16mA (or 20mA). When the analog value is less then required with this setting, the signal will be ignored.
The cut-off value can be programmed is the range 0.0 - 99.9%.
Examples:

	SPAN (setup 13)	REQUIRED CUT-OFF	CUT-OFF (setup 52)	REQUIRED OUTPUT
	450 L	25 L	25/450 x 100%=5.5%	16mA x 5.5% + 4mA = 4.88mA

TUNE MIN / 4MA
53

With this setting it is possible to calibrate the input value for (0)4mA as the signal from the sensor might not be exact 4.0 mA (or 0.0 mA) at level zero. This function will measure the real output value at level zero.

- *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)4mA" value. After pressing enter, CAL SET will be displayed as soon as the calibration is completed. From that moment, the analog value must be more than the calibrated value before the signal will be processed.
- DEFAULT: with this setting, the manufactures value is re-installed.
- CAL SET: to select the last calibrated value.

TUNE MAX / 20MA
54

With this setting it is possible to calibrate the input value for 20mA as the signal from the sensor might not be exact 20.0 mA at maximum level. This function will measure the real output 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 "20mA" value. After pressing enter, CAL SET will be displayed as soon as the calibration is completed. From that moment, the analog value must be less than the calibrated value for a reliable measurement.
- DEFAULT: with this setting, the manufactures value is re-installed.
- CAL SET: to select the last calibrated value.

6 - LINEARISATION

The linearisation function is available to correct for the tank shape, to approach the real contents of the tank at any height, beyond the general Span entered with setup 13.
A maximum of fifteen linearization-positions can be entered while the interpolation will calculate any other position in-between.
For each linearization position, the percentage of signal and the Factor (MF) must be entered.

The Meter Factor for each linearization step is calculated with following formula:

$$\text{Meter-Factor} = \frac{\text{measured level}}{\text{calculated level}}$$

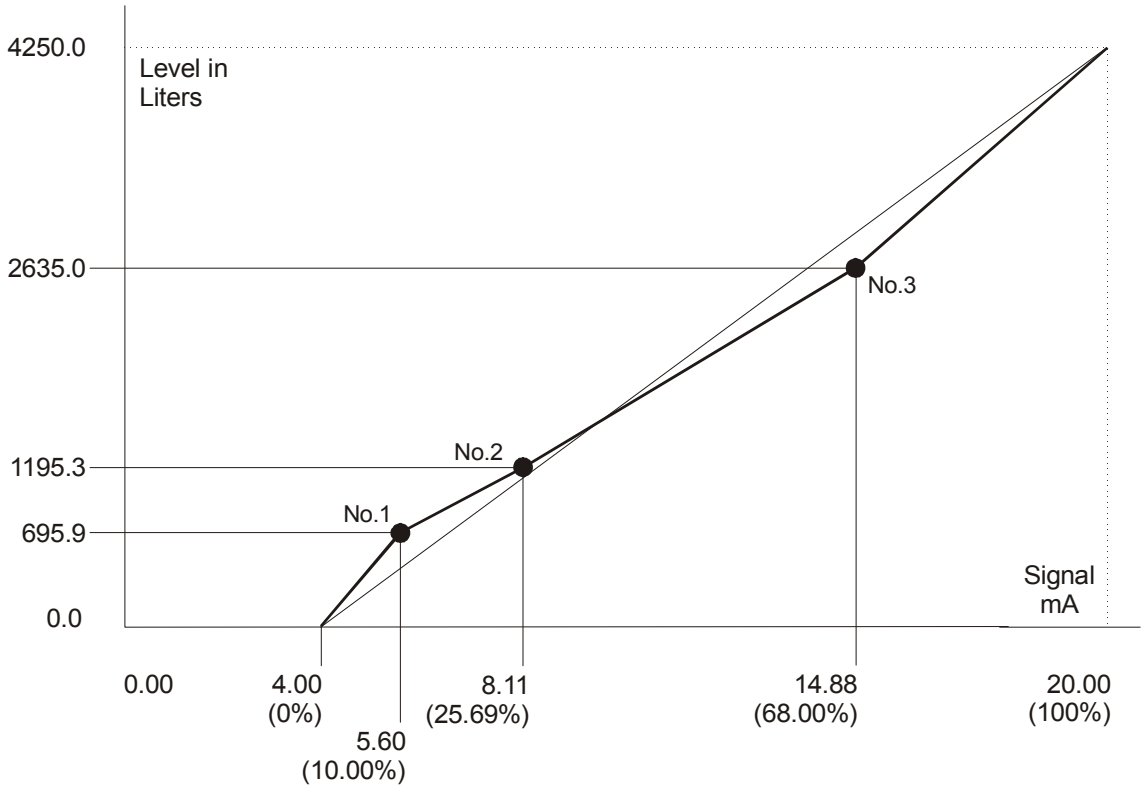
It is advised to enter the percentages in increasing order, however it is not necessary. Please have a look at following example to understand the method of linearization:

In this example:
Span: 4250 Liter
Signal calibrated on: 4-20mA

No.1:
The real quantity is 695.9 L @ 5.60mA
(5.60 - 4.00) / (20.00 - 4.00) x 100% = 10.00% of signal
At 10% of the signal, you would expect: 4250.0 x 10% = 425.0 L
The M-Factor for No.1 is: 695.9 / 425.0 = 1.636471

No.2:
The real quantity 1195.3 L @ 8.11mA
(8.11 - 4.00) / (20.00 - 4.00) x 100% = 25.69% of signal
At 25.69% of the signal, you would expect: 4250.0 x 25.69% = 1091.7 L
The M-Factor for No.2 is: 1195.3 / 1091.7 = 1.094898

No.3:
The real quantity is 2635.0 L @ 14.88mA
(14.88 - 4.00) / (20.00 - 4.00) x 100% = 68.00% of signal
At 68.00% of the signal, you would expect: 4250.0 x 68.00% = 2890.0 L
The M-Factor for No.3 is: 2635.0 / 2890.0 = 0.911765



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6 - LINEARISATION (CONTINUED)

PERCENTAGE / M-FACTOR 61 TO 6F	The percentage is displayed at the bottom line of the display. With value 0% the M-Factor is disabled. The M-Factor is displayed at the top-line of the display. The minimum value to be entered is 0.000001 and the maximum value is 9.999999. *Please note that this value has always six decimals while the "dot" is not displayed.* Most M-factors will be around 1.000000 like 0.945354 or 1.132573.
DISABLE / ENABLE 6G	With this setup function, you can easily enable / disable the linearization function.

