F9.20 Battery Powered Flow Monitor

INSTRUCTION MANUAL

Table of Contents

1. Introduction

1.1. Safety Instructions

General Statements

❑ Do not install and service the instrument without following the Instruction Manual.
❑ Unit installation and wiring connections should only be performed by qualified staff.
❑ Do not modify product construction.

Installation and Commissioning Statements

❑ To clean the unit, use only chemical compatible products.

1.2. Unpacking

Please verify that the product is complete and without any damage. The following items must be included:
- F9.20 Battery Powered Flow Monitor
- Instruction Manual for F9.20 Battery Powered Flow Monitor
- Instruction Manual for F3.00 Flow Sensor (only for F9.20.XX Compact Battery Powered Flow Monitor)

2. Description

2.1. Design

The FLS FlowX3 F9.20 Battery Powered Flow Monitor is equipped with two long life lithium batteries and it integrates the power supply for the sensor. It is designed to show on the LCD display flow rate and totalized flow volume with no external power supply required. One of the two totalizers is resettable while the other is non-resettable and it is used to permanently record volume consumption. Self explaining calibration menus allow a customized setup of all measuring parameters and the state of the art electronic design ensures long-term reliable and stable indications. The high flexibility is maximized with only one packaging for compact pipe mount, panel or wall installation.

2.2. Technical Features
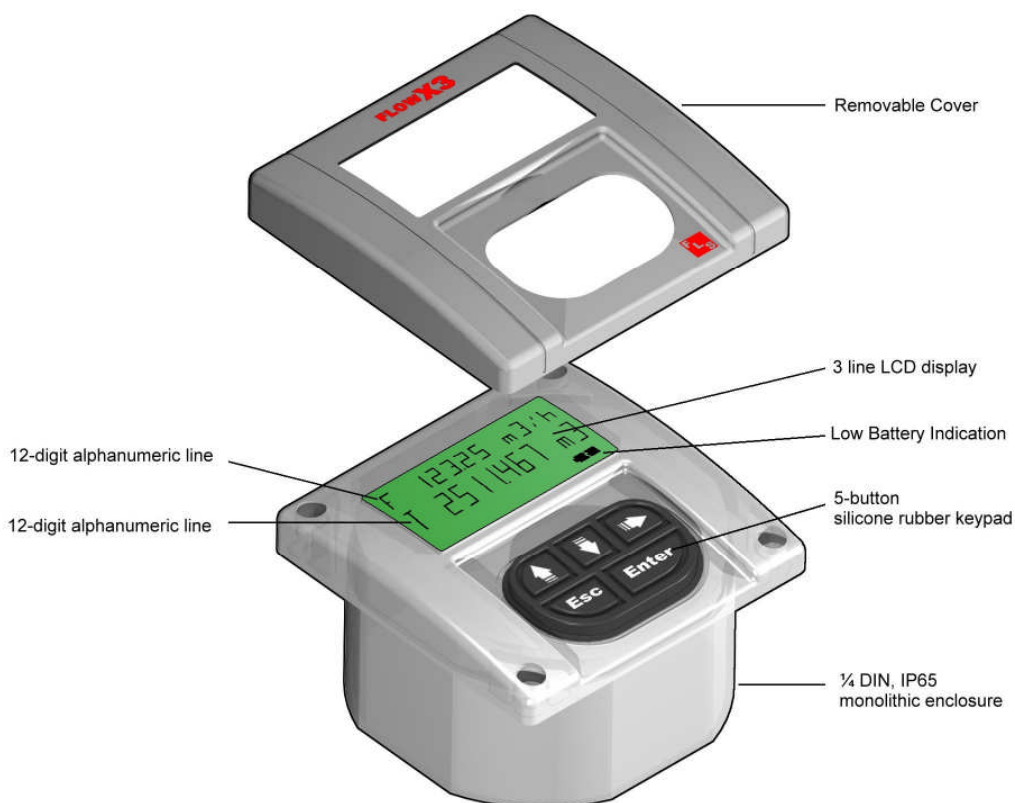
2.3. Connection to FlowX3 Sensors

FlowX3 Monitor	FlowX3 Sensors											
	F3.00.H	F3.00.C	F3.01.H	F3.01.C	F3.15.H*	F3.30.H*	ULF.H	ULF.R	ULF3.15*	ULF3.30*	F111.H	F111.C
F9.20		X		X				X				X

* with Output Kit mounted

3. Specifications

3.1. Technical Data

General
Associated flow sensor:
- FLS FlowX3 Coil effect with frequency output
- FLS FlowX3 Reed effect

Materials:
- Case: PC
- Panel gasket: Neoprene
- Wall & Field gasket: EPDM
- Keypad: 5-button silicone rubber

Display:
- 3 line LCD: 2 x 12 alphanumeric lines + 1 icon line
- Update rate: 1 second

Enclosure: IP65 front

Electrical
Supply Voltage: 2 x 3.6 Volt Lithium thionyl chloride battery, 2.8 Ahr
Battery life: nominal 5 years
Sensor Input (Frequency):
- Sensor power: 3,6 Volt
- Range: 1 to 500 Hz

Environmental
Operating temperature: -5 to +60°C (23 to 140°F)
Storage temperature: -10 to +80°C (14 to 176°F)
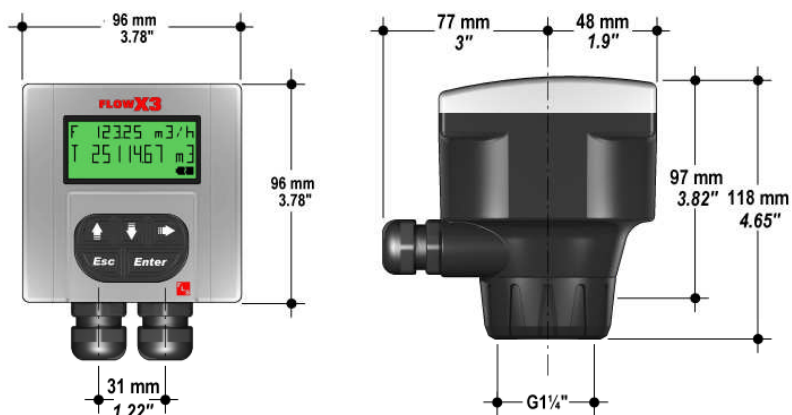Relative humidity: 0 to 95% non condensing

Standards and Approvals
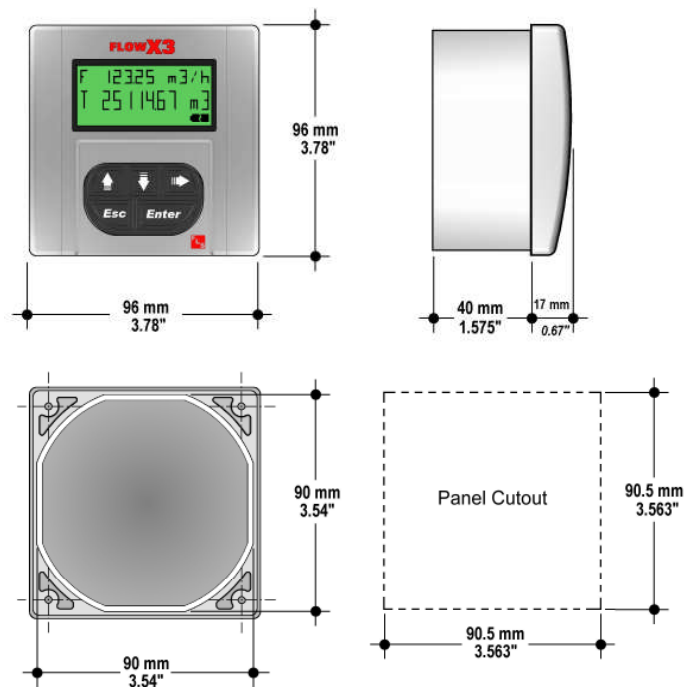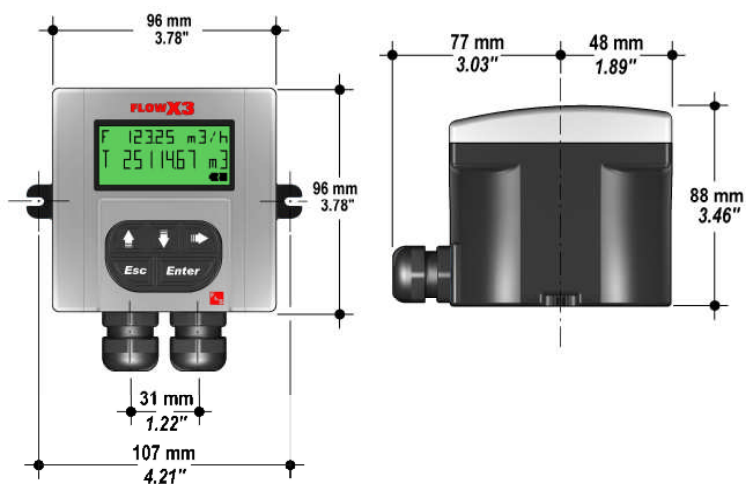Manufactured under ISO 9002
CE

3.2. Dimensions

Compact Mount

Panel Mount
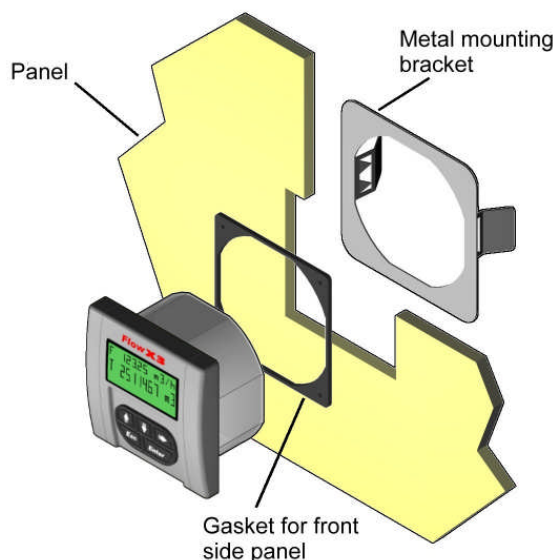

Panel Cutout

Wall Mount

4. Installation

The battery powered flow monitor is available just in one packaging for compact field version, panel or wall installation. The compact field version is mounted on top of the sensor using the compact mounting kit (F9.KC1), the panel version is installed using the panel mounting kit (F9.KP1), while the wall mounting version is fixed with the wall mounting kit (F9.KW1).The mounting kits can be ordered directly connected to the monitor or separately and then simply installed on it.

