FLOW

1. Edition

Instruction Manual

Flow Measurement Transmitter NivuFlow 750/700

Firmware Revision: 1.14

Original Manual: German

Instrumentation for Water Industry
NIVUS GmbH • Im Taele 2 • D-75031 Eppingen • Internet: www.nivus.de
Phone: +49 (0) 72629191-0 • Fax: +49 (0) 72629191-999 • E-Mail: info@nivus.com

nivus®

Branch offices

NIVUS AG, Schweiz
Hauptstrasse 49
CH - 8750 Glarus
Tel.: +41 (0)55 6452066
Fax: +41 (0)55 6452014
E-Mail: swiss@nivus.com
Internet: www.nivus.de

NIVUS, Austria
Mühlbergstraße 33B
A-3382 Loosdorf
Tel.: +43 (2754) 567 63 21
Fax: +43 (2754) 567 63 20
E-Mail: austria@nivus.com
Internet: www.nivus.de

NIVUS, France
14, rue de la Paix
F - 67770 Sessenheim
Tel.: +33 (0)3 88071696
Fax: +33 (0)3 88071697
E-Mail: info@nivus.fr
Internet: www.nivus.fr

NIVUS Ltd., United Kingdom
Wedgewood Rugby Road
Weston under Wetherley
Royal Leamington Spa
CV33 9BW, Warwickshire
Tel.: +44 (0)1926 632470
E-Mail: info@nivus.com
Internet: www.nivus.com

NIVUS Service, United Kingdom
1 Arisaig Close
Eaglescliffe
Stockton on Tees
Cleveland, TS16 9EY
Tel.: +44 (0)1642 659294
E-Mail: info@nivus.com
Internet: www.nivus.com

NIVUS Sp. z o.o., Poland
ul. Hutnicza 3 / B-18
PL - 81-212 Gdynia
Tel.: +48 (0) 58 7602015
Fax: +48 (0) 58 7602014
E-Mail: poland@nivus.com
Internet: www.nivus.pl

NIVUS Middle East (FZE)
Building Q 1-1 ap. 055
P.O. Box: 9217
Sharjah Airport International
Free Zone
Tel.: +971 6 55 78 224
Fax: +971 6 55 78 225
E-Mail: Middle-East@nivus.com
Internet: www.nivus.com

NIVUS Korea Co. Ltd.
#2502, M Dong, Technopark IT Center
32 Song-do-gwa-hak-ro
Yeon-su-gu
INCHEON, Korea 406-840
Tel. +82 32 209 8588
Fax. +82 32 209 8590
E-Mail: korea@nivus.com
Internet: www.nivus.com

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Important Note

This instruction manual may exclusively - even in parts - be copied or translated in any other way with the express written consent of NIVUS GmbH.

Translation

If the device is sold to a country in the European Economic Area (EEA) this instruction handbook must be translated into the language of the country in which the device is to be used.

Should the translated text be unclear, the original instruction handbook (German) must be consulted or the manufacturer contacted for clarification.

Copyright

Names

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1. General

Important Note

READ CAREFULLY BEFORE USE

KEEP IN A SAFE PLACE FOR LATER REFERENCE!

This Instruction manual for the flow measurement unit NivuFlow 750 is for the intended use of the device. It is intended for exclusive use by appropriately trained and qualified personnel.

This manual must be read carefully and understood prior to Installation or connection.

This Instruction manual is part of the NivuFlow 750 delivery and shall be available to users at any time. The safety instructions contained therein must be followed.

In case of selling the flow measurement unit this technical description must be provided to the purchaser.

The description on the operation of the transmitter with the sensors can be found in the accompanying manuals .

- Technical Instructions for Correlation Sensors and external Electronic Box
- Installation Instruction for Correlation and Doppler sensors
- Technical Description for the Ex-Separation Interface iXT
- Technical Description for the Multiplexer MPX

2. Safety Instructions

2.1 Signs and symbols used

These safety instructions must be followed to ensure your safety and prevent property damage.

DANGER

Hazard warnings

Indicates an immediate high risk which may result in death or severe personal injury if not avoided.

WARNING

Warning notice

Indicates a possible danger with moderate risk which may result in death or severe personal injury if not avoided.

WARNING

Danger of electrical shock

Indicates a possible danger by electrical power with moderate risk which may result in death or severe personal injury if not avoided.

CAUTION

Notes for caution

Indicates a possible danger with moderate risk that may result in minor or moderate injury or may result in property damage, if not avoided.

Important Note

Indicates situations that may result in damage to property and/or loss of data, if not avoided. Contains information, that needs to be highlighted.

Note

Indicates situations that do not result in personal injury.

2.2 Warning notices on the product

General warning label

This symbol is for operators to refer to this instruction manual. Observing the information contained therein is required in order to maintain protection measures provided by the instrument during installation procedures and operation.

Protective conductor

This symbol refers to the protective conductor of the unit.
Depending on the mode of installation the instrument shall be operated solely connected to an appropriate protective conductor according to applicable laws and regulations.

2.3 Safeguards and precautions

WARNING

Germ contamination

Please note that due to the operation in the waste water field the measurement system and cables may be loaded with dangerous disease germs. Respective precautionary measures must be taken to avoid damage to one's health.
Wear protective clothing!

WARNING

Regulations for health and safety at work have to be observed!

Before starting installation work, observing the work safety regulations need to be checked. Failure to observe may cause personal injury.

WARNING

Do not disable safety devices!

It is strictly prohibited to disable the safety devices or to change the way they work.
Failure to observe may cause personal injury as well as to system damage.

WARNING

Disconnect from power supply

Disconnect the instrument from power supply before you begin to execute maintenance, cleaning and/or repair works. Repair works shall be executed solely by expert personnel. Disregarding may lead to electrical shocks.

Important Note

The system should be installed and put into operation only by qualified personnel.

2.4 Liability Disclaimer

The manufacturer reserves the right to change the contents of this document including this liability disclaimer without prior notice and cannot be held responsible in any way for possible consequences resulting from such changes.

For connection, initial start-up and operation as well as maintenance of the unit the following information and higher legal regulations of the respective country (e.g. VDE regulations in Germany) such as applicable Ex regulations as well as safety requirements and regulations in order to avoid accidents shall be observed.

All operations on the device which go beyond installation or connection measures in principle shall be carried out by NIVUS staff or personnel authorised by NIVUS due to reasons of safety and guarantee.

The manufacturer is not liable for failures resulting from improper or inappropriate use.

2.5 User's Responsibilities

Important Note

In the EEA (European Economic Area) national implementation of the framework directive 89/391/EEC and corresponding individual directives, in particular the directive 89/655/EEC concerning the minimum safety and health requirements for the use of work equipment by workers at work, as amended, are to be observed and adhered to.

Make sure to have a local operating permit available and observe the associated conditions. In addition to this you must observe environmental requirements and local laws the following points:

- Personnel safety (accident prevention regulations)
- Safety of work materials and tools (safety equipment and maintenance)
- Disposal of products (laws on wastes)
- Disposal of materials (laws on wastes)
- Cleaning (cleansing agents and disposal)

Connections:

Operators shall make sure prior to operating the instrument that during installation and initial start-up the local regulations (such as regulations for electrical connection) are observed.

Personnel requirements

Installation, commissioning and maintenance shall be executed only by personnel meeting the demands as follows:

- Expert personnel with relevant training an appropriate qualification
- Personnel authorised by the plant operator

Qualified personnel

within the context of this documentation or the safety notes on the product itself are persons who are sufficiently familiar with installation, mounting, starting up and operation of the product and who have the relevant qualifications for their work; for example

I. Training, instruction or authorisation to activate/deactivate, isolate, ground, and mark electric circuits and devices/systems according to the safety engineering standards.

II. Education and instruction according to the standards of safety engineering regarding the maintenance and use of adequate safety equipment.

III. First aid training

Additional instructions

For installation and operation of the complete system apart from this instruction manual the following instruction manuals shall be used additionally:

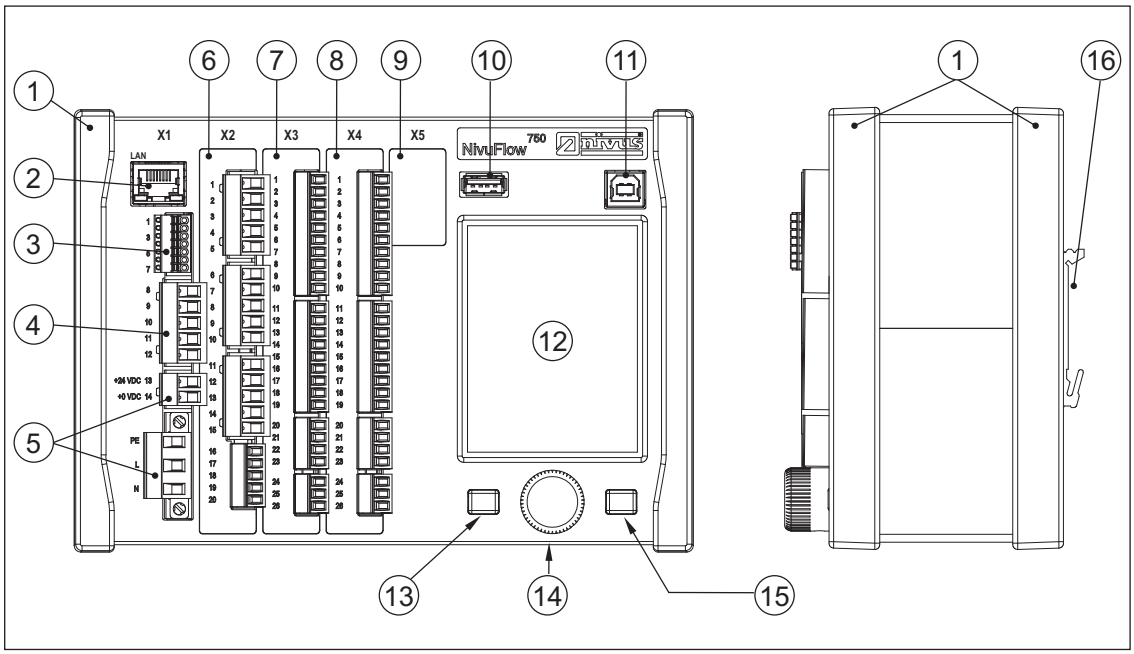
- Technical Instructions for Correlation Sensors and external Electronic Box
- Installation Instruction for Correlation & Doppler Sensors
- Technical Instructions for Ex Separation Interface iXT (for the use in hazardous areas)
- Technical Instructions for Multiplexer MPX (for the use of several sensors)

Important Note

This instruction manual is part of the standard delivery and must be available to the user at any time. Observe any notes on safety contained therein.

3. Product specification

3.1 Product construction and overview

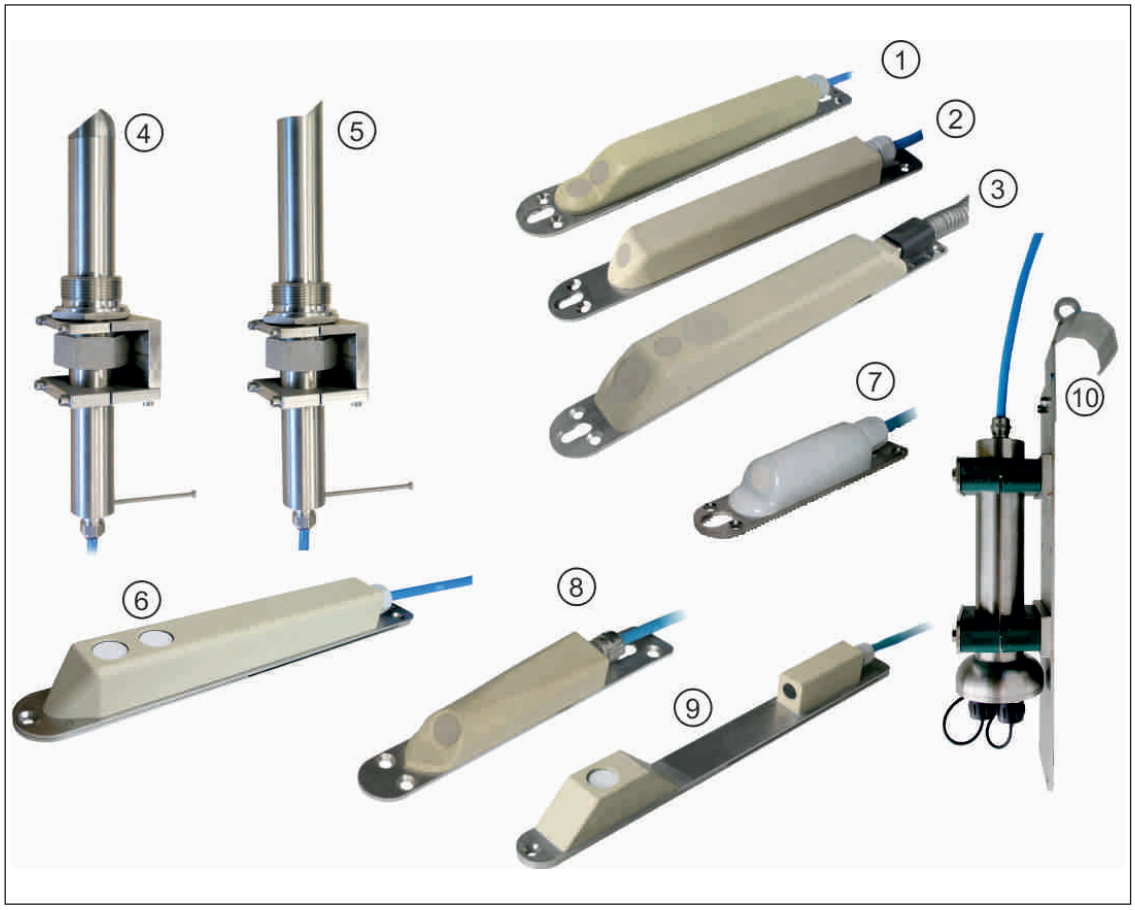


1. Trims / cover strips
2. Network interface (LAN)
3. Bus interface
4. Connection air-ultrasonic sensor (RS485)
5. Power supply
6. Plugin X2 - v-sensor 1
7. Plugin X3 - Type S1, M3, M9 only
8. Plugin X4 - Type S1, M3, M9 only
9. Plugin X5 - spare plugin port (unused)
10. USB-A interface (data transfer)
11. USB-B interface (service)
12. Graphic display
13. Function key
14. Rotary pushbutton
15. Function key
16. DIN rail fastening

Fig. 3-1 General view NivuFlow 750

3.2 Connectable sensors

The image below provides an overview on the connectable sensors.



1. Flow velocity wedge sensor, Type POA-V2H1/V2U1
2. Flow velocity wedge sensor, Type POA-V200/V2D0
3. Flow velocity wedge sensor, Type CS2
4. Pipe sensor, Type CS2, with sensor screw joint and retaining element
5. Pipe sensor, Type POA, with sensor screw joint and retaining element
6. Ultrasonic level sensor, Type OCL-L1
7. Mini flow velocity wedge sensor, Type CSM-V100
8. Mini flow velocity wedge sensor, Type CSM-V1D0
9. Ultrasonic level sensor, Type DSM
10. Electronic Box, Type EBM

Fig. 3-2 Overview sensors and Electronic Box

3.3 Use in accordance with the requirements

Important note

The instrument is intended solely for the purpose described below.
Modifying or using the instruments for any other purposes without the manufacturer's written consent will not be considered as use in accordance with the requirements.
The manufacturer cannot be held responsible for any damage resulting from improper use.
The user alone bears any risk.

The permanent flow meter Type NivuFlow 750 including the accompanying sensors is designed for continuous flow measurement of slight to heavily polluted media in part filled and full channels, pipes and similar. The maximum permissible limit values as specified in chapter 3.5 shall be necessarily observed. Any case varying from these conditions which is not approved by NIVUS GmbH in written form is left at the owner's risk.

Ex protection

Important note

Install the transmitter out of Ex zones!
The Ex approval of the sensors is part of the „Technical Description for Correlation Sensors". The Ex approval of the Ex Separation Interface is part of the „Technical Description for iXT Ex Separation Interface".

To use flow velocity sensors in Ex areas an iXT Ex Separation Interface shall be necessarily installed between transmitter and sensors.

The wiring diagrams can be found in the according instruction manual.

Note

For installation and commissioning the conformity certificates as well as the test certificates issued by the respective authorities shall be followed.
The combination of NivuFlow and the iXT Ex Separation Interface is adjusted solely to NIVUS correlation sensors regarding the intrinsically safe system review according to EN 60079-25.
In the event of using sensors by third-party manufacturers the operator shall carry out a system review according to EN 60079-25!
The required specifications of the iXT Ex Separation Interface can be found in the according EC type examination certificate.

3.4 Device identification

The instructions contained within this manual are valid only for the type of device specified on the title page.

The name plate is fixed on the side of the enclosure and contains the following:

- Name and address of the manufacturer
- CE label
- Information on type and series, serial no. if available
- Power supply

In case of enquiries and ordering replacement parts it is important to specify article number as well as the serial number of the respective transmitter or sensor. This ensures correct and quick processing.

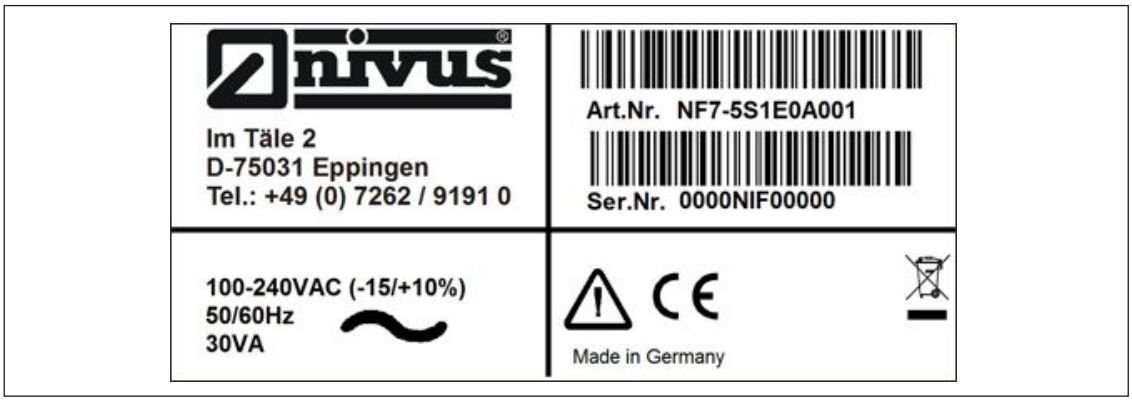


Fig. 3-3 Nameplate AC version

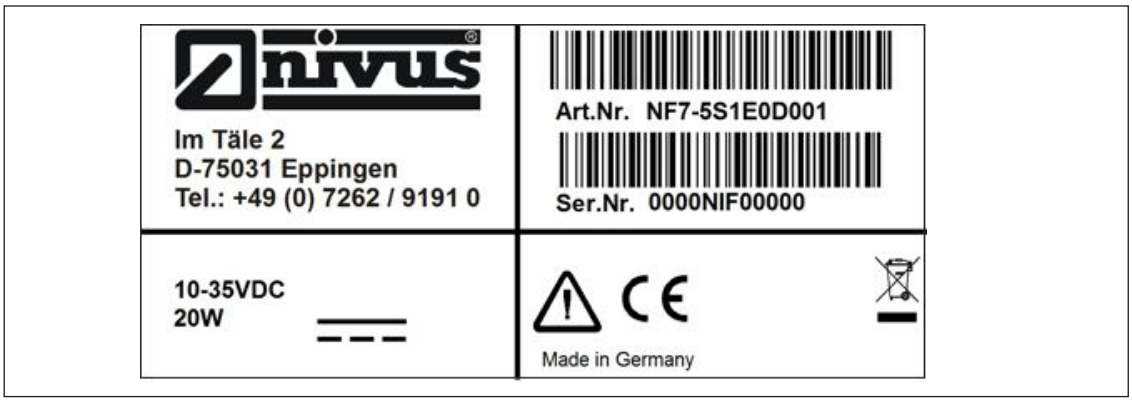


Fig. 3-4 Nameplate DC version

3.5 Specifications

Power supply	100 to 240 V AC, -15 % / +10 %, 47 to 63 Hz or 10 to 35 V DC
Supply connection	Plug with spring-cage terminal clamps
Max. power consumption	AC: 30 VA / DC: 20 W
Typ. power consumption	1x POA-V2U1 + 1x i-Sensor + 1 relay energised, 230 V AC: (rounded) 14 W
Enclosure	- Material: aluminium and plastic - Weight: approx. 1150 g
Protection	IP20, shock resistance IK08
Operating conditions	- Protection class I - Overvoltage category II - Pollution degree II - AC unit for use in altitudes up to 3000 m above MSL. At relay voltages > 150 V the use is restricted to an altitude of max. 2000 m (AC and DC units)
Operating temperature	DC: -20 °C to +70 °C AC: -20 °C to +65 °C
Storage temperature	-30 °C to +80 °C
Max. ambient temp. for installation and operation	+50 °C
Max. humidity	80 %, non-condensing
Display	TFT full graphic colour daylight display, 240 x 360 pixel, 65536 colours
Programming	Dialog mode using rotary pushbutton and 2 function keys, in German, English and French
Connection	Plug with spring-cage terminal clamps
Inputs	- 1 x 4-20 mA for external level (2-wire probe) - 1 x RxTx-Bus for NIVUS air-ultrasonic sensor Type OCL - 1 x (Type S1) or 7 x (Type M3) 0/4-20 mA with 12 Bit resolution for external level, external controller setpoint and data storage of external units, accuracy ±0.4 % of measuring range final value (20 mA), load 91 Ohm - 2 x (Type S1) or 10 x (Type M3) digital input - 1 (Type S1) or 1 - 3 (Type M3) velocity sensors (POA, CS2 or EBM Electronic Box + CSM) connectable
Outputs	- 2 x (Type S1) or 4 x (Type M3) 0/4-20 mA, load 500 Ohm, - 12 Bit resolution, accuracy higher than ±0.1% at 20 °C (higher than ±0.4 % at -20 °C … +70 °C) - 1 x bistable relay SPDT (Typ S1), maximum load 230 V AC / 2 A (cos. 0.9), min. switching current 100 mA - 1 x (Type S1) or 6x (Type M3) relay(s) SPDT, maximum load 230 V AC / 2 A (cos. 0.9), min. switching current 10 mA
Controller	3-step controller, quick close function, adjustable slide position in case of error
Data memory	Internal 1.0 GB, for programming and readings memory
Storage cycle	30 seconds to 5 minutes
Communication	- Modbus TCP via networks (LAN/WAN, Internet) - Modbus RTU via RS485 or RS232 - Internet via Ethernet (in preparation)

Sensors

Observe the specifications of the according sensors as described in the respective instruction manuals or technical descriptions.

Storing

The following storing conditions shall be strictly adhered to:

- max. temperature: +80 °C
- min. temperature: - 30 °C
- max. humidity: 80 %, non-condensing
- The NivuFlow shall be protected from corrosive or organic solvent vapours, radioactive radiation as well as strong electromagnetic radiation. Always store the instrument in its original packaging.

3.6 Configuration

3.6.1 Device Types

The NivuFlow is available in different versions which mainly vary in terms of the number of connectable sensors. The article number can be found on the nameplate which is fixed on the side of the enclosure.

NF7-	Type						
	5	For part filled and full applications					
		Typ					
		S1	1 x v-sensor, 1 x air-ultrasound OCL, 2x DE, 2x DA, 2x AE, 2x AA				
		SR	1 x v-sensor, 1 x air-ultrasound OCL, 7 x DE, 5 x DA, 5 x AE, 4 x AA built-in 3-step controller				
		M3	3 x v-sensor, 1 x air-ultrasound OCL, 10 x DE, 6 x DA, 8 x AE, 4 x AA, built-in 3-step controller				
			Enclosure and construction				
			E0	DIN rail mounting/installation in switching cabinet			
			W0	Field enclosure			
			W2	Type S with built-in iXT Ex Separation Interface in field enclos.			
			W4	Type M3 with built-in iXT 420 Ex in field enclosure			
				Power			
				A0	100 - 240 V AC		
				D0	9-36 V DC		
					Firmware extensions		
					0	none	
					A	Analytics (connection via RS 485)	
						Number of measurement places	
						1	1 measurement place
						2	2 measurement places
						3	3 measurement places

3.6.2 Delivery

Note

Check if your delivery is complete. Check the packaging for visible damage immediately after receipt. Any possible damage in transit shall be instantly reported to the carrier. Furthermore a written report shall be sent to NIVUS GmbH in Eppingen.
Incomplete deliveries shall be reported in writing either to your local representative or directly to the NIVUS head office in Eppingen within 2 weeks.

The standard delivery of the NivuFlow contains:

- The instruction manual including the certificate of conformity and approvals. It contains any relevant information on how to operate the NivuFlow.
- a transmitter type NivuFlow 750

Check extra accessories depending on your order and by using the delivery note.

3.6.3 Transport

Do not expose the system to heavy shocks or vibrations. Use the original packaging for transport.

3.6.4 Return

The units shall be returned at customer cost to NIVUS Eppingen using the original packaging. Insufficiently franked shipments will not be accepted!

3.6.5 Installation of spare parts and parts subject to wear and tear

We herewith particularly emphasise that replacement parts or accessories not supplied by NIVUS moreover are not certified and approved by NIVUS too. Installation and/or the use of such products hence may negatively influence predetermined constructional characteristics of the measurement system or even lead to instrument failures.

NIVUS cannot be held responsible for any damage resulting due to the use of non-original parts and non-original accessories.

You can find original manufacturer spare parts or accessories in chapter 9.5.

4. Functional Principle

The NivuFlow 750 is a non-portable measurement system for flow measurement. The equipment ins conceived preferably for measurements in slight to heavily polluted aqueous liquids with various compositions.

The system can be used in part filled and full flumes, channels and pipes featuring various shapes and dimensions.

The NivuFlow 750 can be used for measurements in part filled flumes as well as in full pipes. The device types SR, M3 and M9 are equipped with an extra 3-step controller to control a slide valve or other control elements.

The NivuFlow 750 is designed to connect the sensors below:

NIVUS flow velocity sensors:

- POA-V2
- CS2
- EBM-Box (Electronic Box Mini)

Up to 3 POA or CS2 sensors or type EBM electronic boxes with type CSM sensors can be connected simultaneously to the unit types M3 and M9. This supports the more accurate detection of flow velocities on a common measurement place.

The NivuFlow 750 provides the option to connect additional sensors.

NIVUS level sensors:

- OCL-L1
- i-Sensor
- NivuCompact
- NivuBar

Note

The measurement method is based on the ultrasound reflection principle. Hence, it is indispensable for the system to work that there are particles in the water, which are able to reflect the ultrasonic signal sent by the sensor (dirt particles, gas bubbles or similar).

4.1 Level measurement using water ultrasound

Depending on the sensor type selected, the water-ultrasonic combi sensor may include up to two different level measurements.

When using water-ultrasound or with hydrostatic level measurement, the type POA is equipped with one sensor crystal; type CS2 however has 2 sensor crystals with different size available. Sensors type CSM do not have a water-ultrasonic measurement.

When measuring the level using water-ultrasound, the horizontal sensor crystal(s) utilise(s) the ultrasound time-of-flight (transit time) method. The measurement uses the time between transmission and reception of an impulse being reflected on the water surface.

$$h_{l} = \frac{c \bullet t_{l}}{2}$$

h	= filling level
c	= sound running time
t1	= time between transmitted and received signal

At a medium temperature of 20 °C the sound running time in water is 1480 m/s. The temperature-dependent deviation is 0.23 % per Kelvin.

To achieve level measurements with millimetre accuracy, the medium temperature is investigated permanently. The investigated temperature the is used to correct the sound running time for calculation purposes.

The fixed level value is added to the determined value h1. The result is the total flow level h.

4.2 Level measurement using pressure

Combi sensors may be equipped with an extra hydrostatic level measurements. This measurement depends on the sensor type used.

The piezoresistive pressure sensor operates based on the relative pressure principle. The pressure of the static water column above the sensor is direct proportional to the filling level. Fluctuations in atmospheric pressure are compensated by a small air tube, which is integrated into the sensor cable. The pressure sensor allows to determine flow levels even if the sensor has been installed out of the centre of the channel bottom.

The pressure sensor is adjusted by entering a manually determined reference value at the initial start-up. Additionally, a height caused by the sensor installation is added..

4.3 Level measurement using an external level sensor

Depending on the selected type of level measurement an external 4-20 mA signal may be used for the level (e.g. by using an i-Series sensor).

It is possible to directly connect 2-wire sensors supplied by the NF7xx (e.g. NivuBar, NivuCompact, i-Series sensor). A 4-20 mA signal provided by an external transmitter (such as 4-20 mA from NivuMaster) can be used as well.

