Installation & Operation Manual

# IFQ MONITOR

## Monitor and transmitter for RAVEN-EYE® or BELUGA™ sensor


## For firmware v1.09

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FLOW-TRONIC nv

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# 1 Specifications

Specifications are subject to change without notice.

| | |
|---|---|
| **Housing** | |
| **Dimensions** | 285 x 250 x 145 mm |
| **Weight** | 2.0 kg |
| **Enclosure** | ABS plastic (Acylonitrile-Butadine-Styrene), NEMA 4 |
| **Operating temperature** | -25 to 55 °C |
| **Storage temperature** | -30 to 65° C |
| **Operating humidity** | Max 90% r.H. ; not condensing |
| **Protection** | IP65 |
| **Power requirements** | |
| **AC** | 85-265 VAC, 47- 63 Hz, max. 25 W, incl. sensors. |
| **DC** | 9-36 VDC, max. 25 W, incl. sensors. |
| **General** | |
| **Sensor interface** | RS485 digital sensor interface for RAVEN-EYE® or BELUGA™ |
| **Display** | 144x32 pixel white-on-blue graphical display.<br>Two lines of text display scrolling between: FLOW, VELOCITY, LEVEL and TOTAL FLOW<br>Internal battery status indication. |
| **LED** | 6 status indication LEDs. |
| **Outputs** | 3x analog output 4-20 mA ; 10 bits, up to 250 Ohm load : FLOW, VELOCITY and LEVEL |
| | 2x relay output ; Rating: 6A at 30 VDC / 6A at 250 VAC : TOTAL IMPULSE and ALARM |
| **Supported sensors** | Velocity: RAVEN-EYE® or BELUGA™<br>Level: ULS-02, ULS-06; RLS-15, PLS-02 or PLS-06 |
| **Inputs** | 1x 4…20 mA analog input for level sensor (ULS-02, ULS-06 or other external level sensor) |
| **Logger (optional)** | Memory: 2 Gb<br>Type: Flash memory (SD card)<br>File format: .tsv |
| **Communication (opt.)** | Modbus RTU (slave) over RS485 communication port |
| **Setup & operation** | 7 position sealed membrane keypad |
| **Certifications** | CE, RoHs |
| **Warranty** | |
| **Warranty** | 1 year from date of shipment. |

# 2 General Information

The content of this manual is thought to be accurate. The manufacturer is not liable for direct, indirect, special, incidental or consequential damages resulting from any defect or omission in this manual, even if advised of the possibility of such damages. In the interest of continued product development, the manufacturer reserves the right to make improvements in this manual and the products it describes at any time, without notice or obligation. Revised editions are found on the manufacturer's website or can be requested contacting the manufacturer or local distributor.

## 2.1 Safety information

Please read this entire manual before unpacking, setting up or operating this equipment. Pay attention to all danger, warning and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment.
To make sure that the protection provided by this equipment is not impaired, do not use or install this equipment in any manner other than specified in this manual.

### 2.1.1 Use of hazard information

***DANGER***
*Indicates a potentially or imminently hazardous situation which, if not avoided, will result in death or serious injury.*

***WARNING***
*Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.*

***CAUTION***
*Indicates a potentially hazardous situation that may result in minor or moderate injury.*

***Important Note:*** *Indicates a situation which, if not avoided, may cause damage to the instrument. Information that requires special emphasis.*

***Notice:*** *Indicates a situation that is not related to personal injury.*

### 2.1.2 Precautionary labels

Read all labels and tags attached to the instrument. Personal injury or damage to the instrument could occur if not observed.

| | |
|---|---|
|  | This is the safety alert symbol. Obey all safety messages that follow this symbol to avoid potential injury. If on the instrument, refer to the instruction manual for operation or safety information. |
|  | Electrical equipment marked with this symbol may not be disposed of in European public disposal systems after 12 August of 2005. In conformity with European local and national regulations (EU Directive 2002/96/EC), European electrical equipment users must now return old or end-of life equipment to the Producer for disposal at no charge to the user.<br>***Note:*** *For return for recycling, please contact the equipment producer or supplier for instructions on how to return end-of-life equipment, producer-supplied electrical accessories, and all auxiliary items for proper disposal.* |

| | |
|---|---|
|  | This symbol, when noted on a product enclosure or barrier, indicates that a risk of electrical shock and/or electrocution exists. |
|  | This symbol, when noted on the product, identifies the location of the connection for Protective Earth (ground). |
|  | This symbol, when noted on the product, identifies the location of a fuse or current limiting device. |
|  | This symbol, when noted on the product, indicated the presence of devices sensitive to Electro-static Discharge (ESD) and indicated that care must be taken to prevent damage with the equipment. |

### 2.1.3 Confined space precautions

***DANGER***
Explosion hazard. Training in pre-entry testing, ventilation, entry procedures, evacuation/rescue procedures and safety work practices is necessary before entering confined spaces.

***Important Note**: The following information is provided to guide users of Flo-Dar Sensors on the dangers and risks associated with entry into confined spaces.*

On April 15, 1993, OSHA's final ruling on CFR 1910.146, Permit Required Confined Spaces, became law. This new standard directly affects more than 250,000 industrial sites in the U.S.A., and was created to protect the health and safety of workers in confined spaces.

**Definition of a confined space:**

A confined space is any location or enclosure that presents or has the immediate potential to present one or more of the following conditions:

- An atmosphere with less than 19.5% or greater than 23.5% oxygen and/or more than 10 ppm Hydrogen Sulfide ($H_2S$).
- An atmosphere that may be flammable or explosive due to gases, vapors, mists, dusts or fibers.
- Toxic materials which upon contact or inhalation, could result in injury, impairment of health or death.

Confined spaces are not designed for human occupancy. They have restricted entry and contain known or potential hazards. Examples of confined spaces include manholes, stacks, pipes, vats, switch vaults, and other similar locations.

Standard safety procedures must always be followed prior to entry into confined spaces and/or locations where hazardous gases, vapors, mists, dusts or fibers may be present. Before entering any confined space check with your employer for procedures related to confined space entry.

## 2.2 Product overview

The IFQ Monitor controls and transmits flow data from RAVEN-EYE® or BELUGA™ sensors. The IFQ Monitor becomes a powerful open-channel flow meter and data reporting system when it is used with the following components:

- RAVEN-EYE® or BELUGA™ sensor
- RTQ-Log
- ULS-02 or ULS-06 level sensor

### 2.2.1 System features

The flow meter consists of the IFQ Monitor and a sensor unit or sensor combination (sold separately).

Usual sensors connected to the IFQ Monitor are:

- RAVEN-EYE® or BELUGA™ sensors
- Level sensors (radar, ultrasonic, hydrostatic pressure)

The 4-20 mA outputs provide a convenient way to transfer real-time flow data to SCADA and other data collection systems, control systems and display devices. Optionally, the IFQ Monitor can be equipped with Modbus RTU (slave) communication port to transfer all data digitally.

The display shows simultaneously two lines of data scrolling automatically between: VELOCITY, LEVEL, FLOW and TOTAL FLOW.

### 2.2.2 Applications

- Perform inflow & infiltration (I&I) studies
- Billing purposes
- Sewer or channel flow monitorung
- Discharge monitoring
- Capacity studies
- Monitor the industrial flow from factories
- High velocity flows
- Process control
- Wastewater treatment plant balancing, inflow or outflow
- Storm water monitoring & compliance
- Modeling & sewer evaluation studies
- Combined sewer overflow (CSO) monitoring

## 2.3 Unpack the instrument

Remove the IFQ Monitor from the shipping carton. Inspect for any visible damage. If an item is missing or damaged, contact your direct representative or Flow-Tronic S.A.