4.1. Panel Installation

The panel mounting version consists of the monitor and the mounting bracket kit F9.KP1 with gasket for IP65 watertight panel installation. The monitor perfectly fits into a standard ¼ DIN panel cutout.

1. Cut out the panel: the F9.20 requires a panel opening of 90,5 x 90,5 mm (3,563" x 3,563"). ¼ DIN punches are recommended, alternatively a jigsaw or another cutting tool may be used.
2. Recommended minimum clearance between panel cutouts is 28 mm (1.1") as illustrated.
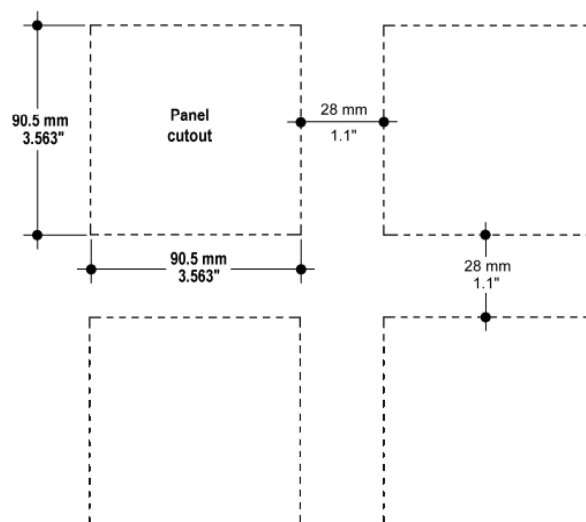
3. Place gasket on the instrument and install into the panel. Be sure the panel gasket is properly seated against the panel and around the instrument case.
4. Slide the metal bracket over the back of the instrument. Press the bracket against the inside of the panel to perfectly fix the instrument in place.

To REMOVE: press the clips outward while pulling the bracket away from the instrument panel. Do not allow the instrument to fall out of the panel opening: it may be helpful to secure the instrument temporarily with tape from front.

4.2. Wall Installation

The wall mounting version consists of the monitor and the wall mounting kit. The F9.KW1 kit includes the plastic adapter with gasket for IP65 watertight wall installation and the fixing screws.
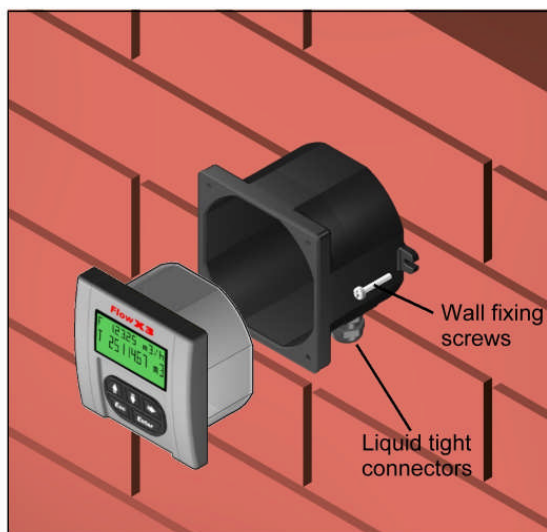
1. Fix the wall mounting kit to a solid wall using the included screws.
2. Pull the electrical cables through liquid tight connectors.
3. Make wiring connections according to wiring diagrams.
4. Secure carefully the F9.20 to the wall mounting kit using the included screws until finger tight.
5. Assemble the front cover.

4.3. Compact Installation

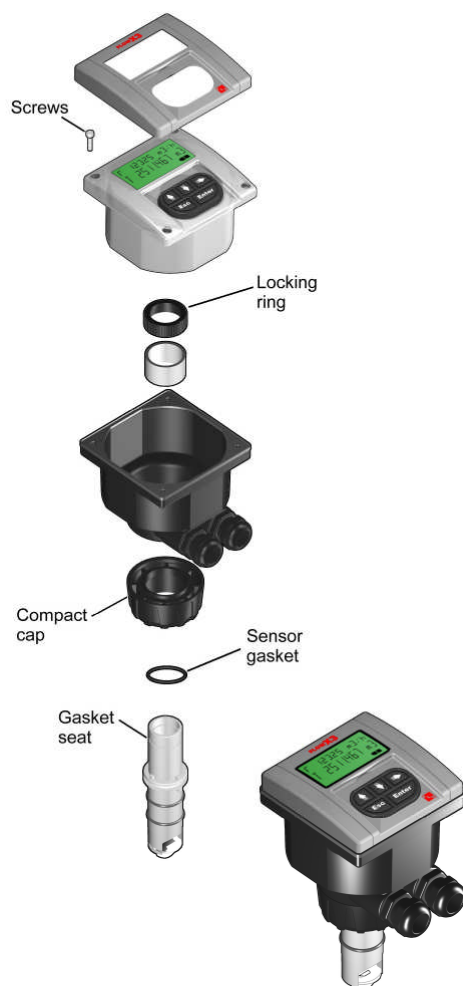The compact mounting kit F9.KC1 includes the compact plastic adapter with gasket for IP65 watertight installation, the sensor gasket, the compact cap, the locking ring and four fixing screws.

1. Assemble the sensor gasket in the proper seat.
2. Lubricate the sensor gasket with a silicone lubricant. Do not use any petroleum based lubricant that may damage the gasket.
3. Add the compact cap to the sensor and insert the sensor into the plastic adapter making sure the alignment tabs are seated in the fitting notches.
4. Lock the sensor to the adapter: screw completely the locking ring.
5. Pull the electrical cables through liquid tight connectors.
6. Make wiring connections according to wiring diagrams.
7. Secure carefully the F9.20 to the compact mounting kit using the included screws until finger tight.
8. Assemble the front cover.

4.4. Wiring

All wiring connections to F9.20 are made via removable terminals. Flow sensor terminals are orange, all other terminals are green.

⚠️ **CAUTION**

General recommendation

- Terminals accept 26 to 12 AWG (0.08 to 2.5 mm^2)
- Strip around 10 mm (0.4") of insulation from the wire tips and tin bare ends to avoid fraying.
- Ferrules are suggested when connecting more than one wire to a single terminal.
- Remove the upper part of the terminals for an easy cabling.
- Insert wire tip or ferrule completely into the terminal and fix with the screw until finger tight.
- **Compact or Wall Installation**
  Use electrical cables with the proper external diameter for the liquid tight connector:
  PG11: external diameter between 2-7 mm (0.079-0.276")
  PG13,5: external diameter between 5-12 mm (0.197-0.472")

Rear Terminal View
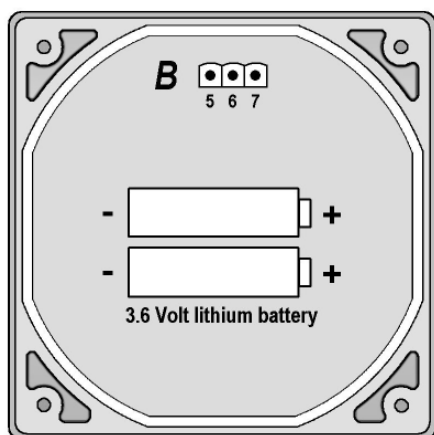
SENSOR	
5	GND
6	IN
7	V+

Sensor *B*

Battery Replacement

Battery indication appears on the display when battery voltage is low

- **Perform the procedure to save the current totalizer in permanent memory <u>before</u> battery replacement.** Refer to section **8.1.3. Inftot Backup**

- Replace the batteries on the rear side of the instrument

⚠️ **CAUTION**

Dispose of the worn out battery properly! Ask to local authorities.