Note

i*-Series sensors have pre-programmed measurement ranges. For further reference please see the i-Series sensors instruction manual.*
i-Sensors can be put into operation even without using a HART modem. To do so enter the sensor's measurement span in the parameter "Value at 20 mA". Depending on the sensor installation height it may be necessary to additionally set a negative offset value.

	i-3	i-6	i-10	i-15
4 mA (empty) 0 % pan distance to sensor face in m	3,0	6,0	10,0	15,0
20 mA (full) 100 % pan distance to sensor face in m	0,125	0,300	0,300	0,500
Measurement span (value at 20 mA)	2,875	5,7	9,7	14,5

Fig. 4-1 i-Series sensors measurement span

4.4 Flow velocity detection

The piezo crystal has a slope to the flow direction and operates as a flow velocity sensor. Here an ultrasonic burst with a defined angle is sent into the medium. All the particles in the measurement path (air, dirt) reflect a small amount of the ultrasonic signal. The result is a particular signal depending on shape and size of the particles. Hence, the multitude of the reflected signals results in a reflection pattern (see Fig. 4-2). The piezo crystal the receives this pattern again, which then is converted into electric signals and will be saved in a built-in digital signal processor (DSP).

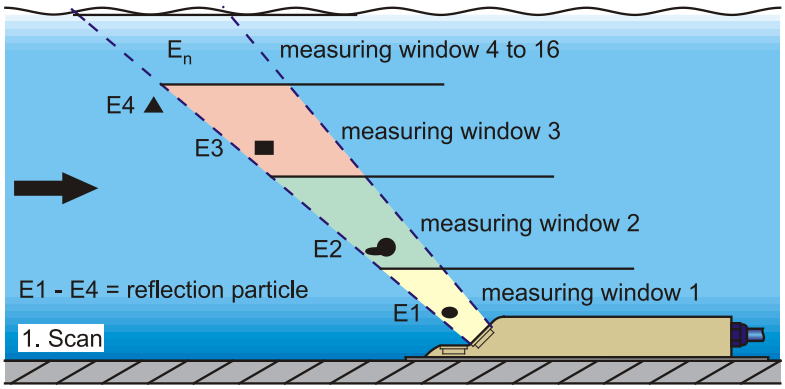


Fig. 4-2 Situation at first signal detection

After a certain period a second ultrasonic burst is sent into the medium. The newly generated reflection signal is saved in the DSP too.

In various flow levels there are different flow velocities (flow velocity profile). Depending on the level, the reflecting particles' movement away from the first measurement point therefore varies. Hence, a distorted reflection pattern results (see Fig. 4-3). At the same time slightly different reflections occur: some particles have been turning around and thus have another shape of reflection; some particles are no longer within the measurement range and others (new ones) have now moved into the measurement range.

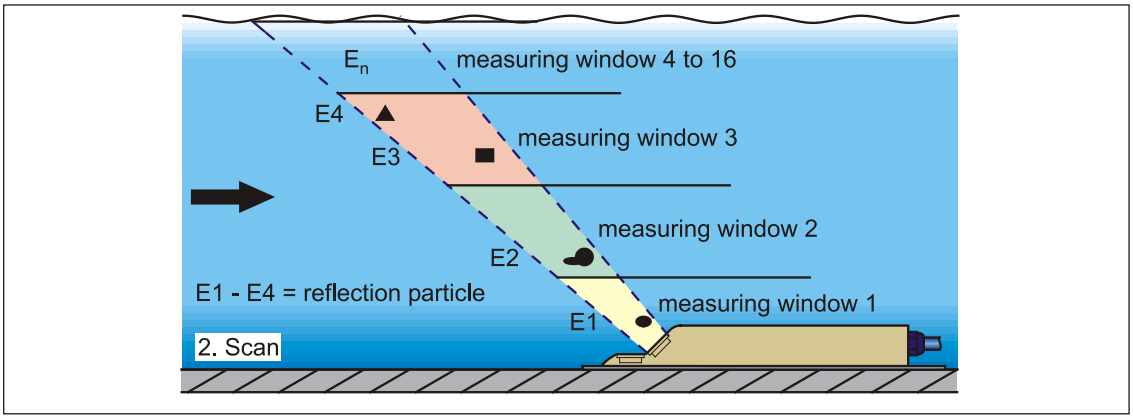


Fig. 4-3 Situation at second signal detection

The DSP checks both received reflection patterns for similarities using the cross correlation method. All existing signal differences (caused by new or rotated particles) are rejected so that two similar but temporarily offset signal patterns are left for velocity evaluation.

Depending on the flow levels both patterns are subdivided into 16 measurement windows. Then, in each measurement window the time shift Δt of the pattern is investigated (see Fig. 4-4).

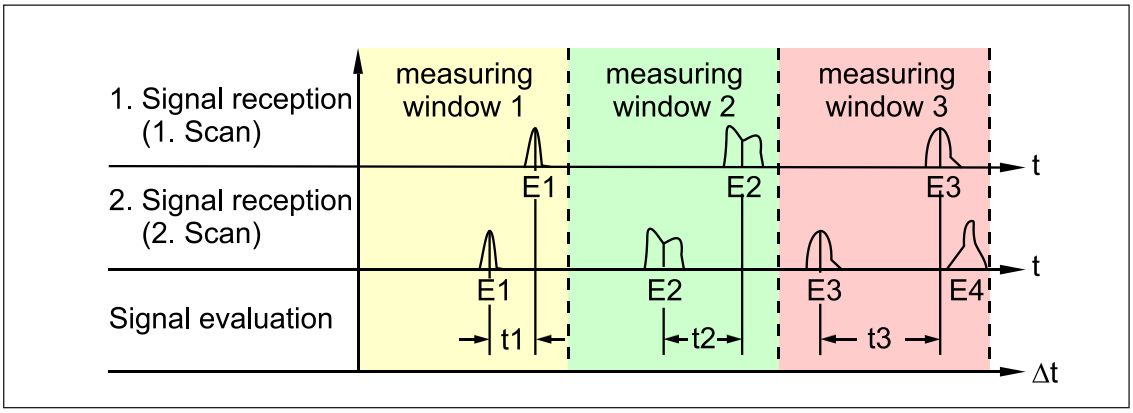


Fig. 4-4 Echo signal images and evaluation

Based on the beam angle, the interval between both transmitted signals and the shift of the signal pattern therefore in each single measurement window the flow velocity can be determined.

It mathematically strings the single flow velocities together which results in the flow profile of the acoustic path.

This velocity profile is indicated directly on the display of the NivuFlow.

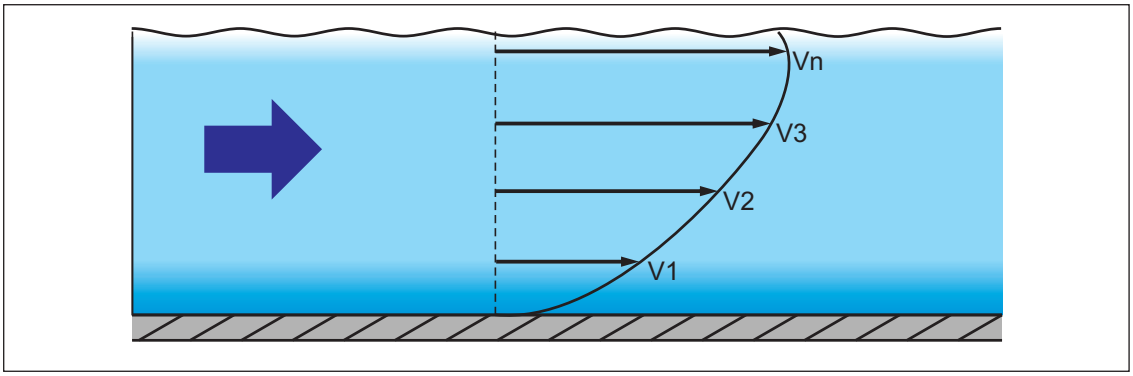


Fig. 4-5 Determined flow profile

If a sufficient calming section is available on the measurement place it is possible to compute a 3-dimensional flow distribution (see Fig. 4-6) .

The result is based on the geometric data of the flume and the velocity distribution.

In asymmetric flow profiles and heavily structured profiles it is recommended to use more than one flow velocity sensor. The entered sensor positions and the according individual vertical V-profiles are included with the overall 3D-profile and are indicated as well.

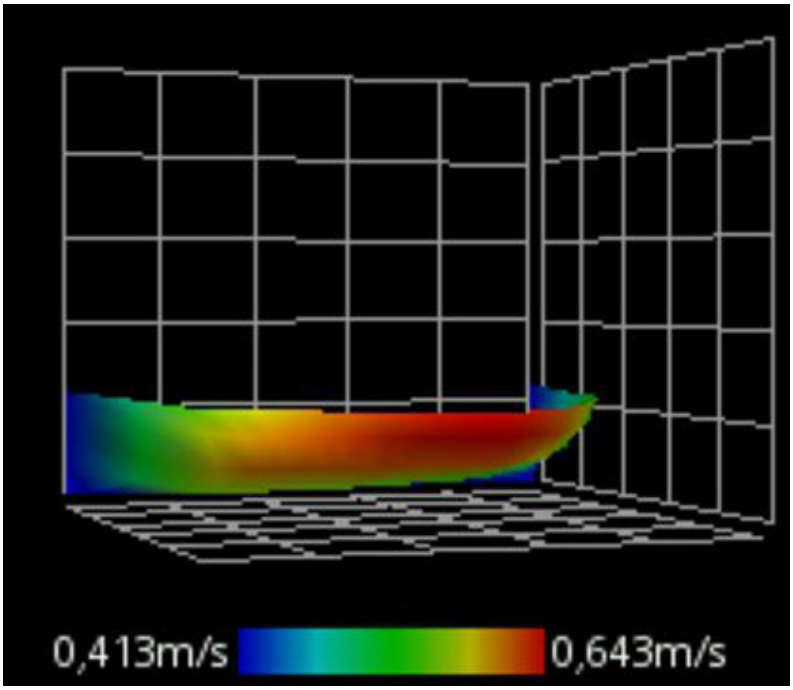


Fig. 4-6 Computed 3-dimensional flow profile

Taking this flow velocity distribution as a basis, the flow rate can be calculated and indicated by considering channel shape, channel dimensions and filling level. This flow rate is available as free programmable analog signal or as impulse signal on the transmitter output.

5. Installation and Connection

5.1 Installation Instructions

During the installation, ensure that the following instructions regarding ESD and installation place.

☞ Never operate the device without the four blue plastic cover strips!

☞ Follow applicable legal or operational guidelines!

Improper handling can result in injury and / or damage to the equipment.

WARNING

Danger from electrical current

Without the four blue plastic cover strips the protection against electrical shock is not guaranteed.
Do not operate the device without the four blue plastic cover strips.
Non-observance may result in personal injuries.

5.1.1 Hints on how to avoid electrostatic discharge (ESD)

ESD risks

Maintenance procedures which do not require power supply of the instrument shall not be executed before the unit has been disconnected from mains power in order to minimise danger and ESD risks.
Disconnect the NivuFlow from mains power.

The sensitive electronic components inside the unit may get damaged by static electricity. The manufacturer recommends the following steps to prevent the device from getting damaged due to electrostatic discharge:

☞ Discharge static electricity from your body before touching the instrument's electronic components.

☞ Avoid unnecessary movements to reduce the risk of building up static electricity.

5.1.2 Choosing the installation place

The NivuFlow with DIN rail fastening is conceived for installation in switching cabinets. It can be also installed in field enclosures or similar. Due to the protection degree, NivuFlow 750 is not suitable to be installed directly on site without protective measures.

☞ Pay attention for adequate ventilation at the installation place.

☞ During installation make sure that possibly existing separating devices (power switch) remain to be easily accessible.

Choose the installation place for your instrument considering specific criteria. Strictly avoid:

- direct sunlight
- objects radiating strong heat
- permissible ambient temperature: -20° C to +40° C
- objects with strong electromagnetic fields (frequency converters, high voltage power lines or similar)
- corrosive chemicals or gases
- mechanic shocks
- vibrations
- radioactive radiation
- direct installation close to footpaths or travel ways

Fastening

For fastening use a DIN rail type TS35 according to EN50022 with a minimum length of 140 mm. Fasten the rail horizontally in the intended enclosure/switching cabinet by using at least two screws.

The transmitter is hooked into the DIN rail from above and then is snapped into place diagonally downwards by exerting slight pressure from the front..

5.2 Electric Installation

Important Note

To avoid damage to the instrument the installation shall be performed by qualified expert personnel only.

For electric installation the local regulations in the respective countries (e.g. VDE 0100 in Germany) shall be referred to.

For installation in wet environments or in areas subject to flooding risk, extra protection such as by using a residual-current-operated protective device (RCD) is necessary if required.

Regarding Ex protection check whether the instruments power supply needs to be integrated into the facility's emergency shut-down concept.

Before feeding the rated voltage, transmitter and sensor installation must be correctly completed. Check that the installation is correct.

Observe that the installation shall be carried out by qualified personnel only. Further statutory standards (local), regulations and technical rulings have to be taken into account.

5.2.1 Connection clamp for protective earth conductor and AC power supply

WARNING

Danger from electrical current

The terminal block X1 (connections 15-17) for connection of the earth conductor and AC power supply is as an integral part of the device. It is no plug connection.
The device may only be operated if the terminal blocks are firmly screwed on the screw flange.
Disregarding may result in personal injuries.

Observe the described requirements for connection to the terminal block in chapter 5.7.

5.2.2 Power supply DC

The DC version of NivuFlow 750 can be directly operated from the 24 V direct current network of a control cabinet. The input voltage available at the input clamps must not fall below 10.0 V at maximum load (20 W). The clamp voltage at no-load operation is not allowed to rise above a maximum of 35.0 V.

5.2.3 Power supply AC

The AC version of NivuFlow 750 can be directly operated from the low-voltage network. The AC power supply requirements are described in chapter 3.5 Specifications.

The cross-sectional dimension of the power supply wires must be 0.75 mm² and must be in accordance to IEC 227 or IEC 245.

CAUTION

Risk of electric shock

The power supply must be separately protected by a 6 A slow-blow fuse and has to be isolated from other facility parts separate turn-off, e.g. by using an automatic cut-out with >B< characteristics). This separator should be marked conveniently.
Disregarding may result in personal injuries.

5.2.4 Relays

Observe the connection and switching specifications of the relays (see chapter 3.5 Specifications). The reliability of the switching contact deteriorates if the minimum switching current is lower than specified.

WARNING

Risk of electric shock

Contact protection according to the requirements as specified in EN 61010-1:2010 is not guaranteed in the event of relay voltages >150 V due to the testing pin terminal of the relay clamp blocks.
Take all necessary protection against electrical shock according to the laws and regulations!
For example: Open the cabinet/field enclosure only by the use of a tool or key,
or use fault-current circuit breaker or similar.
Disregarding may cause personal injury.

CAUTION

Risk of electric shock

The relay contacts of the instrument shall be protected using 6 A slow-blow fuses as soon as voltages in the low voltage range (such as AC supply voltages) are to be switched via the instrument's relay contacts. Moreover these contacts shall be designed so as to be switched off independent from other circuit parts. DC units shall be equipped with an appropriate protective earth conductor in order to avoid dangerous voltages or currents.
Disregarding may cause personal injury.

5.3 Sensors

5.3.1 Cable for sensor connection

Between sensor and transmitter (direct connection non Ex):

For the complete distance between the NIVUS sensors and transmitter type NivuFlow 750 use the specified cable of NIVUS LiYC11Y 2 x 1,5mm² + 1 x 2 x 0,34 mm² + PA.

Between sensor and iXT/MPX:

If a NIVUS standard cable LiYC11Y 2 x 1,5mm² + 1 x 2 x 0,34 mm² + PA is used, the maximum cable length of 150 meter between sensors and iXT/MPX is possible.

This cable length will reduce to 135 m if overvoltage protection elements are used on one side. Using protection on both sides will reduce the max. cable length to 120 m (see chapter 5.4).

Between iXT/MPX and transmitter:

If a NIVUS cable type LiYC11Y 2 x 1,5mm² + 1 x 2 x 0,34 mm² + PA is used, the maximum distance between iXT and the transmitter is 50 m.

The use of NIVUS overvoltage protection elements on one or both sides does not influence the possible cable length .

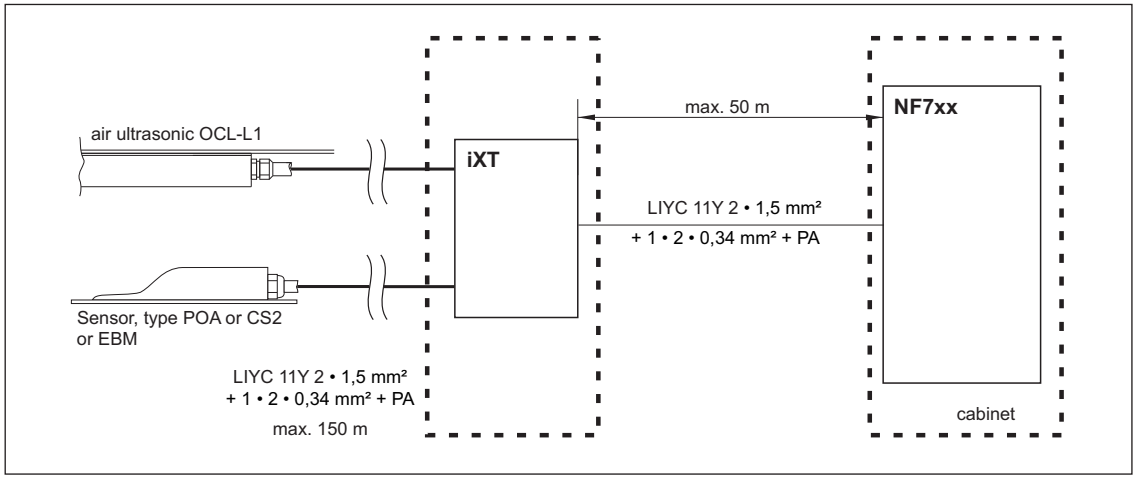


Fig. 5-7 Connecting Ex-separation interface iXT to NivuFlow via standard cable

The alternative use of a telecommunications cable type A2Y(L)2Y allows the extension of the distance between MPX and iXT up 250 m. To do so, 9 wires for power supply and GND each are combined. One wire pair is used for RS485 communication.

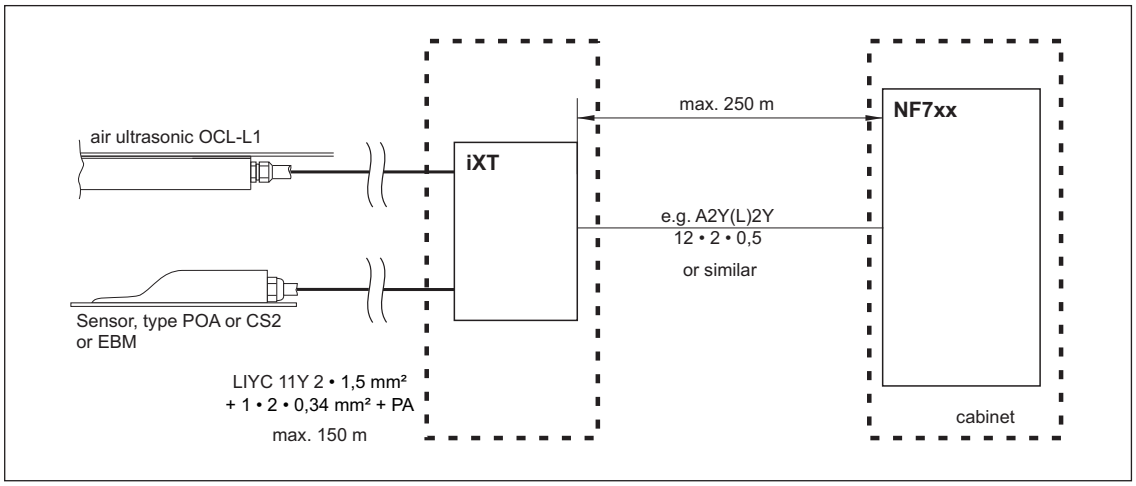
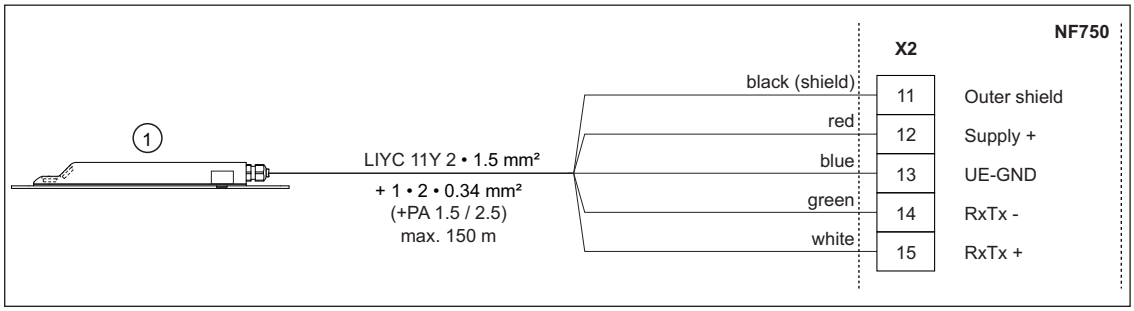


Fig. 5-8 Connecting iXT to NivuFlow via telecommunications cable

5.3.2 Sensor Connection

Flow velocity and water ultrasonic combi sensors

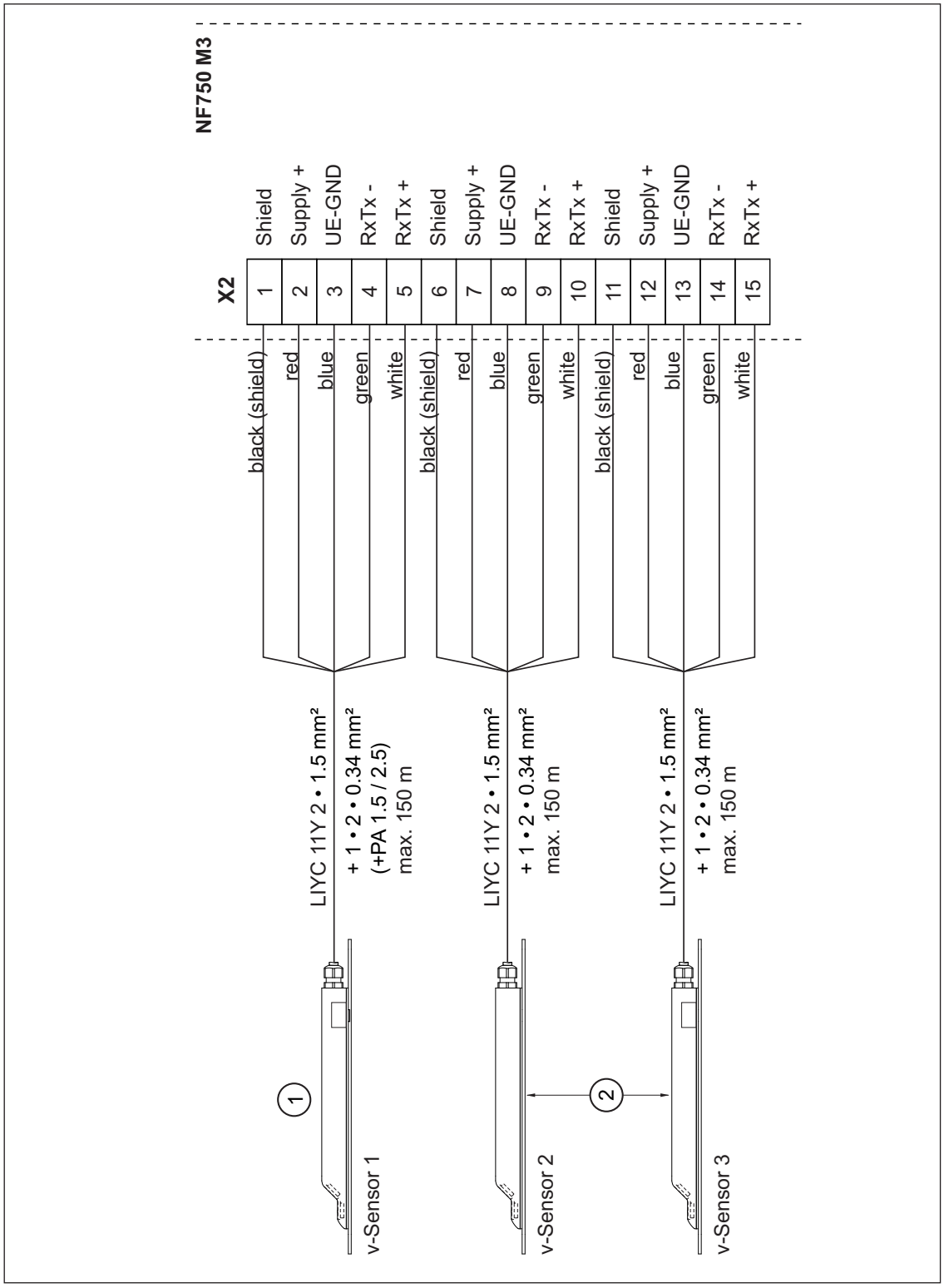


1. Connectable flow velocity sensors

Fig. 5-9 Connecting flow velocity sensors to NivuFlow 750, Type S1/SR

This flow velocity sensors can be connected to the Nivuflow:

- POA-V200
- POA-V2H1
- POA-V2D0
- CS2-V100
- CS2-V200
- CS2-V2H1
- CS2-V2D0
- CS2-V2U1



1. Sensor 1 (leading sensor) - or Electronic box
2. Sensor 2/3 (additional sensors for flow velocity) - or Electronic box

Fig. 5-10 Connecting 2/3 flow velocity sensors to type M3

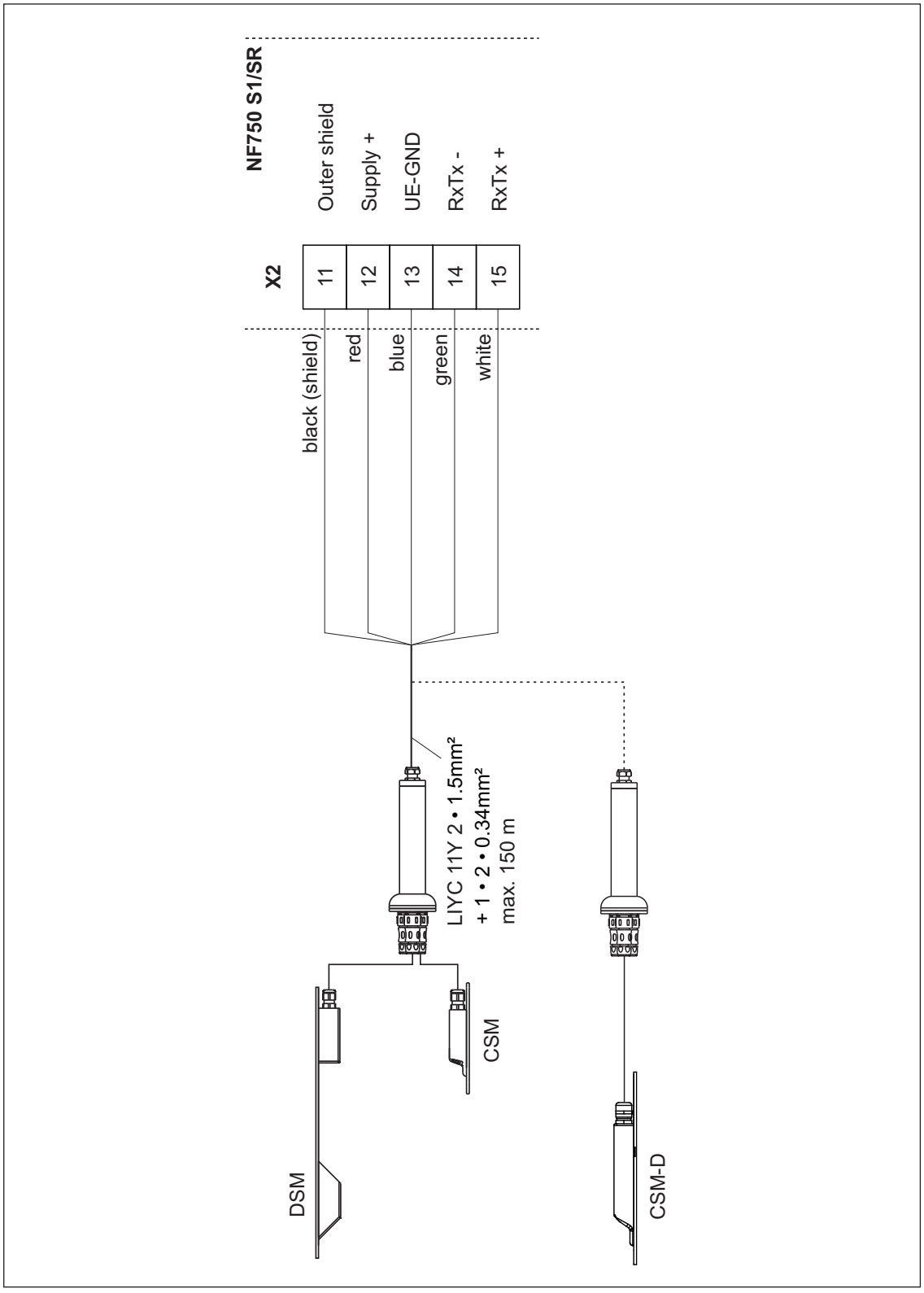


Fig. 5-11 Connecting Mini sensor family to type S1/SR

Connecting a CSM-D sensor is exactly the same as the CSM / DSM.