## 2.4 Front panel

Refer to Figure 1 for the IFQ Monitor panel features

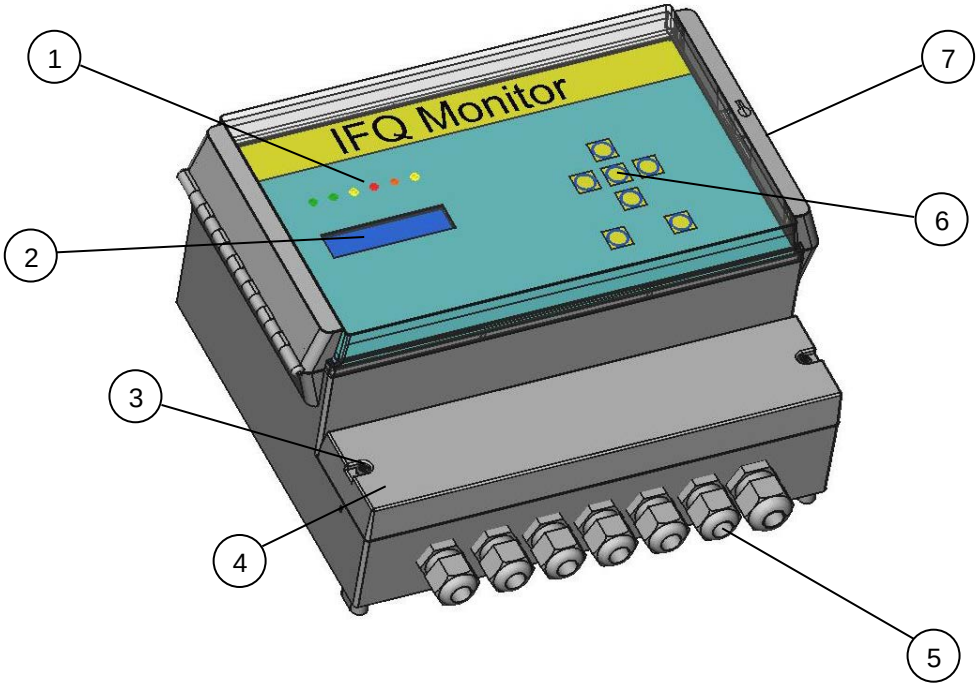



Figure 1: IFQ Monitor features

| | | | |
|---|---|---|---|
| **1** | LEDs | **5** | Cable glands |
| **2** | Display | **6** | Navigation keys |
| **3** | Cover attachment screw | **7** | Side channel cover access |
| **4** | Bottom cover | | |

## 2.5 Product identification


Figure 2: Identification label

| | | | |
|---|---|---|---|
| **1** | Serial Number | **2** | Model |

# 3 Installation

## 3.1 Mount the Instrument

***DANGER***
*Potential confined space hazards. The monitor is not suitable for manholeinstallations.*

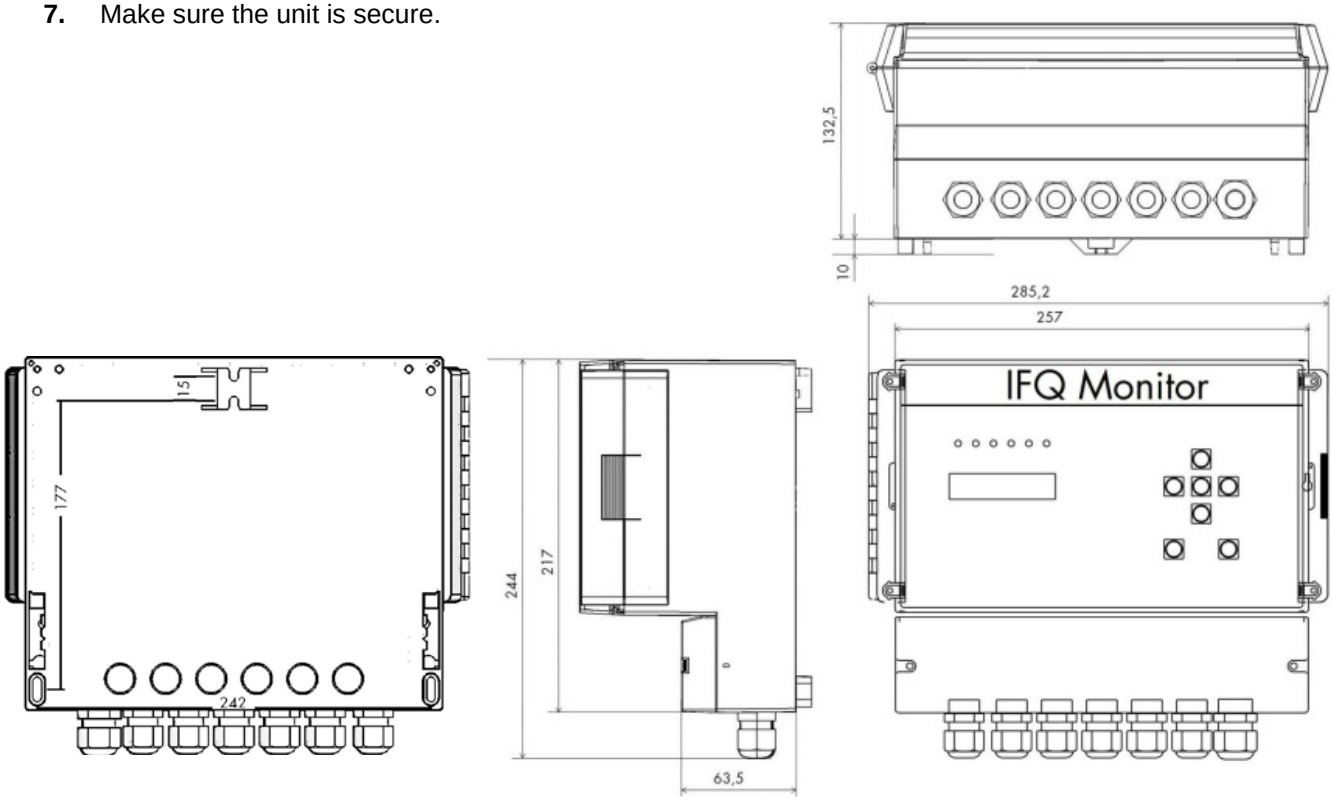
***DANGER***
*Only qualified personnel should conduct the tasks described in this section of the manual.*

***Important Note**: Do not mount the monitor in locations that receive direct exposure to sunlight or rain.*

Install the IFQ Monitor on a flat surface indoors or in an environmental enclosure or protective covering outdoors.

1. Position the unit on the mounting surface. Make sure the unit is approximately at eye-level with the cable entry side facing downward.
2. Mark the position of the screw holding the top of the IFQ Monitor. This position should be the middle of the horizontal position of the IFQ Monitor and 25 mm under the top of the IFQ Monitor.
3. Drill the appropriate-sized hole at the marked location and use 1 screw to support the monitor. Choose a fastener that is suitable for the mounting surface (concrete, wood, metal, etc.). Let the screw emerge from 5 to 10 mm.
4. Position the unit on the screw and assure that it is not screwed too much or not enough to support correctly the monitor.
5. Remove the bottom cover (Figure 1 on page - 7 -), mark the mounting holes positions and drill the appropriate-sized holes at the marked locations.
6. Use 2 screws or bolts to attach the monitor to the surface. Choose a fastener that is suitable for the mounting surface (concrete, wood, metal, etc.).

   ***Note**: The clearance through the mounting holes is 5 mm.*
7. Make sure the unit is secure.



## 3.2 Electrical connections

***DANGER***
*Electrocution hazard. Always disconnect power to the instrument when making any electrical connections.*

When making any wiring connections to the instrument, the following warnings and notes must be adhered to, as well as any warnings and notes found throughout the individual installation sections. For more safety information refer to section 2.1 on page - 4 -.

Special care has to be taken to avoid the influence of any magnetic or electric fields near the device. In order to prevent malfunctions or damages to the device, only original parts have to be used.

***Important Note**: Never connect an analogue I/O to a digital I/O!*

***Important Note**: Repairs and adaptations have to be done by the manufacturer.*

### 3.2.1 Electrostatic Discharge (ESD) considerations

***NOTICE***
*To minimize hazards and ESD risks, maintenance procedures not requiring power to the analyzer should be performed with power disconnected.*

Delicate internal electronic components can be damaged by static electricity, resulting in degraded instrument performance or eventual failure.

Flow-Tronic S.A. recommends taking the following steps to prevent ESD damage to your instrument:

- Before touching any instrument electronic components (such as printed circuit cards and the components on them) discharge static electricity from your body. This can be accomplished by touching an earth-grounded metal surface such as the chassis of an instrument or a metal conduit or pipe.
- To reduce static build-up, avoid excessive movement. Transport static-sensitive components in anti-static containers or packaging.
- To discharge static electricity from your body and keep it discharged, wear a wrist strap connected by a wire to earth ground.
- Handle all static-sensitive components in a static-safe area. If possible, use anti-static floor and work bench pads.