Note !

7 - ANALOG OUTPUT

A linear 4-20mA signal (type AB: 0-20mA or type AU: 0-10V) output signal is generated according to the calculated level with a 10 bits resolution. The settings for level (SETUP - 1) influences the analog output directly.
The relationship between level and analog output is set with the following functions:

Note !

DISABLE / ENABLE 71	The analog output can be disabled. In case of a passive analog output type AP, 3.5mA will be generated if a power supply is available but the output is disabled.
MINIMUM LEVEL 72	Enter here the level according which the output should generate a 4mA signal (or 0mA / 0V) - in most applications at level "zero". The number of decimals displayed is according to SETUP 12. The measuring units (L for example) is according SETUP 11 but can not be displayed.
MAXIMUM LEVEL 73	Enter here the level according which the output should generate a 20mA (or 10V) - in most applications at maximum level. The number of decimals displayed is according to SETUP 12. The measuring units (L for example) is according SETUP 11 but can not be displayed.
CUT-OFF 74	A low-level cut-off can be set as percentage over the full range of 16mA (or 20mA / 10V). When the level is less than the required level, the current will be 4mA. **Examples:**

4MA (SETUP 72)	20MA (SETUP 73)	CUT-OFF (SETUP 74)	REQUIRED LEVEL	OUTPUT
0 L	100 L	2%	(100-0)*2% = 2.0 L	4+(16*2%) = 4.32mA
20 L	800 L	3.5%	(800-20)*3.5%= 27.3 L	4+(16*3.5%)=4.56mA

Continued next page >>>

7 - ANALOG OUTPUT (CONTINUED)

TUNE MIN / 4MA
75

The initial minimum analog output value is 0/4mA or 0V. However, this value might differ slightly due to external influences such as temperature for example. The 0/4mA or 0V value can be tuned precisely with this setting.

- *Before tuning the signal, be sure that the analog signal is not being used for any application!*

After pressing PROG, the current will be about 4mA (or 0mA / 0V). The current can be increased / decreased with the arrow-keys and is directly active. Press ENTER to store the new value.
Remark: the analog output value can be programmed "up-side-down" if desired, so 20mA at minimum level for example!

TUNE MAX / 20MA
76

The initial maximum analog output value is 20mA (or 10V). However, this value might differ slightly due to external influences such as temperature for example. The 20mA value (or 10V) can be tuned precisely with this setting.

- *Before tuning the signal, be sure that the analog signal is not being used for any application!*

After pressing PROG, the current will be about 20mA. The current can be increased / decreased with the arrow-keys and is directly active. Press ENTER to store the new value.
Remark: the analog output value can be programmed "up-side-down" if desired, so 4mA at maximum level for example!

FILTER
77

This function is used to stabilize the analog output signal.
The output value is update every 0.1 second. With the help of this digital filter a more stable but less actual reading can be obtained.
The filter principal is based on three input values: the filter level (01-99), the last analog output 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 there response times are indicated:

FILTER VALUE	RESPONSE TIME ON STEP CHANGE OF ANALOG VALUE. TIME IN SECONDS			
	50% INFLUENCE	75% INFLUENCE	90% INFLUENCE	99% INFLUENCE
01	filter disabled	filter disabled	filter disabled	filter disabled
02	0.1 second	0.2 second	0.4 second	0.7 second
03	0.2 second	0.4 second	0.6 second	1.2 seconds
05	0.4 second	0.7 second	1.1 seconds	2.1 seconds
10	0.7 second	1.4 seconds	2.2 seconds	4.4 seconds
20	1.4 seconds	2.8 seconds	4.5 seconds	9.0 seconds
30	2.1 seconds	4 seconds	7 seconds	14 seconds
50	3.5 seconds	7 seconds	11 seconds	23 seconds
75	5.2 seconds	10 seconds	17 seconds	34 seconds
99	6.9 seconds	14 seconds	23 seconds	45 seconds

8 - RELAY OUTPUT

Note !

With “SETUP 2”, four alarm levels can be entered. Based on the options order, the F173-A-OS will have 2, 3 or 4 alarm outputs.
Note: If the unit is Intrinsically Safe, it will have two alarm outputs. If type OS (relay board) has been supplied, it will have four alarm outputs. Else it has three alarm outputs.

OUTPUT R1 **81**	Assign the output function to output R1. Following can be selected: low-low - low - high - high-high alarm - all alarms - off
OUTPUT R2 **82**	Assign the output function to output R2. Following can be selected: low-low - low - high - high-high alarm - all alarms - off
OUTPUT R3 **83**	Assign the output function to output R3. Following can be selected: low-low - low - high - high-high alarm - all alarms - off
OUTPUT R4 **84**	Assign the output function to output R4. Following can be selected: low-low - low - high - high-high alarm - all alarms - off

9 - COMMUNICATION (OPTIONAL)

Functions as described below deal with hardware that are not part of the standard delivery.
Programming of these functions does not have any effect if this hardware has not been installed.
Consult the optional Modbus communication manual for a detailed explanation.

BAUDRATE **91**	For external control, following communication speeds can be selected: 1200 - 2400 - 4800 - 9600 baud
BUS ADDRESS **92**	For communication purposes, a unique identity can be attributed to every F173-A-OS. This address can vary from 1-255.
MODE **93**	The communication is executed according Modbus protocol RTU mode. With OFF, the communication is disabled.

A - OTHERS

TYPE OF MODEL **A1**	For support and maintenance it is important to have information about the characteristics of the F173-A-OS. 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 **A2**	For support and maintenance it is important to have information about the characteristics of the F173-A-OS. 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 **A3**	For support and maintenance it is important to have information about the characteristics of the F173-A-OS. 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.
PASSWORD **A4**	All SETUP-values can be password protected. This protection is disabled with value 0000 (zero). Up to and including 4 digits can be programmed, for example 1234.
TAGNUMBER **A5**	For identification of the unit and communication purposes, a unique tagnumber of maximum 7 digits can be entered.