To connect 2 or 3 Electronic boxes, proceed as described the connection of flow velocity sensors in Fig. 5-11.

Make sure, that the Electronic box is connected as lead sensor (v-sensor 1) if you use a DSM sensor for level measurement.

Flow velocity sensor with integrated pressure measurement cell

Observe the following connection notes when connecting a flow velocity sensor with integrated pressure measurement cell to NivuFlow 750, type M3:

- use only one sensor with integrated pressure measurement cell
- connect the sensor with integrated pressure measurement cell to the terminal for v-sensor 1 (lead sensor)
- the other two sensors do not need to be equipped with an integrated pressure measurement cell

The exact sensor connection procedure is described in the **>Technical Instruction for Correlation Sensors<**.

However note:

- Flow velocity sensors with integrated measurement cell must be operated with a pressure compensation element only.

Note

The pressure compensation element serves as connection socket for cable extension at the same time. Please observe not to exceed the maximum cable length between sensor and transmitter of 135 m (443 ft.) in Ex areas in consideration of the maximum permissible line resistance.

The installation of the flow velocity sensors is described in the separate **>Installation Instruction for Correlation and Doppler sensors<**.

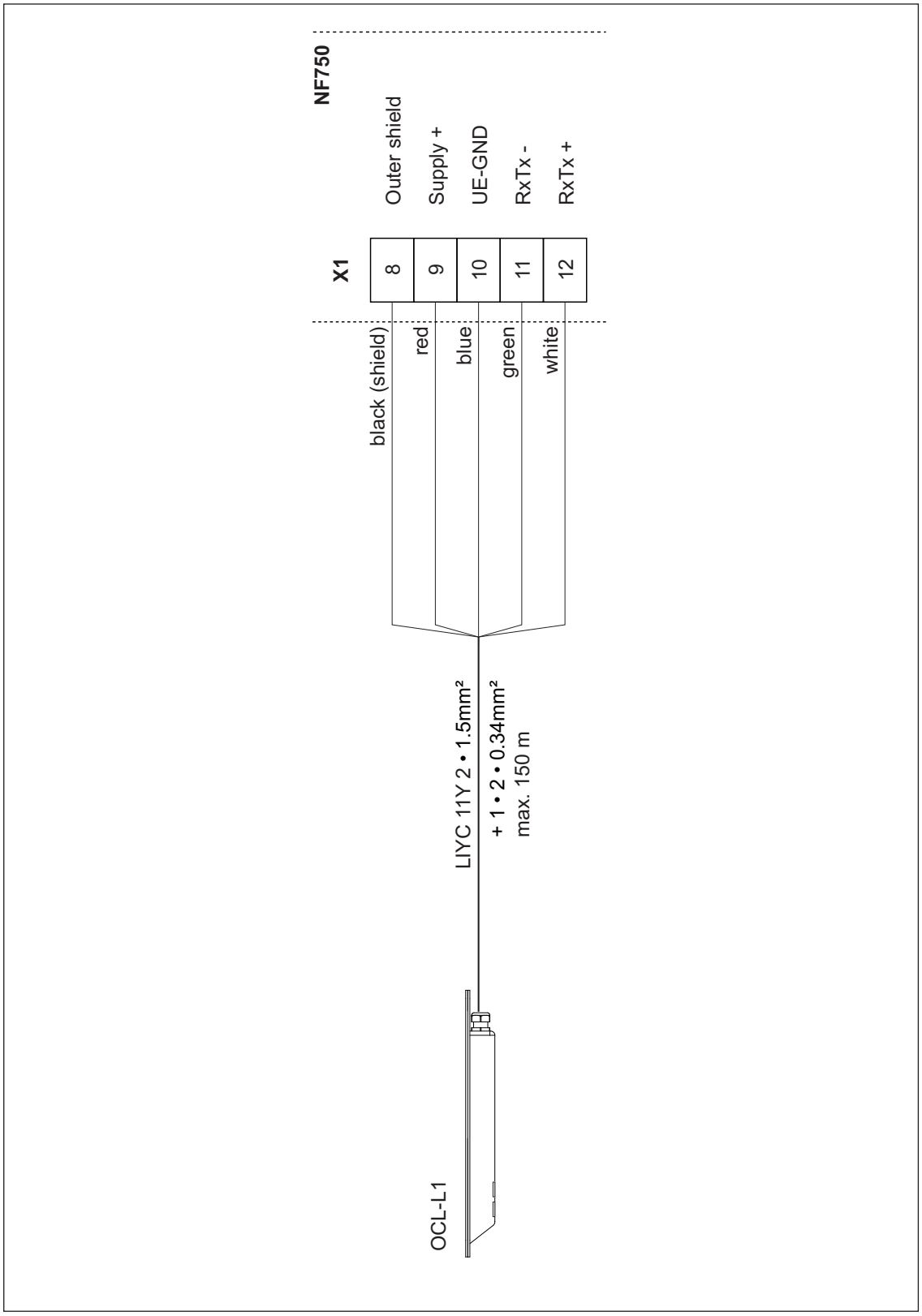


Fig. 5-12 Connection air ultrasonic sensor, type OCL

Level via 2-wire sensor

The level measurement can also be carried out by a 2-wire sensor (NivuBar, NivuCompact 2-wire echo sounder or similar) which is supplied by the NivuFlow.

☞ Connect the 2-wire sensor to the following terminals:

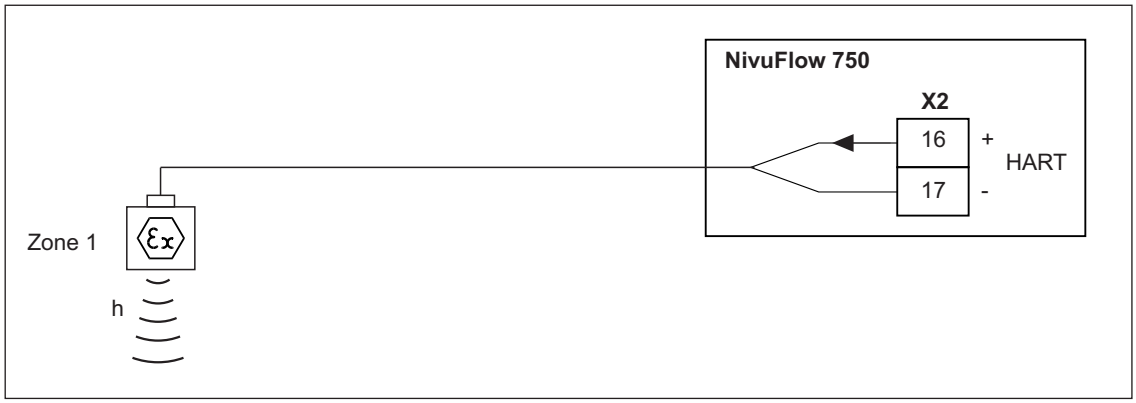


Fig. 5-13 Connecting a 2-wire sensor EX for level measurement

If the mA signal of the level measurement is provided from an external transmitter (e.g. NivuMaster), the transmitter must be connected to the following terminals:

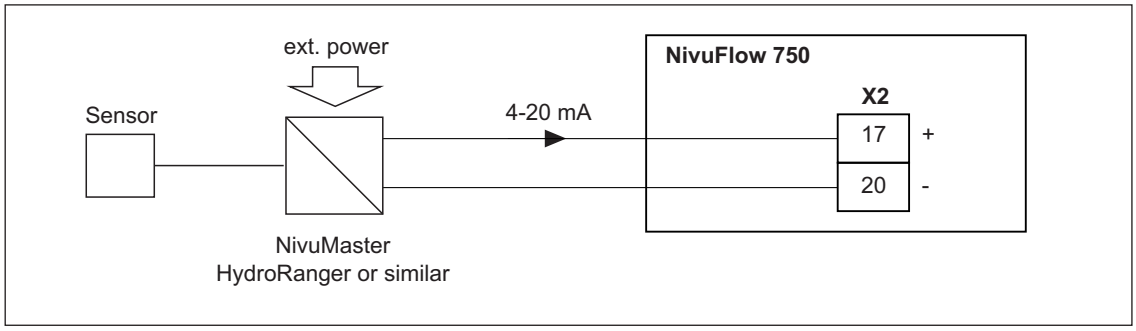


Fig. 5-14 Connecting an external transmitter

5.4 Overvoltage Protection

For effective protection of the NivuFlow transmitter it is necessary to protect power supply as well as mA-output using overvoltage protection devices.

NIVUS recommends surge arrestors types EnerPro 220Tr, EnerPro 24Tr (for 24 V DC) for the mains supply, as well type DataPro 2x1 24/24Tr for mA-inputs and mA-outputs.

The flow velocity sensor as well as the air-ultrasonic sensor type OCL are internally protected against overvoltage. If higher voltages are expected to occur they can be protected by combining the types DataPro 2x1 12/12-11µH-Tr (N) as well as SonicPro 3x1 24 V/24 V.

Important Note

If using the sensors in Ex areas consider the connected loads of the overvoltage protection devices as well as capacity and inductance of the NIVUS sensor cables (POA, CS2, OCL, EBM) additionally!

The maximum permissible NIVUS cable lengths in Ex areas are:

- *single-side overvoltage protection: 135 m (443 ft.)*
- *double-side overvoltage protection: 120 m (394 ft.)*

Note

The use of overvoltage protection elements for sensors in Non-Ex areas will reduce the maximum possible cable length.

The line resistance is 0.3 Ohm/wire. This resistance must be taken into account considering the allowed total resistance (see “Technical Instructions for Correlation Sensors” for details).

Note

Observe the non-reversed connection (p-side to transmitter) as well as a correct, straight wiring supply.

Ground (earth) must lead to the unprotected side.

The overvoltage protection devices are ineffective if wired incorrectly!!

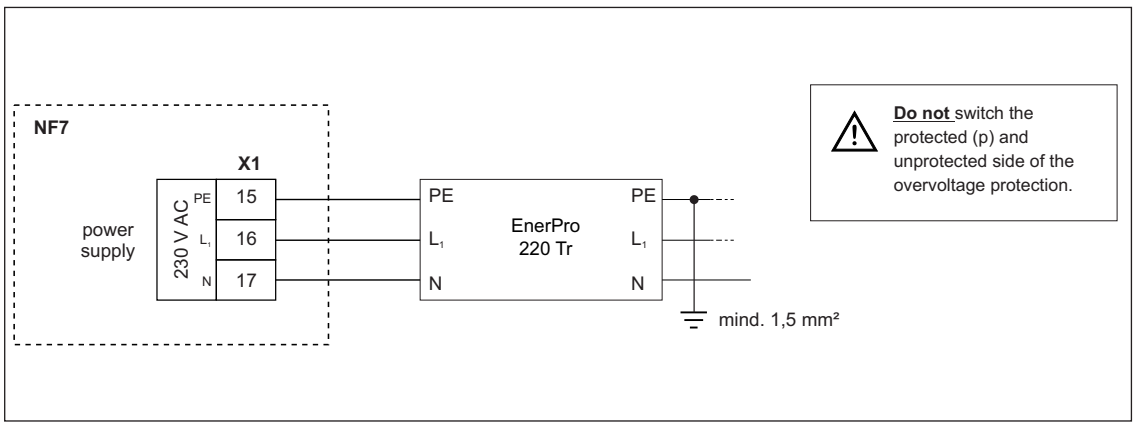


Fig. 5-15 Overvoltage protection for power supply AC

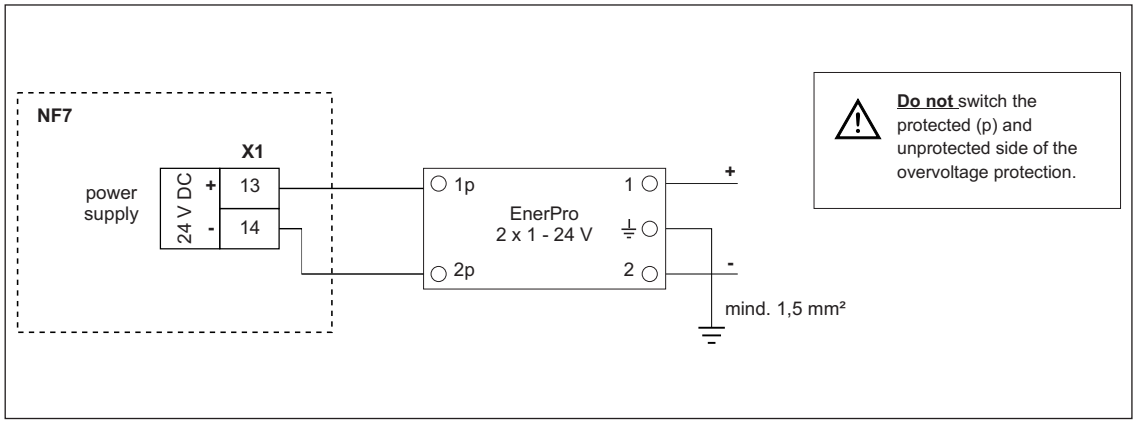


Fig. 5-16 Overvoltage protection for power supply DC

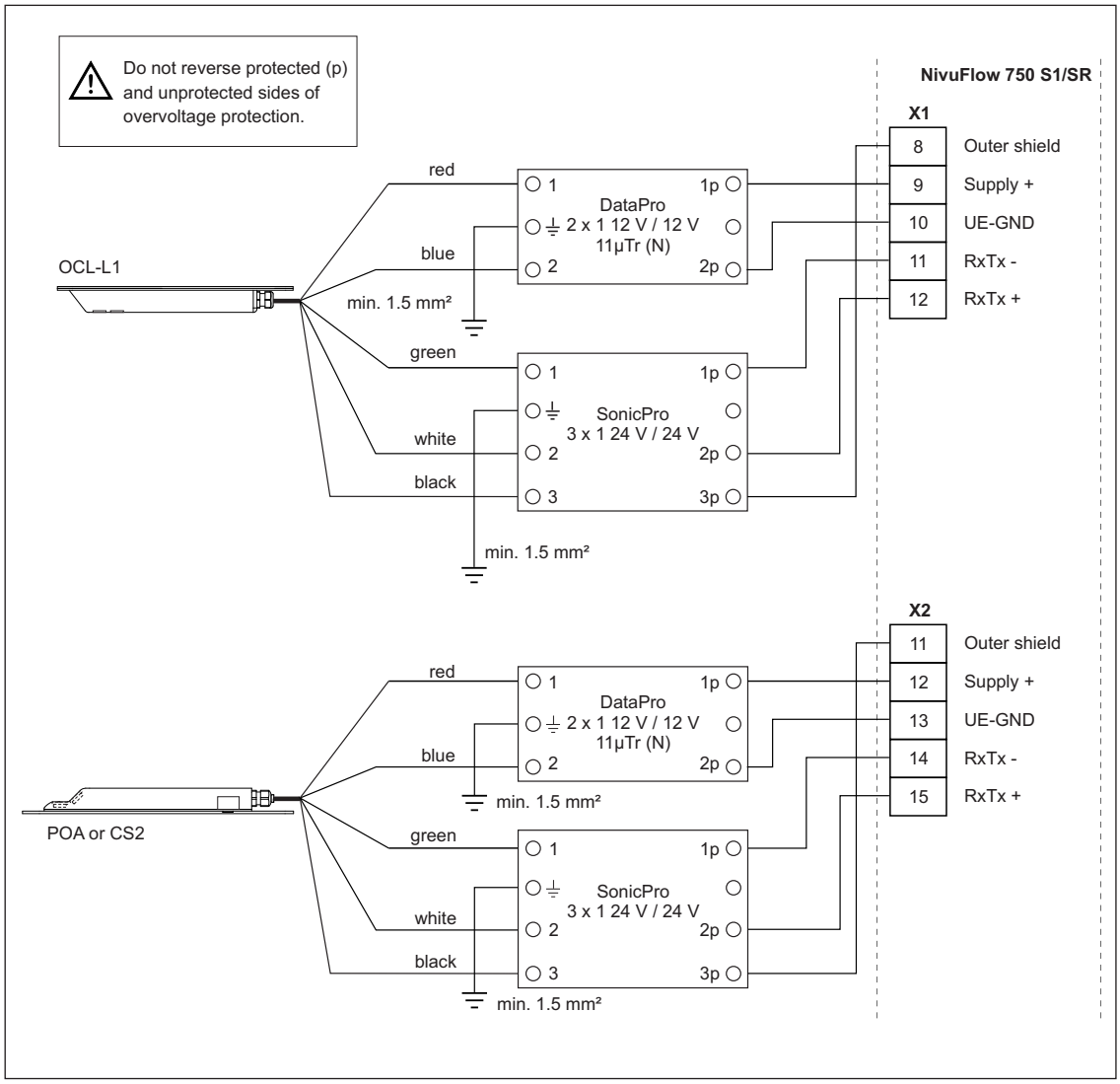


Fig. 5-17 Sensor overvoltage protection for S1/SR

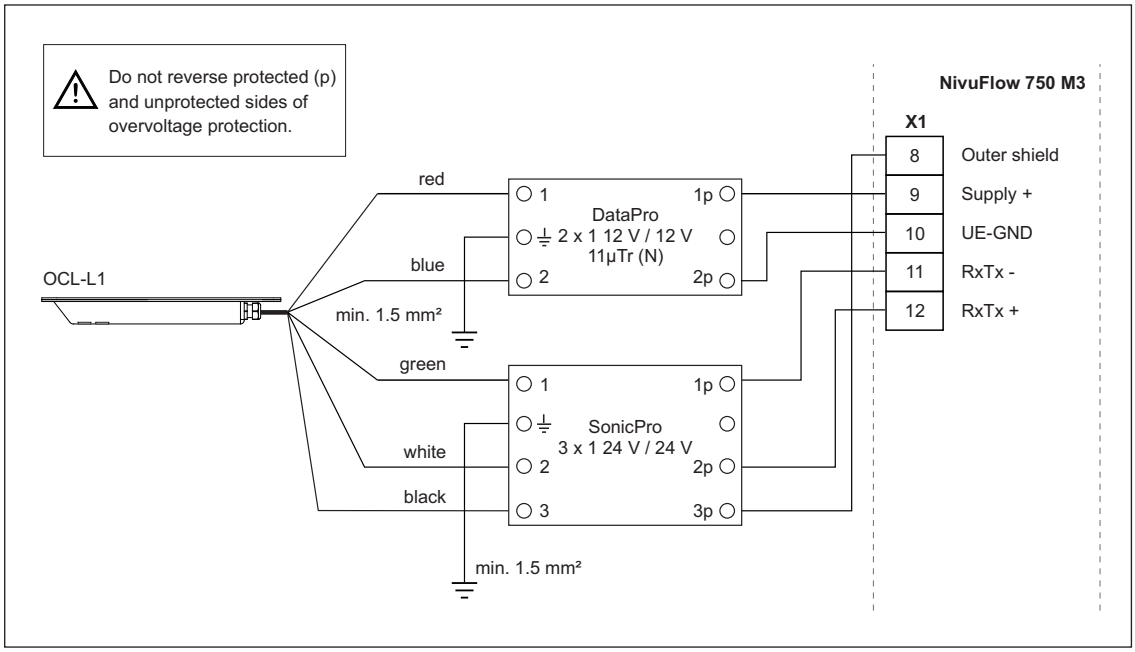


Fig. 5-18 Overvoltage protection air ultrasonic sensor OCL on M3

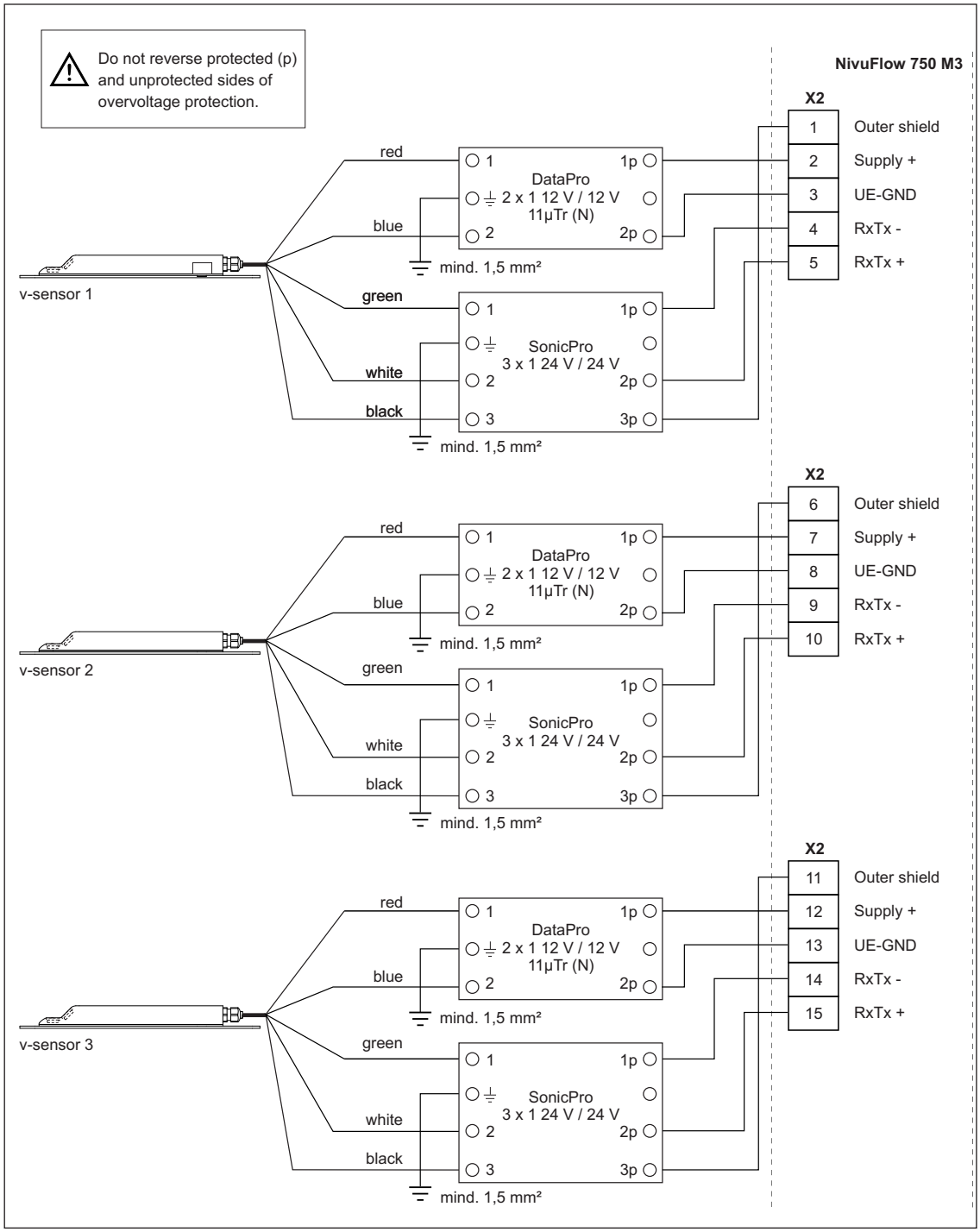


Fig. 5-19 Overvoltage protection Flow velocity sensor to M3

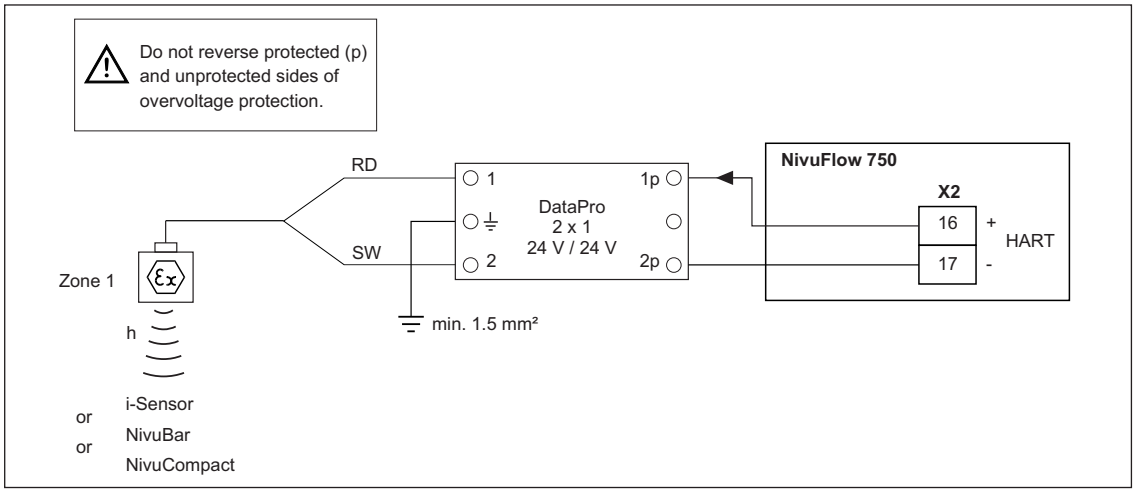


Fig. 5-20 Overvoltage protection external level measurement

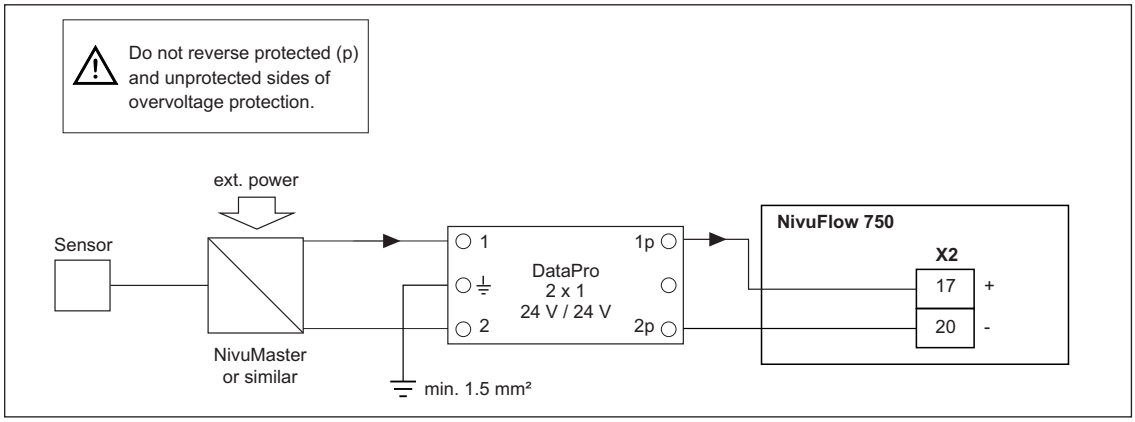


Fig. 5-21 Overvoltage protection of 4-20 mA input from external transmitter

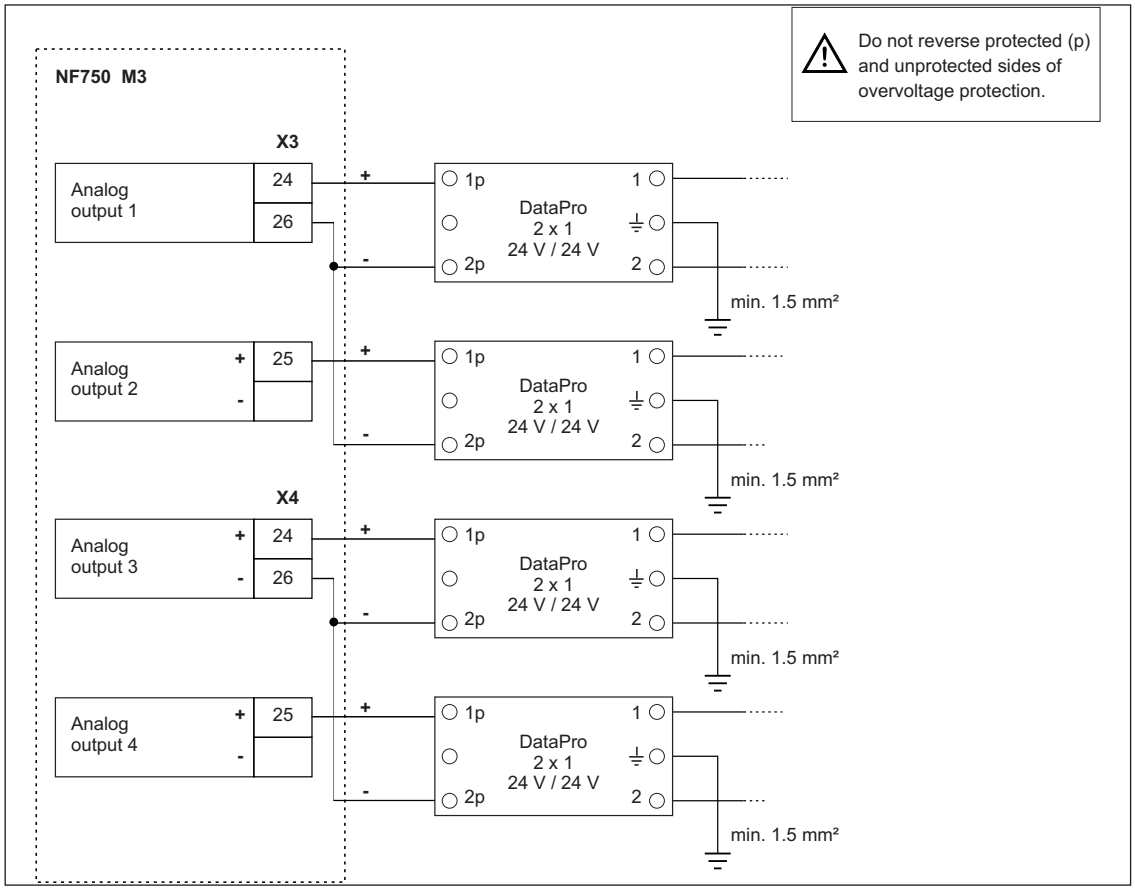


Fig. 5-22 Overvoltage protection analog outputs NivuFlow 750, type M3

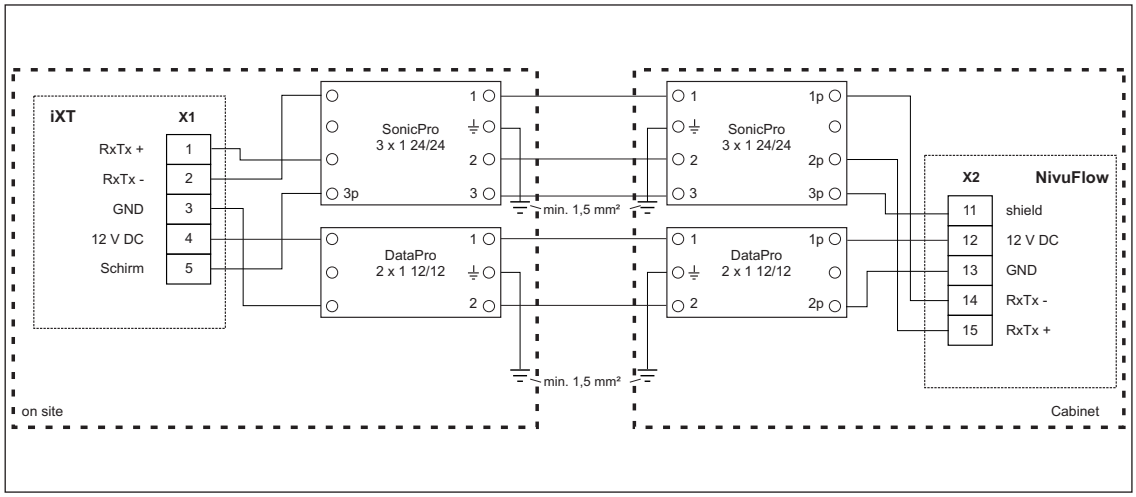


Fig. 5-23 Overvoltage protection iXT to NivuFlow 750 S1/SR

5.5 Connection to the Terminal Blocks

All NivuFlow transmitters are equipped with plug-in spring-cage terminal blocks. The use of these plug-in spring-cage terminal blocks enables an easy pre-installation of the transmitter. This allows a possible revision of individual sensors, input signals and output signals etc. Also a fast transmitter exchange is possible.