Sensor Wiring Diagram

F3.00.C IP68 or F3.01.C (compact version) flow sensor connection
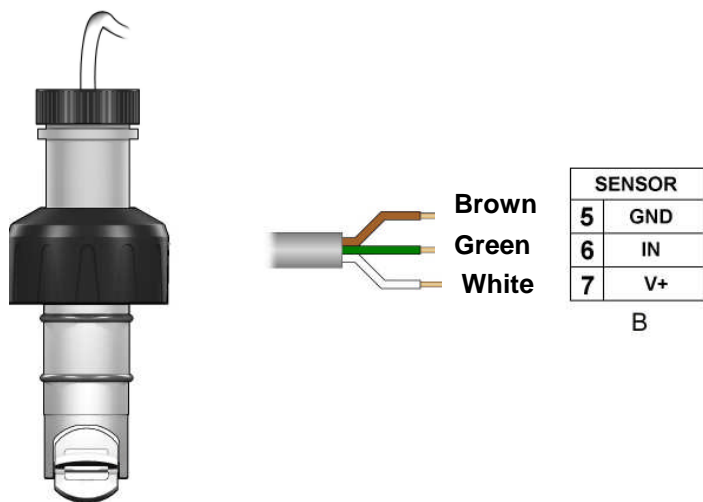
F3.00.C IP65 flow sensor connection
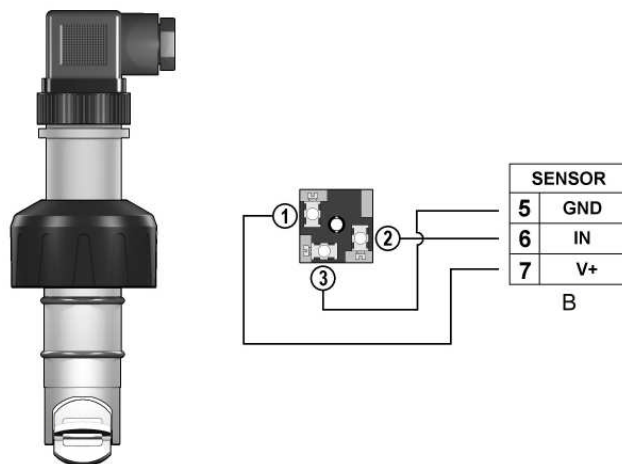
ULFXX.R flow sensor connection with two wires

The capacitor C and the resistor R are already included if the sensor and the monitor are bought together.

ULFXX.R flow sensor connection with three wires

5. Operational Overview

The FlowX3 F9.20 battery powered flow monitor, like all members of X3 Line, features a digital display and a five-button keypad for system set-up, calibration and operation. This section contains a description of the keypad functions and the general operation flowchart of the instrument.

5.1. Keypad Functions

The five push buttons of the keypad are used to navigate display levels and modify settings.

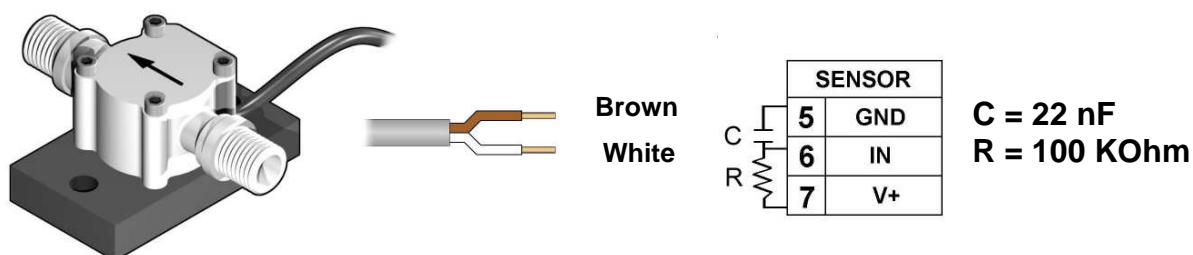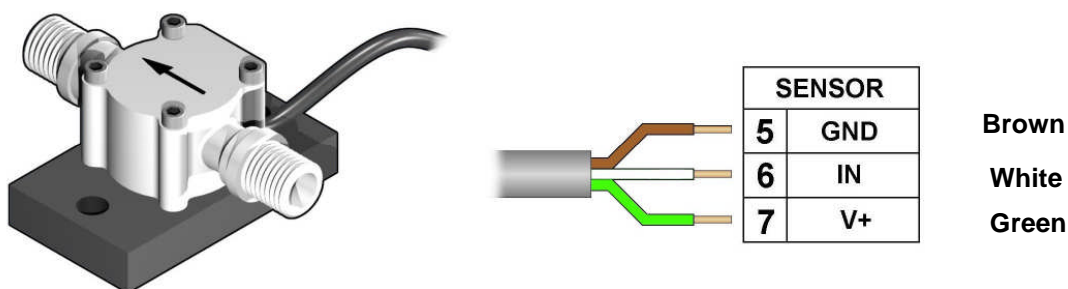The function of each button may change according to display level; please refer to following table:
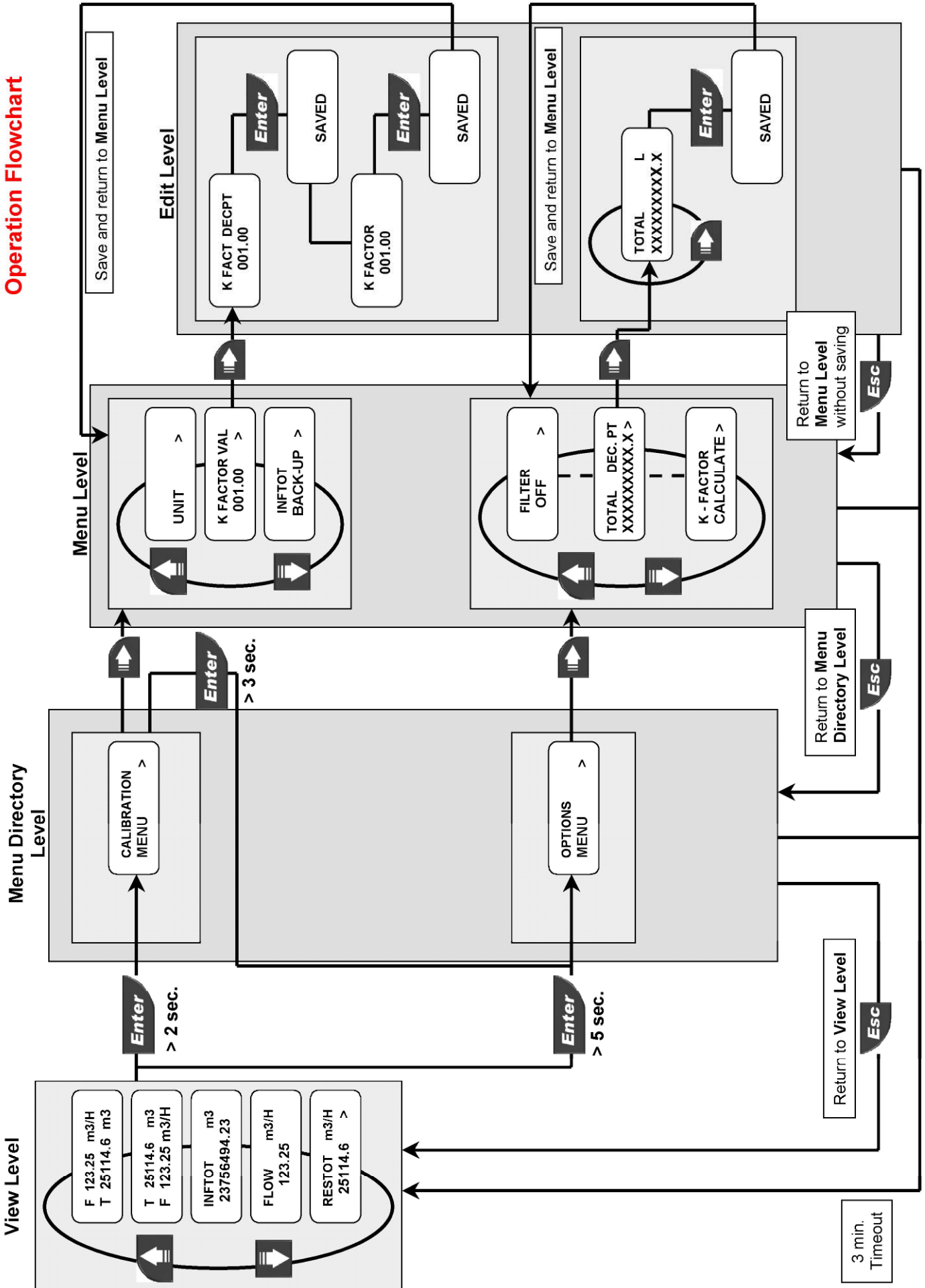
Level	**Function**				
View	Scroll through items	Scroll through items	Select items marked with >	---------	Go to Menu Directory Level
Menu Directory	Scroll through items	Scroll through items	Enter menu for editing	Return to View	---------
Menu	Scroll through items	Scroll through items	Enter menu item for editing	Return to Menu Directory	---------
Edit	Modify an item or a flashing digit	Modify an item or a flashing digit	Scroll right through flashing digits	Return to Menu without saving	Save new settings

5.2. General Operation Flowchart

The F9.20 battery powered flow monitor features four different levels as shown in the following flowchart illustrating the basic navigation concepts.