### 3.2.2 Wiring of power

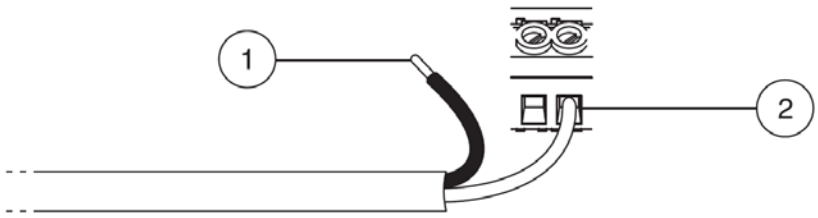
***DANGER***
*Hazardous supply voltage can shock or cause death.*

***WARNING***
*Disconnect power before making connections.*

***WARNING***
*The AC and DC units have different components. Do not connect AC power to a DC monitor and vice versa.*

#### 3.2.2.1 AC power

1. Remove the bottom cover (Figure 1 on page - 7 -).
2. Insert the power cable through the cable gland in the bottom of the enclosure.
3. Properly prepare each wire (
4. Figure 3 on page - 11 -).
5. Install the ground wire into the AC power terminal (Figure 4 on page - 11 -). Tighten the wire and then tug gently to make sure the connection is tight.
6. Install the neutral and line wires into the AC power terminal as described in
7. Table 1. Tighten each wire and then tug gently to make sure the connection is tight.
8. Tighten the cable gland to secure the cord.
9. Seal any unused openings in the enclosure with cable gland plugs.
10. Install the bottom cover.




| | | | |
|---|---|---|---|
| **1** | Strip 1 cm of insulation. | **2** | Seat insulation against connector with no bare wire exposed. |

Figure 3: Wiring preparation and insertion

Figure 4: AC power wiring

| Terminal Wiring | Connector N° | Wire color |
|---|---|---|
| Hot | A | Brown |
| Neutral | B | Blue |
| Protective Earth (PE) | C | Green with yellow tracer |

Table 1: AC Wiring information

Once the power cable is connected to a power source, a status LED indicates if the IFQ Monitor is powered.

### 3.2.2.2 DC power

1. Remove the bottom cover (Figure 1 on page - 7 -).
2. Insert the power cable through the cable gland in the bottom of the enclosure.
3. Properly prepare each wire (
4. Figure 3 on page - 11 -).
5. Install the ground wire or cable braid to the protective earth terminal. Tighten the wire and then tug gently to make sure the connection is tight. Refer to
6. Table 2 below for wiring.
7. Install the negative wire (black or blue) first and then the positive (red) wire into the power terminal. Tighten each wire and then tug gently to make sure the connection is tight. Refer to
8. Table 2 below for wiring.
9. Tighten the cable gland to secure the cord.
10. Seal any unused openings in the enclosure with cable gland plugs.
11. Install the bottom cover.

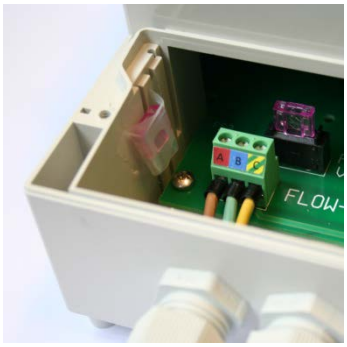


Figure 5: DC power wiring

| Terminal Wiring | Connector N° | Wire color |
|---|---|---|
| Positive | A | Red |
| Negative | B | Black or Blue |
| Protective Earth (PE) | C | Green with yellow tracer |

Table 2: DC Wiring information

### 3.2.3 Wiring

***DANGER***
*Potential confined space hazards. If conduit is installed from the IFQ Monitor to the sensor, the conduit must be sealed to keep sewer gases out of the electronics.*

The connection chamber is used for the RAVEN-EYE® or BELUGA™, other sensors connections and all connections from the IFQ Monitor to other systems (digital outputs & analog outputs).

**Procedure**

1. Disconnect power to the IFQ Monitor.
2. Screw off the cover attachement screws (Figure 1 on page - 7 -) in order to access the connection chamber.
3. Insert the cable(s) through the cable glands (Figure 1 on page - 7 -).
4. Install each wire into the terminal block (Figure 6 on page - 13 -) using Table 3 on page - 13 - and as a reference for cable connections. Tighten each wire and then tug gently to make sure the connection is tight.
5. Tighten the cable gland where the cable(s) go through.
6. Install the connection chamber cover and screw the cover attachement screws back in.

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| | | Purpose | | | Purpose |
|---|---|---|---|---|---|
| 1 | V+ | RAVEN-EYE | 25 | | **GND[1]** |
| 2 | V- | | 26 | | **0 V** |
| 3 | RS485- | | 27 | C[2] | **Contact Output: Alarm** |
| 4 | RS485+ | | 28 | NC[3] | |
| 5 | GND[1] | | 29 | C[2] | **Contact Output: Totalizer** |
| 6 | + | **ULS-02, ULS-06 or other level sensor** | 30 | NO[4] | |
| 7 | - | | 31 | + | **Analogic Output: Velocity** |
| 8 | GND[1] | | 32 | - | |
| 9 | + | **Analogic Output: Level** | 33 | + | **Analogic Output: Flow** |
| 10 | - | | 34 | - | |

Table 3: Wiring map

***Note:*** *Each terminal is labeled (+, -) for polarity. This is the voltage polarity when a load resistance is placed across the terminals.*

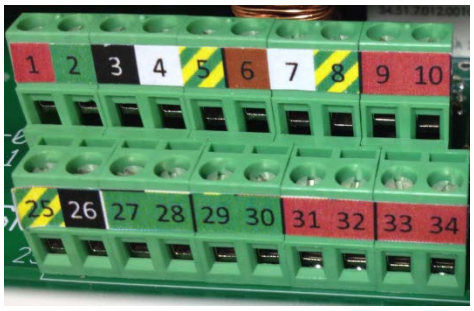


Figure 6: Connection chamber

[1] GDN = Ground
[2] C = Common Terminal
[3] NC = Normally Closed
[4] NO = Normally Open

### 3.2.3.1 RAVEN-EYE® or BELUGA™ sensor cable connections

1. Disconnect power to the IFQ Monitor.
2. Screw off the cover attachement screws (Figure 1 on page - 7 -) in order to access the connection chamber.
3. Insert the cable(s) through the cable glands (Figure 1 on page - 7 -).
4. Install each wire into the terminal block (Figure 6) :
    a. Connect the ground cable to terminal N° 5.
    b. Connect the negative supply (terminal N° 2) and then the positive supply (terminal N°1).
    c. Connect the RS485 cables in terminal N° 3 for the black cable and N° 4 for the white cable.
5. Tighten each wire and then tug gently to make sure the connection is tight.
6. Tighten the cable gland where the sensor cable goes through.
7. Install the connection chamber cover and screw the cover attachement screws back in.

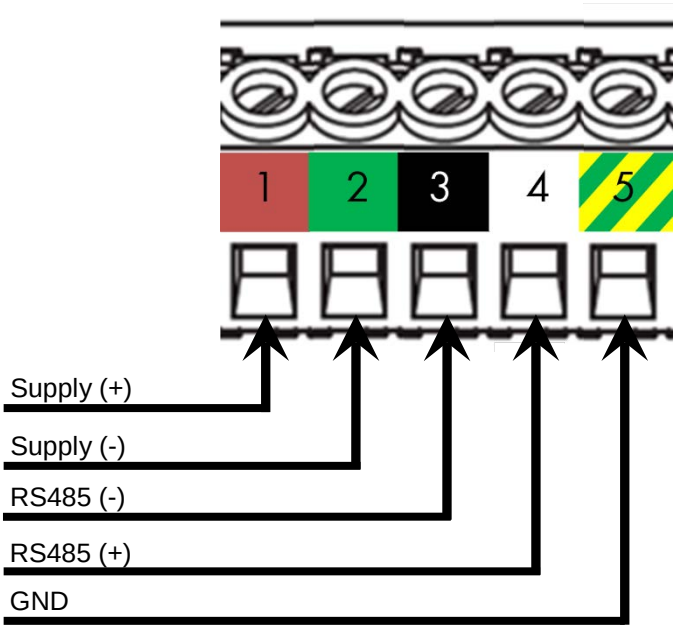


Figure 7: Connections for RAVEN-EYE®

### 3.2.3.2 ULS (or other level sensor) cable connections

1. Disconnect power to the IFQ Monitor.
2. Screw off the cover attachement screws (Figure 1 on page - 7 -) in order to access the connection chamber.
3. Insert the cable(s) through the cable gland (Figure 1 on page - 7 -).
4. Install each wire into the terminal block (Figure 8) :
    a. If available connect the ground cable in terminal N° 8.
    b. Connect the brown cable in terminal N° 6 and the white cable in terminal N° 7.
5. Tighten each wire and then tug gently to make sure the connection is tight.
6. Tighten the cable gland where the cable goes through.
7. Install the connection chamber cover and screw the cover attachement screws back in.