The spring-cage terminal blocks are suitable for the connection of single-wire and multiple wire copper cables. These cables are vibration-proof and gas-tight.

To open the contacts on the terminals, proceed as follows:

☞ Press with a slot screwdriver on the front-side orange elements

☞ Observe to not exert too much pressure

Screw terminals are used for connecting the power supply.

To connect the power supply, use a slot screwdriver with a blade width of 3.0 or 3.5 mm. Insert and remove the terminals only in de-energised condition.

WARNING

Risk of electric shock

Multiple wire cables (strands) of the AC power supply circuit as well as of relay connections shall be equipped with ferrules featuring an isolated protective collar (plastic ferrule) to avoid danger due to several protruding wires.
Disregarding may cause personal injury.

Terminal block	Power supply	Bus-/ Network	Terminals A/E etc.	Air-US-sensor OCL as well as v-sensors
wire cross section, rigid cables [mm²]	min. 0,2 max. 2.5	min. 0.2 max. 0.5	min. 0.14 max. 1.5	min. 0.2 max. 2.5
wire cross section, flexible cable [mm²]	Not for DC-connections: min. 0.2 max. 2.5	min. 0.2 max. 0.5	min. 0.14 max. 1.5	min. 0.2 max. 2.5
wire cross section flexible with ferrule blank [mm²]	Not for DC-connections: min. 0.25 max. 2.5	min. 0.25 max. 0.5	min. 0.25 max. 1.5	min. 0.25 max. 2.5
wire cross section flexible with ferrule w. plastic sleeve [mm²]	min. 0.25 max. 2.5	No information	min. 0.25 max. 0.5	min. 0.25 max. 2.5

5.6 Transmitter Connection

5.6.1 Types of Measurement Transmitter

The NivuFlow 750 measurement transmitter is available in 3 different versions:

- Type S1 - Standard version each for one flow velocity sensor, one level sensor and the option to additionally connect an external level sensor
- Type SR - Standard version with extra controller function.
- Type M3 - extended connection options for up to 3 flow velocity sensors

All three versions have the same clamp designations. These blocks are functionally assigned to the different connection areas. The transmitter type SR and M3 have additional terminal blocks.

5.6.2 Connection Diagrams

WARNING

Risk of electric shock

The terminal block for the connection of the protective earth conductor and the AC power supply (X1 connections 15-17) is a fixed component of the instrument. The instrument shall be operated only with the terminal block screwed on tightly using the screw flange. Disregarding may cause personal injury.

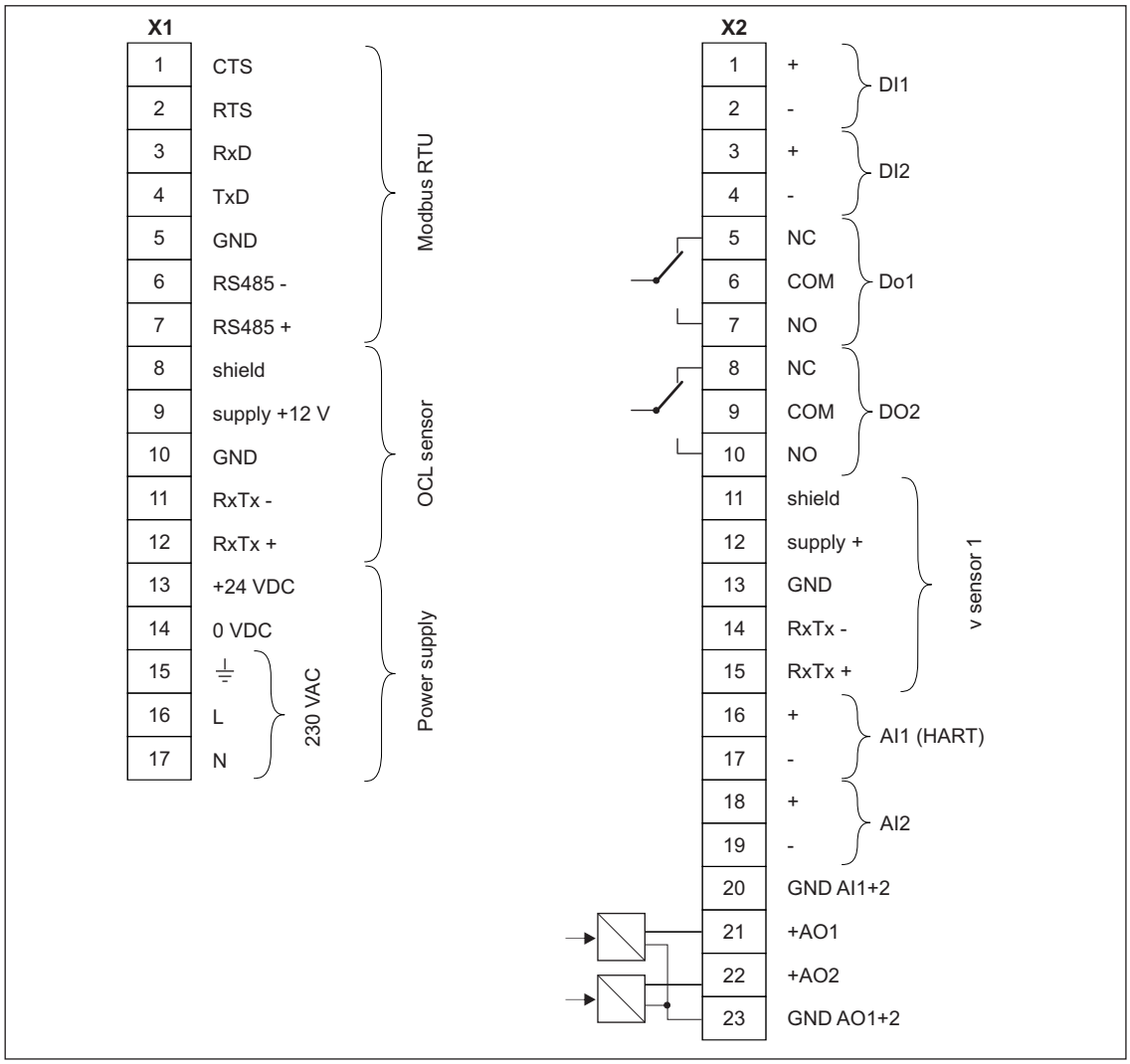


Fig. 5-24 General connection diagram - NivuFlow 750, type S1

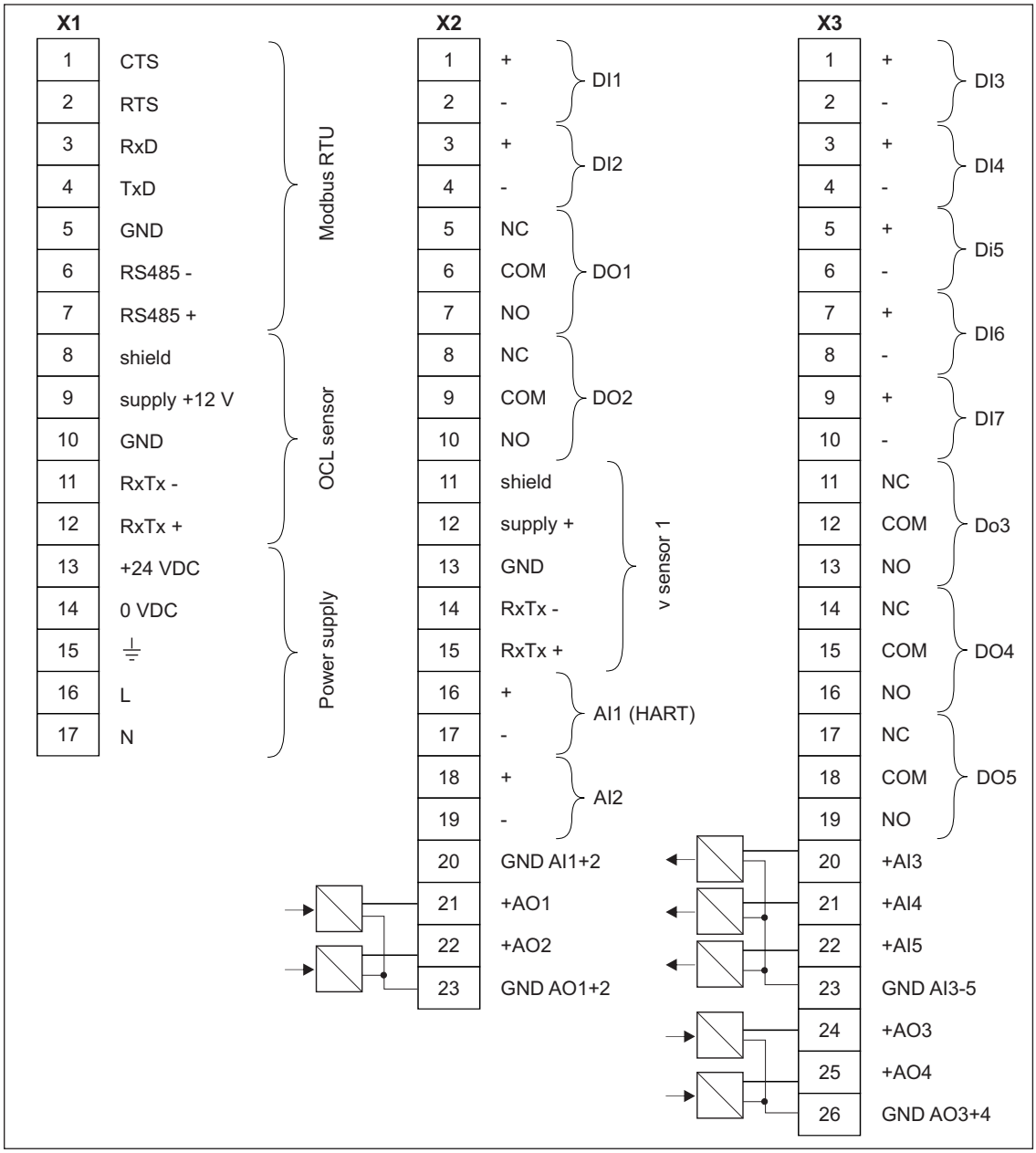


Fig. 5-25 General connection diagram - NivuFlow 750, type SR

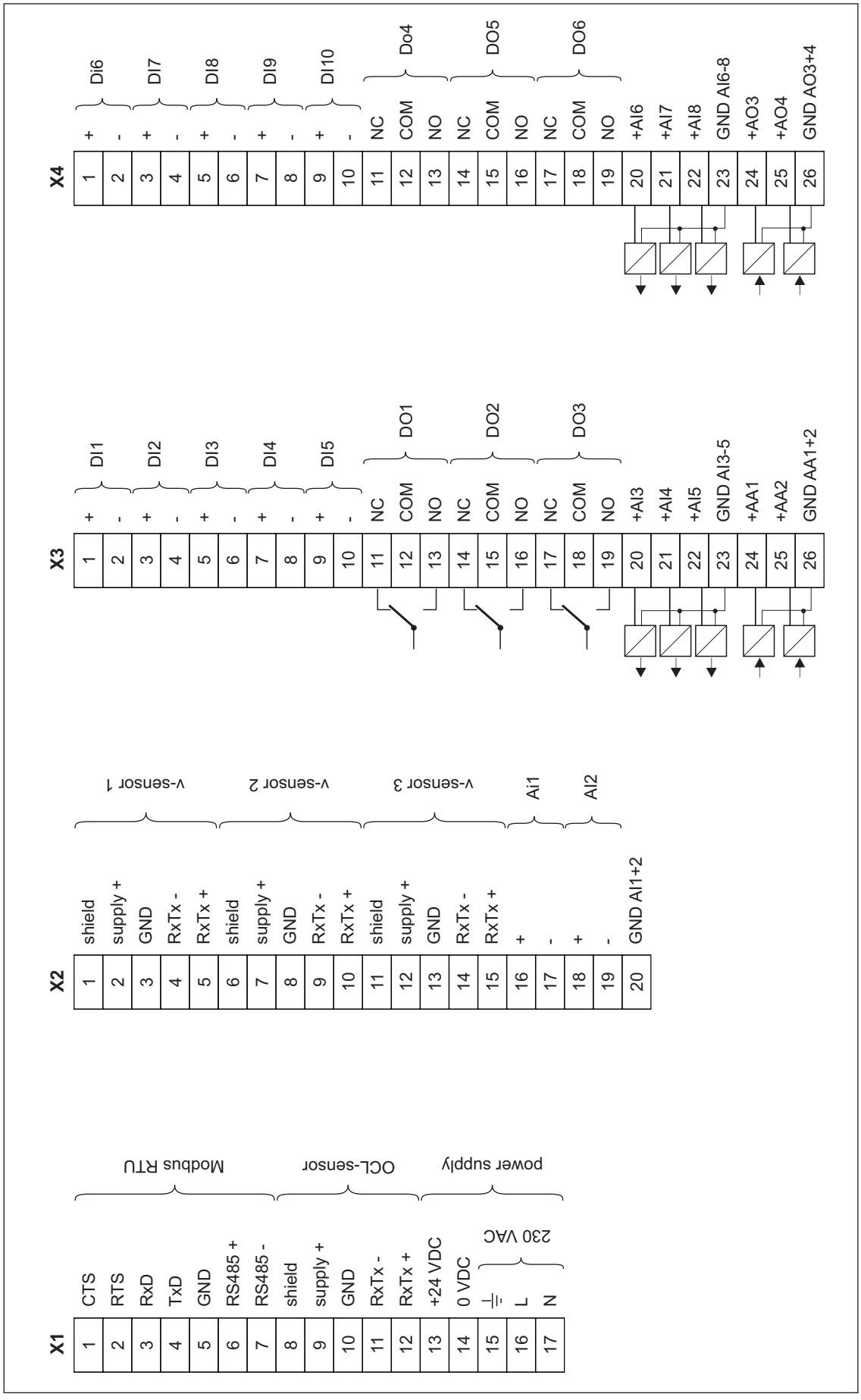
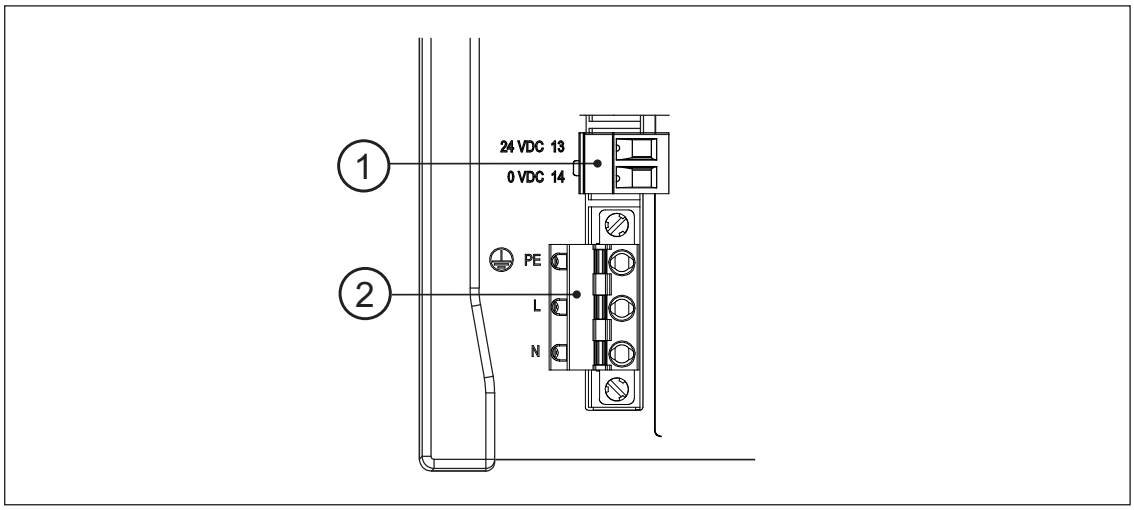


Fig. 5-26 General connection diagram - NivuFlow 750, type M3

5.6.3 Switching on voltage supply

Depending on the type of NivuFlow 750 used the unit can be powered with 100-240 V AC (-15/+10 %) or with 9-35 V DC.



1. 24 V DC connection of type NivuFlow 750
2. 230 V AC connection of type NivuFlow 750

Fig. 5-27 Electrical Connections of power supply NivuFlow

Important Note

A transmitter with 24 V DC cannot be operated with alternating current. Further, it is not possible to operate a 230 V AC transmitter with 24 V direct current.

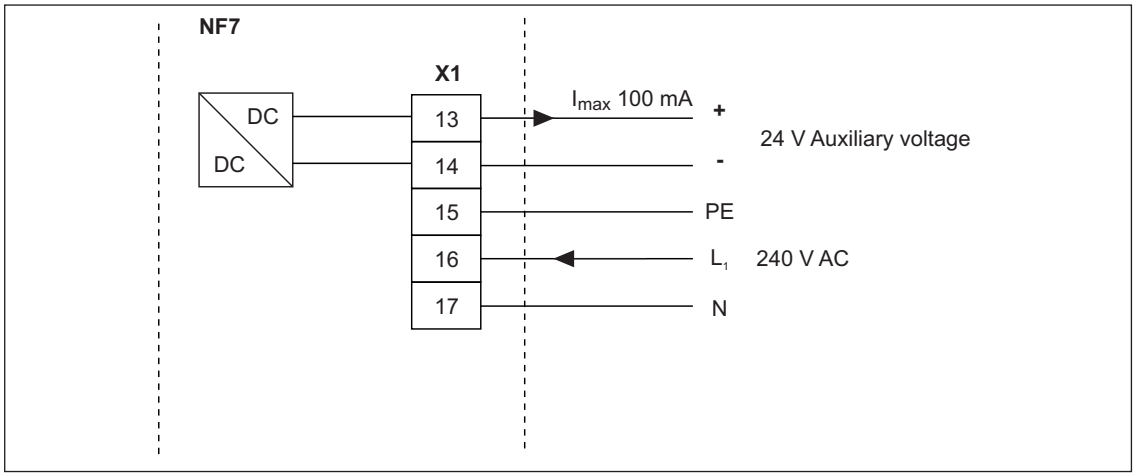


Fig. 5-28 230 V AC connections of power supply

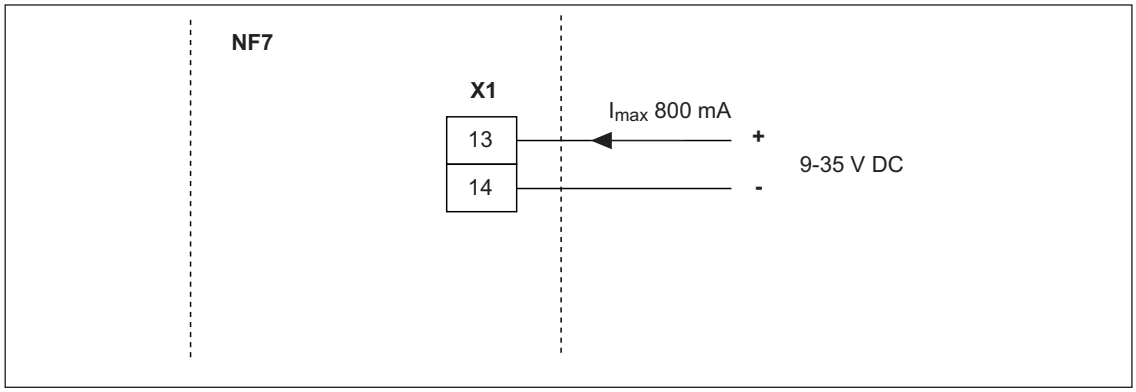


Fig. 5-29 DC connections of power supply

6. Putting into Operation

6.1 General

Notes to users

Before connecting and operating the NivuFlow 750 the instructions below shall be followed!

This instruction manual contains all information required for the setting of parameters and for the use of the instrument. The manual is intended for technically qualified personnel. Appropriate knowledge in the areas of measurement systems, automation technology, control engineering, information technology and wastewater hydraulics are preconditions for putting the NivuFlow into operation.

Read this instruction manual carefully in order to guarantee proper function of the NivuFlow 750 zu gewährleisten. Verdrahten Sie das NivuFlow nach dem vorgegebenen Anschlussbild in Kapitel 5.6.2. In case of doubt regarding installation, connection or the setting of parameters contact our hotline:

- **+49 (0) 7262 9191-955**

General principles

The system shall not be put into operation before the installation has been finished and checked. Follow the hints in the instruction manual to eliminate the risk of faulty or incorrect setting of parameters. Before you begin to set parameters, get familiar with the transmitter operation using entry wheel, function keys and display.

The connection of transmitters and sensors (according to chapters 5.6.2. and 5.3.2) s followed by the setting of the measurement place parameters.

In most cases it is sufficient to set:

- shapes and dimensions of the measurement place
- sensors used and the according positions
- display units
- span and function of analog and digital outputs

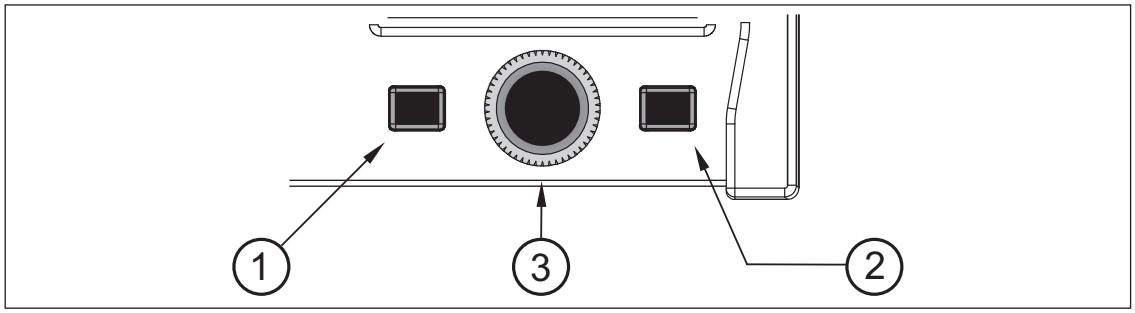
The user surface of the NivuFlow is easy to understand. Users can make all required basic settings themselves.

In case of the following requirements let either the manufacturer or an expert company authorised by the manufacturer set the parameters:

- Extensive programming tasks
- Difficult hydraulic conditions
- Special channel shapes
- Lack of expert personnel
- If the service specification requires a protocol on settings and errors

6.2 NivuFlow Control Elements

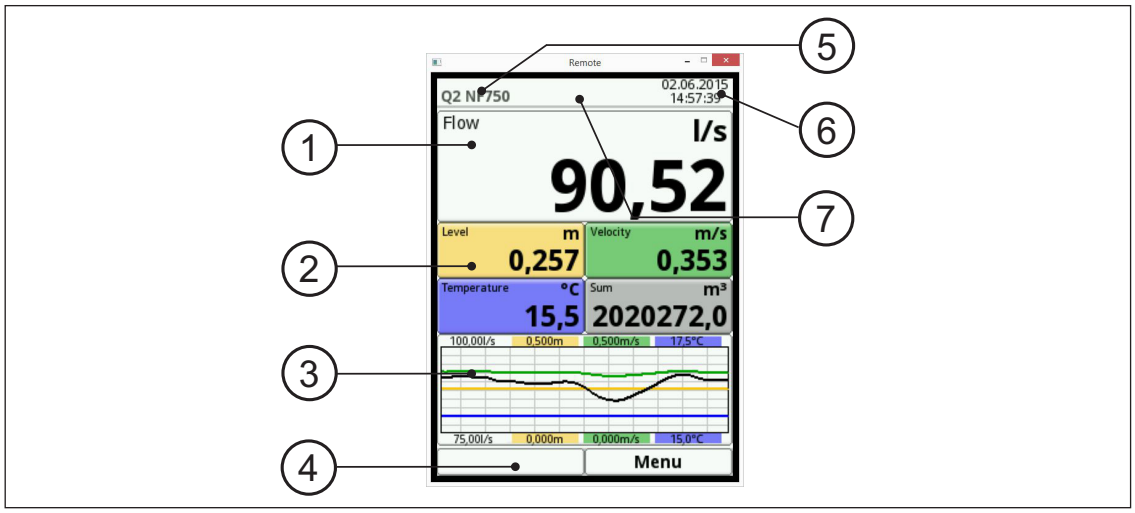
Two control buttons and one rotary pushbutton are available for the setting of parameters and to input required data.



1. Left function key (Back button)
2. Right function key (variable: Menu/Data entry)
3. Rotary pushbutton

Fig. 6-1 NivuFlow control elements

6.3 Display Overview



1. Display area 1 (Output field 1)
2. Display area 2 (Output fields 2-5)
3. Display area 3
4. Functions
5. Name of measurement place
6. Date / time
7. Error message sent or display for active service mode

Fig. 6-2 Display

6.4 Menus

There are six basic menus available which can be viewed and selected by pressing the right function key.

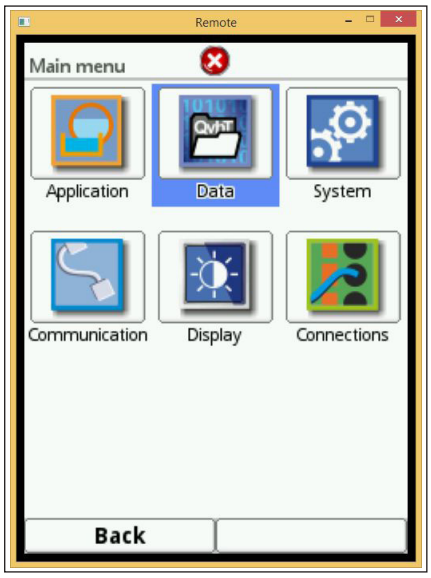


Fig. 6-3 Main menu

The menus are:

Application	This is the most comprehensive menu of the NivuFlow. It guides the commissioning personnel through the entire setting of parameters for the dimensions of measurement places, selection of sensors, analog and digital inputs and outputs, control functions and diagnostics.
Data	This menu allows to visually indicate charts on flow rate, level and average flow velocity. There are tables on 24-hour day totals available. Moreover this menu can be used to save data and parameters as well as to load parameters. An USB stick can be formatted using this menu. It is possible to modify storage cycles and totals here as well.
System	This menu can be used to recall basic information on the transmitter such as serial no., version, art.-no. and many more. You will need this information in the event of queries from the manufacturer. Settings such as language, time and data format can be modified in the country settings. System time as well as time zones can be found in the Time/Date sub-menu. Error messages are available in the according sub-menu. The service level is not described in more detail here.
Communication	This menu contains parameters for all communication interfaces available on the NivuFlow.
Display	Here more basic parameters such as contrast, backlight and display dimming can be adjusted. Moreover the format of the output fields (text, decimal places...) can be set.
Connections	This menu shows the connection options for Ex separation interface and sensor Multiplexer.