- ❑ **View Level:** this is the default level. After instrument set-up, all measured values. Refer to section **6. View Level** for details.
- ❑ **Menu Directory Level:** there are two different Menu Directories for different set-up and calibration. Refer to section **7. Menu Directory Level** for details.
  Access to this level can be free or password protected. Entering the correct password allows direct access to next levels and to all editable items in all menus, until a return to View Level.
- ❑ **Menu Level:** the current setting for each item in a Menu can be viewed and selected for editing at this level.
- ❑ **Edit Level:** all instrument parameters can be set, modified and saved at this level. Refer to section **8. Menu and Edit Levels** for details.

Operation Flowchart

Edit Level

K FACT DECPT
001.00

Enter → SAVED

K FACTOR
001.00

Enter → SAVED

Save and return to **Menu Level**

TOTAL   L
XXXXXXXX.X

Enter → SAVED

Save and return to **Menu Level**

Menu Level

UNIT   ∧

K FACTOR VAL
001.00   ∧

INFTOT
BACK-UP   ∧

FILTER
OFF   ∧

TOTAL   DEC. PT
XXXXXXXX.X ∧

K - FACTOR
CALCULATE ∧

Return to **Menu Level** without saving   *Esc*

Menu Directory Level

CALIBRATION
MENU   ∧

Enter   > 3 sec.

OPTIONS
MENU   ∧

Return to **Menu Directory Level**   *Esc*

View Level

F 123.25   m3/H
T 25114.6 m3

T 25114.6   m3
F 123.25 m3/H

INFTOT   m3
23756494.23

FLOW   m3/H
123.25

RESTOT m3/H
25114.6   ∧

Enter   > 2 sec.

Enter   > 5 sec.

Return to **View Level**   *Esc*

3 min. Timeout

6. View Level

- During normal operation, the flow monitor is in View Level displaying all measured values.
- If the flow monitor is in a different level and no activity occurs for more than 3 minutes, it will return to View Level.
- To select the item you want displayed, press UP or DOWN arrows.
- **Changing display indication does not affect or interrupt instrument operation and calculation.**
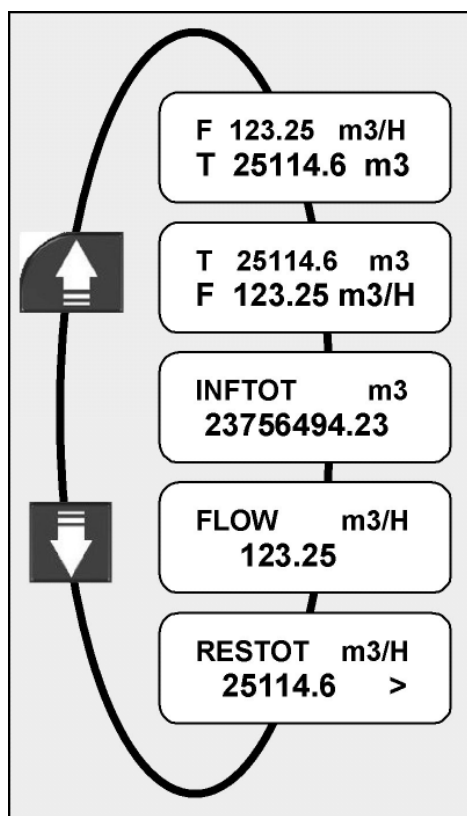
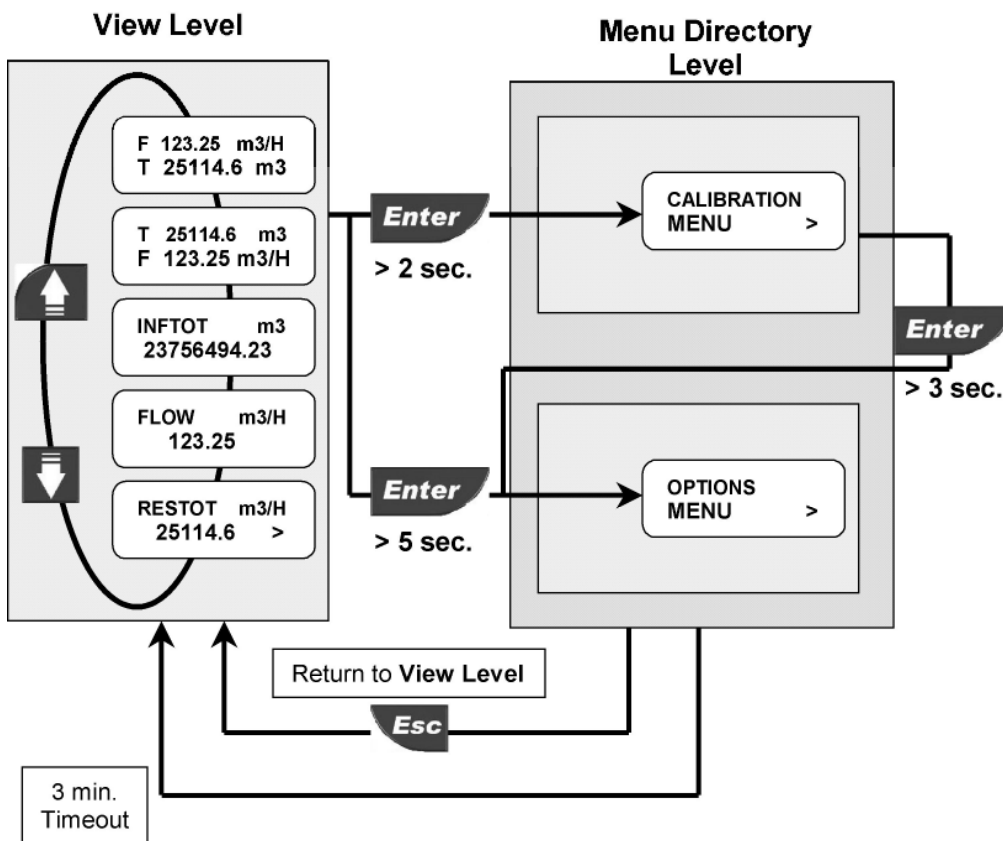|	**Description**
F 123.25 m3/H T 25114.6 m3	Flow rate and resettable totalizer value
T 25114.6 m3 F 123.25 m3/H	Resettable totalizer and flow rate value
INFTOT m3 23756494.23	Permanent totalizer value
FLOW m3/H 123.25	Flow rate value
RESTOT m3/H 25114.6 >	Resettable totalizer value. Press the RIGHT arrow key to reset. If locked, you will need to enter the password first. Lock or unlock the total reset in Option Menu (refer to **section 8.4.8. Restot PWD** for details)

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7. Menu Directory Level

Access to this level can be free or password protected. Entering the correct password allows direct access to next levels and to all editable items in all menus, until a return to View Level (refer to **section 8.4.7. Menu PWD** to select password protected access).

Four different menus are available to fully set-up the F9.20 Battery Powered Flow Monitor. These menus are separated in two different Menu Directories.
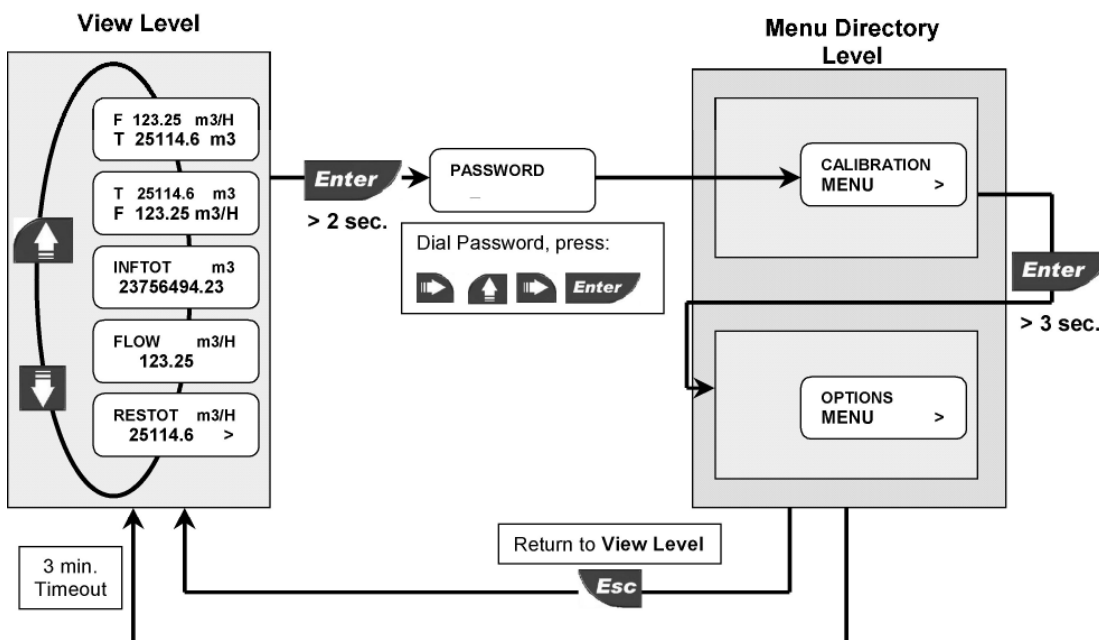In terms of getting started and making measurements, Calibration Menu is the most important menu in the F9.00 and it is the only one included in the first Menu Directory.
Output Menu, Simulation Menu and Option Menu are included together in the second Menu Directory.