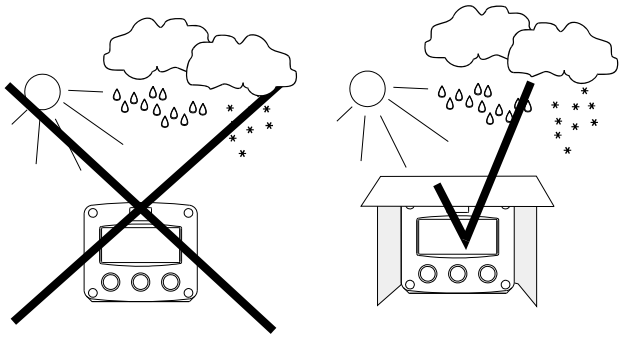
4. INSTALLATION

4.1. GENERAL DIRECTIONS

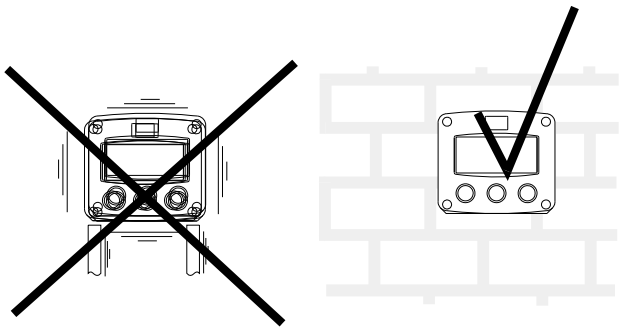
Caution !

- 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 F173-A 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 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 " at the front 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 4X)!
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 F173-A on a solid structure to avoid vibrations.

4.3. DIMENSIONS- ENCLOSURE

Aluminum enclosures:

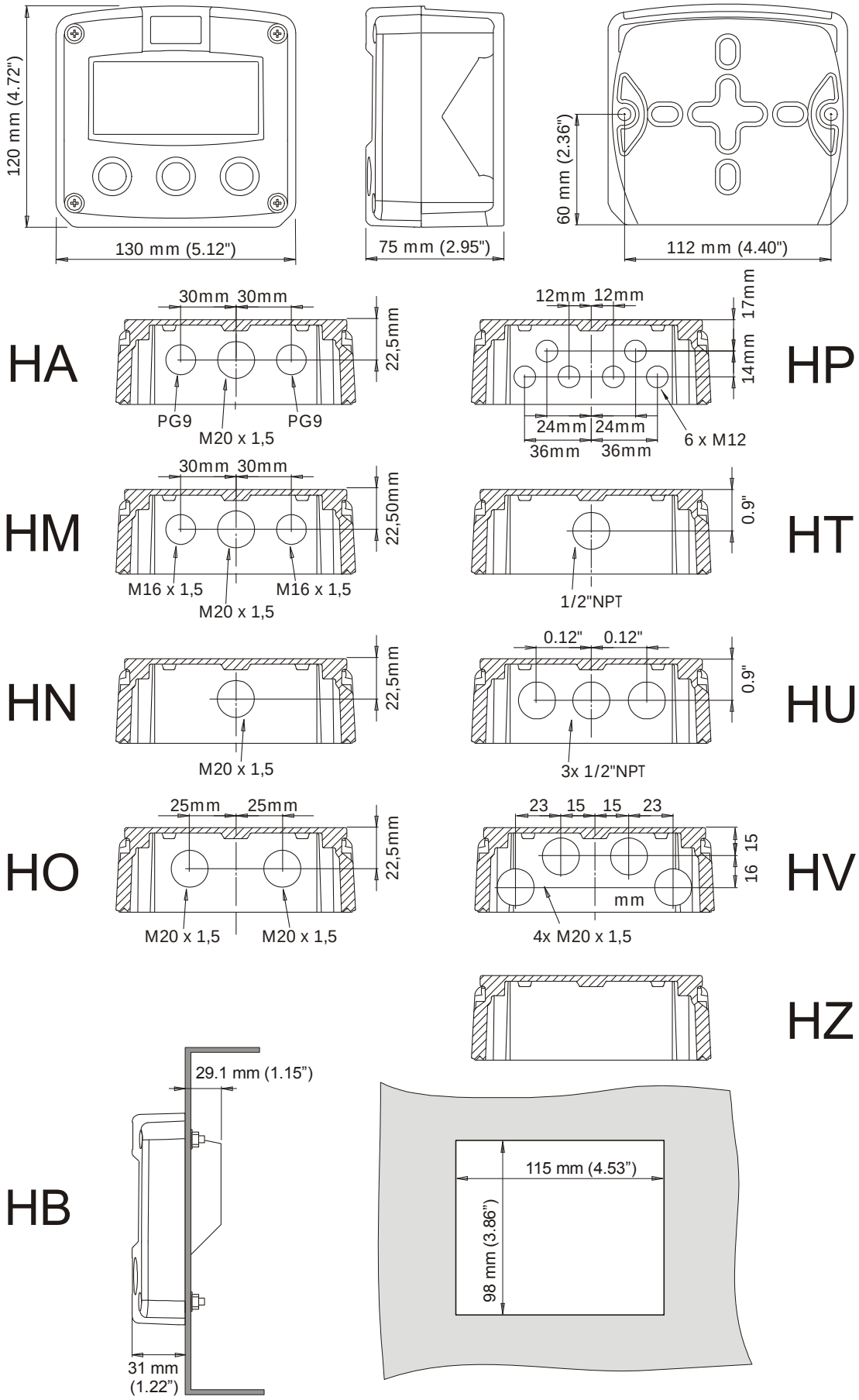
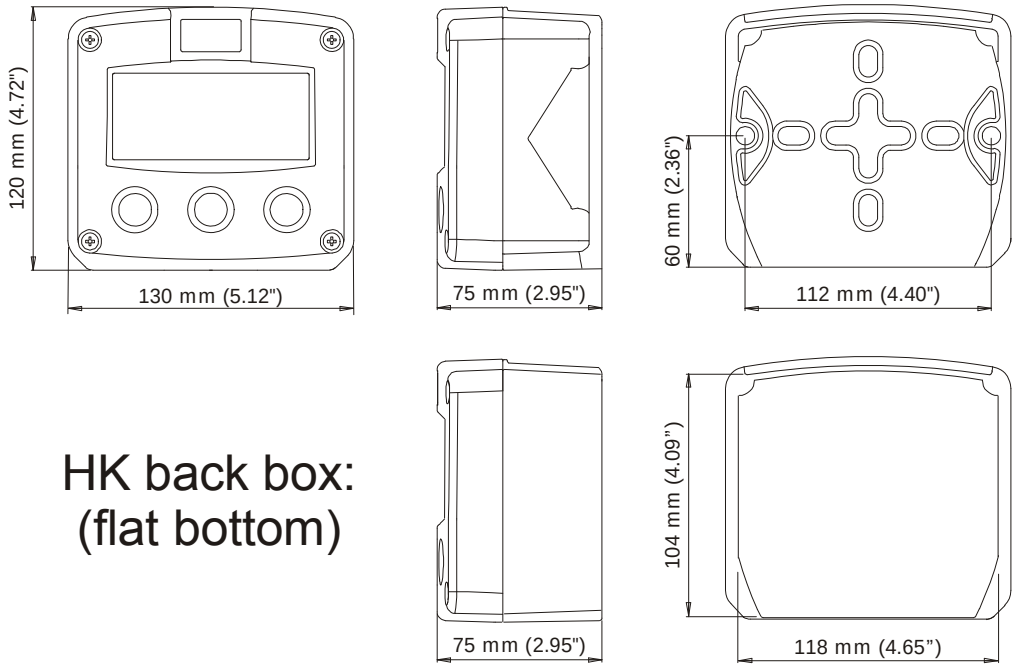
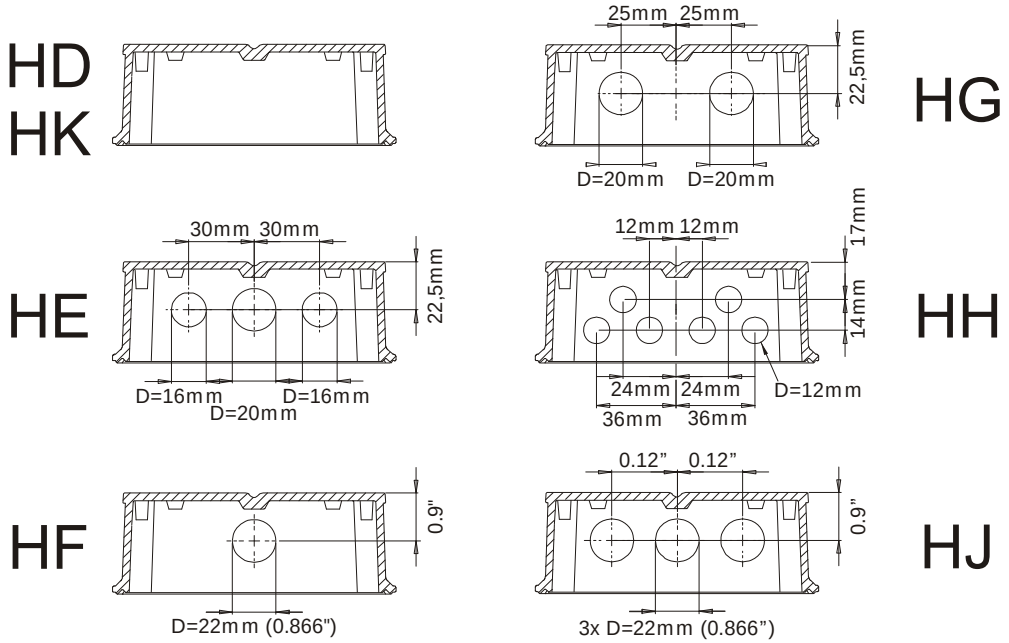