6.5 Operation Basics

The NivuFlow is operated completely in dialog mode supported by the graphs on the display. To select individual menus and sub-menus use the rotary pushbutton as well as the both function keys.

Left function key	Is required to exit menus or submenus.
Right function key	Is used to enter the first menu level. This key can also be used to confirm value inputs (numeric keypad or letter keypad).
Rotary pushbutton	Use the rotary pushbutton to enter specific submenus. The functions can be selected using the rotary pushbutton as well. Rotate the wheel until the desired parameter or submenu is highlighted in >BLUE<. Pressing the black centre of the wheel takes you to the next parameter level.

7. Parameter setting

7.1 Parameter Principles

The two function keys as well as the rotary pushbutton are required for the parameter setting (see chapter 6.2).

The transmitter in the background operates with the settings which have been entered at the beginning of the parameter setting. Just after you finish and storing the new entries, the system asks to accept the new values.

7.2 General Overview Main Menu

All settings of the NivuFlow 750 are grouped in total six setup menus. The individual menus are described in this chapter. The options can be found in the main menu as described in the figure below.

Fig. 7-4 Main menu display

Application

This menu is the most comprehensive and most important one when it comes to setting the parameters of the NivuFlow 750.

The application menu contains six submenus where shapes and dimensions of measurement places can be set. Level and flow velocity sensors used can be defined and the according mounting positions can be set here. Moreover the required analog and digital inputs and outputs can be defined here.

The function of the analog and digital inputs and outputs can the configured:

- Functions
- Measurement ranges
- Measurement spans
- Limit values

Within this system, additional functions are:

- 2-point step control programming
- Diagnostics of sensors Inputs and outputs or of the complete system

Constant, fixed sludge levels can be entered and the low flow suppression can be set here. Damping and signal evaluation and signal output stability can be modified here as well.

Data

The data menu contains all internal stored measurement values.

Following functions are available:

- Graphical representation of the measured values
- List of the 100 last 24h-sum values
- Communication and transmission of internal files
- Formatting of the external USB stick
- Transfer of adjusted parameters of measurement place parameters to and from the USB stick
- Various options for setting and erasing the internal data memory
- Storing cycle settings

System

This menu contains transmitter information:

- Firmware
- Article number
- Serial number

Additional the menu contains setting options:

- Language
- Units
- Date and time correction

You can also see the internal error storage displayed.

Communication

This menu includes options for various communication interfaces to connect with other communication systems:

- TCP/IP
- Server
- HART
- Modbus

Display

You can adjust the backlight level of the display. Possible corrections of the five output fields of the main menu.

Connections

Set here whether an iXT intelligent Ex-Separation Module or a sensor multiplexer are connected to the transmitter.

7.3 Application

7.3.1 Measurement Place Settings

This is one of the most relevant basic menus when it comes to setting parameters. The parameter settings of a measurement site contains basic settings for:

- Name of measurement place
- Type of channel profile and channel dimensions
- Possible solid sediments settings
- Low-flow suppression
- Measurement damping and stability

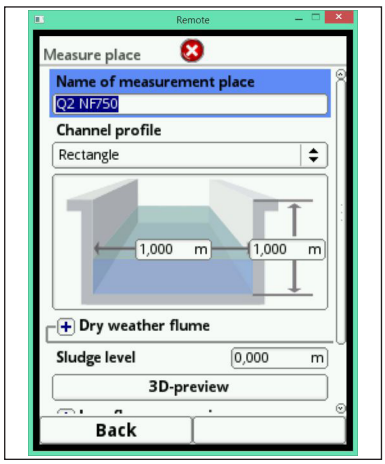


Fig. 7-5 Parameter setting of the measurement place

Once in the main menu choose the application menu, which takes you directly to the parameter settings of the measurement place. Observe the procedures below when setting the measurement place parameters:

☞ Press the rotary pushbutton to enter the menu.

☞ Turn the rotary pushbutton to scroll through the menu. A sub menu can be selected, as soon as it is highlighted blue.

7.3.1.1 Name of Measurement Place

Enter the desired measurement place name here. Your entry is limited to 256 characters.

The default name is “NIVUS1“.

The default name is deleted automatically as soon as the first character of the new measurement place name is entered.

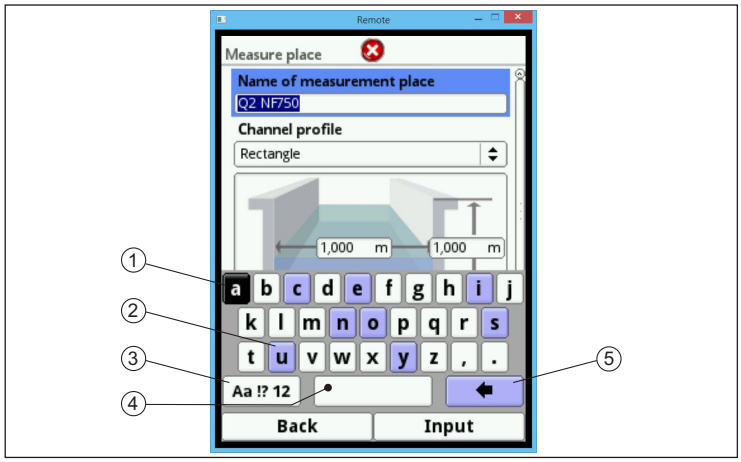
The name of the measurement place is entered by the rotary pushbutton.

☞ Press the rotary pushbutton - a virtual keypad featuring individually selectable letters is indicated in the lower half of the display.

☞ Turn the rotary pushbutton to navigate through the virtual keypad. Characters highlighted blue feature dual functions. Holding the button depressed for approx. 1 sec. switches over to alternative function.

☞ Press the rotary pushbutton until the desired character is highlighted black. By pressing the character is applied to the text box automatically.

☞ Repeat this process until the complete name is on the display.



1. Selected character
2. Dual function character
3. Shift (upper / lower case ...)
4. Space
5. Back or delete button

Fig. 7-6 Keypad

A shift key ban be found at the bottom left of the keypad. Move the cursor to this key to activate by using the rotary pushbutton.

The shift key can be used to select from the following options:

- Upper case
- Lower case
- Special characters
- Digits

This settings allow individual names of the measuring place almost without limitations.

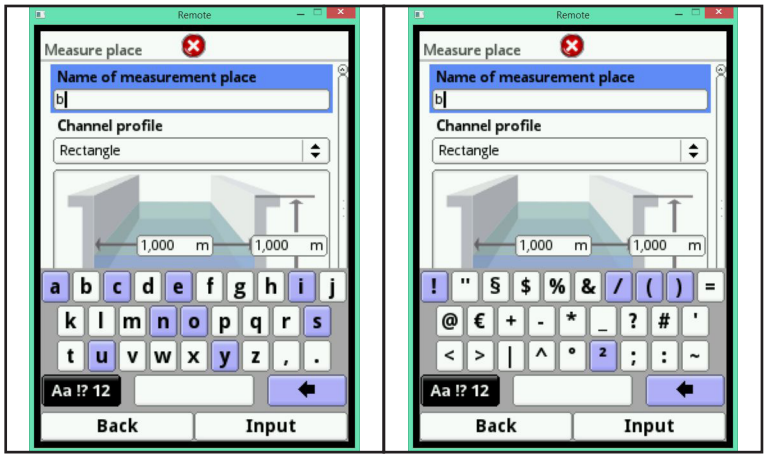


Fig. 7-7 Change key functions

If typed wrong:

- ☞ Open the keypad.
- ☞ Turn the rotary pushbutton until you get to the >back arrow< (back button).
- ☞ Press the rotary pushbutton - this will erase the wrong letter or number.
- ☞ Write subsequently until the complete name is in the text box .
- ☞ Confirm the entry with the right hand function key.

The name of measurement is taken to the main menu and is displayed there.

7.3.1.2 Channel Profile

The NivuFlow 750 allows to select from a wide variety of standardised channel profiles mainly used in practice.

Since particularly older channel systems often have special shapes, the NivuFlow 750 moreover provides the option to enter dimensions or heights/areas of symmetric and asymmetric channels in tables. The profile chosen is shown as graph in the 3D preview box if selected. To indicate the graph the dimensions entered are set in relation to one another.

This visual control is important to instantly see whether the profile has been basically created correctly. Particularly for free profiles this kind of direct verification is helpful.

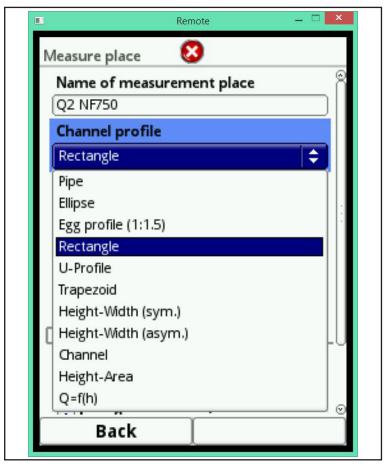


Fig. 7-8 Selectable channel profiles

Basic selection of channel profiles:

☞ Turn the rotary pushbutton until the “channel profile” is highlighted blue.

☞ Press the rotary pushbutton. This opens a drop-down menu.

☞ Turn the rotary pushbutton and select one of the defined profiles.

☞ Confirm the selected profile by pressing the rotary pushbutton again.

The selected profile will be displayed.

Pipe

This selection is suitable for round pipes, however can be used for half shells featuring a filling level of 50 % max. as well. Deformed pipes featuring asymmetric height/width ratio can be set using the ellipsoid geometry selection. For U-profiles there is an extra selection available.

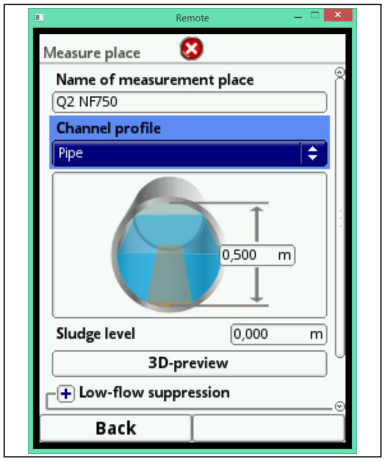


Fig. 7-9 Selection pipe profile

After you selected the geometry, enter the pipe diameter.

☞ Turn the rotary pushbutton until the profile graphic is marked with a blue frame. At the same time the value of the dimension(s) will be highlighted in blue

☞ Press the rotary pushbutton. A numeric keypad appears.

☞ Now enter the profile dimension values number by number. Use the same procedure as described in how to enter the measurement place name.

☞ Pay attention to the dimension (comma). The default setting of the channel profile dimension units is *METER*.

☞ Confirm the value with the right hand function key.

Fase entries can be deleted number by number using the back button.

Deleting procedure is the same as described in how to enter the measurement place name.

If multiple dimensions need to be entered (such as for trapezoid profiles), you can get to the next dimension after confirming and rotating the rotary pushbutton.

☞ Use the same steps for the next input as described above.

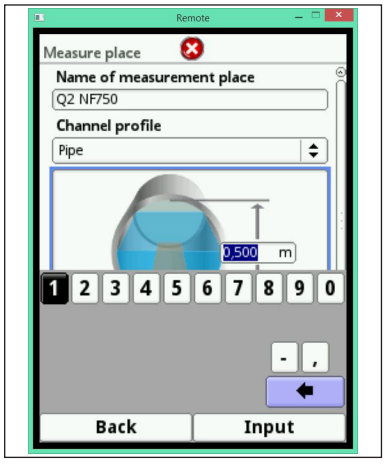


Fig. 7-10 Enter geometry dimensions

Ellipse

Ellipsoid profiles can be found mainly in pipes subject to mechanical loads (lateral pressure or crown pressure). There are also special channel shapes known as ellipsoid profiles.

Symmetric ellipsoid profiles should not be confused with ovoid profiles (egg-shaped)!

Ovoid profiles feature different radii in bottom and crown.

After selecting the ellipsoid profile use the both input boxes to enter the maximum width and height. The dimension entry is described after the Fig. 7-9.

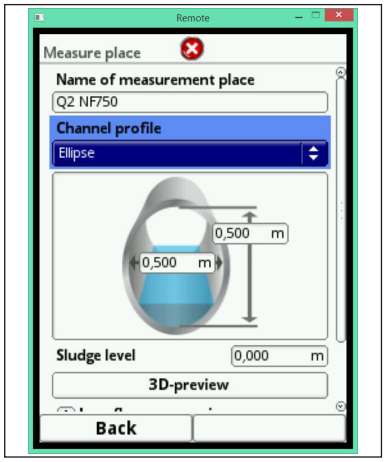


Fig. 7-11 Selection ellipse

Ovoid profile (1:1.5)

This channel shape is a “standard egg shape“ according to German DWA A 110 featuring a width/ height ratio of 1:1.5. Squeezed or shrunk ovoid profiles need to be set using a free profile.

When setting the ovoid profile parameters only the maximum channel width needs to be entered. The NivuFlow 750 calculates the height automatically by using the fixed 1:1.5 ratio.

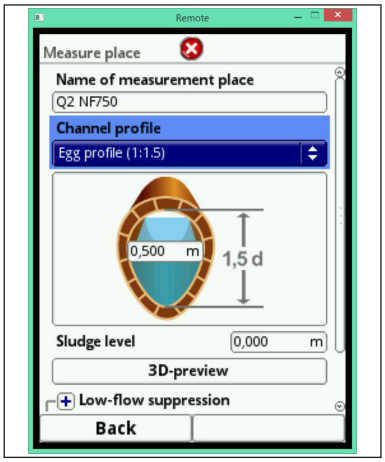


Fig. 7-12 Ovoid profile 1:1,5 settings

Rectangle

This selection can be used to set the parameters of channels featuring vertical walls and a horizontal bottom. The parameters can be easily set by merely entering width and height of the channel. The menu moreover includes the option to set the parameters for channels with a center dry weather flume.

You can select following choices for dry weather channels:

- Gem top circular profile (width > 2x height)
- Half shell (width = 2x height)
- U profile (width > 2x height)

The quickest way to set the parameters for rectangular channels featuring a symmetric dry weather flume and sloped berms is to use the trapezoid function with vertically applied walls. Other dry weather flumes or asymmetric flumes within rectangular channels need to be set as free profiles.

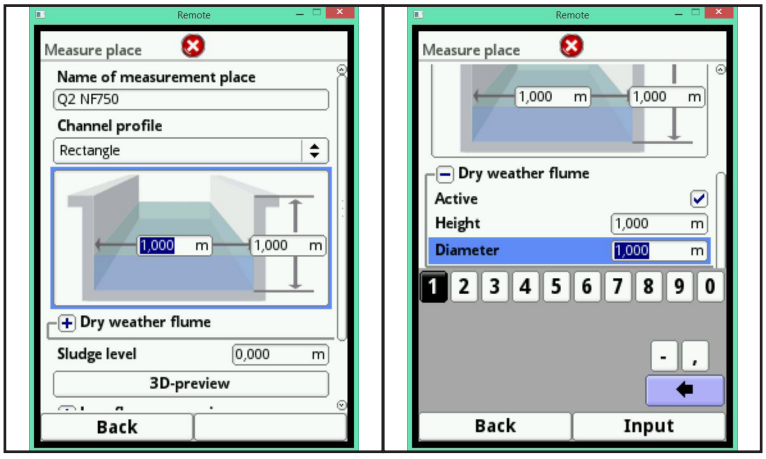


Fig. 7-13 Rectangular profile and extra options

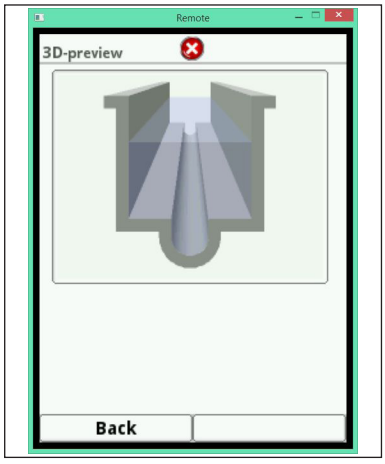


Fig. 7-14 3D graph with dry weather flume

U-profile

The U-profile is composed from a bottom semicircle and vertical walls. The semicircle radius here is ½ the channel width and is entered automatically by the system. Profiles with radii larger than 0.5 x channel width should be created as free profiles.

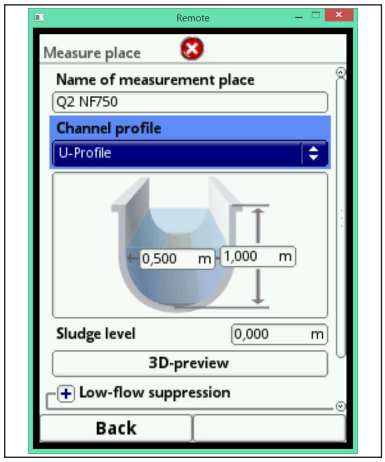


Fig. 7-15 U-profile parameters

Trapezoid profile

This selection allows to set the parameters for symmetric channels featuring a horizontal bottom and sloped walls. Parameters of symmetric channels with a horizontal bottom, sloped walls and featuring vertical walls at the top can be set in this menu too.

Select the 3D preview to verify correct input.

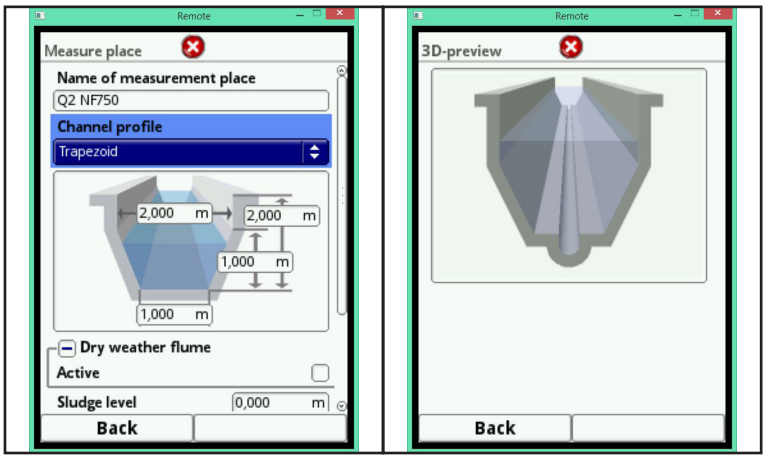


Fig. 7-16 Programming trapezoid profile with rectangular top

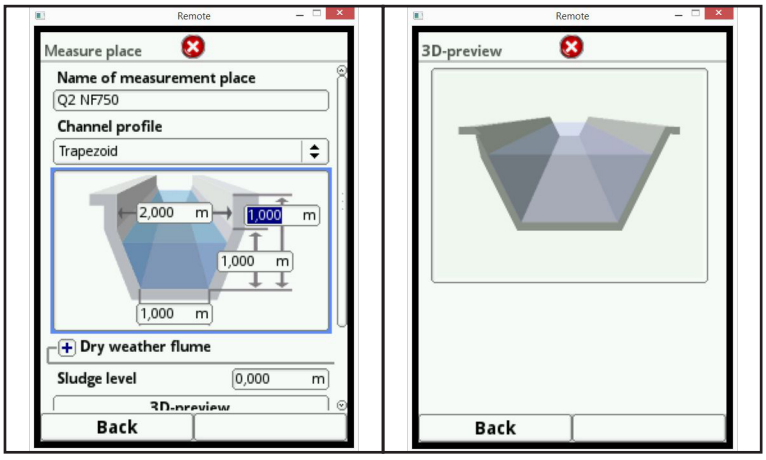


Fig. 7-17 Programming trapezoid profile without rectangular top

Right as with rectangular profiles, a dry weather flume can be added as extra option.

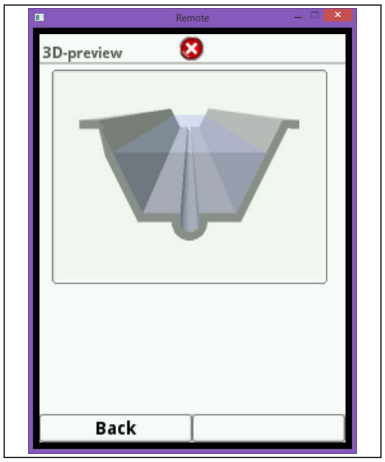


Fig. 7-18 Trapezoid profile with dry weather flume

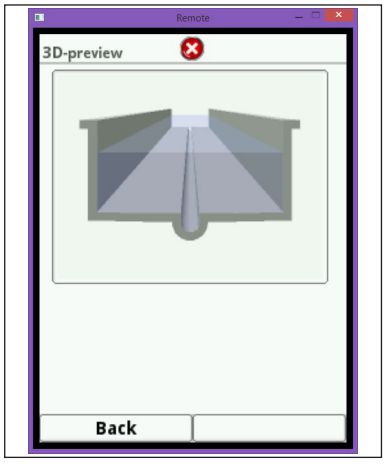


Fig. 7-19 Trapezoid profile with vertical walls and dry weather flume

Fig. 7-19 shows an example of settings for a trapezoid profile with vertical walls and a dry weather flume as rectangular channel with sloped berms.

Symmetric profile using height-width

This menu can be used to set any kind of symmetric profiles.

Selecting the button >Table< Indicates a table of values where a maximum of 32 breakpoint pairs (channel height/channel width) can be entered. The system calculates these values automatically and saves them as symmetric profile in the internal memory.

A true to scale drawing is required to set the channel parameters.

☞ Draw a vertical auxiliary line onto the drawing in the channel center.

☞ Then draw horizontal auxiliary lines on the distinct points where the profile changes.

☞ Measure the length of the auxiliary lines and subsequently convert the length true to scale.

☞ Start at level 0 to define the starting point of the channel.

☞ Enter height and width of all other breakpoints “freely”.

The distance between individual height breakpoints may vary. Not all of the 32 breakpoints need to be necessarily entered in order to define the profile since the NivuFlow 750 linearises between individual breakpoints.

In case of large irregular changes of the channel dimensions select a lower distance between breakpoints in this section.

A proportional graph of the values is indicated after the channel parameters have been set. Thanks to this visual aid, bad programming issues can be visualised and corrected directly if required.

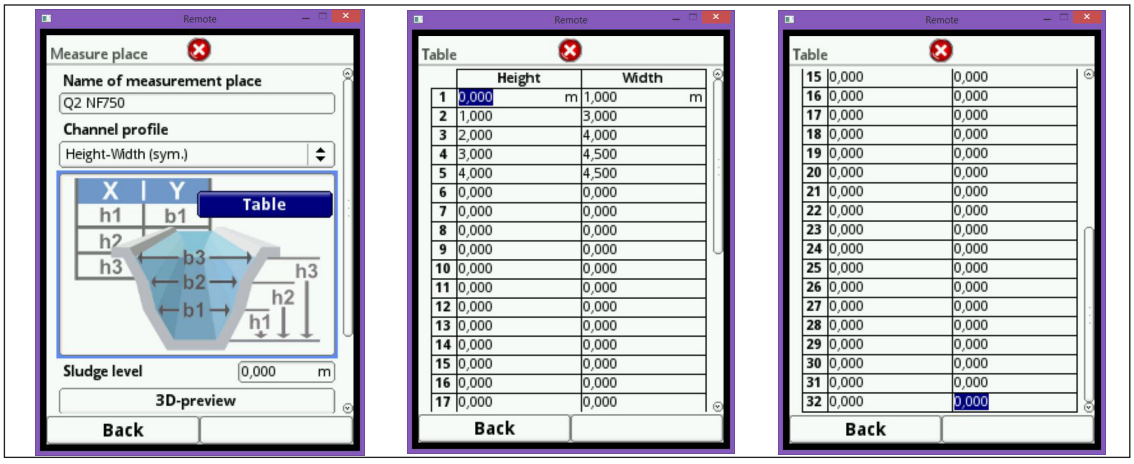


Fig. 7-20 Setting parameters using free symmetric height-width profile

Free asymmetric height-width profile

In practice asymmetric profiles with unusual shapes can be found occasionally. This is where the programming options for asymmetric profiles are used.

Necessarily use a true to scale drawing as described before in the symmetric profiles section.

- ☞ Draw a vertical auxiliary line onto the drawing from the lowest point of the channel to the top.
- ☞ Starting at this line, draw horizontal auxiliary lines from the distinct points of profile changes to the left and to the right.
- ☞ Measure the distances of each of these auxiliary lines starting at the center auxiliary line to the right and to the left.
- ☞ Convert the results true to scale and enter the breakpoints into the 3 value columns as follows:
  height - width to the left - width to the right
- ☞ Start at level 0 to define the starting point of the channel.
- ☞ Enter all other breakpoints “freely”. A maximum of 32 breakpoints can be entered. Channel height, channel width to the left, channel width to the right.

Important Notes

The viewing direction >Width left< or >Width right< is opposite to the flow direction in the channel.

The distance between individual height breakpoints may vary. Not all of the 32 breakpoints need to be necessarily entered in order to define the profile since the NivuFlow 750 linearises between individual breakpoints.

In case of large irregular changes of the channel dimensions select a lower distance between breakpoints in this section.

A proportional graph of the values is indicated here too after the channel parameters have been set. Bad programming is visualised.

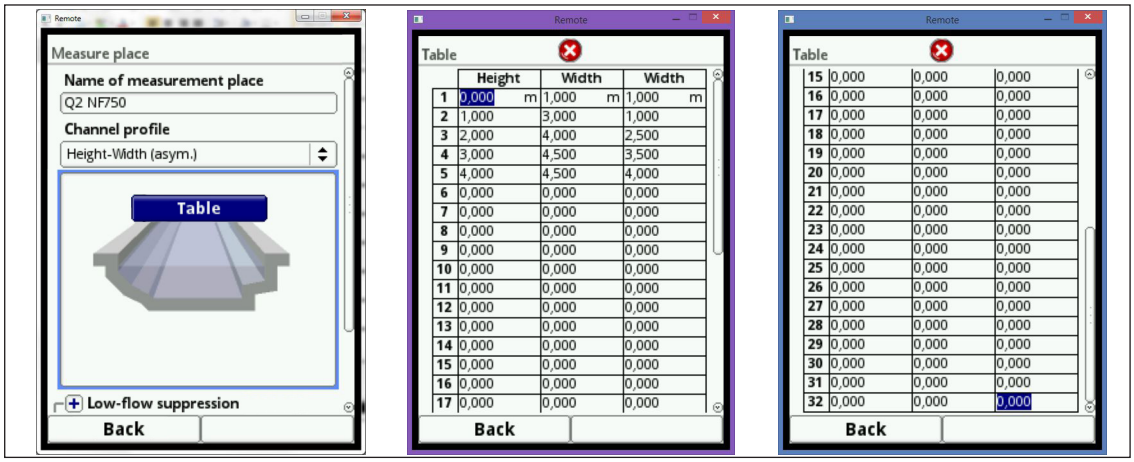


Fig. 7-21 Setting parameters using free asymmetric height-width-width profile

Free symmetric height-area profile

Some hydraulic tables may contain height-area value pairs instead of height-width to specify symmetric channels.

In such cases enter the value pairs into the selected height-area table. The following procedure is the same as with programming height-width profiles. The programmed profile however cannot be indicated as graph here.

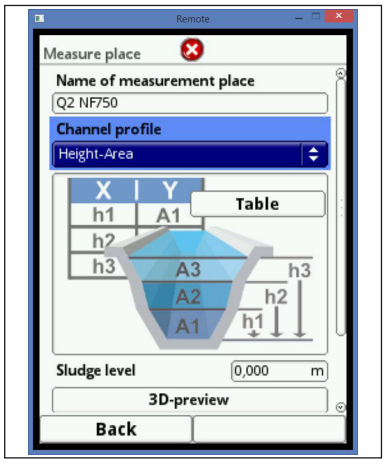


Fig. 7-22 Setting parameters using free asymmetric height-area profile

Q/h-Function

This function significantly varies from the functions described above.

The selection is neither considering the channel profile nor the flow velocity and the communication with flow velocity sensors which may be connected is disabled. The missing flow velocity values will not be considered in to create possible error diagnostics.

The system exclusively operates a Q/h-function. This means that a defined flow rate depending on the currently measured level is indicated. This value is entered into a value table depending on the height. This table can hold a maximum of 32 height-related breakpoints. The NivuFlow 750 linearises between individual breakpoints.