7.1. Free access (no password required)

View Level

Menu Directory Level

F 123.25 m3/H
T 25114.6 m3

T 25114.6 m3
F 123.25 m3/H

INFTOT m3
23756494.23

FLOW m3/H
123.25

RESTOT m3/H
25114.6 >

Enter > 2 sec.

Enter > 5 sec.

CALIBRATION MENU >

OPTIONS MENU >

Enter > 3 sec.

Return to **View Level**

Esc

3 min. Timeout

7.2. Password protected access

View Level

Menu Directory Level

F 123.25 m3/H
T 25114.6 m3

T 25114.6 m3
F 123.25 m3/H

INFTOT m3
23756494.23

FLOW m3/H
123.25

RESTOT m3/H
25114.6 >

Enter > 2 sec.

PASSWORD

Dial Password, press:

CALIBRATION MENU >

OPTIONS MENU >

Enter > 3 sec.

Return to **View Level**

Esc

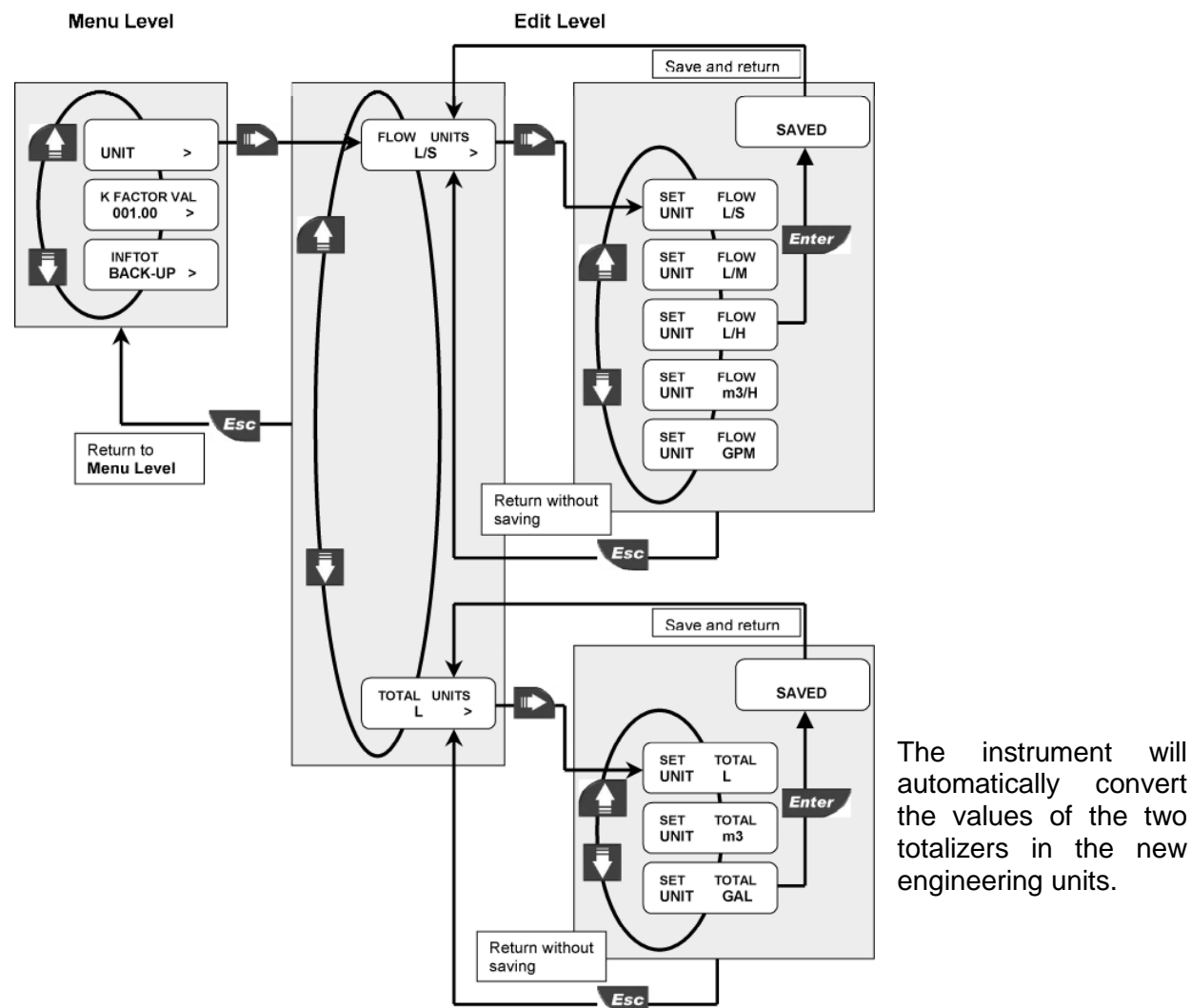3 min. Timeout

8. Menu and Edit Levels

8.1. Calibration Menu

The F9.20 basic settings are made in this menu:
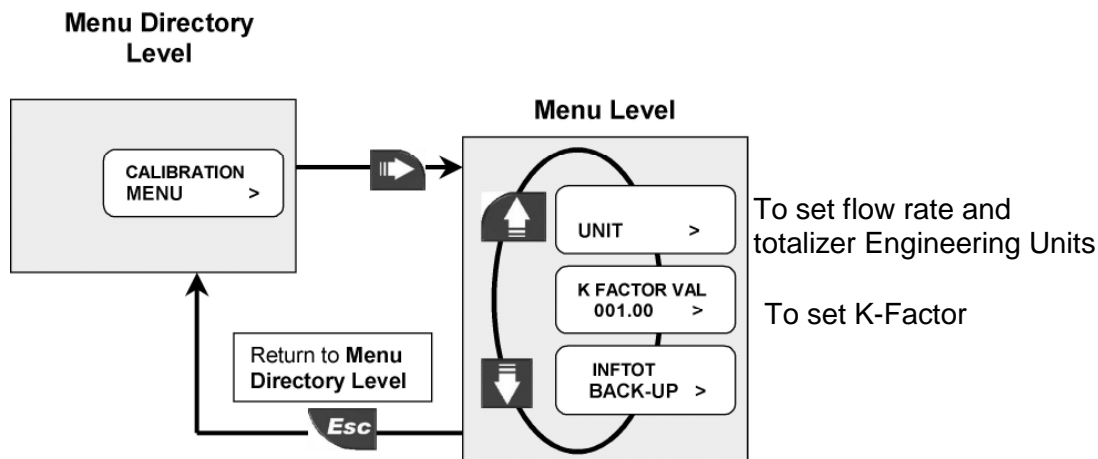
8.1.1. Unit

Set the engineering units for the instant flow rate and the total flow rate.
All the options available are displayed on the LCD.