Fig. 6: Dimensions aluminum enclosures.

GRP enclosures:





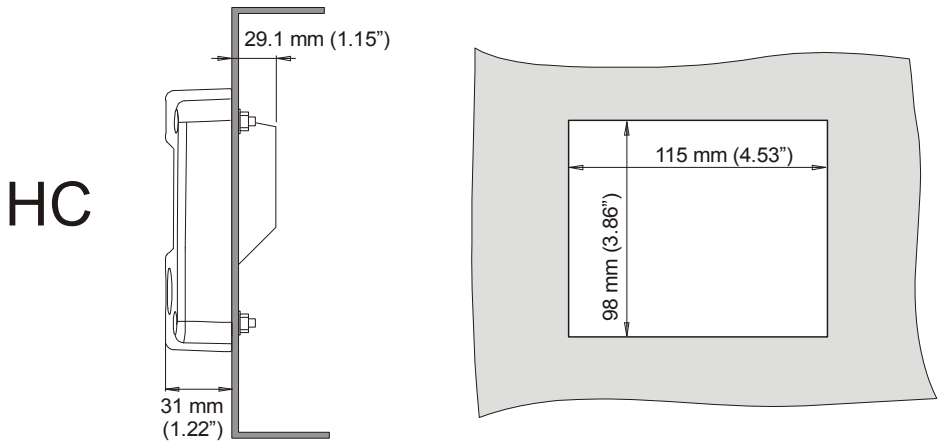


Fig. 7: Dimensions GRP enclosures.

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).

Aluminum enclosures

- When installed in an aluminum enclosure and a potentially explosive atmosphere requiring apparatus of equipment protection level Ga and Da, the unit must be installed such that, even in the event of rare incidents, an ignition source due to impact or friction sparks between the enclosure and iron/steel is excluded.

- Do ground the aluminum enclosure properly as indicated, if the F173-A 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.

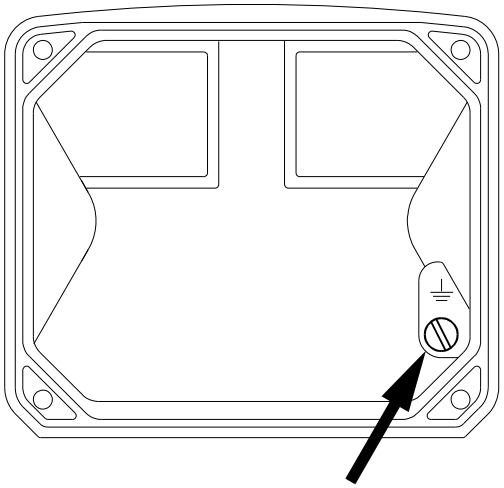


Fig. 8: Grounding aluminum enclosure with type PM 115-230V AC.

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.
- An effective screened cable for the input signal, and grounding of its screen to terminal 9 (GND) or at the sensor itself, whichever is appropriate to the application.

4.4.2. VOLTAGE SELECTION SENSOR SUPPLY

Option PD: Sensor supply: 3.2V - 8.2V - 12V or 24 V:
With this option, a real power supply for the sensor is available. The sensor can be powered with 8.2 - 12 or 24 V DC (max. 50mA@24V). The voltage is selected by the three switches inside the enclosure.