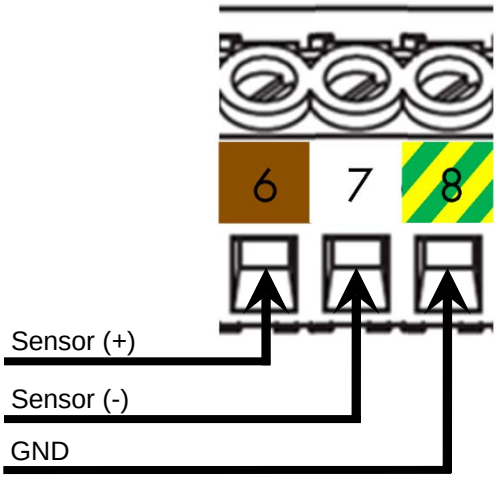


Figure 8: Connections for ULS-02, ULS-06 or other level sensor

### 3.2.3.3 4-20 mA output connections

***Important Note:*** *The maximum load is 250Ω.*

1. Disconnect power to the IFQ Monitor.
2. Screw off the cover attachement screws (Figure 1 on page - 7 -) in order to access the connection chamber.
3. Insert the cable(s) through the cable glands (Figure 1 on page - 7 -).
4. Install each wire into the terminal block as shown in Figure 9.

   ***Note:*** *Each terminal is labeled (+, -) for polarity. This is the voltage polarity when a load resistance is placed across the terminals.*
5. Tighten each wire and then tug gently to make sure the connection is tight.
6. Tighten the cable gland(s) where the cable(s) go(es) through.
7. Install the connection chamber cover and screw the cover attachement screws back in.

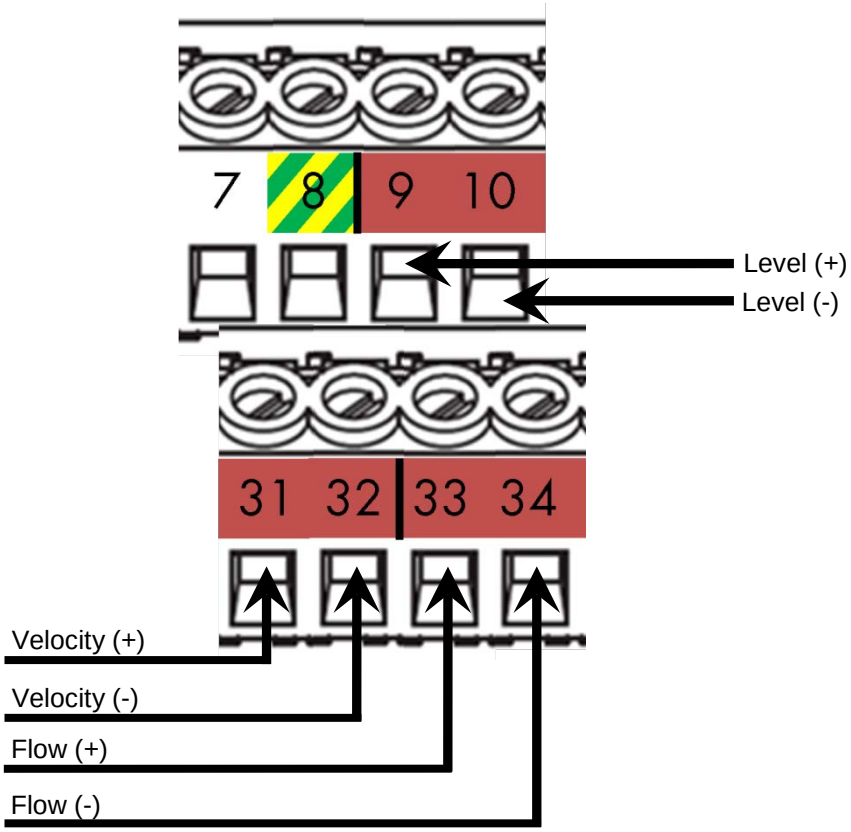


Figure 9: Connections for 4-20 mA outputs

### 3.2.3.4 Contact output connections

***Important Note:*** *The maximum current allowed through the contact is 6A.*

1. Disconnect power from the IFQ Monitor.
2. Screw off the cover attachement screws (Figure 1 on page - 7 -) in order to access the connection chamber.
3. Insert the cable(s) through the cable glands (Figure 1 on page - 7 -).
4. Install each wire into the terminal block (Figure 10)

   ***Note:*** *The alarm is Normaly Closed (NC). It means that the contact is closed (terminal N° 27 is linked to connection 28) when the device is not supplied.*
5. Tighten each wire and then tug gently to make sure the connection is tight.
6. Tighten the cable gland(s) where the cable(s) go(es) through.
7. Install the connection chamber cover and screw the cover attachement screws back in.

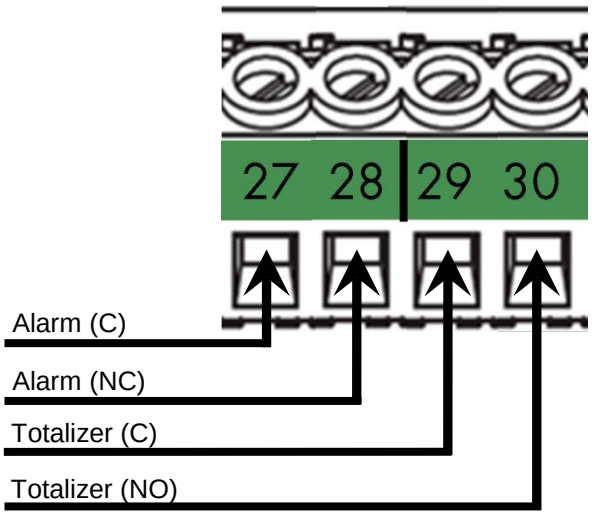


Figure 10: Connections for contact output

### 3.2.3.5 Modbus RTU output cable connections

1. Disconnect power to the IFQ Monitor.
2. Screw off the cover attachement screws (Figure 1 on page - 7 -) in order to access the connection chamber.
3. Insert the cable(s) through the cable gland (Figure 1 on page - 7 -).
4. Install each wire into the terminal block (Figure 11) :
    a. If available connect the ground cable in terminal N° 39.
    b. Connect the RS485- in terminal N° 37 and the RS485+ in terminal N° 38.
5. Tighten each wire and then tug gently to make sure the connection is tight.
6. Tighten the cable gland where the cable goes through.
7. Install the connection chamber cover and screw the cover attachement screws back in.

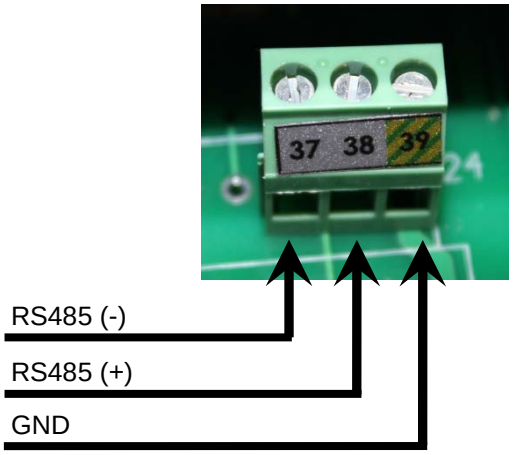


Figure 11: Connections for Modbus RTU (slave) output

### 3.2.3.6 Modbus RTU output parameters

The IFQ Monitor is the **slave** device.

The serial communication has the following characteristics:

- Communication (COM PORT): RS485
- Protocol: MODBUS RTU
- Baud rate: 19200 bauds
- Number of bits: 8
- Parity: None
- Number of stop bits: 1

The IFQ Monitor uses the following MODBUS functions:

- 03 “Read holding registers”

Used data types:

- Signed16 16 Bit signed integer
- Unsigned16 16 Bit unsigned integer
- Float32 32 Bit Floating Point