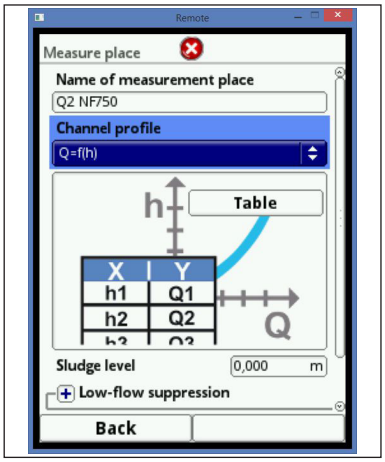


Fig. 7-23 Programming Q/h-characteristics

7.3.1.3 Low-flow suppression

Low-flow rate

This parameter is to suppress lowest movement or apparent flow rates. The main area of use is the measurement of overflow volumes in buildings with permanent dam-up.

☞ Rotate the rotary pushbutton until >Low-flow suppression< Is highlighted. A drop-down menu will open.

☞ Enable the low-flow suppression by pressing the rotary pushbutton. The button symbol toggles between + and -.

☞ Rotate the rotary pushbutton until >Active< Is highlighted.

☞ Press the rotary pushbutton. Enable >Active< by ticking the right-hand box.

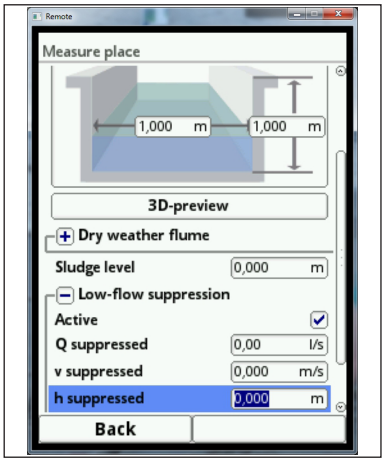


Fig. 7-24 Low-flow suppression

>Q suppressed<

Enter a flow value. As soon as the current, calculated readings are lower than the entered value, the system will automatically set the readings to >0<. Only positive values can be entered. Entered values are interpreted as absolute values and can act as positive values and as negative values.

>v suppressed<

Low-flow volumes in applications with large profiles and high levels can be suppressed here. Very low velocity variations over long periods may cause apparently high volume fluctuations which cannot be hidden by using the >Q suppressed< function. The system will set the readings automatically to >0< as soon as the flow velocities are lower than the parameter set for this function.

This is why the calculated volume is “0“ as well.

Only positive values can be entered. Entered values are interpreted as absolute values and can act as positive values and as negative values..

>h suppressed<

Enter a value. The system will set the readings automatically to >0< as soon as the levels are lower than the entered value. This is why an area is not calculated and hence no volumes can be computed.

7.3.1.4 Sludge level

Enter a fixed sedimentation level within the channel in this parameter. The calculation algorithm will treat the sludge level entered as non-moving partial area of the channel on the bottom featuring a horizontal surface. This level is subtracted from total wetted hydraulic area prior to flow calculation.

7.3.1.5 Damping

Damping relates to all level and flow velocity values which are available as input. It is not possible to select individual values to apply different damping values.

Taking the specified period, all readings are saved and a floating average is created for each individual average value. This average is used for further calculation of the flow rate.

7.3.1.6 Stability

By setting a stability time invalid level and velocity values are disregarded (>0< is a valid entry!!). During this period the NivuFlow 750 operates using the latest valid reading.

The invalid value will not be accepted as such and the according calculations and actions will not be carried out before the stability time has expired.

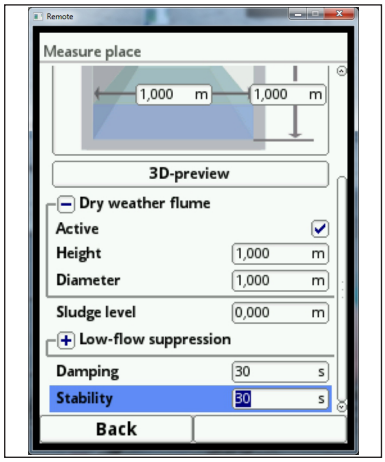


Fig. 7-25 Stability

7.3.2 h-sensors

After setting the measurement place parameters, the level sensor(s) shall be defined and the according measurement range(s) need to be determined.

The level sensor parameters can be set in the **h-sensors** submenu.

Fig. 7-26 Selection level sensor settings

7.3.2.1 h-sensor types

You can find a choice of level sensors behind the button >h-Sensor types<.

☞ Rotate the rotary pushbutton until h-sensor types is highlighted blue.

☞ Press the rotary pushbutton - the PLUS toggles to MINUS and the selection lists open up.

☞ Choose the sensor type connected to the NivuFlow 750.

☞ Rotate the rotary pushbutton until you reach the desired sensor type and tick the checkbox by pressing the rotary pushbutton.

☞ In the event of using multiple level sensors (such as I-Sensor and flow velocity sensor with integrated pressure cell) tick the checkbox for each sensor.

Note

Selected sensors which however are not connected cannot be generated by the NivuFlow 750.
After finishing the parameter settings the missing or faulty programmed sensors are detected and the instrument issues an error message.

The number of the selected sensors is equal to the number of the individual level measurement sensors over the entire measurement cross section. Only one level sensor can provide a valid reading per measurement. A maximum of three different level sensors can be selected.

The instrument will automatically detect if a selected combination should not make any sense (such as fixed value + a different sensor). Such faulty combinations will not be accepted by the system.

The selected level sensors are indicated visually on the display at their intended positions.

Example: air-ultrasonic sensor on the top with beam direction from top down; pressure sensor and water-ultrasound on the channel bottom.

The level sensors are shown within the channel shape previously specified when setting the measurement place parameters.

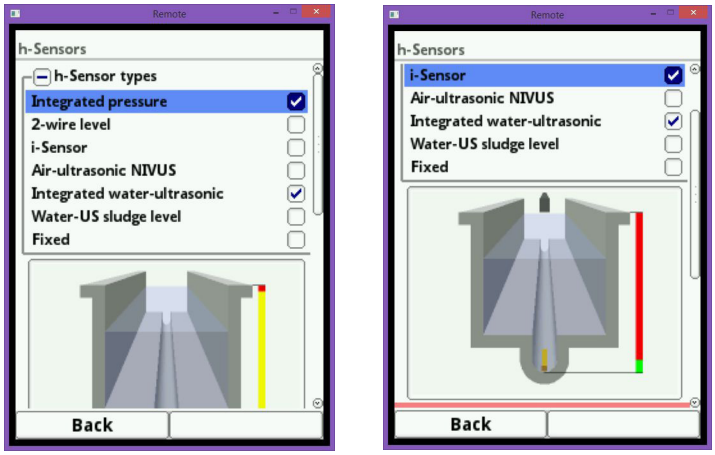


Fig. 7-27 Level sensor selection

Select from the following level sensors:

Integrated pressure:	Level measurement from the bottom using a combi sensor with integrated pressure cell (Type V2D or V2U). Lateral installation possible, e.g. In case of sedimentation or high pollution loads. Level measurement possible even in case of impoundage.
2-wire level	The level is measured by using an external 2-wire sensor supplied by the NivuFlow 750. Example: pressure probe Type NivuBar Plus or compact echo sounder Type NivuCompact. The use of 0/4-20 mA signal from external transmitters such as NivuMaster or MultiRanger can be enabled in this menu as well.
i-Sensor	Here the ultrasonic i-Series sensor by NIVUS can be connected using the HART interface.
NIVUS air-ultrasound	The level is measured from the top down using an air-ultrasonic sensor Type OCL-L1 or DSM-L0. These sensors are used to measure low flow levels. The level sensor shall be installed exactly in the center of the channel crown (±2 °) parallel to the water surface.

Integ. water-ultra-sound	The level is measured from the bottom up with Type POA-V2H, POA-V2U, CS2-V2H or CS2-V2U combi sensor using water ultrasound. This sensor type is appropriate for discharge detection in medium part filled areas. The combi sensor shall be installed exactly in the center of the bottom (deviation ±2 °). The sensor however can be placed out of the center in the event of sedimentation or the risk of soiling. In this case water-ultrasound from the bottom up however must not be used since this may lead to measurement failure! For such situations a different level sensor (ultrasound from top down or pressure cell) must be used.
Water-US sludge level	This setting allows to detect sedimentation - and if metrologically sufficient - the level of sedimentation. This option can be selected only for part filled and full applications in combination with a different level measurement. Here a combi sensor Type POA-V2H or CS2-V2H using water-US from TOP DOWN is used. This combi sensor is either installed permanently (e.g. in full applications using fixed values) or it is fastened using a float in part filled applications. See Fig. 7-27 for more details.
Fixed value	This option is conceived for permanently full pipes and channels. Such applications do not require level measurements. The measurement system in this case provides the constant filling level required for flow calculation. This Parameter can be used as a supporting values for tests or for initial start-ups without if level values are not available.

7.3.2.2 Define Measuring Ranges

Depending on type and number of the selected sensors a coloured bar is shown on the right-hand side of the channel profile graph. The colour of this bar indicates the individual sensor operating range.

- The lower measuring range is displayed in green
- The middle measuring range is displayed in yellow
- The upper measuring range is displayed in rot.

One green bar is shown if only one sensor is used for measuring, the combination green/red indicates the use of 2 sensors.

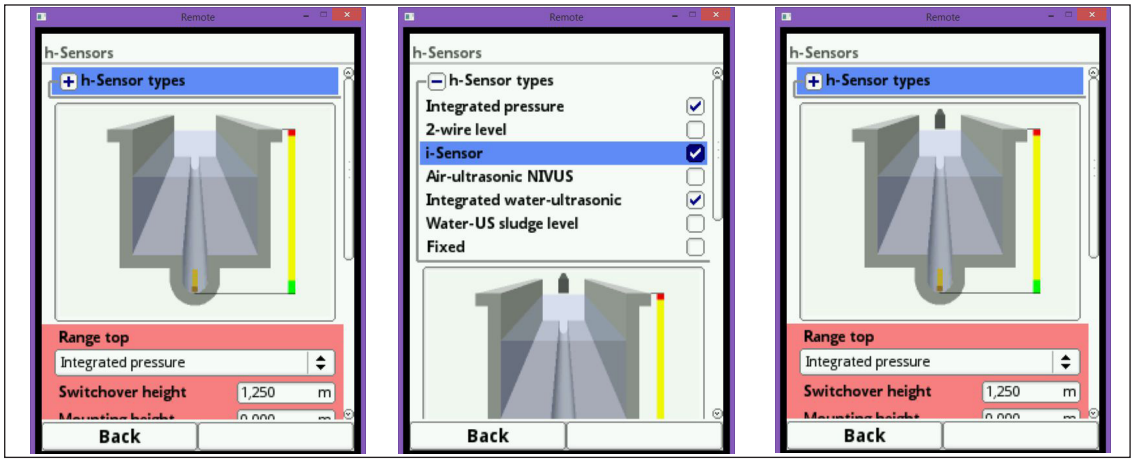


Fig. 7-28 Sensor selection and indication of sensor measuring ranges

Depending on type and number of the selected sensors 1–3 coloured programming sections are shown below the channel profile graph. The colours of this programming sections are equal to the colours of the sidebars and the according sensors.

- The lower level range is always displayed green
- The middle level range is always displayed yellow
- The upper level range is always displayed red.

One green bar is shown if only one level sensor is used for the entire application range, the combination green/red indicates the use of 2 level areas.

Fig. 7-29 Indication of programmable ranges

You can assign one level sensor to each programming section (see Fig. 7-27 -„Level sensor selection“). The NivuFlow 750 will automatically assign the sensors to the appropriate programming sections. The assignment depends on the channel shape set.

- Air ultrasonic: Range bottom
- Integrated pressure: Range top etc.

This assignment can be configured individually. During this procedure only the previously selected sensors are indicated (see Fig. 7-27 - „Level sensor selection“).

It is possible to use even one level sensor for 2 or 3 programming sections. In such a case the other activated level measurement values are merely saved in the internal memory, however will not be used for calculation purposes.

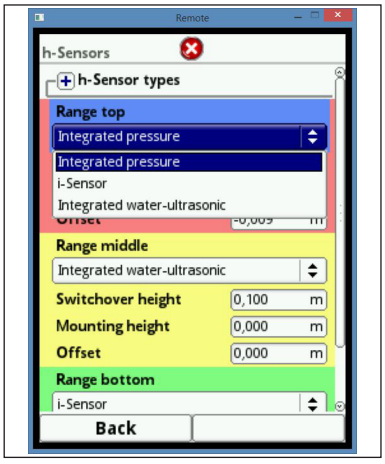


Fig. 7-30 Level sensor assignment to programming section

The range of each programming section can be modified. To do so, change the respective >Switchover height< accordingly

Important Note

Observe to accurately specify the positioning values of the individual sensors.

Sensors with built-in pressure measurement cell shall be installed at the lowest point of the channel bottom (sensor Type POA-V2D, POA-V2U, CS2-V2H, CS2-V2U and CSM-V1D).

If sensors should feature an elevated mounting position die (block or similar) or should be installed on a berm, it is necessary to enter a different value as mounting height. Measure the distance from the bottom edge of the sensor mounting plate down to the lowest point of the application.

Then enter this value as “Mounting height“.

The center of the sensor mounting plate is the reference value in the event of tilted or inclined sensors (such as lateral installation within pipes or trapezoid channels).

The sensor position value is accepted automatically for the position of the v-sensor as well as for the determination of v-crit (see chapter 7.3.3.4).

It is possible to additionally enter an offset to adjust the pressure sensors.

Enter the values by using the virtual keypad.

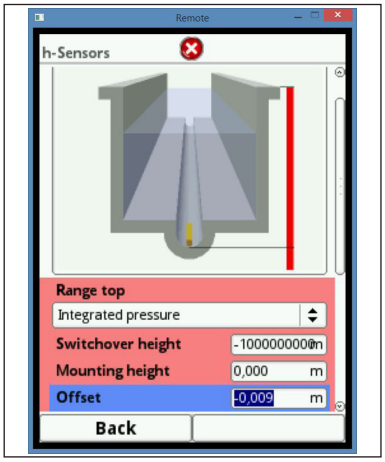


Fig. 7-31 Programming integrated pressure sensor

The same specifications apply for flow velocity sensors with integrated water-ultrasonic sensor. Measure the distance from the top edge of the sensor crystal.

The Type POA and CS2 sensors feature different sensor constructions and hence different sensor heights. The system automatically detects and considers these differences accordingly while connecting the sensors

Important Note

When using i-Sensors (connection via HART interface) *necessarily observe to correctly specify the sensor type. The NivuFlow 750 automatically takes over the sensor-specific data.*

In i-Sensor selection menu, tick the iXT/MPX checkbox as soon as the sensor is connected via the HART interface of an iXT or MPX.

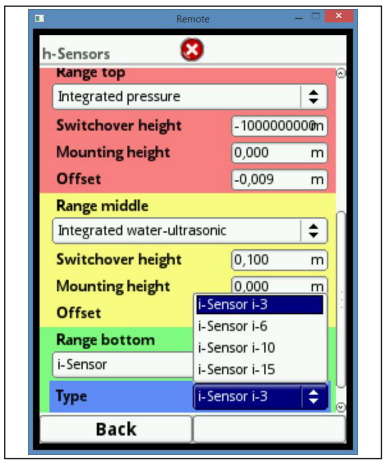


Fig. 7-32 Programming i-Sensor type

Important Note

If an i-Sensor is connected using a type iXT Ex separation interface or a type MPX multiplexer, it is necessary to enable the use of iXT/MPX in the connections main menu prior to programming this type of sensor. If not activated, the connection cannot be selected in h-sensors menu.

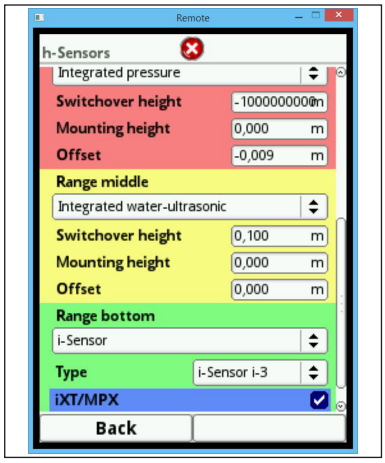


Fig. 7-33 Activation of HART-interface in iXT

The i-Sensor mounting height relates to the bottom edge of the sensor until the channel zero point. This value defines the 0-point of the measurement. The accuracy of the level measurement using the i-Sensor is directly influenced by how accurate this mounting height is set.

7.3.3 v-sensors

Apart from the measurement place and the level sensors, the third relevant point is setting the parameters of the flow velocity sensors. Except type and number of sensors this menu moreover includes the spatial position. The values specified within this menu relate to the defined channel regarding shape and spatial dimension.

Fig. 7-34 Flow velocity sensor selection

7.3.3.1 Number of Flow velocity sensors

Depending on the type of transmitter up to 3 flow velocity sensors can be connected to the NivuFlow 750.

- NivuFlow 750 type S1 - 1 flow velocity sensor
- NivuFlow 750 type SR - 1 flow velocity sensor
- NivuFlow 750 type M3 - up to 3 flow velocity sensors

Open the v-Sensor menu. With a Type M3 transmitter connected a selection box showing options 1-3 is indicated in the top right-hand corner. This box can be used to set the parameters of all connected sensors following each other. Per default v-Sensor 1 is always activated as first sensor.

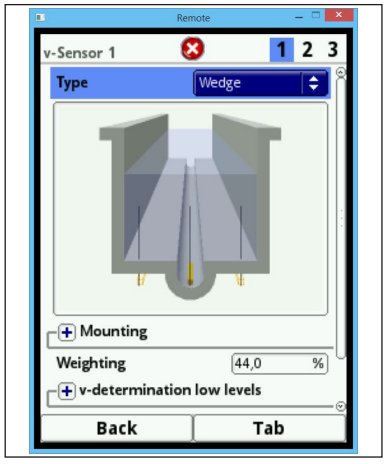


Fig. 7-35 v-Sensor selection transmitter type M3

☞ Press the right-hand function key (Tab) to move to v-Sensor 2.

☞ Tick the “Active“ checkbox. Now the parameters for the activated sensor can be set. The active sensor is directly visible in the application graph.

The sensor of which the parameters are currently being set is highlighted in the graph. The other available sensors at the same time appear as simple outlines.

☞ After setting the parameters go to v-Sensor 3.

☞ With v-Sensor 3 proceed the same way as with v-Sensor 2.

☞ Enter the values for v-Sensor 3.

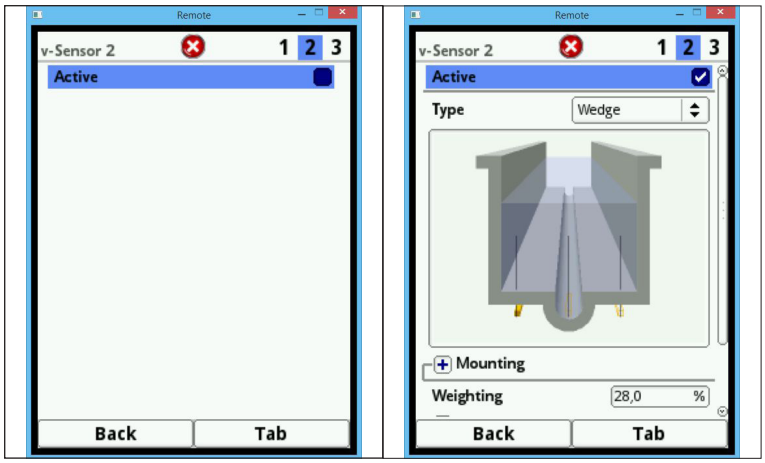


Fig. 7-36 Activation v-Sensor 2 and v-Sensor 3

7.3.3.2 Sensor types

Select from a total of 4 different sensor types:

- Wedge (POA and CS2 sensors)
- Pipe (POA and CS2 sensors)
- EBM without pressure (connection of CSM-V100 wedge sensors via EBM Electronic Box)
- EBM with pressure (connection of CSM-V1D0 wedge sensors via EBM Electronic Box)

The selected sensor shape >Wedge< or >Pipe< Is shown in the graph.

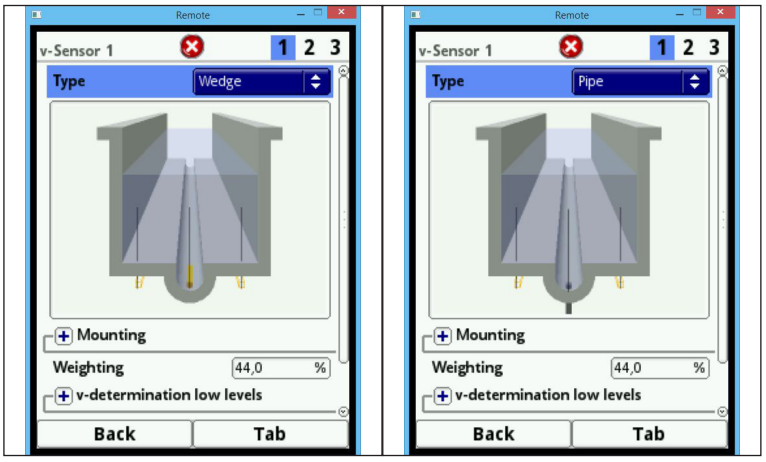


Fig. 7-37 Graph wedge or pipe sensor

7.3.3.3 Sensor mounting position

Extra application parameters can be set for the installation of v-sensors. These parameters are intended mainly for installation positions which vary from the default settings.

☞ Rotate the rotary pushbutton until >Mounting< is highlighted blue.

☞ Press the rotary pushbutton - the PLUS toggles to MINUS and an input menu opens up.

Option “Flush with wall”

This point is available only for the following channel profiles:

- pipe
- egg shape
- U profile

The parameters >Mounting height<, >Distance center< and >Mounting angle<, which need to be adjusted to each other, can be entered here.

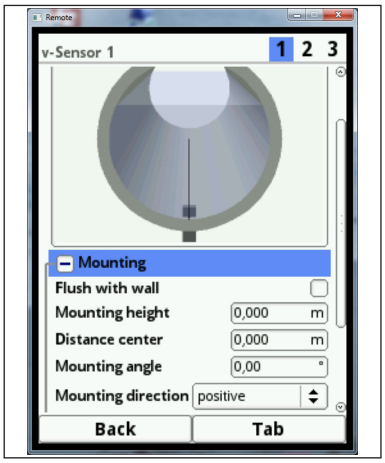


Fig. 7-38 Programming using height, distance and angle

For sensor installation flush with wall you can alternatively enter the angle of incidence only. Enter this angle when:

- Wedge sensors are installed directly on the wall of the tilted/bent area
- pipe sensors are inserted from the outside at a right angle

The use of the 1-parameter programming by entering the angle only requires an angle of incident directed to the center of the circular profile or segment as well as the installation situations mentioned above. However this method significantly facilitates correct programming.

☞ Tick the >Flush with wall< checkbox

This reduces the number of input boxes. Only the >Mounting angle< box remains to be enabled.

☞ Enter the sensor mounting angle.

☞ Verify your input. The graph now indicates the sensor showing the angle of incident entered.

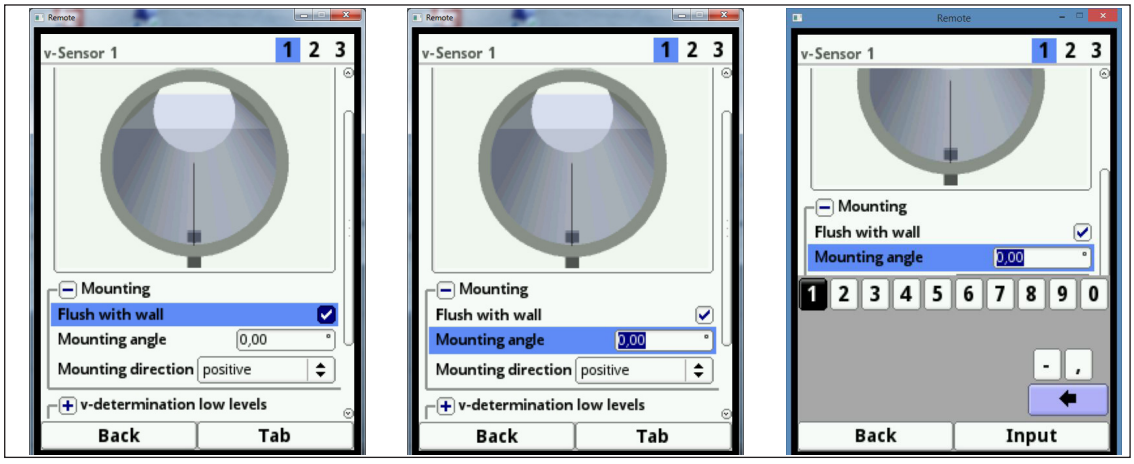


Fig. 7-39 Parameter setting only by entering the angle

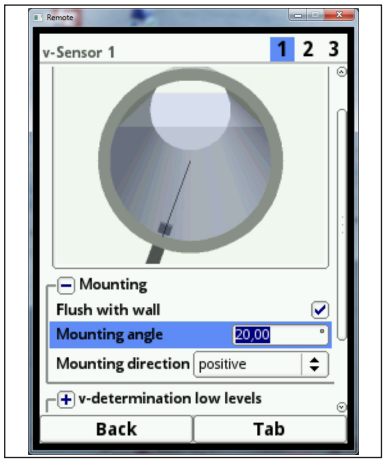


Fig. 7-40 Flush-mounted display at the right angle

This function is not available with other channels profiles.

Input box >Mounting height<

To set the mounting height parameters proceed as follows:

☞ Measure the distance between the bottom edge of the mounting plate (v-sensor) and the lowest point of the channel bottom.

☞ Rotate the rotary pushbutton until mounting height is highlighted.

☞ Enter the measured distance. The default unit is METER.

It is not necessary to enter a value as soon as the sensor is mounted directly on the ground at the lowest point of the channel (e.g. pipe sensor if inserted at the lowest point of the application from the outside).

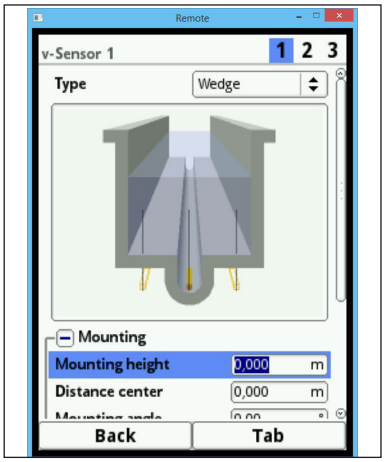


Fig. 7-41 Parameter setting mounting height

In structured channel profiles such as channels featuring a dry weather flume and a berm, the lowest point within the channel is equal to the zero point. The lowest point in this case is the bottom of the dry weather flume.

The berm shall be considered as elevated installation position if more sensors are put directly onto the berm.

☞ For v-Sensor 2 and v-Sensor 3 enter the height of the berm as mounting height.

☞ Verify your entry using the application graph.

With the aid of the application graph it is possible to verify the correct mounting height of the v-sensors instantly. Fig. 7-42 shows that the berm is not considered as mounting height. The graph shows the v-sensors below the channel bottom.

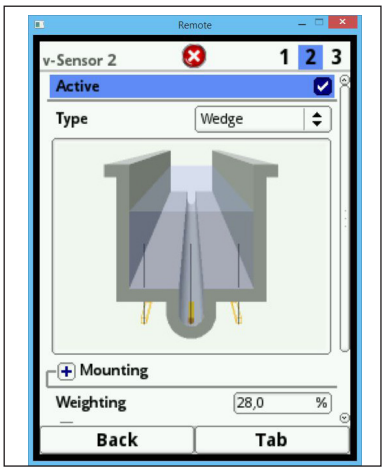


Fig. 7-42 Mounting height v-sensors 2 and 3 to deep

If sensors need to be installed at an elevated position using a block or similar due to the risk of soiling or sedimentation, this distance needs to be considered as well.

☞ Determine the sensor positions related to the 0-point of the application. The reference point is the bottom edge of the mounting plate, with pipe sensors the horizontal area of the sensor head.

☞ Enter the distance into the input field >Mounting height<.

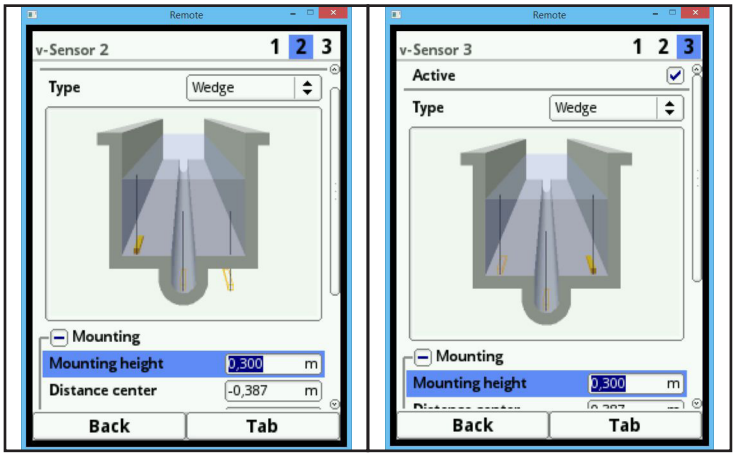


Fig. 7-43 Height position of v-sensor 2 and 3 are set correctly

Input field >Distance center<

Contrary to the usual point of view the user looks in the direction of flow, the v-sensors however look in the direction of the user.