8.1.2. K-Factor

Set the K-Factor to tell the monitor and transmitter how to convert the input frequency from the flow sensor into a flow rate. The K-factor is unique to the sensor model and to the pipe size and material.
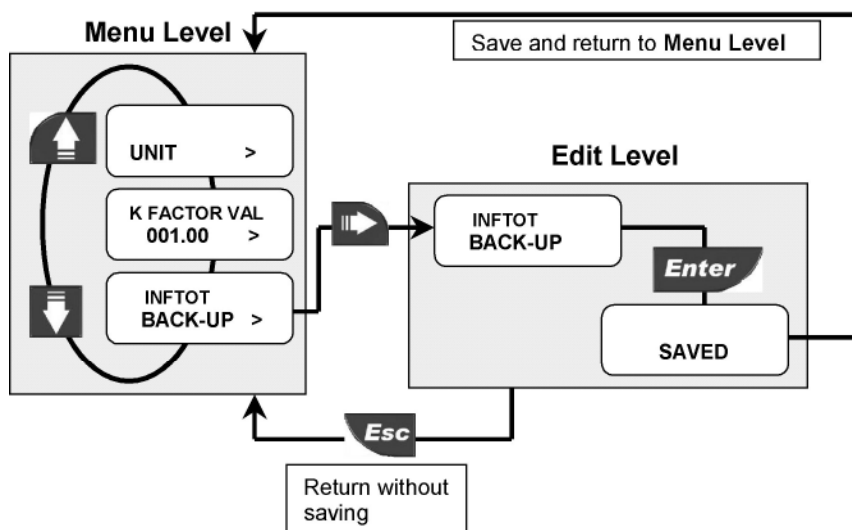Refer to Flow Sensor Instruction Manual for the correct value.
Limits: 000.01 to 99999 (the K-Factor cannot be set to 0)
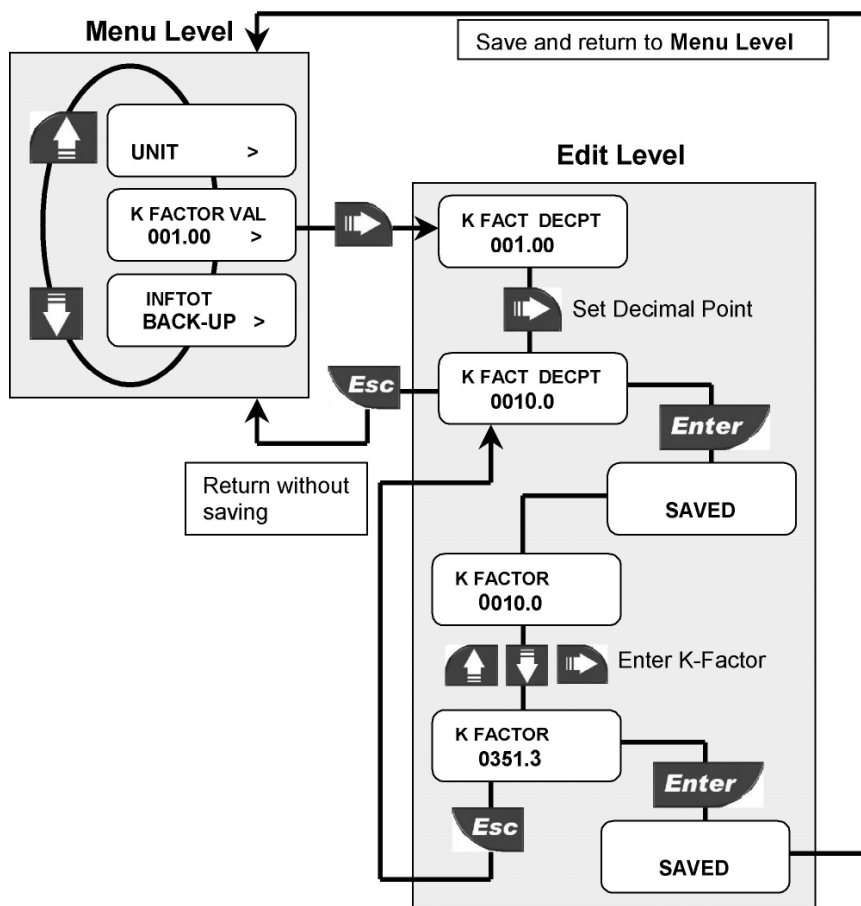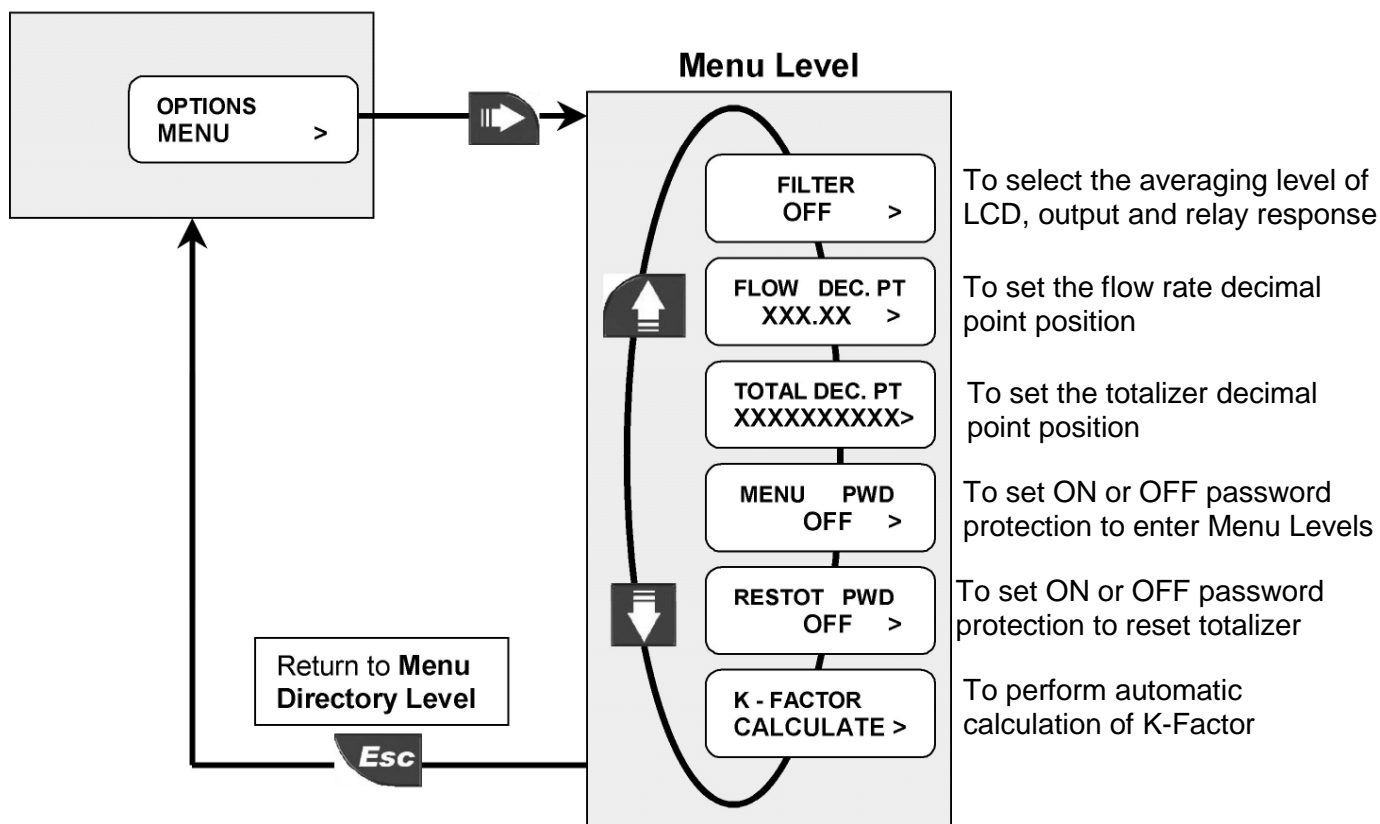

8.1.3. Inftot Backup

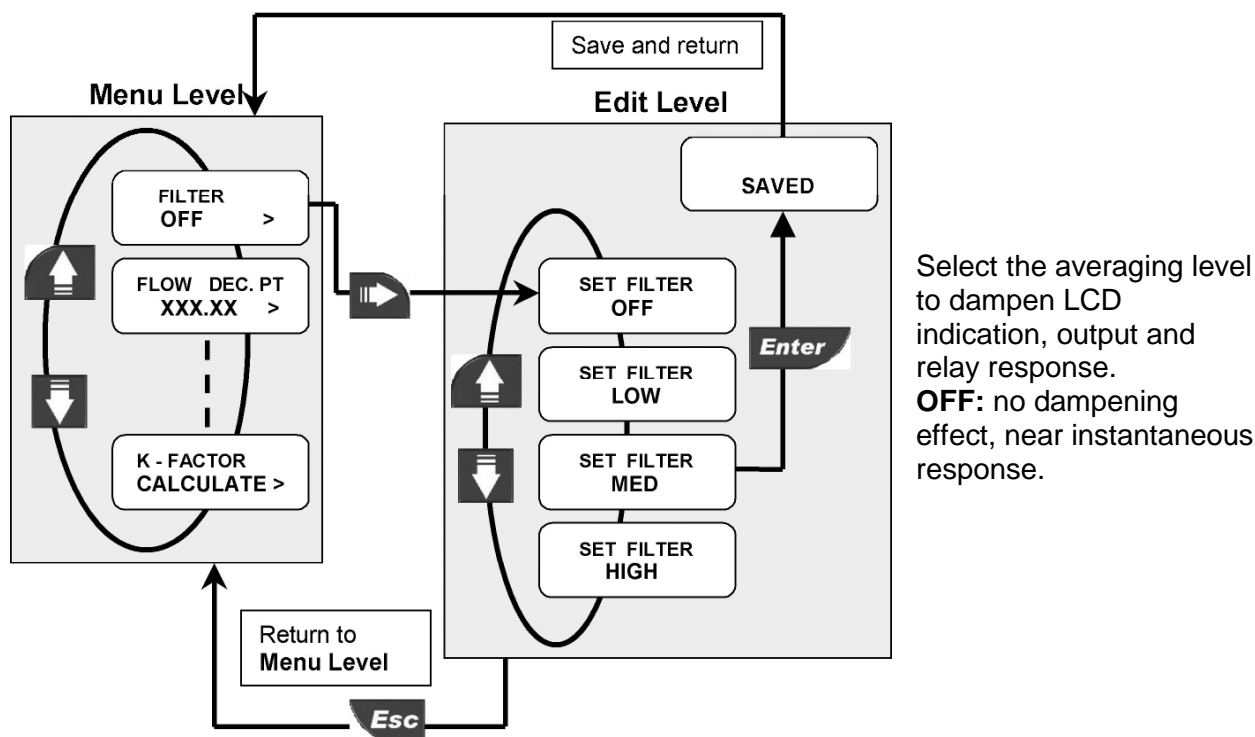The totalizer value can be stored in permanent memory whenever desired.