First, remove the terminal strip(s) after which the internal plastic cover can be removed. The switches are located in the top left corner (option PD) as indicated:

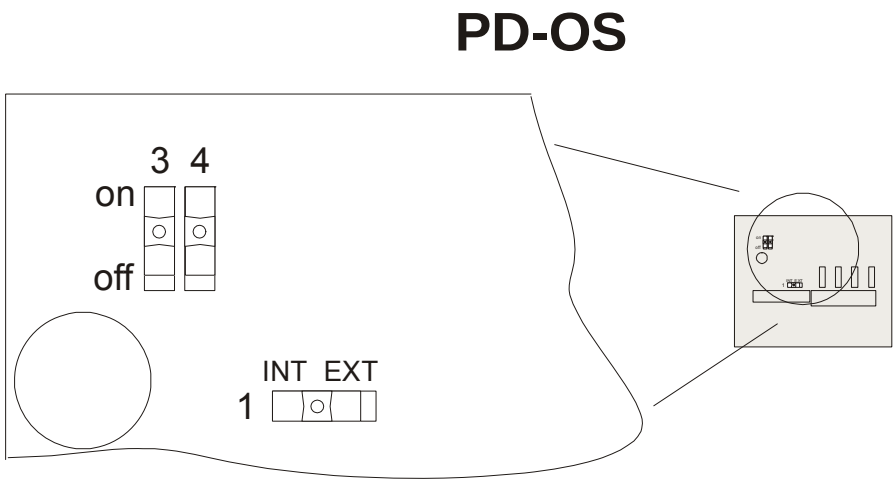


Fig. 8: switch position voltage selection (option PD and PD-OS).

Switch positions

SENSOR A	
SWITCH 1	VOLTAGE
on	3.2 V DC
off	switch 3+4

VOLTAGE SELECTION		
SWITCH 3	SWITCH 4	VOLTAGE
on	on	8.2 V DC
off	on	12 V DC
on	off	12 V DC
off	off	23 V DC

Function switch 1: voltage selection sensor internal (3.2V) or external (switch 3+4).
Function switch 3+4: the combination of these switches determine the voltage as indicated.

4.4.3. TERMINAL CONNECTORS

The following terminal connectors are available:

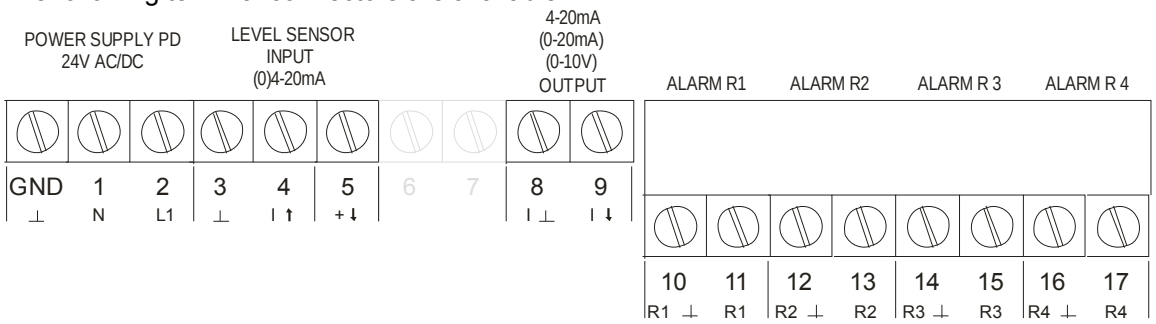


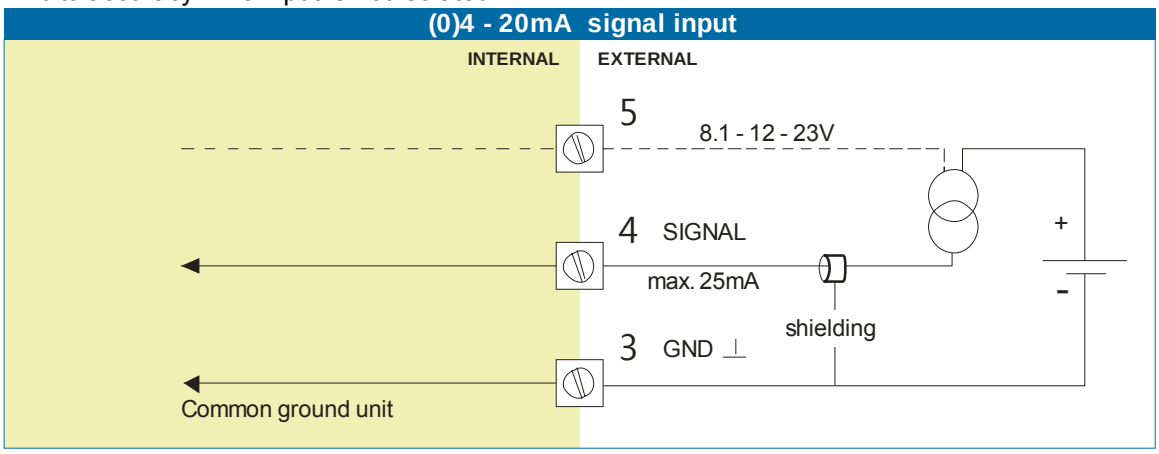
Fig. 9: Overview terminal connectors F173-A-OS-PD.

REMARKS TERMINAL CONNECTORS:

Terminal GND- 01- 02; power supply - <u>only available with type PD</u>:

OPTION	SENSOR SUPPLY	Terminal			backlight	OPTION AA	OPTION AU	option OA	option OR
		GND	01	02					
PD 24V AC	8,2-12-24V max 50mA		AC	AC		◊	◊	◊	
PD 24V DC	8,2-12-24V max 50mA	L-	L+			◊	◊	◊	

Terminal 03-05; Sensor input:
The F173-A-OS requires a (0)4-20mA sensor signal which will be processed 4 times a second with a 14 bits accuracy. The input is not isolated.