Word Order HI-LO = Hi Byte on lower register address

#### 3.2.3.7 Measurement data „read only“

| Address | Mode | Length | Type | Unit | Description | Comment |
|---|---|---|---|---|---|---|
| **1000** | R | 2 | float32 | m/s | Velocity vQP | Velocity considering the quality parameters |
| **1002** | R | 2 | float32 | m/s | Velocity vQPMF | Velocity considering the quality parameters and the median filter |
| **1004** | R | 2 | float32 | m/s | Velocity vAVG | Average velocity |
| **1006** | R | 2 | float32 | m/s | Velocity vRAW | Raw surface velocity |
| **1008** | R | 1 | unsigned16 | | Sensor identification | =0x0001 (RAVEN-EYE)<br>=0x0014 (BELUGA 20°)<br>=0x002D (BELUGA 45°) |
| **1009** | R | 1 | signed16 | | VSN | Quality parameter (Velocity Spectrum Number) |
| **1010** | R | 2 | float32 | | SNR | Quality parameter (Signal to Noise Ratio) |
| **1012** | R | 1 | signed16 | | AGC | Quality parameter (Automatic Gain Control) |
| **1013** | R | 1 | signed16 | | NOT | Quality parameter (Number Of Trials) |
| **1014** | R | 2 | float32 | °C | Temperature | Internal temperature of the sensor |
| **1016** | R | 2 | float32 | % | Humidity | Internal humidity of the sensor |
| **1018** | R | 2 | float32 | Bar | Pressure | Internal pressure of the sensor |
| **1020** | R | 2 | float32 | | Standard deviation (σ) | Quality parameter |
| **1022** | R | 2 | float32 | | Amplitude (A) | Quality parameter |
| **1024** | R | 2 | float32 | m | Level (h) | |
| **1026** | R | 2 | float32 | l/s | Flow rate (Q) | |
| **1028** | R | 1 | unsigned16 | | Status | |

Table 4: Registers to be read

## 3.3 Connect the power source

***DANGER***
*Electrocution hazard. Hazardous supply voltage can shock or cause death. Do not connect AC power to a DC Monitor.*

1. Check all connections.
2. Screw back the bottom panel cover.
3. Tighten screws on cover.
4. Connect the power source.

## 3.4 Record the installation measurements

1. Document the site specific data (location, site ID and description).
2. Enter the installation date.
3. Record the serial numbers of the monitor and sensor.
4. Record pipe inside dimension (ID) number.
5. Record the level offset or level calibration as appropriate. Refer to the sensor manual for the installed sensor.
6. Record the sediment level if applicable.

# 4 Operation

The IFQ Monitor does not connect to any laptop or computer. All changes in settings are made with the navigation keys (Figure 1 on page - 7 -).

The site and velocity sensor configuration are made using RTQ-Log software and connecting the sensor directly to the computer.

## 4.1 Configuration of velocity sensor

### 1.1.1 Configuration with RTQ-Log for IFQ MONITOR or PLC

Use the RAV-4001 communication cable to connect sensors equipped with open end cables to a computer. The adaptor from the RAV-4001 diposes of 4 quick connect terminals.

1. Connect the black and white cables from the sensor to the terminal of the RAV-4001.
2. Connect the red and green cables from the sensor to the terminal of the RAV-4001.
3. Connect the USB connector from the RAV-4001 to the computer and launch RTQ-Log.

***Note:*** *When connected via USB communication cable (RAV-4001), the sensor does not need to be connected to a separate power supply as the power coming from the computer is sufficient.*

Figure 12: RAV-4001 USB communication cable for open end cables

Refer to the setup & operation manual from the velocity sensor for further information.

## 4.2 Open/Remove the protective cover

In order to remove the protective cover, deblock the security if it's in place, open the closure on the right side and lift up the top cover window.

***Important Note***: *Always close the protective cover during operation in order to protect the display from any damage or environmental conditions.*

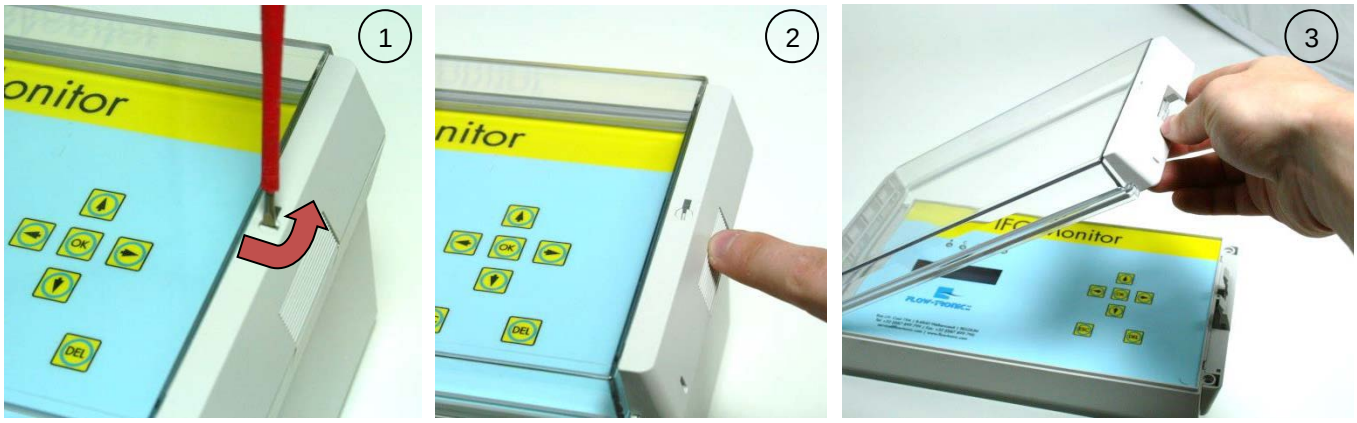


Figure 13: Open protective cover

## 4.3 Main screen

When powering on the IFQ Monitor, some information about the device and the firmware is shown: serial number followed by the firmware version. You will then be directly forwarded to the “Main Screen”.

Lift up the top cover window in order to use the navigation keys. Refer to section 4.2 on page - 21 -.

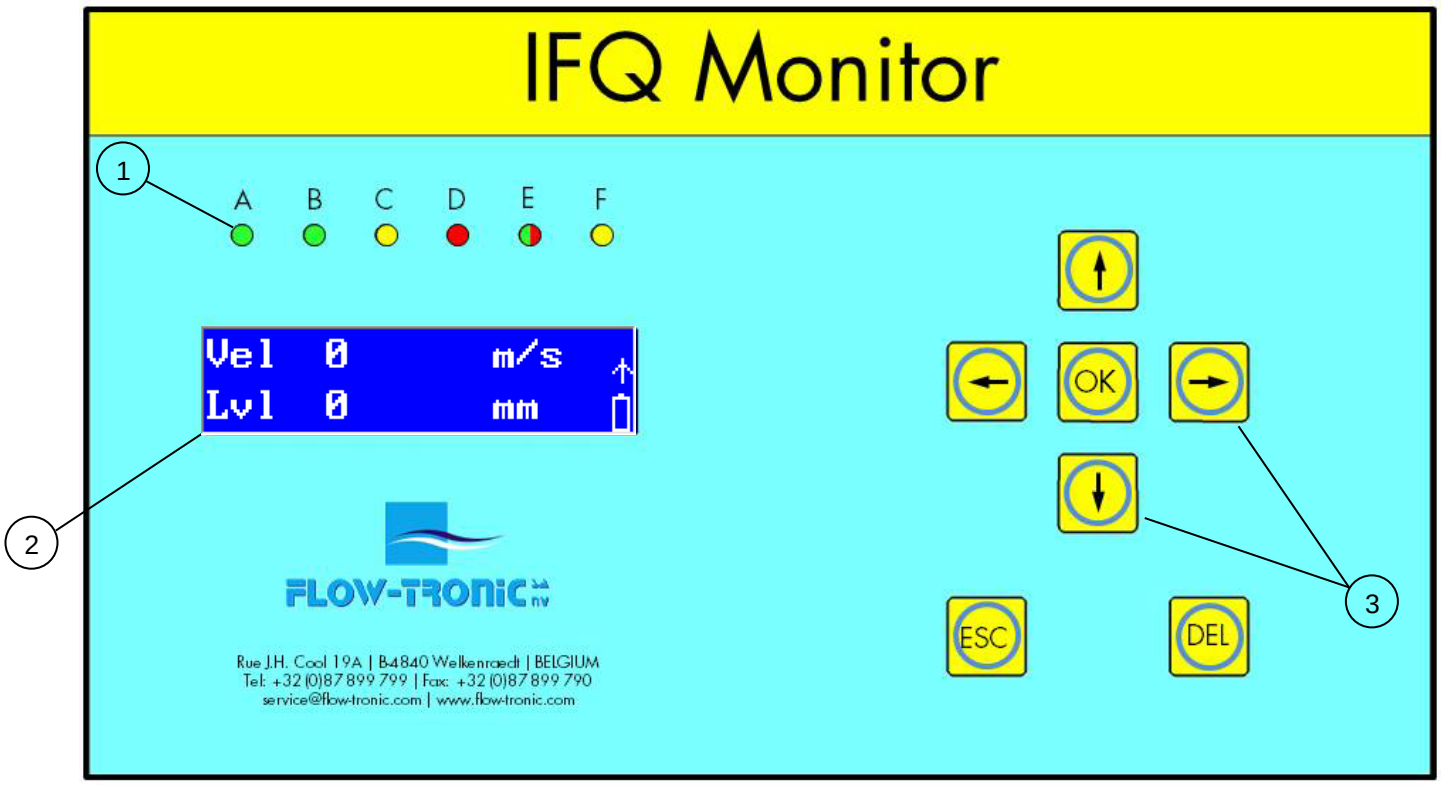


Figure 14: Main screen

| | | | |
|---|---|---|---|
| **1** | Status LEDs | **3** | Navigation keys |
| **2** | Result screens | | |

- For detailed information about the *status LEDs* refer to section 4.3.2 on page - 23 -.
- For detailed information about the *result screens* refer to the section 4.3.1 on page - 23 -.
- The *navigation keys* are explained for each kind of menu in the sections 5.2.1 and 5.1.