CAUTION

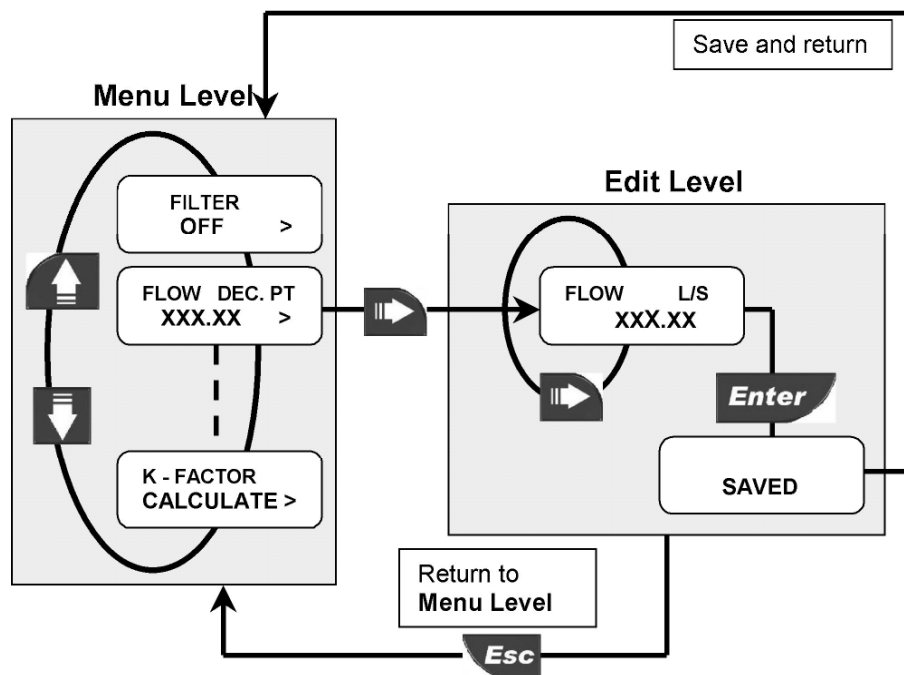**The procedure must be performed before battery replacement.**

8.2. Options Menu

Menu Directory Level


```
OPTIONS
MENU        >
```

Menu Level

```
FILTER
OFF        >
```
To select the averaging level of LCD, output and relay response

```
FLOW  DEC. PT
XXX.XX     >
```
To set the flow rate decimal point position

```
TOTAL DEC. PT
XXXXXXXXX>
```
To set the totalizer decimal point position

```
MENU     PWD
           OFF    >
```
To set ON or OFF password protection to enter Menu Levels

```
RESTOT   PWD
           OFF    >
```
To set ON or OFF password protection to reset totalizer

```
K - FACTOR
CALCULATE >
```
To perform automatic calculation of K-Factor

Return to **Menu Directory Level**

Esc

8.2.1. Filter

Save and return

Menu Level

```
FILTER
OFF        >
```

```
FLOW  DEC. PT
XXX.XX     >
```

```
K - FACTOR
CALCULATE >
```

Edit Level

```
SAVED
```

```
SET  FILTER
OFF
```

```
SET  FILTER
LOW
```

```
SET  FILTER
MED
```

```
SET  FILTER
HIGH
```

Enter

Select the averaging level to dampen LCD indication, output and relay response.
OFF: no dampening effect, near instantaneous response.

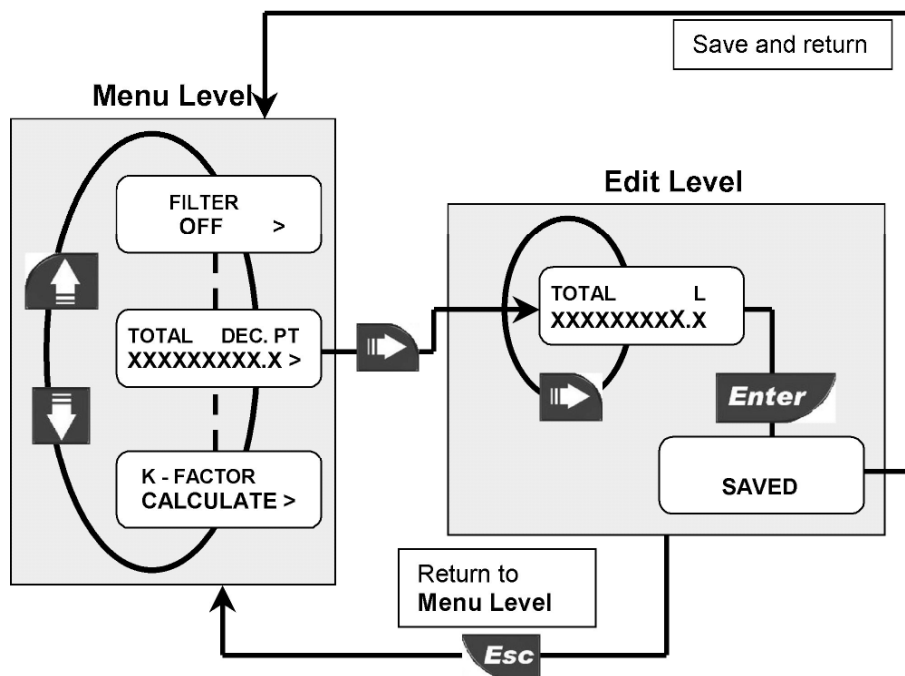Return to **Menu Level**

Esc

8.2.2. Flow Decimal Point

Set the decimal point position to get the best resolution for the application.
Select one of the following options:
X.XXXX ; **XX.XXX** ; **XXX.XX** ; **XXXX.X** ; **XXXXX.**

8.2.3. Total Decimal Point

Set the decimal point position to get the best resolution for the application.
Select one of the following options
XXXXXXXX.XX
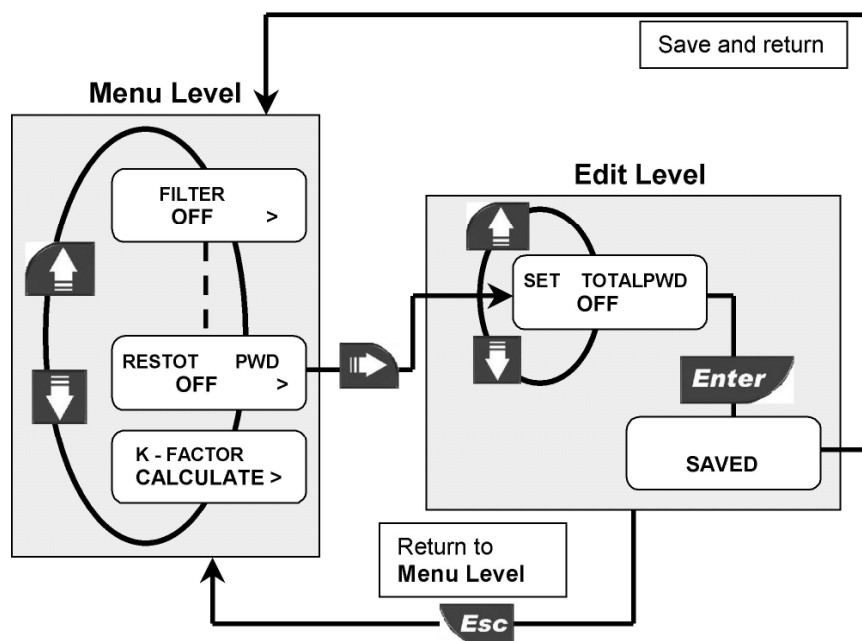**XXXXXXXXX.X**
XXXXXXXXXX.

8.2.4. Menu PWD
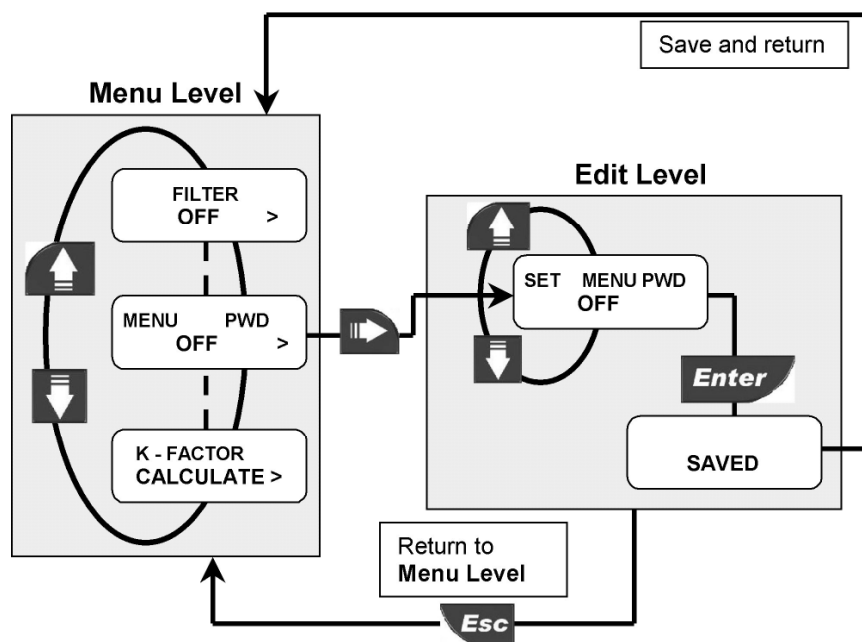
Set ON the Menu PWD to protect access to Menu Directory Level and next levels.