While programming observe that the real position is rotated by 180 °.

The sensor parameters are set as follows.

- v-Sensor 1 is always in the center position
- Applications featuring 2 v-sensors:
  v-Sensor 1 right
  v-Sensor 2 left
- Applications featuring 3 v-sensors:
  v-Sensor 1 center
  v-Sensor 2 left
  v-Sensor 3 right

The NivuFlow 750 calculation procedures are based on the v-sensor installed in the channel center. If the v-sensor needs to be installed out of the center the offset must be entered in >Distance center<.

- Entering a negative value virtually moves the sensor to the left
- Entering a positive value virtually moves the sensor to the right

If 2 or 3 v-sensors are used the sensor positions need to be entered in the “Distance center“ box. The value relates to the center of the application.

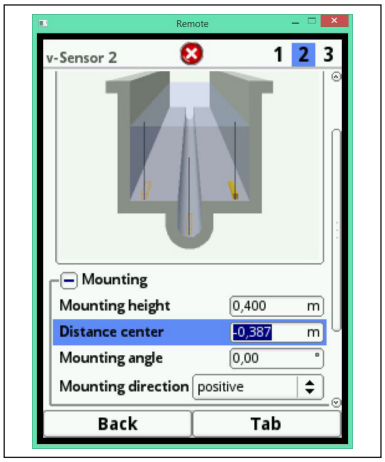


Fig. 7-44 Entering sensor position, in relation to the application center

Input box >Mounting angle<

Per default the NivuFlow 750 is set as to measure the flow velocity always vertically upwards from the v-sensor.

In some applications however it may be necessary to install the sensor in a sloped or even in a horizontal position:

- sloped on the inclined walls of a trapezoid channel
- lateral on channel walls
- in the round section of a pipe profile or an U-profile

In such a case the altered angles of incidence need to be entered in the NivuFlow 750. The vertical, upward beam of the ultrasonic signal is the reference point.

The slope of the angle of incidence is set opposite to the direction of flow as follows:

- a negative value is equal to a slope to the left
- a positive value is equal to a slope to the right
- 90 degrees are equal to a horizontal beam
- 180 degrees are equal to a downward beam (e.g. for float applications)

Mounting direction

This particular parameter is used only with special applications. The direction of sensor installation is always set to >positive< Per default (measuring against the direction of flow).

Note

Do not modify this parameter. Entering >negative< results in invalid flow velocity readings.

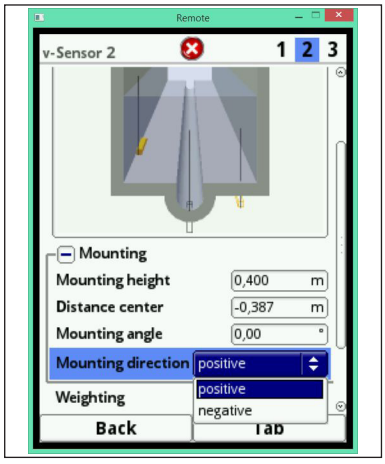


Fig. 7-45 Modifying the sensor mounting direction

Weighting

In the event of using 2 or 3 flow velocity sensors the relevance of each individual flow velocity sensor for the result of the average total velocity must be defined. Enter your value as a percentage in the “Weighting” box.

The default setting is 100 %.

Note

The weighting value depends on the application as well as the sensor position. Such applications demand comprehensive knowledge on fluid mechanics and require NIVUS personnel or an authorised expert company.

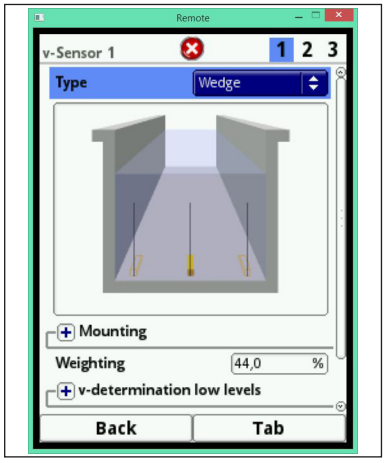


Fig. 7-46 Weighting v-sensor

7.3.3.4 v-Determination low levels

Due to constructional and physical reasons the flow velocity sensors cannot measure the flow velocity anymore below a certain minimum level. Depending on the type of sensor this minimum level is approx. between 3 and 8 cm.

Poor application conditions or an elevated sensor installation may push this level even higher. This level is referred to as h-crit.

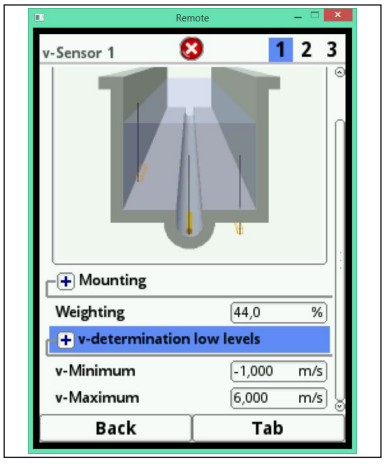


Fig. 7-47 Sub menu: v-determination low levels

The >v-determination low levels< menu facilitates the detection of temporary low flow volumes (such as discharges at night, infiltration water or similar).

A requirement for this function is:

The application must be backwater-free!

Working principle:

As soon as the level falls significantly, from a certain point on it is not possible anymore to measure the flow velocity. The NivuFlow 750 creates an internal table of v/h-readings at the point of the minimum level (h-crit) on which a flow velocity still can be measured. The system here uses the latest measurable flow velocity reading. The exponent of the channel shape set is considered automatically to calculate this curve.

As soon as no flow velocity can be recorded anymore, a level however is measured, the system automatically computes an “appropriate“ flow velocity within this value table.

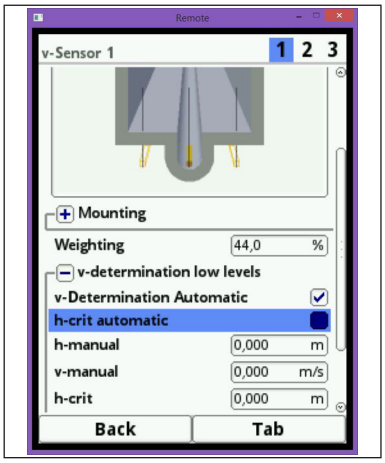


Fig. 7-48 Menu for v/h-calculation

V-Determination Automatic

☞ Rotate the rotary pushbutton until >v-Determination Automatic< is highlighted blue.

In the default setting the selection box is activated. That means that the function is active.

As soon as the level reaches h-crit (critical level), the latest measured flow velocity reading is saved automatically as a calculation basis for lower levels. This calculated flow velocity value then is used to compute the flow rate if the level continues to fall. Should the level first rise above h-crit and then fall below h-crit again, the newly determined velocity value is used as a calculation basis for the flow rate calculation to come.

If >v-Determination Automatic< is disabled and the level should fall below h-crit, the system uses the flow velocity value set under v-manual to calculate the flow rate.

Disable >v-Determination Automatic< box as soon as you expect very low flow levels and backwater within your channel. Deactivation makes sense too as soon as in the event of flow rate zero a small amount of the medium is supposed to stand still.

☞ Set the value in >v-manual< to ZERO. The system then does not compute any flow rates at very low flow levels.

h-crit automatic

This option box is ticked as per default. This automatic calculation method includes the specification of the sensor type and the mounting height parameters (chapter 7.3.3.3, Fig. 7-41). The lowest possible level required to measure flow velocities is automatically determined by the NivuFlow 750. If this option is disabled the system utilises the value set in >h-manual< as h-crit.

Per default >h-manual< Is set to >0<.

h-manual

This input box is used to manually enter the level. This level is related to the flow velocity value >v-manual<.

>h-manual< must not be lower than >h-crit< Since otherwise readings might get lost.

>h-manual< is active only if >h-crit automatic< is disabled.

v-manual

Use this input box to manually enter a flow velocity value. This value is related to >h-manual<. The required flow velocity value for the according level can be computed e.g. by using hydrologic software.

>v-manual< Is active only if >v-Determination Automatic< Is disabled.

h-crit

This input box is used for v/h-calculation. To do so, enter the level as from which the system is desired to utilise v/h-calculation. >h-crit< is active only if >h-crit automatic< is disabled. The value entered in >h-crit< must not be higher than the value in >h-manual<.

7.3.3.5 Limitation of velocity evaluation

The input boxes >v-Minimum< and >v-Maximum< are relevant to limit the flow velocity evaluation. Enter the maximum permissible negative and positive velocity values here.

A typical application is to avoid the evaluation of negative flow velocities (backflow). In this case simply set the maximum value for negative flow velocities to 0.

Note

*EIt is not possible to increase the possible flow velocity evaluation to values higher than the technical limits as described in chapter **3.5**. The system will not accept such entries.*

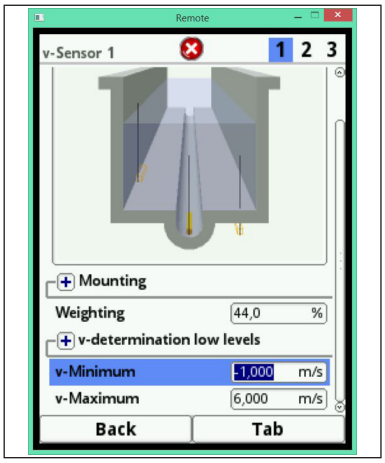


Fig. 7-49 Limitation of velocity evaluation

7.3.4 Inputs/Outputs (analog)

This menu is to define the function of the analog as well as digital inputs and outputs. Other parameters such as measurement and output errors, offsets, limit values, error reactions etc. can be set here as well.

☞ Open the menu Input/Output via main menu

Fig. 7-50 Analog input and output selection

The input/output menu is subdivided in four parts:

- Analog inputs
- Analog outputs
- Digital inputs
- Digital outputs

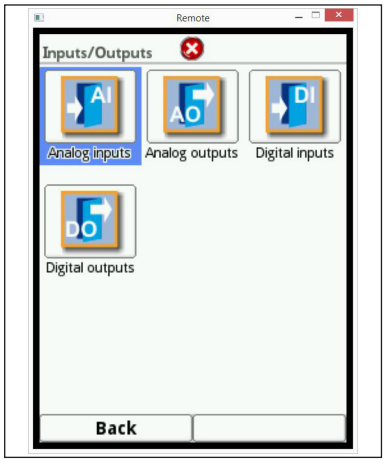


Fig. 7-51 Selection analog inputs

7.3.4.1 Analog inputs

The number of analog inputs is depending on the device type:

- Type S1 = 2 analog inputs
- Type SR = 5 analog inputs
- Type M3 = 8 analog inputs

The available analog inputs are indicated in the top right corner of the display.

By pressing the right-hand >Tab< control key you can select the analog inputs successively. The selected input is shown as clear text message in the top right display corner.

In the default setting the analog inputs are inactive.

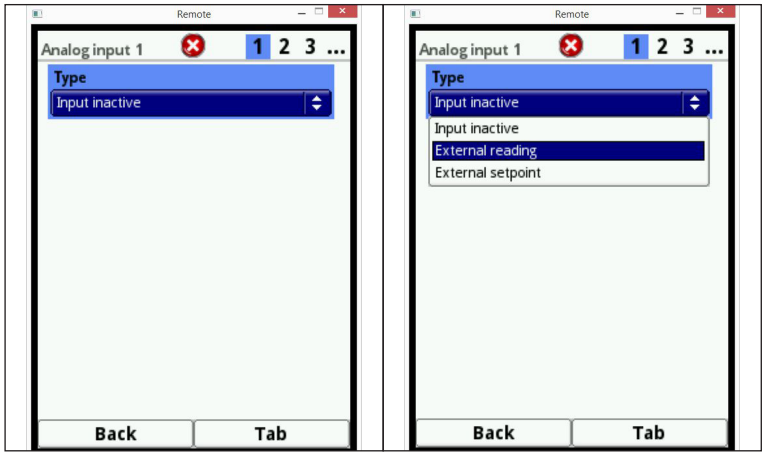


Fig. 7-52 Activation analog inputs

Currently the analog inputs can be used as external readings only. Therefore, the NivuFlow 750 can be used as an extra data logger for readings from external systems. This however does not influence the unit's capabilities as flow meter.

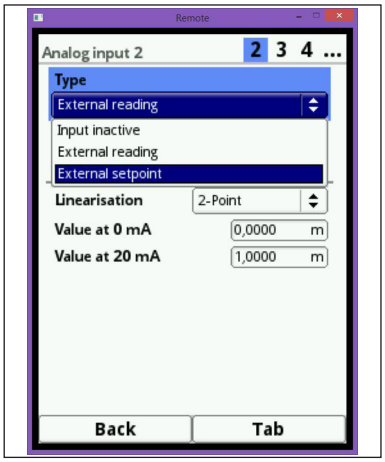


Fig. 7-53 Parameter setting analog input

After activating the analog inputs the input range can be either set to 0-20 mA or 4-20 mA.

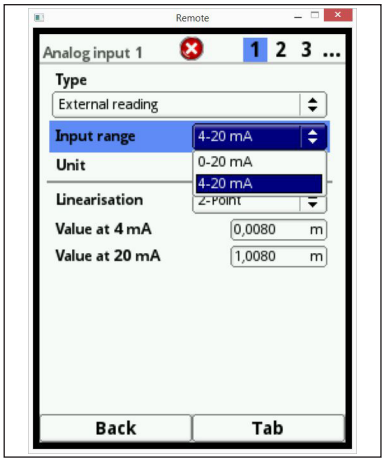


Fig. 7-54 Selection input range

The units are indicated in a text box. You may also specify individual units. The number of characters describing the unit must not exceed a maximum of 5 characters.

The further programming procedures are described in chapter 7.3.1.1 Name of measurement place.

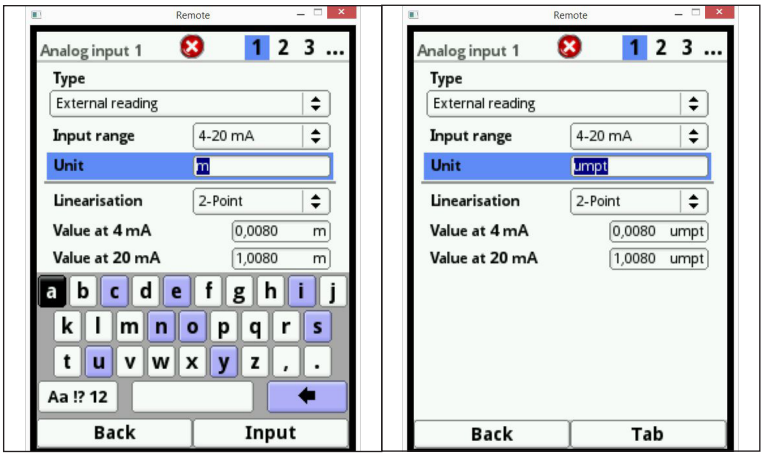


Fig. 7-55 Definition of units

Finally set the scale to save.

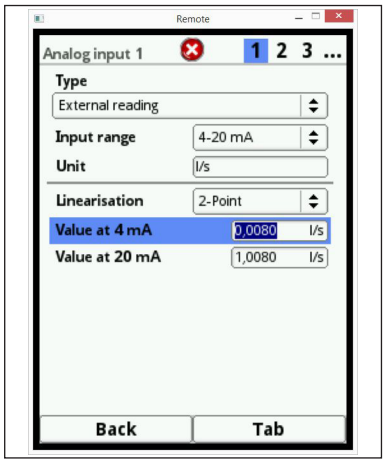


Fig. 7-56 Scale

7.3.4.2 Analog outputs

The number of analog outputs is depending on the device type:

- Typ S1 = 2 analog outputs
- Typ SR = 2 analog outputs
- Typ M3 = 4 analog outputs

The available analog outputs are indicated in the top right corner of the display.

By pressing the right-hand >Tab< control key you can select the analog outputs successively. The selected input is shown as clear text message in the top right display corner. In the default setting the analog outputs are inactive.

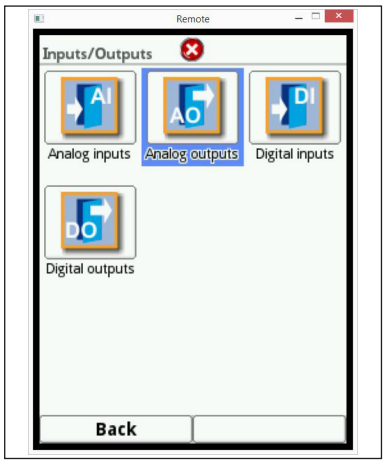


Fig. 7-57 Selection analog outputs

Various functions can be assigned to the analog outputs. Here it is possible to assign the same function in different measurement ranges to 2 analog outputs.

Example

Analog output 1 = Flow rate 4 - 20 mA corresponds to 0 - 100 l/s,

Analog output 2 = Flow rate 4 - 20 mA corresponds to 0 - 5000 l/s

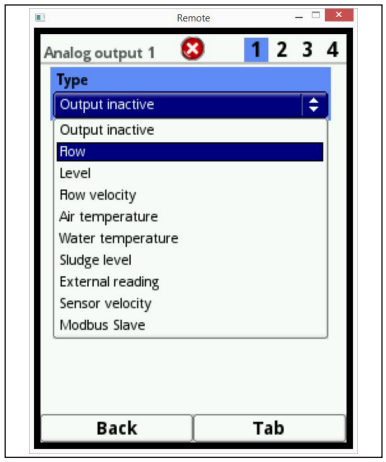


Fig. 7-58 Activation analog output

Following functions of the analog output are possible:

- **Flow**
  Output of the application flow rate (calculated from average flow velocity and wetted cross-section) at the selected analog output.

- **Level**
  The level used for calculation is available at the selected analog output. This is the level enabled for the current level section in menu Application/h-Sensors.

- **Flow velocity**
  The calculated average flow velocity (calculated even from 2 or 3 sensors) used to compute the current flow rate is available at the selected analog output.

- **Air temperature**
  As soon as an air-ultrasonic sensor Type OCL-L1 is in use, it is possible to output the measured air temperature used by the sensor to compensate sound running time errors.

- **Water temperature**
  The medium temperature detected by POA or CS2 flow velocity sensors is available at the selected analog output. This function is not available if a CSM sensor is used.

- **Sludge level**
  In applications measuring volumes from top down using a float with level detection using an external or an OCL as well as a water-ultrasonic sensor at the same time, it is possible to determine and to output the sludge level from the difference between both level sensors by considering the immersion depth.

- **External reading**
  Possibly linearised readings available at the analog input are available here again as output.

- **Sensor velocity**
  In the event of using multiple flow velocity sensors and if the average flow velocity of the individual measurement paths is to be determined, the desired flow velocity sensor can be selected here in order to output its readings at the analog output.

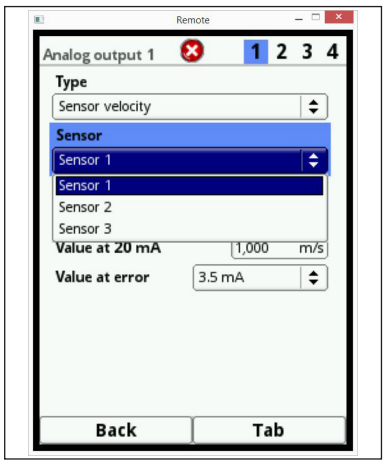


Fig. 7-59 Select Sensor velocity

- **Modbus Slave**
  The analog output can be used via Modbus to output controlled signals from other systems. After enabling the function select the output range of 0-20 or 4-20 mA.

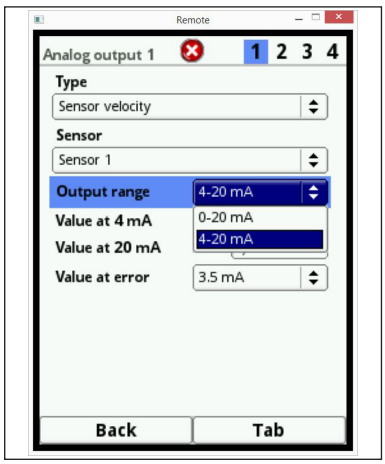


Fig. 7-60 Select Output range

Set the output range subsequently.

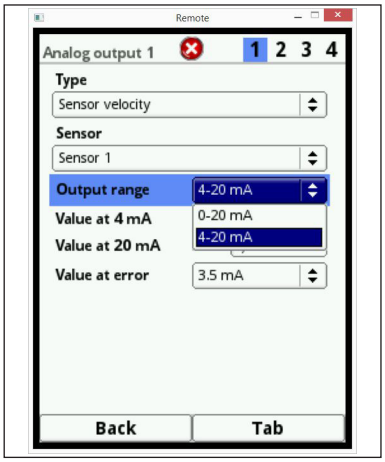


Fig. 7-61 Programming output range

It is possible to define a certain behaviour for the analog output to react in case if missing readings. Select from the settings below:

- 0 mA
- 3,5 mA
- 21 mA
- Hold the last valid measured value (Hold)

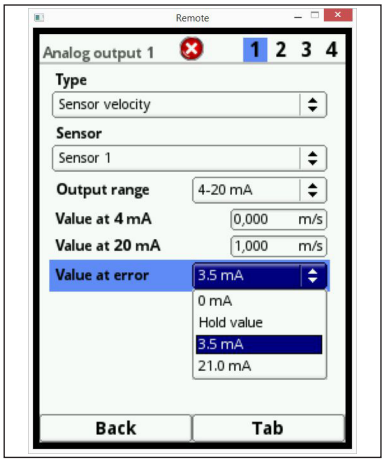


Fig. 7-62 Possible options in event of errors

7.3.4.3 Digital inputs

The number of digital inputs is depending on the device type:

- Type S1 = 2 digital inputs
- Type SR = 7 digital inputs
- Type M3 = 10 digital inputs

The available digital inputs are indicated in the top right corner of the display.

By pressing the right-hand >Tab< control key you can select the digital inputs successively. The selected input is shown as clear text message in the top right display corner

In the default setting the digital inputs are inactive.

Fig. 7-63 Select digital inputs

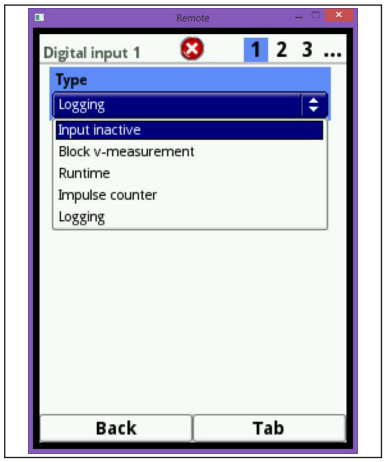


Fig. 7-64 Activation of digital inputs

The following functions can be assigned to the digital inputs:

- **Block v-measurement**
  By using an external contact (float switch, pressure bell switch..) the flow measurement can be blocked as long as a signal is available at the am digital input.
  Typical applications here e.g. are discharge channels with high dam-up levels without actual discharge featuring movement due to wind, waves, ship traffic or similar. In such cases the measurement is released by a contactor located in the diversion structure.
  The contactor shall be set to switch shortly before discharge begins.
  If this function is selected the logic can be additionally modified as follows:
  - non-inverted digital input
  - inverted digital input

- **Runtime**
  The system detects and saves the duration of the ongoing signal at the digital input.
  Such records can be used e.g. for pump run times or unit run times.
  If this function is selected the logic can be additionally set as follows:
  - non-inverted digital input
  - inverted digital input

- **Impulse counter**
  The system detects and saves the number of the ongoing signals at the digital input.
  The counter simply counts the status changes detected at the digital input (1->0 or 0->1).
  If this function is selected determine if the rising edge (status change >0< to >1<) or the falling edge (status change >1< to >0<) Is used for evaluation.

- **Logging**
  Incoming signals are recorded and saved including start and stop times (time stamp).
  The areas of use are:
  - access control
  - recording of events
  - run times … etc.

  If this function is selected the logic can be additionally modified as follows:
  - non-inverted digital input
  - inverted digital input

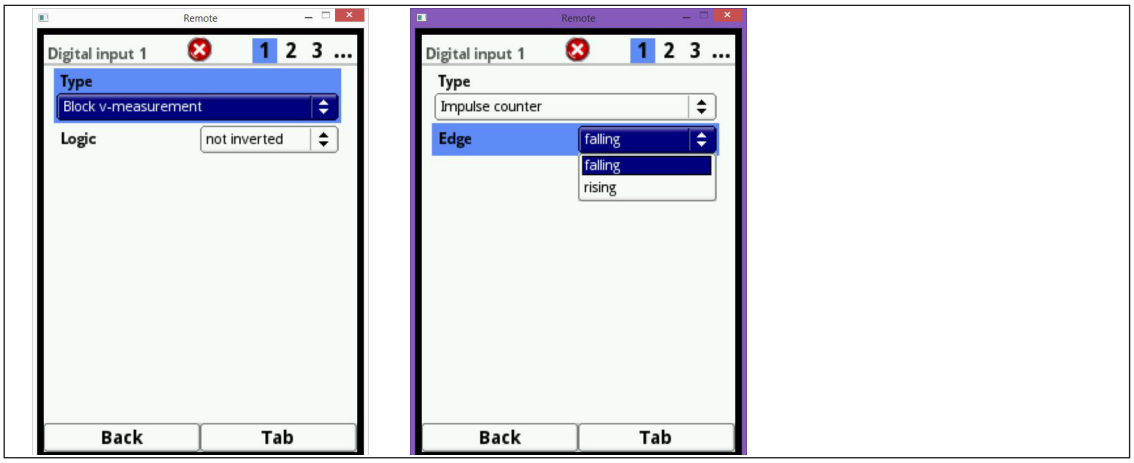


Fig. 7-65 Adjustment options Logic

7.3.4.4 Digital outputs

The number of digital outputs is depending on the device type:

- Type S1 = 2 digital outputs
- Type SR = 5 digital outputs
- Type M3 = 6 digital outputs

The available digital outputs are indicated in the top right corner of the display.

By pressing the right-hand >Tab< control key you can select the digital outputs successively. The selected output is shown as clear text message in a drop-down list in the display.

In the default setting the digital outputs are inactive.

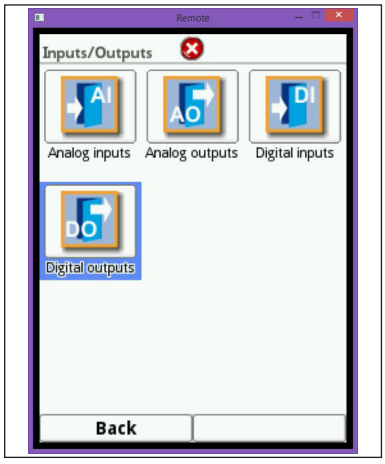


Fig. 7-66 Select digital outputs

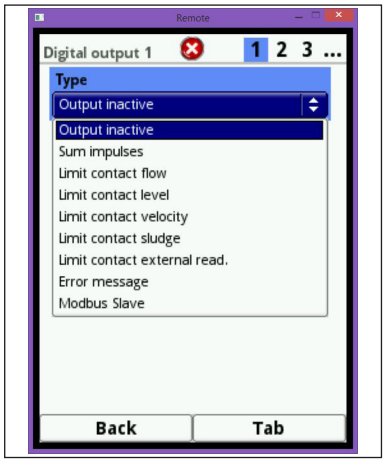


Fig. 7-67 Activation of digital outputs

The following functions can be assigned to the digital outputs:

- **Sum impulses**
  Output of volume-proportional sum impulses.
  The parameters below can be set here:
  - Significance (impulses per volume)
  - Output logic (normally closed / normally open)
  - Impulse duration (relay energised/de-energised)
  The duration can be set to a period between 100 ms and 5000 ms.

If in the event of sharply increasing flow rates the output frequency of the impulse output should be lower than the frequency of the flow rate, the sum impulses which have not been output yet are saved internally until the calculated flow volume falls below the impulse frequency again. After that, the sum impulses will be output additionally.