### 4.3.1 Result screens

The result screen display 4 different values. The display automatically scrolls down to show the 4 values. The unit of the 4 values can be configured in the “Main menu” choosing “Units”. For further information, please refer to section 5.2.3 on page - 30 -.

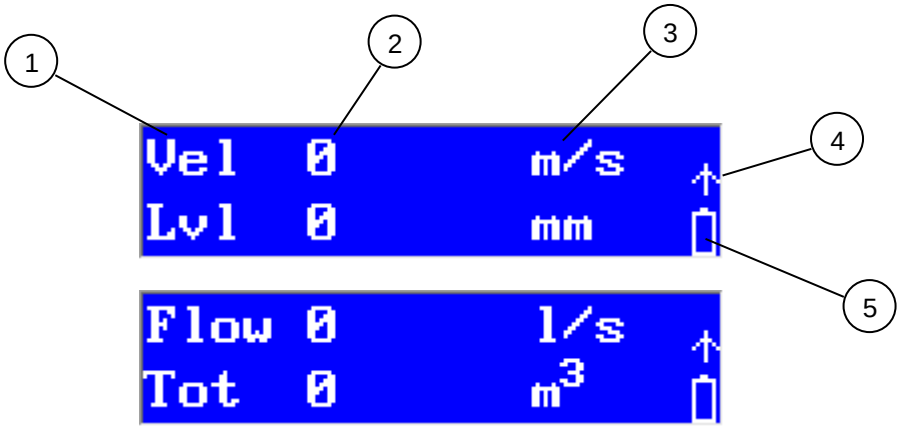


Figure 15: Result screens

| | | | |
|---|---|---|---|
| **1** | Name of value | **4** | SIM/GPRS Information (not implemented yet) |
| **2** | Value | **5** | Internal Battery Level |
| **3** | Unit (configurable) | | |

#### 4.3.1.1 “M” indication

The IFQ Monitor can display a maximum of 7 characters. In order to have a better view, 6 characters are used for numbers and one is a space between the numbers and the units.

If the value that needs to be displayed needs more than 6 characters, the IFQ adds a “k”, “M” or “G” behind the numbers. “k” means kilo (only for a values between -999999 and -100000, “M” means Mega and “G” means Giga.

So if the value displayed is 1.062M m³ is effectively 1.062 Mega cubic meters = 1.062.000 m³

The maximum amount that can be displayed is 2.000.000.000 m³

### 4.3.2 Status LEDs

In general :

- The green LED A is used for the RAVEN-EYE® or BELUGA® and linked to the flow measured.
- The green LED B is not used (always off).
- The yellow LED C is used for the logger function.
- The red LED D is used for the alarm, combined with another LED, the alarms can be distinguished.
- The green and red LED E is used for the firmware itself and the internal battery.
- The yellow LED F is not used (always off).

#### 4.3.2.1 LED A (green)

| Pattern | Description |
|---|---|
| OFF | The velocity sensor doesn't reply |
| ON | The "flow" is less or equal to zero |
| Flickering with LED D | Alarm generated by the velocity sensor. The reason may be one of the following:<br>▪ Internal temperature of sensor is bigger than 50°C<br>▪ RAVEN-EYE sensor is not sealed anymore |
| Flashes 1s ON/1s OFF | The "flow" is positive and less than the limit of the contact totalizer output |
| Flashes 100ms ON/200ms OFF | The "flow" is positive and bigger than the limit of the contact totalizer output. The contact output is closed continously. The external device counting the pulses will get incorrect information. |

#### 4.3.2.2 LED C (yellow)

| Pattern | Description |
|---|---|
| OFF | The SD-Card is present and can be ejected. |
| Flickering quickly | The SD-Card is used by the Firmware. Do **not eject** the SD-Card. |
| Flickering with LED D | The SD-Card is not detected. |

#### 4.3.2.3 LED D (red)

| Pattern | Description |
|---|---|
| ON and LED A : OFF | The velocity sensor doesn't reply. |
| ON | Error occurs with the level sensor. |
| Flickering with LED A | Alarm generated by the velocity sensor. The reason may be one of the following:<br>▪ Internal temperature of sensor is bigger than 50°C<br>▪ RAVEN-EYE sensor is not sealed anymore |
| Flickering | At least one analog output is out of range. |
| Flashes 100ms ON/200ms OFF with LED A | The "flow" is positive and bigger than the limit of contact totalizer output. The contact output is closed continuesly. The external device counting the pulses will get incorrect information. |
| OFF | No error |

#### 4.3.2.4 LED E (green and red)

| Pattern | Description |
|---|---|
| Flickering green | The IFQ Monitor is initializing. |
| Flashes 500ms ON/ 500ms OFF | The IFQ Monitor is running. |
| Flashes 1.5s ON/ 500ms OFF | The IFQ Monitor is running and the internal battery is charging. |
| Flickering red | The firmware has produced an error. |

### 4.3.3 Alarm messages

Alarms generated by the flow system will also be displayed on the “Main screen”. To acknowledge the alarm press OK. If the alarm stays on, the alarm message will be displayed again after 30 seconds.

## 4.4 Logger (option)

The IFQ Monitor can optionally be equipped with a logger function to record measured data and alarms on a non-volatile memory SD card. Flow-Tronic tested different brands of SD card with a capacity of 2 Gb to 32 Gb. Compatible SD cards can be purchased from your local Flow-Tronic representative.

The data is stored as .tsv (tab separated values) files on the memory card (one file per month for ease of data treatment).

***Note:*** *A memory of 2 Gb will store up to 13 years of data at a 1 minutes logging interval.*

***Important Note***: *Use memory cards purchased from Flow-Tronic only. Other manufacturer’s cards or cards with other capacities may lead to partial or complete loss of data.*

Additionally, the IFQ Monitor stores alarms or occurred errors in separate file called “IFQ_LOG” (see Figure 16). This file indicates power failures, data values exceeding set ranges, etc.

Files stored on the SD card can be opened as a spreadsheet in Windows Excel.

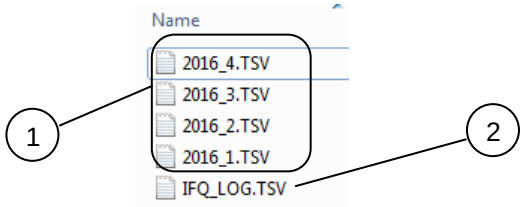


Figure 16: Data files

| | | | |
|---|---|---|---|
| **1** | Data files | **2** | Alarm & error log file |

***Note:*** *The decimal separator (comma or point) can be selected in the “Language” menu (refer to section 5.2.7 on page - 32 -)*

### 4.4.1 Installing a SD card

***WARNING***
*Do not remove SD card from IFQ Monitor when LED C is flickering. Doing so may result in total data loss and complete destruction of the SD card.*

1. Screw off the cover attachement screws (Figure 1 on page - 7 -) in order to access the connection chamber.
2. Insert the SD card (contacts facing downwards) the SD card slot show on Figure 17.
3. Make sure the SD card is inserted correctly (push-push system) and tightly. A small “click” will assure proper fitting.

***Note:*** *The SD card can be inserted in one way only, incorrect plugging is going to be avoided due to mechnaichal construction of the slot. Do not apply any force to insert card. If the card doesn’t fit properly, rotate the card and find the right positioning.*

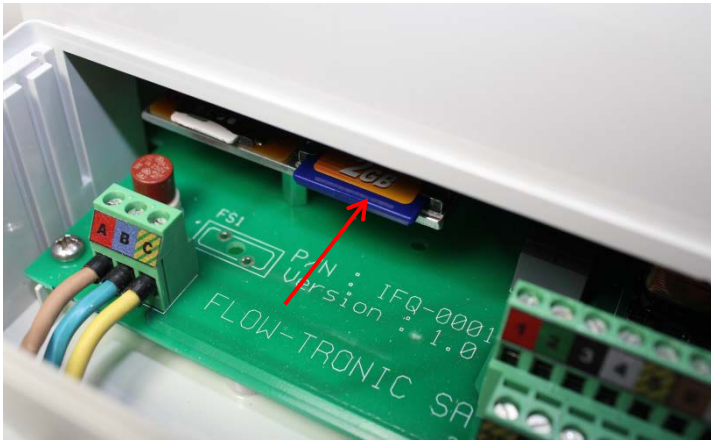


Figure 17: SD card slot

To remove the SD card, push on the card and the slot will release it.