NOTE: the standard password is [image] and it cannot be modified.
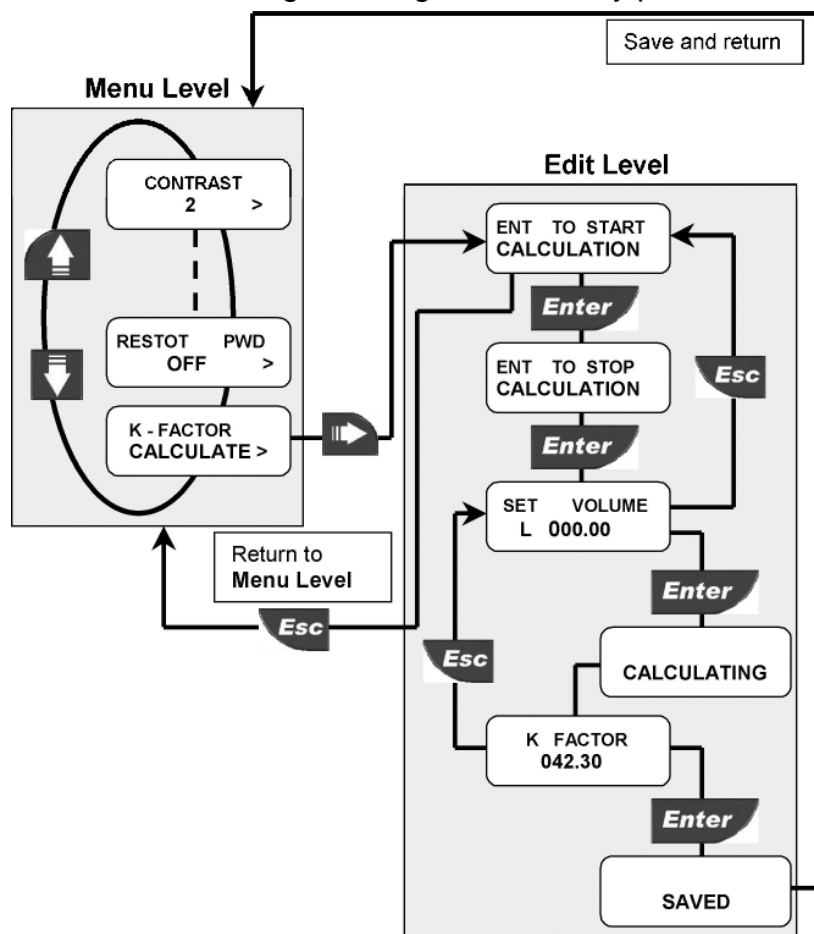
8.2.5. Restot PWD

Set ON the Restot PWD to protect the resettable totalizer from undesired reset operations.

NOTE: the standard password is [image] and it cannot be modified.

8.2.6. K-Factor Calculate

Option used to perform automatic calculation of K-Factor by measuring the volume filled into a tank. This to get the highest accuracy possible.

Press ENTER to start calculation. Switch on a pump or open a valve. F9.20 starts counting pulses from the sensor.

When the tank is full, switch off the pump or close the valve. Press ENTER to stop calculation. F9.20 stops counting pulses from the sensor.

Enter the volume (in liter) of fluid filled into the tank.

F9.20 is calculating the new K-Factor.

Successful K-Factor calculation. Press ENTER to accept new K-Factor or ESC to return without saving.

9. Troubleshooting

The instrument correctly installed is maintenance-free. The case and the front panel can be cleaned with soft cloth and an appropriate cleaning agent.

9.1. Display messages

Display	Causes	Solutions
F OVF L/H T 25114.6 m3 T 25114.6 m3 F OVF L/H FLOW L/H OVF	• Flow rate is in OVERFLOW: it exceeds the maximum display capability	• Change the flow rate engineering units
MAX FREQ ERROR	• Input frequency is too large	• Check sensor connection • If not FlowX3 sensor, verify sensor data sheet and compatibility
SET VALUE MORE THAN 0	• K-Factor cannot be set to 0 • Volume filled into the tank (during K-factor calculation procedure) cannot be set to 0	• Enter K-Factor value from 000.01 to 99999 • Enter any volume from 000.01 to 999.99
TOTAL OVF ERROR	• With the new engineering unit chosen, the totalized volume exceeds maximum display capability	• Change the totalizer engineering units
K FACTOR OUT OF RANGE	• The value calculated during the K-Factor calculation procedure is out of range	• Move decimal point position or • Check entered volume

10.Ordering Data

FlowX3 F9.20

Part No.	Description
F9.00	Battery Powered Flow Monitor

FlowX3 F9.20.P1 (Panel Mount version)

Part No.	Description
F9.20.P1	Panel Mount Battery Powered Flow Monitor

FlowX3 F9.20.WX (Wall Mount version)
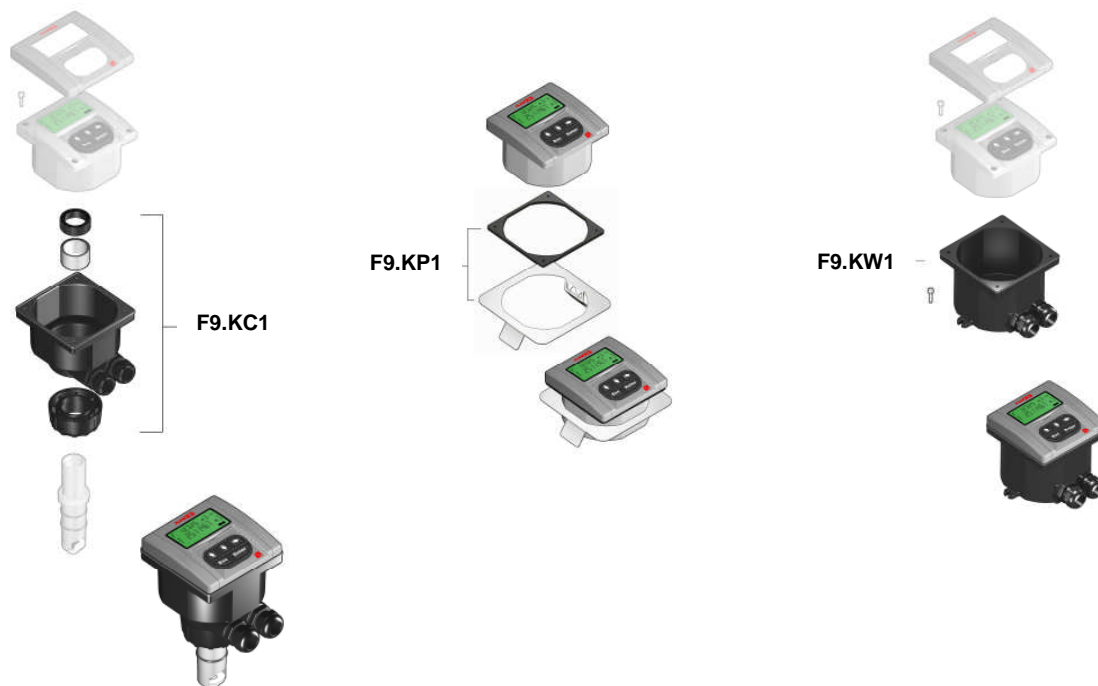
Part No.	Description
F9.20.W1	Wall Mount Battery Powered Flow Monitor

FlowX3 F9.00.XX (Compact Field Mount version)

Part No.	Description	Sensor Length	Sensor Body	Sensor O-rings
F9.00.01	Field Mount Flow Monitor & Transmitter	L0	CPVC	EPDM
F9.00.02	Field Mount Flow Monitor & Transmitter	L0	CPVC	FPM
F9.00.03	Field Mount Flow Monitor & Transmitter	L1	CPVC	EPDM
F9.00.04	Field Mount Flow Monitor & Transmitter	L1	CPVC	FPM
F9.00.05	Field Mount Flow Monitor & Transmitter	L0	PVDF	EPDM
F9.00.06	Field Mount Flow Monitor & Transmitter	L0	PVDF	FPM
F9.00.07	Field Mount Flow Monitor & Transmitter	L1	PVDF	EPDM
F9.00.08	Field Mount Flow Monitor & Transmitter	L1	PVDF	FPM
F9.00.09	Field Mount Flow Monitor & Transmitter	L0	316SS	EPDM
F9.00.10	Field Mount Flow Monitor & Transmitter	L0	316SS	FPM
F9.00.11	Field Mount Flow Monitor & Transmitter	L1	316SS	EPDM
F9.00.12	Field Mount Flow Monitor & Transmitter	L1	316SS	FPM
F9.00.13	Field Mount Flow Monitor & Transmitter	L0	BRASS	EPDM
F9.00.14	Field Mount Flow Monitor & Transmitter	L0	BRASS	FPM
F9.00.15	Field Mount Flow Monitor & Transmitter	L1	BRASS	EPDM
F9.00.16	Field Mount Flow Monitor & Transmitter	L1	BRASS	FPM

Mounting Kits

Part No.	Name	Description
F9.KC1	Compact mounting Kit	Plastic adapter with gasket, compact cap, locking ring and 4 fixing screws
F9.KP1	Panel mounting Kit	Mounting bracket with gasket
F9.KW1	Wall mounting Kit	Plastic adapter with gasket and fixing screws

F9.KC1

F9.KP1

F9.KW1

F9.20 Battery Powered Flow Monitor

Spare Parts

Item	Part No.	Name	Description
1	F9.SP3	Cover	PC front cover, no LED
2	F9.SP4.1	PG 13.5	PG13.5 Cable Gland for Compact or Wall mounting Kit
2	F9.SP4.2	PG 11	PG11 Cable Gland for Compact or Wall mounting Kit
3	F9.SP6	Replacement battery	3.6 Volt Lithium thionyl chloride battery