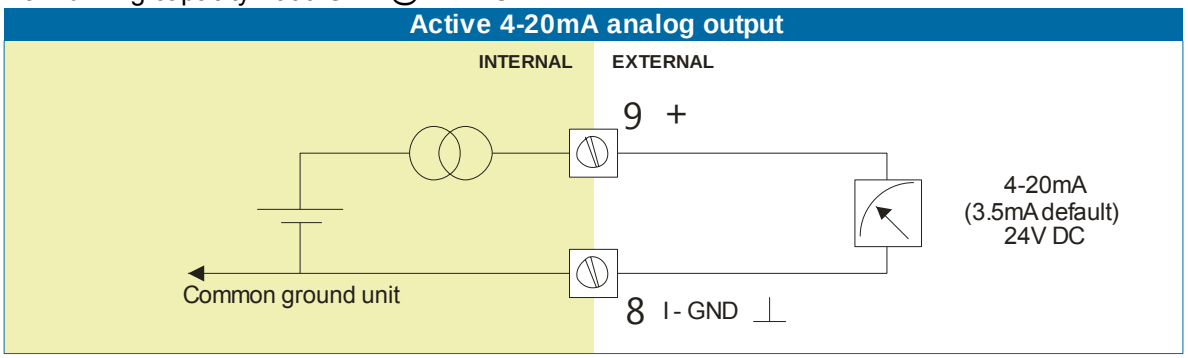
Terminal 06-07; Unused

Caution !

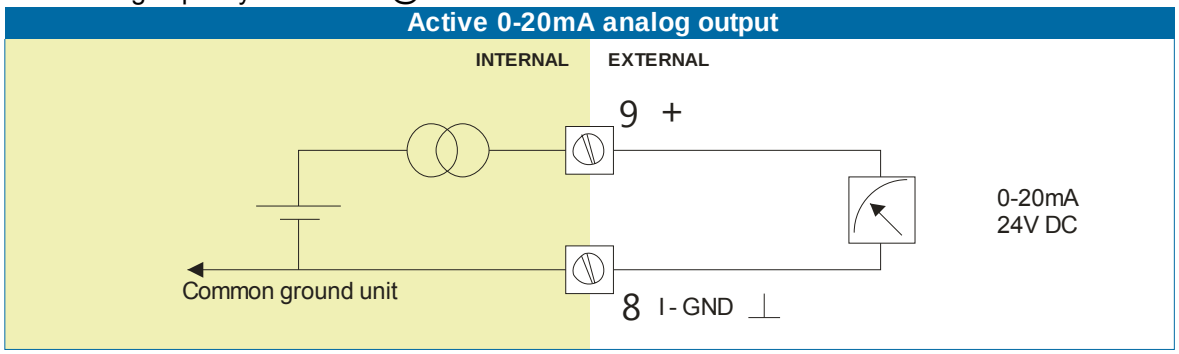
Caution:
Do not connect wires to these terminals*; they are not in use for daily operation but for testing of the F173-A-OS. The onboard electronics hardwired to these terminals, should not be exposed to field wiring or "foreign voltages".*

Terminal 08-09 analog output (SETUP 7):
An analog output signal proportional to the level is available as standard. Various options are available.

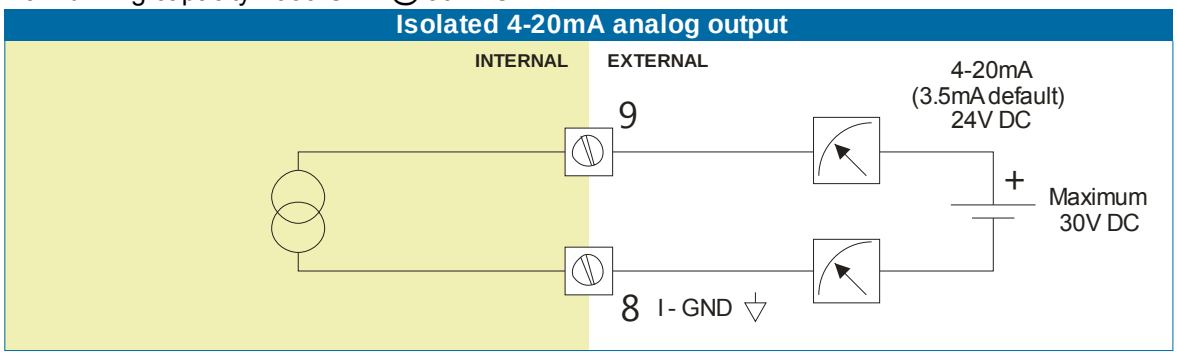
Type AA:
An <u>active 4-20mA signal</u> proportional to the level is available with this option.
When the output is disabled, a 3.5mA signal will be generated on these terminals.
Max. driving capacity 1000 Ohm @ 24VDC.



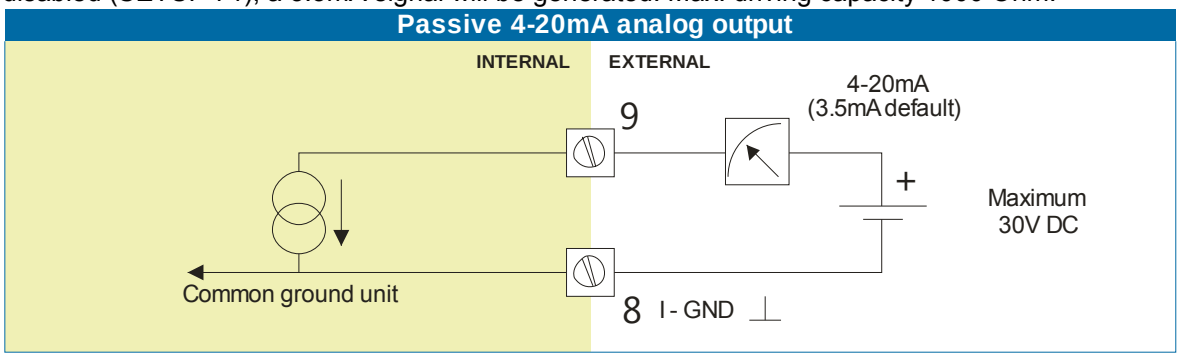
Type AB:
An active 0-20mA signal proportional to the level is available with this option.
Max. driving capacity 1000 Ohm @ 24VDC.