***Important Note***: *Do not remove SD card from IFQ Monitor when LED C is flickering. Doing so may result in total data loss and destruction of the SD card.*

# 5 Settings

## 5.1 General settings

There are 2 common ways used by the IFQ Monitor's menu to set the configuration : Preselected values and numerical values.

### 5.1.1 Preselected values

To set a preselected value :

- Use the arrows ↑ & ↓ to scroll through the different propositions.
- Use the arrows ← or key OK to select the current value. A "√" is displayed 2 seconds to confirm that the current value has been saved.
- Use the left arrow ← or key ESC to cancel.

A "√" is showed before the value that is currently selected.

### 5.1.2 Numerical values

To set a numerical value :

- Use the arrows ↑ & ↓ to increase or decrease the number underlined.
- Use the arrows ← & ← to switch the underlined number.
- Press OK to validate the current value. A "√" is displayed 2 seconds to confirm that the current value has been saved.
- Press ESC to cancel the modification of the the current value. An "X" is displayed 2 seconds to confirm that the current value has not been saved and the previous value is kept.
- Use the key DEL to reset the value with the factory settings.

***Note:*** *The value cannot be set at a value outside the limits enforced by the manufacturer.*

## 5.2 Main Menu

### 5.2.1 Entering the “Main Menu” and “Sub Menu”

- In order to acces the “Main Menu”, press the navigation key OK.
- The display automatically comes back to the “Main Screen” after some minutes[5]. Press the navigation key ESC, or DEL to come back to the “Main screen”.
- Use the arrows ↑ & ↓ to navigate in the menu.
- Use the arrows → or key OK to make access the selected “Sub Menu”.
- Use the arrow ← to make come back one step in the menu.

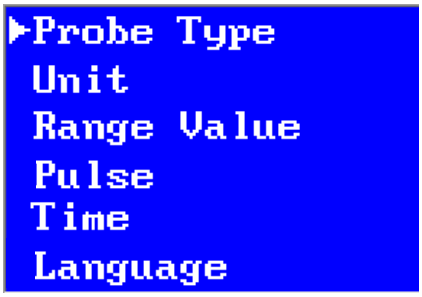


Figure 18: Main Menu

[5] 1 minute for one step backwards through the menu layer.

### 5.2.2 Probe Type Menu

#### 5.2.2.1 ULS-02 & ULS-06

These 2 sensor configurations (ULS-02 & ULS-06) are implemented in the IFQ Monitor.

- Chose the appropriate sensor: ULS-02 or ULS-06 and press OK
- Enter the probe offset using the arrows ↑, ↓, ⊖ & ⊖ then press. The range of the probe is automatically computed with this information.

***Note:*** *The probe offset is the distance between the tip of the ULS-02 or ULS-06 sensor and the bottom of the channel under the probe. Please refer to Figure 19.*

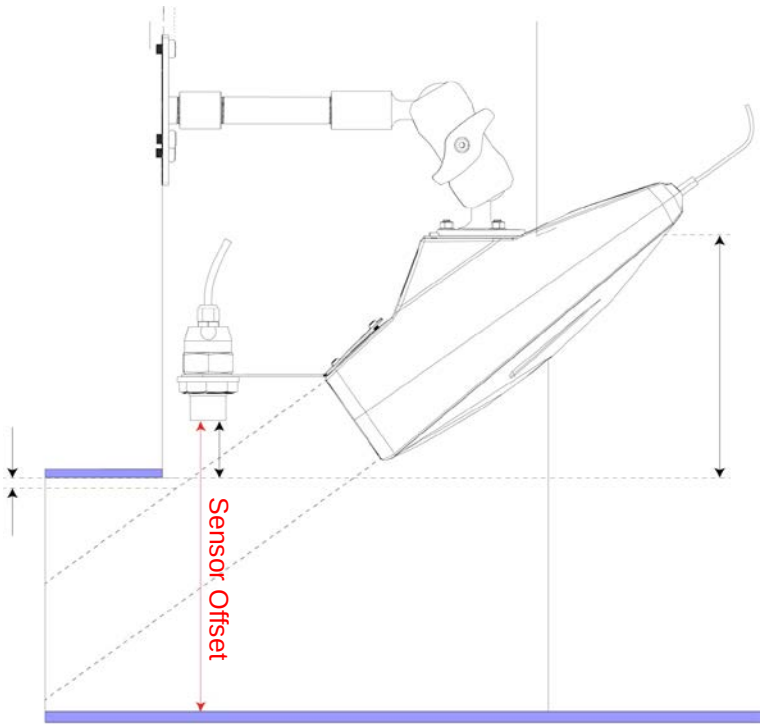


Figure 19: ULS-02 & ULS-06 offset with a RAVEN-EYE®.

#### 5.2.2.2 Other Probe

For any level sensor other than the sensors mentioned above (ULS-02 & ULS-06), please refer to the manufacturer's manual for setup. For implementing the values for an external level sensor, make the following:

1. Select "Probe Type " in the "Main Menu" then press OK
2. Select "Other Probe" in the "Probe Type Menu", then press OK
3. Enter the water level for the 4 mA value using the arrows ↑, ↓, ⊖ & ⊖, then press OK

   ***Note:*** *The entered value can be positive or negative. This may depend on the offset or type of probe used.*

4. Enter the water level for the 20 mA value using the arrows ↑, ↓, ⊖ & ⊖ then press OK

   ***Note:*** *The entered value can be positive or negative. This may depend on the offset or type of probe used.*

### 5.2.3 Unit Menu

In the “Unit Menu”, all units can be configured. The units are used to display the values on the screen, select the range value (see section 5.2.4) and configure of the contact output (see section 5.2.5).

***Note:*** *If a unit is selected, it will affect all items described above.*

*Example: If m is slected for level and the new selected unit is mm, the range values for the 4-20 mA outputs will be adapted according to the new selected unit. If the range value was set to 0 m for 4 mA and 2 m for 20 mA, the new range value following the change of unit will be 0 mm for 4 mA and 2.000 mm for 20 mA.*

Implementing units:

1. Select “Unit “ in the “Main Menu”, then press OK
2. Select value that need to be configured (Flow, Velocity, Level or Pulse) in the “Unit Menu” and press OK
3. Select the unit that needs to be attributed to a value using the ↑ and ↓ arrows, then press OK

Available units:

| | |
|---|---|
| ***Flow*** | *l/s, m³/h, m³/s, gpd, gpm, cfm* |
| ***Velocity*** | *cm/s, m/s, fps* |
| ***Level*** | *mm, cm, m, inch, ft* |
| ***Pulse*** | *l, m³, g, cf* |

### 5.2.4 Range Value Menu

The range value is used to select the range of the 4-20 mA outputs.

Between 4 and 20 mA a linear conversion is used to convert numerical values into current output.
If one of the outputs is out of range, an error message appears on the display, the LED D flashes and the error contact is closed.

Implementing range values for the 4-20 mA outputs:

1. Select “Range Value “ in the “Main Menu”, then press OK
2. Select the output that need to be configured (Flow, Velocity or Level) in the “Range Value Menu”, then press OK
3. Enter the value for the 4 mA (min.) using the arrows ↑, ↓, − & − then press OK

   ***Note:*** *The entered value can be positive or negative.*
4. Enter the value for the 20 mA (max.) using the arrows ↑, ↓, − & − then press OK

   ***Note:*** *The entered value can be positive or negative.*

### 5.2.5 Pulse Menu

The pulse is used for an external totalizer. The value of the pulse is used to set the signification of each pulse for the totalizer contact output.

***Note:*** *The duration of the closing contact is fixed to 100 msec. This means that the limit (frequency of contact closure) is set at maximum 5 contacts per second.*
*If the flow is bigger, a faulty alarm will turn on and the totalizer contact ouput is closed.*

Example: With a flow of 1 l/s and a pulse every 5 l.

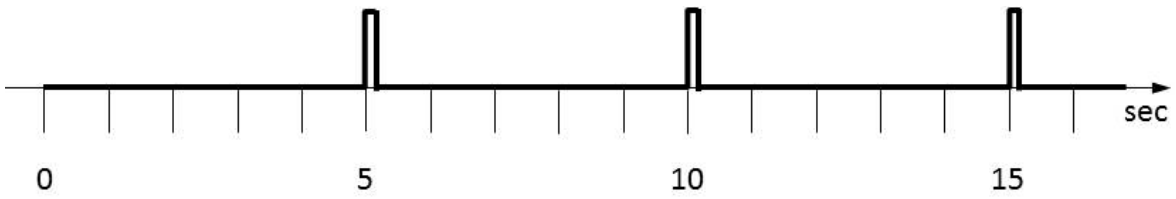


Figure 20: Contact totalizer output for 1l/s and a pulse each 5l.

Implementing pulse value:

1. Select “Pulse“ in the “Main Menu”, then press OK
2. Enter the value for the pulse using the arrows ↑, ↓, − & ← then press OK

   ***Note:*** *The unit of the pulse is configured in the “Unit Menu”, refer to section 5.2.3*

### 5.2.6 Time Menu

#### 5.2.6.1 Set the timezone

Select “Time“ in the “Main Menu”, then press OK

1. Press the up ↑ or down ↓ arrows until the correct timezone is reached, then press OK

   ***Note:*** *For countries that use summer and winter time, the timezone must be changed manually.*

   ***Note:*** *For countries that have a timezone different that an integer, press − to select minutes and then use the up ↑ & down ↓ arrows to adjust the timezone by 15 min.*

#### 5.2.6.2 Change the date

It may happen that the IFQ Monitor looses the memory of the date. This is usually due to a long storage of the IFQ Monitor without powering up. In this case the internal battery of the IFQ Monitor is discharged and the date after initialization is not correct.

Set the date :

1. Go back to the “Main Screen”
2. Enter a password by pressing the following buttons on the keypad: 
3. The “Time” menu is displayed. Use the left  and right  arrows to select the timezone, minutes, hours, year, month and day
4. Use the up  & down  arrows to adjust the date and time
5. Press  to validate the changes

The IFQ Monitor will then restart automatically

### 5.2.7 Language

Set the language :

1. Select “Language“ in the “Main Menu”, then press 
2. Press the up  or down  arrows until the desired language is reached, then press 

   ***Note:*** *Available languages are: English, French, German & Russian. Other languages might be added without notice.*
3. If the IFQ Monitor is equipped with the logger option, select the decimal separator to be used for the data (comma or point), then press 

   ***Note:*** *The “Language“ menu is always at the end of the list.*

### 5.2.8 Reset totalizer

The IFQ Monitor disposes of two types of totalizers.

- One totalizer is not resettable. Total flow is added during the whole life of the IFQ Monitor. This totalizer can be consulted in the .tsv files on the SD card (only for IFQ Monitor equipped with a logger)
- The second totalizer (value shown on the display) is resettable by the customer following the procedure below:

Reset second totalizer:

1. Go back to the “Main Screen”
2. Enter a password by pressing the following buttons on the keypad: 
3. “RESET DONE” is displayed on the screen. This assures the reset of the totalizer has been done.

# 6 Maintenance

***WARNING***
*Only qualified personnel should conduct the tasks described in this section of the manual.*

## 6.1 Clean the instrument

Clean the exterior of the instrument with a moist cloth and a mild soap solution.

## 6.2 Fuse replacement

Before replacing any fuse, please contact your direct representative or Flow-Tronic S.A.

# 7 Contact Information

## 7.1 For Belgium and Luxembourg

Flow-Tronic
Rue J.H. Cool 19a
B-4840 Welkenraedt
Belgium

Tel : +32 (0)87 899 799
Fax : +32 (0)87 899 790
Email: info@flow-tronic.com
www.flow-tronic.com

## 7.2 Outside Belgium and Luxembourg

Flow-Tronic maintains a big network of dealers and distributors. To locate a representative, send an e-mail to sales@flow-tronic.com.

## 7.3 Technical Support

Technical and Customer Service Department personnel are eager to answer questions about our products and their use. In Belgium and Luxembourg, call +32 (0)87 899 799 or send an e-mail to service@flow-tronic.com. Outside Belgium and Luxembourg, please contact your direct representative.

## 7.4 Repair Service

Please contact Flow-Tronic before sending any items for repair.

Steps to follow to send the device to Flow-Tronic for repair:

1. Identify the serial number of the device.
2. Record the reason for return.
3. Make sure the equipment is free from foreign debris and is clean and dry before shipping.
4. Ship the item to:

   Flow-Tronic S.A.
   Service
   Rue J.H. Cool 19a
   B-4840 Welkenraedt
   BELGIUM

5. The item that has to be repaired gets an RMA (Return Material Authorization) number.
6. The price for repair is calculated and sent to the customer.
7. Repair is made after having received the authorization from the customer.

# Appendix

## App. 1 Flow-Tronic Customer Service Department Registration Form

Thank you for selecting Flow-Tronic flow instrumentation for your monitoring needs. Enclosed with your instrument you should find the calibration certificate, warranty information, operation manual(s), accessories, and Software Registration Card (SRC) if you purchased our software package.

So that we may better serve your needs, please take a few minutes to complete this Customer Service Registration Form. Completion of this form will enable us to provide you with application information, software upgrades or product change notices.

Please fax (+32 (0)87 899 799) or e-mail (info@flow-tronic.com) this copy to Flow-Tronic or request the e-mail registration form at service@flow-tronic.com

If you have any questions or concerns regarding technical support, parts or service, please call Customer Service at +32 (0)87 899 797 or e-mail us at service@flow-tronic.com

Rue J.H. Cool 19a | B-4840 Welkenraedt | BELGIUM
Tel. : +32 (0)87 899 799 | Fax : +32 (0)87 899 790
E-mail : info@flow-tronic.com | www.flow-tronic.com

**Customer Service Registration Form --- Customer Service Department**
**Flow-Tronic SA**

Flow-Tronic Model _____ Serial Number _____

Company _____

Contact Name _____

Address _____

City _____ State _____ Zip Code _____

Phone (  ) _____ Fax (  ) _____

E-Mail _____

Application Type _____

_____

Rue J.H. Cool 19a | B-4840 Welkenraedt | BELGIUM
Tel. : +32 (0)87 899 799 | Fax : +32 (0)87 899 790
E-mail : info@flow-tronic.com | www.flow-tronic.com

# Warranty Statement

Manufacturer warrants all products of its manufacture to be free from defects in workmanship and material under normal use and service. This warranty extends for a period of twelve (12) months after date of shipment, unless altered by mutual agreement between the purchaser and Flow-Tronic S.A. prior to the shipment of the product. If this product is believed to be defective, purchaser shall notify Flow-Tronic S.A. and will return the product to Flow-Tronic S.A., postage paid, within twelve (12) months after date of shipment by Flow-Tronic S.A. If the purchaser believes the return of the product to be impractical, Flow-Tronic S.A. shall have the option, but will not be required, to inspect the product wherever located. In any event, if the purchaser requests Flow-Tronic S.A. visit their location, the purchaser agrees to pay the non-warranty expenses of travel, lodging and subsistence for the field service response. If the product is found by Flow-Tronic's inspection to be defective in workmanship or material, the defective part or parts will either be repaired or replaced, at Flow-Tronic's election, free of charge, and if necessary the product will be returned to purchaser, transportation prepaid to any point in Europe. If inspection by Flow-Tronic S.A. of such product does not disclose any defect of workmanship or material, Flow-Tronic's regular service repair charges will apply. Computing devices sold but not manufactured by Flow-Tronic S.A. are covered only by the original manufacturer's written warranty. Hence, this warranty statement does not apply.

**The foregoing warranty is manufacturer's sole warranty, and all other warranties, express, implied or statutory, including any implied warranty of merchantability or fitness for a particular purpose, are negated and excluded. The foregoing warranty is in lieu of all other warranties, guarantees, representations, obligations or liabilities on the part of the manufacturer and Flow-Tronic S.A.**

Purchaser's sole remedy and Flow-Tronic's sole obligation for alleged product failure, whether under warranty claim or otherwise, shall be the aforestated obligation of manufacturer to repair or replace products returned within twelve months after date of original shipment.Flow-Tronic shall not be liable for, and the purchaser assumes and agrees to indemnify and save harmless Flow-Tronic in respect to, any loss or damage that may arise through the use by the purchaser of any of Flow-Tronic's products

# Important Note

Warranty extension up to 36 months (total 48 months) can be purchased by the Customer from Flow-Tronic S.A. during 6 months after instrument shipment. For more information please contact Flow-Tronic S.A. by phone, fax or e-mail.

FLOW-TRONIC nv

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