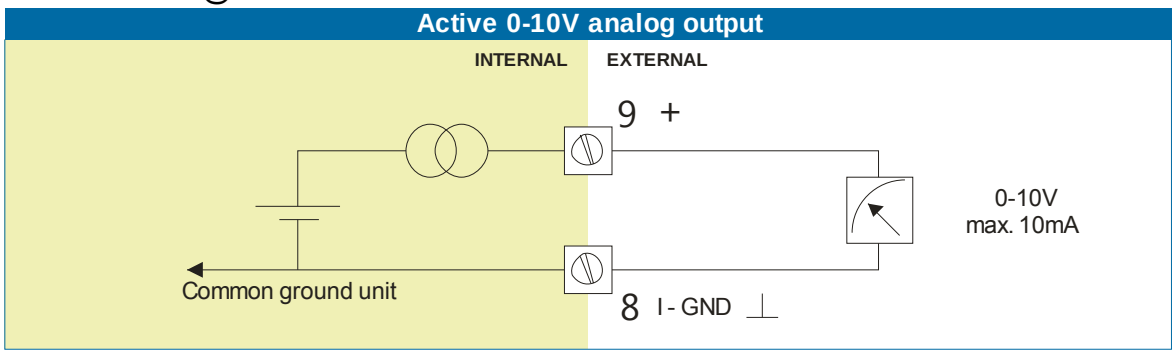
Type AI:
An isolated 4-20mA signal proportional to the level is available with this option.
When the output is disabled, a 3.5mA signal will be generated on these terminals (SETUP 71).
Max. driving capacity 1000 Ohm @ 30VDC.



Type AP:
A 4-20mA current-sinking signal proportional to the level is available as standard.
A DC power supply, with the actuator in series, should be connected to terminal 08 and 09. The current is then regulated by the F173-A-OS. When a power supply is connected but the output is disabled (SETUP 71), a 3.5mA signal will be generated. Max. driving capacity 1000 Ohm.



Type AU:
A 0-10VDC signal proportional to the level is available with this option.
Max. load 10mA @ 10VDC.



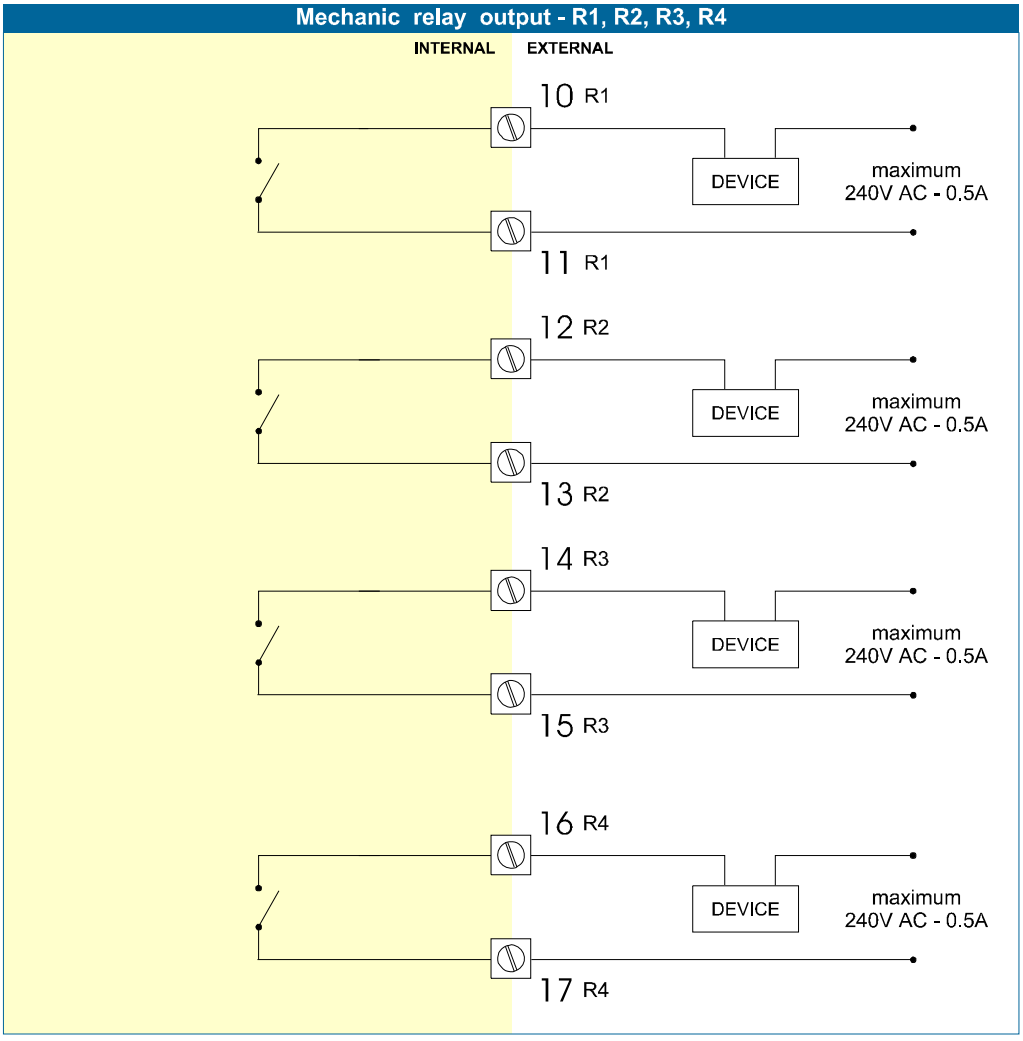
Terminal 10-17; relay outputs
All relay contacts are normally open (NO).

Terminal 10-11; relay output R1:
This output is an alarm output configurable with setup 81.

Terminal 12-13; relay output R2:
This output is an alarm output configurable with setup 82.

Terminal 14-15; relay output R3:
This output is an alarm output configurable with setup 83.

Terminal 16-17; relay output R4:
This output is an alarm output configurable with setup 84.



5. MAINTENANCE

5.1. 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 F173-A-OS 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 F173-A-OS does not require special maintenance unless it is used in low-temperature applications or surroundings with high humidity (above 90% annual mean). It is customers responsibility to take all precautions to dehumidify the internal atmosphere of the F173-A-OS in such a way that no condensation will occur, for example by placing dry silica-gel in the casing just before closing the enclosure.
Furthermore it is required to replace or dry the silica gel from time to time as advised by the silica gel supplier.

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 re-enter any subsequent Span alterations.
- Clean the casing with soapy-water; don't use any aggressive solvents as these might damage the coating.

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	Transflective LCD with green LED backlight. Good readings in full sunlight and darkness. Note: only available for safe area applications. Power requirements: 12-24V DC + 10% or type PD, PF, PM. Power consumption max. 1 Watt.

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-stabilized 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 / NEMA4X
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 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 HH	Drilling: 6x 12mm (0.47").
Option ZS	Silicone free ABS enclosure with EPDM and PE gaskets. UV-resistant polyester keypad. Note: this option comes with type HD only.

Operating temperature	
Operational	-40°C to +80°C (-40°F to +176°F)

Power supply	
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	8-24V AC / DC ± 10%. Power consumption max. 10 Watt. Intrinsically safe: 16-30V DC; power consumption max. 0.75 Watt.
Type PF	24V AC / DC ± 10%. Power consumption max. 15 Watt.
Type PL	Input loop powered from sensor signal 4-20mA (type A, non IS).
Type PM	115-230V AC ± 10%. Power consumption max. 15 Watt.
Type PX	Output loop powered: 8-30V DC. Power consumption max. 0.5 Watt.
Note PF / PM	The total consumption of the sensors`, backlight and outputs may not exceed 400mA@24V.
Note I.S. applications	For intrinsically safe applications, consult the safety values in the certificate.

Sensor excitation	
Type PB / PC / PX	3.2V DC for pulse signals and 1.2V DC for coil pick-up. Note: This is not a real sensor supply. Only suitable for pulse sensors with a very low power consumption like coils (sine wave) and reed-switches.
Type PD	1.2 - 3.2 - 8.2 - 12 and 24V DC - max. 50mA@24V DC
Type PD-XI	Intrinsically safe: Pulse signals: 1.2 - 3.2 - 8.2 - max. 7mA@8.2V DC. Analog signals: the sensor supply voltage is according to the power supply voltage connected to terminal 1. Also terminal 2 offers the same voltage.
Type PF / PM	1.2 - 3.2 - 8.2 - 12 and 24V DC - max. 400mA@24V DC.

Terminal connections	
Type:	Removable plug-in terminal strip. Wire max. 1.5mm2 and 2.5mm2 (Type PM / PF)

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

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

INPUTS

Sensor	
Type A	(0)4-20mA - with signal calibration feature at any current within the range.
Type U	0-10 V - with signal calibration feature at any voltage within the range.
Accuracy	Resolution: 14 bit.. Error < 0.025mA / ±0.125% FS. Low level cut-off programmable.
Span	0.000010 - 9,999,999 with variable decimal position.
Update time	Four times a second.
Voltage drop	2.5 Volt.
Load impedance	3kOhm
Linearization	15 points including interpolation function.
Note	For signal type A and U: external power to sensor is required.

OUTPUTS

Analog output	
Function	transmitting actual temperature.
Accuracy	10 bit. Error < 0.05% - update 10 times a second. Software function to calibrate the 4.00mA and 20.00mA levels precisely within set-up.
Load	max. 1 kOhm
Type AA	Active 4-20mA output
Type AB	Active 0-20mA output
Type AI	Passive galvanically isolated output
Type AP	Passive 4-20mA output - output loop powered
Type AU	Active 0-10V output

Alarm outputs	
Function	low, low-low, high, high-high or all alarms output.
Type OS	Four mechanic relay outputs for alarms. Requires type AP + PD and OR. Not Intrinsically Safe.

OPERATIONAL

Operator functions	
Displayed functions	• actual quantity • actual percentage • low-low alarm value • low alarm value • high alarm value • high-high alarm value

Level	
Digits	6 digits.
Units	mL, L, m3, Gallons, KG, Ton, lb, bl, cf, RND, P, no units.
Decimals	0 - 1 - 2 or 3.
Percentage	0.0 - 100.0 %

APPENDIX B: PROBLEM SOLVING

In this appendix, several problems are included that can occur when the F173-A-OS is going to be installed or while it is in operation.

Analog output does not function properly:
Check:
- SETUP 71 - is the function enabled?
- SETUP 72 / 73: are the level-levels programmed correctly?
- connection of the external power-supply according specification.

Alarm output does not function:
Check:
- SETUP 81 - 84 - did you enable the relays?
- SETUP 2 - alarm: are the correct alarm values programmed

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

ALARM
When the alarm flag starts to blink an internal alarm condition has occurred. Press the "select button" several times to display the 5-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.

LIST OF CONFIGURATION SETTINGS

SETTING	DEFAULT	DATE :	DATE :
1 - LEVEL			
11 unit	L		
12 decimals	0000000		
13 span	000001		
14 decimals span	0		
15 off set	0		
2 - ALARM			
21 level zero	default		
22 alarm low-low	0		
23 alarm low	0		
24 alarm high	0		
25 alarm high-high	0		
26 delay alarm low-low	0.0 sec		
27 delay alarm low	0.0 sec		
28 delay alarm high	0.0 sec		
29 delay alarm high-high	0.0 sec		
3 - DISPLAY			
31 function	span		
32 alarm set	operator		
4 - POWER MANAGEMENT			
41 LCD-new	1 sec.		
42 mode	operational		
5 - SENSOR			
51 filter	01 (off)		
52 cut-off %	00.0%		
53 calibrat. low-(0)4mA	default		
54 calibrat. high-20mA	default		
6 - LINEARISATION			
61 percentage %	0.0%		
M-Factor	1.000000		
62 percentage %	0.0%		
M-Factor	1.000000		
63 percentage %	0.0%		
M-Factor	1.000000		
64 percentage %	0.0%		
M-Factor	1.000000		
65 percentage %	0.0%		
M-Factor	1.000000		
66 percentage %	0.0%		
M-Factor	1.000000		
67 percentage %	0.0%		
M-Factor	1.000000		
68 percentage %	0.0%		
M-Factor	1.000000		
69 percentage %	0.0%		
M-Factor	1.000000		

SETTING	DEFAULT	DATE :	DATE :
6A percentage %	0.0%		
M-Factor	1.000000		
6B percentage %	0.0%		
M-Factor	1.000000		
6C percentage %	0.0%		
M-Factor	1.000000		
6D percentage %	0.0%		
M-Factor	1.000000		
6E percentage %	0.0%		
M-Factor	1.000000		
6F percentage %	0.0%		
M-Factor	1.000000		
6G percentage %	0.0%		
M-Factor	1.000000		
6H linearisation	disabled		
7 - ANALOG OUTPUT			
71 output	disabled		
72 min. level 4-mA	0000000		
73 max. level 20mA	9999999		
74 cut off percentage	0.0%		
75 tune min - 4mA	0208		
76 tune max - 20mA	6656		
77 filter	01 (off)		
8 - RELAY OUTPUT			
81 output R1	off		
82 output R2	off		
83 output R3	off		
84 output R4	off		
9 - COMMUNICATION			
91 baud-rate	2400		
92 address	1		
93 mode	BUS-ASC		
A - OTHERS			
A4 password	0000		
A5 tagnumber	0000000		

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