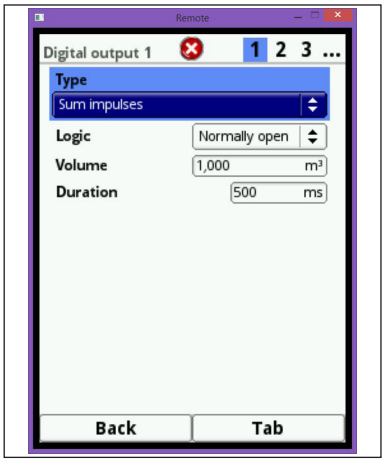


Fig. 7-68 Programming pulse generator

- **Limit contact flow**
  In >Threshold off< and >Threshold on< set one flow limit value for each point. A digital signal will be output if this flow limit value is exceeded. If the flow should fall below the second flow limit value the digital signal will be reset = hysteresis function to avoid output flutter.
  If this function is selected the logic can be additionally modified as follows:
  - Normally closed
  - Normally open

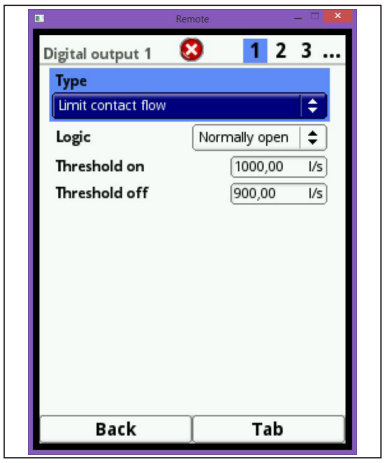


Fig. 7-69 Programming limit contact

- **Limit contact level**
  Level limit contact is used exactly the same way as described in the limit contact flow section.
  Specify a level limit value.
  The level as activated under >Application/h-Sensors< for the current level section is used for calculation. It is not possible to use a free selectable level sensor.
  If this function is selected the logic can be additionally modified as follows:
  - Normally closed
  - Normally open

- **Limit contact velocity**
  The digital signal in the event of exceeding an adjustable velocity limit value will be issued here.
  Proceed as described in >Limit contact flow<.
  The calculated average flow velocity (calculated even by using 2 or 3 sensors) is used here.
  If this function is selected the logic can be set as follows:
  - Normally closed
  - Normally open

- **Limit contact sludge**
  In part filled applications it is possible to determine the sedimentation level. Requirements:
  - use of a float
  - determination of sedimentation distance using water-ultrasound from the float
  - determination of the water level using an external sensor or air-ultrasonic sensor Type OCL.

  From the difference between both level sensors the sedimentation level can be computed. The immersion depth of the water-ultrasonic sensor needs to be considered here.
  Please note:
  Soft sludge levels possibly may not reflect ultrasonic impulses. In such cases the sedimentation level cannot be detected.

- **Error message**
  By enabling the individual selection boxes using the pushbutton, the error types to be issued can be assigned to the digital output.
  Moreover the output logic between the “normally closed” and the “normally open” function can be modified.

Note

Digital output 2 is inappropriate as error output. Digital output 2 is designed as bistable relay. The relay will remain in its last position after being de-energised.
This digital output cannot be used for error messages.

Fig. 7-70 Error messages

- **Modbus Slave**
  The digital output can be used via Modbus to output controlled signals from other systems.

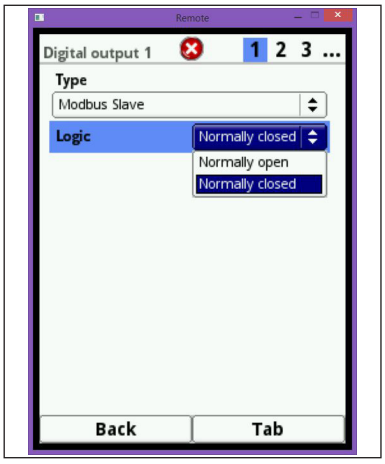


Fig. 7-71 Adjustment options Logic

7.3.5 Q-Control

This function is currently not supported.

Fig. 7-72 Q-Control

7.3.6 Diagnostics

The diagnostics menu is a menu used for indication and simulations.

The settings below can be verified or checked here:

- Sensor functions
- Sensor serial numbers
- Sensor software versions
- Inputs and outputs
- Flow profile

The diagnostics menu is subdivided in 9 submenus.

Fig. 7-73 Diagnostics menu

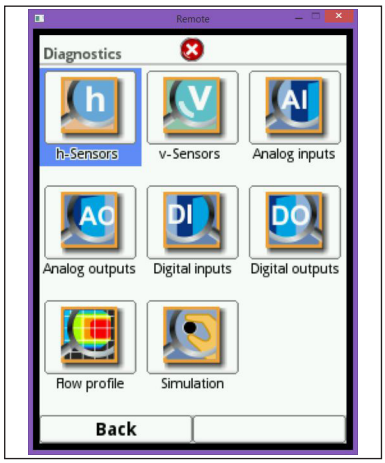


Fig. 7-74 Diagnostics submenu

7.3.6.1 h-Sensors

This- menu is related to the >Applications/h-Menu/Sensor type< menu. Depending on the type and number of sensors defined there, 1–3 coloured programming ranges are shown here.

The colours of three ranges:

- the top range is always indicated red.
- the middle range is always indicated yellow
- the bottom range is always indicated green

One green bar is shown if only one application range is used for the entire application range, the combination green/red indicates the use of 2 ranges.

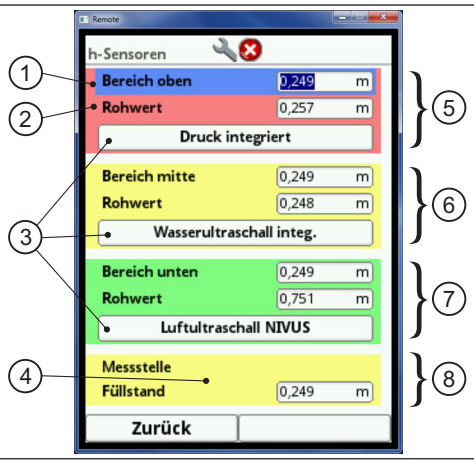
In each section always the corrected and used reading as well as the raw value of the measurement is shown. The deviations in both values are due to installation.

Example: the built-in pressure probe is a few millimetres above the channel bottom. This offset is added automatically to the used reading. Furthermore a zero point adjustment of the pressure cell may be added.

A similar situation applies in the event of using water-ultrasonic sensors, since here the top sensor edge is in a higher position than the channel bottom.

For Type OCL-L1 air-ultrasonic sensors the distance between the sensor bottom edge and the water surface is measured as raw value. The measurement value however is calculated from 0-point (distance sensor bottom edge to channel bottom) minus the distance between sensor bottom edge and water surface.

The bottom section indicates the measurement value currently used for calculation. The colours refer to the sensor providing the reading.



1. Measurement value used
2. Sensor raw value
3. Sensor selection
4. Measurement section used (observe colours)
5. Top measurement section with assigned pressure sensor
6. Middle measurement section with assigned water-ultrasonic sensor
7. Bottom measurement section with assigned air-ultrasonic sensor (OCL-L1)
8. Currently valid value used for flow calculation

Fig. 7-75 Indication of individual measurement results

The following information is relevant to commissioning personnel!

The respective sensor used is indicated in the bottom part of the coloured section.

☞ Rotate the rotary pushbutton until the sensor box is highlighted blue.

☞ Press the rotary pushbutton - the current information on the according sensor (Serial No...) Is shown on the display.

As an extra, the air-ultrasonic sensor provides the current air temperature reading.

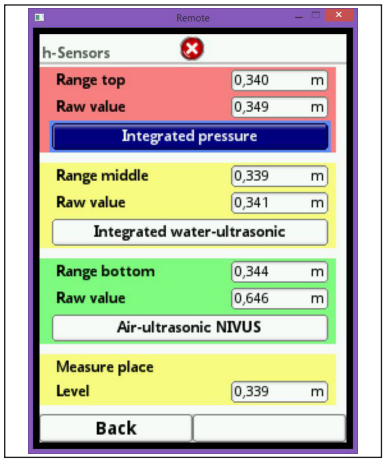


Fig. 7-76 Select pressure sensor

Fig. 7-77 Screen sensor information pressure sensor

In case of using a water-ultrasonic sensor it is possible to additionally read the current echo image as well as the noise level of the sensor cable connection. The latter provides information on the quality of the sensor cable connection (interference).

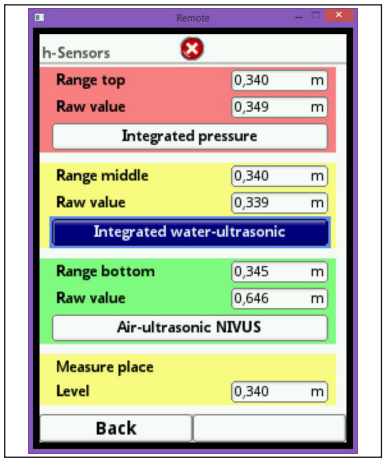


Fig. 7-78 Select water ultrasonic sensor

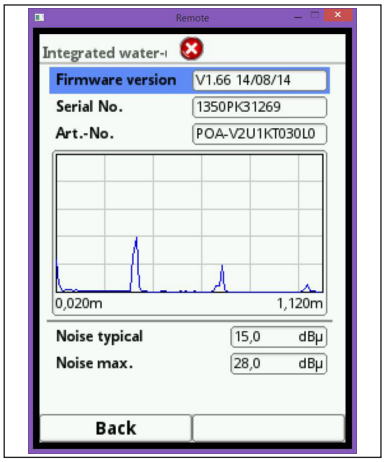


Fig. 7-79 Sensor information and echo image of water-ultrasonic sensor

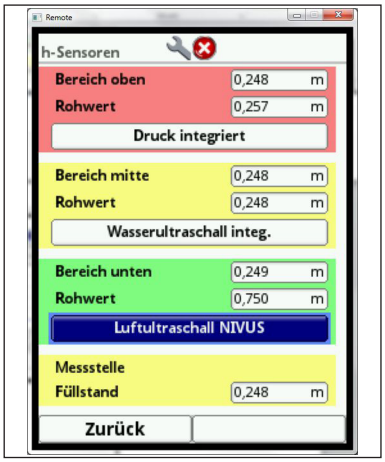


Fig. 7-80 Select air-ultrasonic sensor

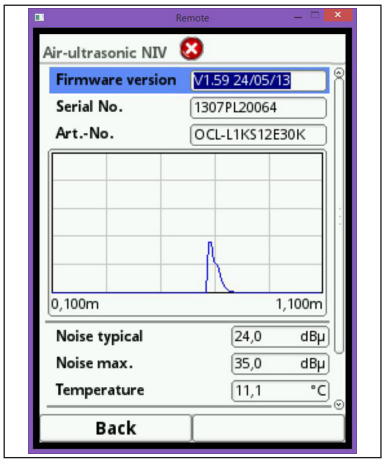


Fig. 7-81 Sensor information and echo image of air-ultrasonic sensor

7.3.6.2 v-Sensors

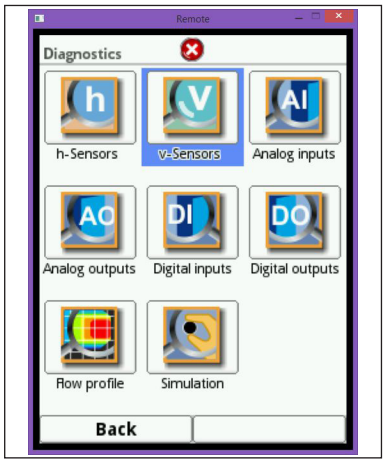
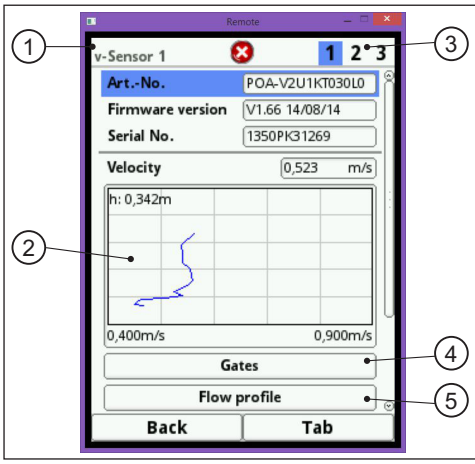


Fig. 7-82 Select v-sensor

The v-Sensors diagnostic menu apart from hardware information indicates the measured flow velocity profile as well.

Use the right-hand function key (Tab) to toggle between the individual sensors.



1. Currently selected sensor
2. Flow velocity profile
3. Number of sensors
4. Display area gate table
5. Display area 3D profile

Fig. 7-83 Information on v-sensor

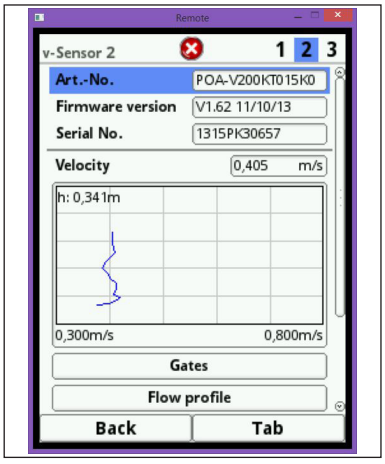


Fig. 7-84 Information on 2. v-sensor

The information Screen on the 3. v-Sensor is exactly the same.

Measured individual velocities as well as the according levels can be indicated as tables:

☞ Rotate the rotary pushbutton until >Gates< is highlighted blue.

☞ Press the rotary pushbutton - the current information is shown as table.

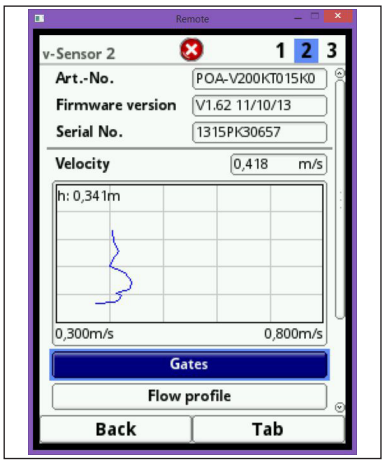


Fig. 7-85 Select gate display

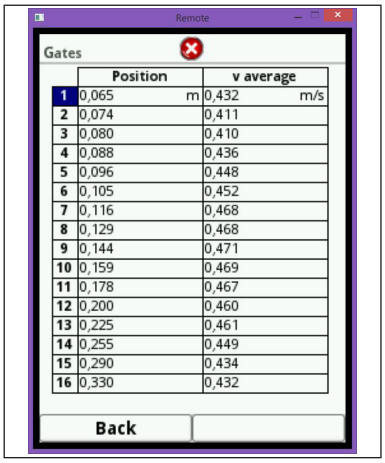


Fig. 7-86 Table of measured single velocities

The information on the measurement and trigger quality as well as the signal cable noise level are relevant to the NIVUS commissioning and service personnel.

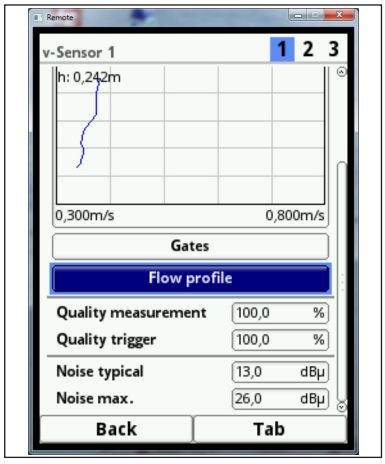


Fig. 7-87 Select 3D Flow profile

The graphic flow profile is calculated following hydraulic methods.

The factors below are taken into account while calculating the flow profile:

- Individual velocities
- Individual levels
- Channel profile
- Channel dimensions

By using more than one flow velocity sensor the quality of this graph can be improved. Horizontal hydraulic disturbances become visible as well.

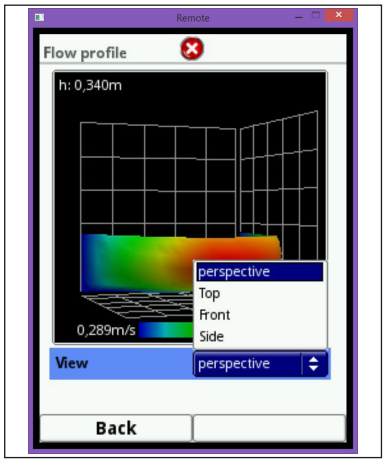


Fig. 7-88 Profile view selection

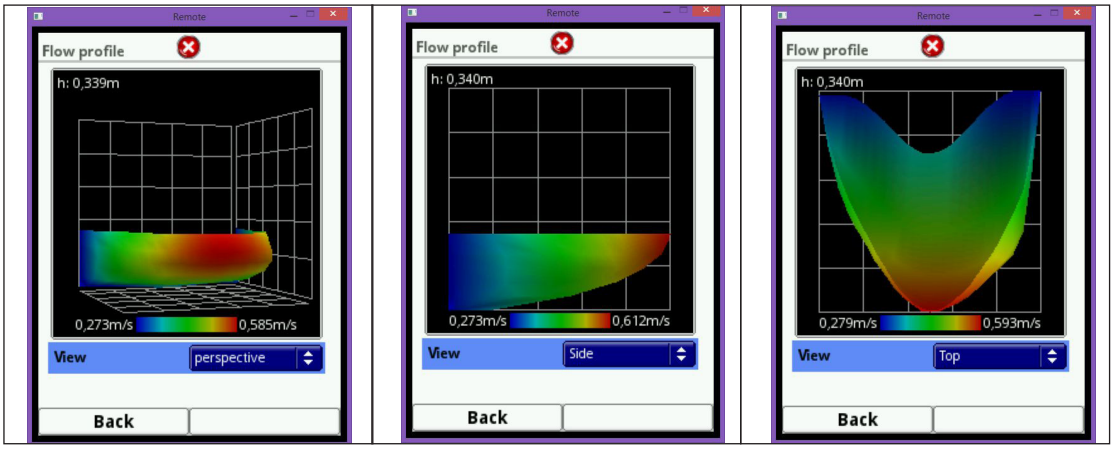


Fig. 7-89 Various profile views

7.3.6.3 Analog inputs

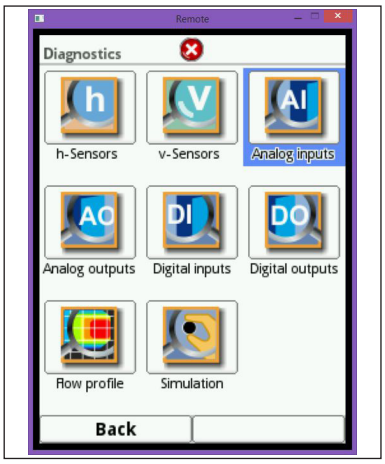


Fig. 7-90 Analog inputs selections

This menu can be used to indicate the current values on the NF7 inputs as well as the readings assigned to this value by using the measurement span.

The number of analog inputs depends on the instrument type:

- Type S1 = 2 analog inputs
- Type SR = 5 analog inputs
- Type M3 = 8 analog inputs

Only this number of analog inputs will be shown on the display.

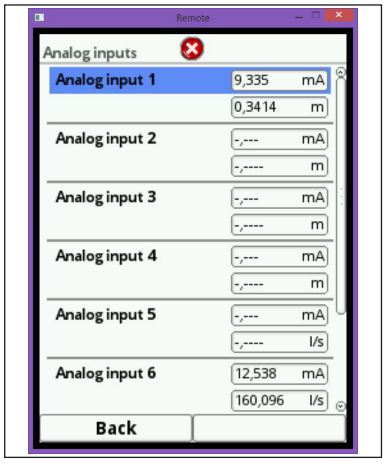


Fig. 7-91 Displayed signal values of type M3

7.3.6.4 Analog outputs

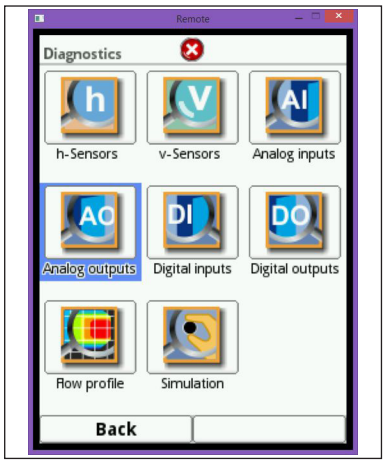


Fig. 7-92 Analog output selection

This menu can be used to indicate the calculated current values to be output through the analog converter as well as the readings assigned to this values by using the measurement span. Moreover it is possible to simulate the analog values.

The number of analog outputs depends on the instrument type:

- Type S1 = 2 analog outputs
- Type SR = 4 analog outputs
- Type M3 = 4 analog outputs

The number of analog outputs will be shown on the display..

Note

Only the signal available on the analog output converter is shown here. The currents actually flowing cannot be output.
This menu cannot be used to detect and to indicate external faulty wiring.

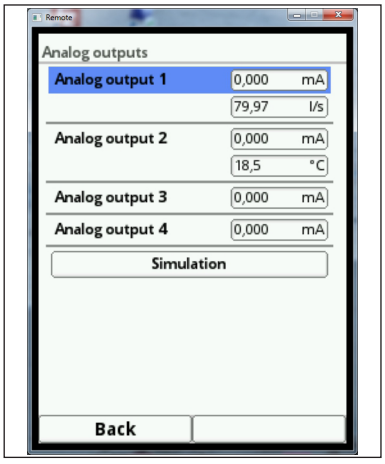


Fig. 7-93 Displayed analog output values

This menu allows to simulate the individual analog outputs.

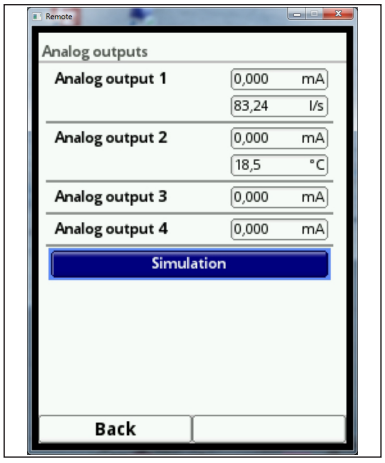


Fig. 7-94 Selected simulation mode

DANGER

Personal injury or property damage

The simulation of analog outputs shall be executed by trained electricians only. The responsible expert personnel must have sound knowledge on the entire control procedures of the according facility.

Prepare the simulation process carefully!

- *Switch the following systems to manual operation.*
- *Disable actuating drives and similar or limit the according functions.*

It is absolutely necessary to have a safety person available!

Disregarding may lead to personal injury or damage your facility.

NIVUS herewith in advance refuse any responsibility for any possible damage to persons or objects at any extent due to the extremely high risk of danger and unforeseeable consequences in the event of incorrect or faulty simulation!

DANGER

Effects on plant sections

The simulation of NivuFlow 750 outputs will directly affect any following plant sections without any safety locking measures!
Simulations are allowed to be executed exclusively by qualified expert personnel.
Observe the hints contained within the above warning!

Note

Due to the reasons of safety mentioned before the simulation mode access is password protected.

Due to reasons of personal safety reveal your password to authorised and trained expert personnel only!

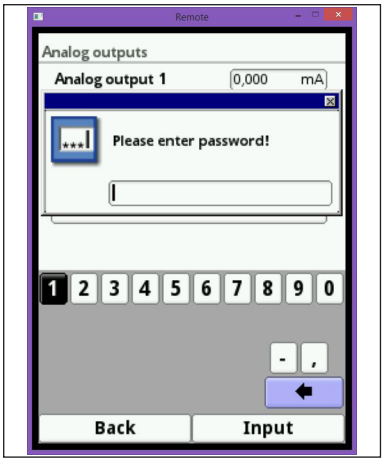


Fig. 7-95 Password entry

For analog output simulation proceed as follows:

☞ Rotate the rotary pushbutton until the desired analog output is highlighted blue.

☞ Press the rotary pushbutton - the analog output is activated by ticking the respective checkbox.

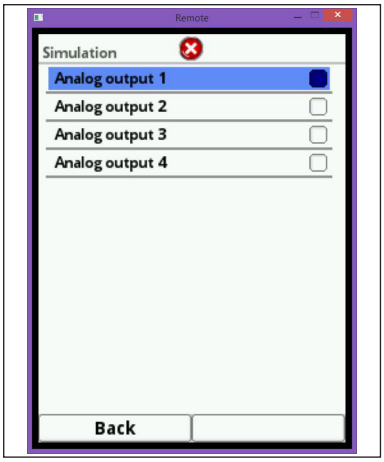


Fig. 7-96 Selecting required analog output

☞ Then enter the desired output current as numeric value.

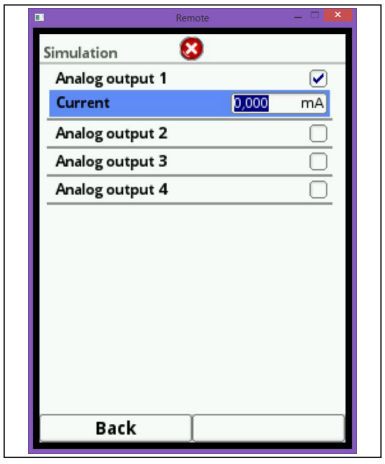


Fig. 7-97 Setting the desired current value for simulation

☞ Observe that the analog output(s) will provide the current values entered as long as the simulation menu is active.

☞ Press the left-hand function key to exit the simulation menu.

7.3.6.5 Digital inputs

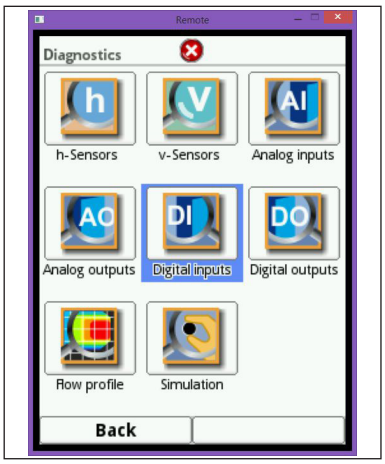


Fig. 7-98 Digital input selection

This menu indicates the signals available on the digital inputs.

The number of digital inputs depends on the instrument type:

- Type S1 = 2 Digital inputs
- Type SR = 7 Digital inputs
- Type M3 = 10 Digital inputs

Only this number of digital inputs will be shown on the display.

Enabled digital inputs feature a ticked checkbox.

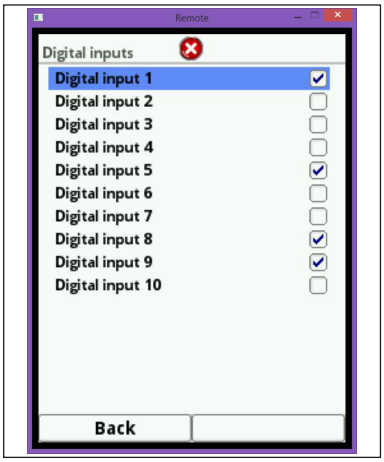


Fig. 7-99 Digital inputs

7.3.6.6 Digital outputs

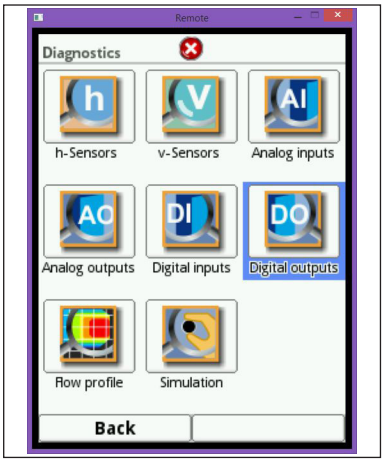


Fig. 7-100 Select Digital outputs

The digital output values set can be viewed using this menu. A simulation of digital outputs is available from this menu too.

The number of digital outputs depends on the instrument type:

- Type S1 = 2 Digital outputs
- Type SR = 5 Digital outputs
- Type M3 = 6 Digital outputs

Only this number of digital outputs will be shown on the display.

Note

The condition of the actually switched relay cannot be indicated here. Only the signal available on the relay for output is visible.

This menu cannot be used to detect and to indicate external faulty wiring.

Enabled digital outputs feature a ticked checkbox.

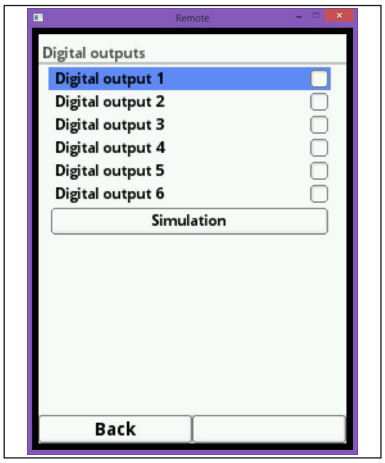


Fig. 7-101 Display status of digital outputs

This menu allows to simulate individual digital outputs.

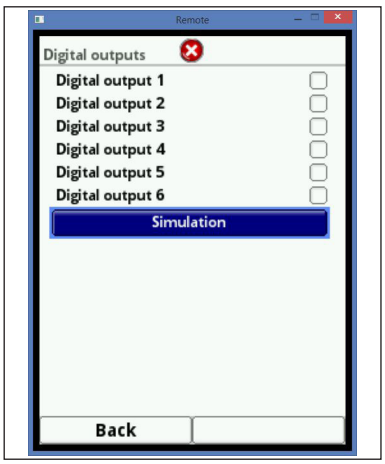


Fig. 7-102 Simulation mode selected

DANGER

Personal injury or property damage

The simulation of analog outputs shall be executed by trained electricians only. The responsible expert personnel must have sound knowledge on the entire control procedures of the according facility.

Prepare the simulation process carefully!

- *Switch the following systems to manual operation.*
- *Disable actuating drives and similar or limit the according functions.*

It is absolutely necessary to have a safety person available!

Disregarding may lead to personal injury or damage your facility.

NIVUS herewith in advance refuse any responsibility for any possible damage to persons or objects at any extent due to the extremely high risk of danger and unforeseeable consequences in the event of incorrect or faulty simulation!

DANGER

Effects on plant sections

The simulation of NivuFlow 750 outputs will directly affect any following plant sections without any safety locking measures!
Simulations are allowed to be executed exclusively by qualified expert personnel.
Observe the hints contained within the above warning!

Note

Due to the reasons of safety mentioned before the simulation mode access is password protected.
Due to reasons of personal safety reveal your password to authorised and trained expert personnel only!

Fig. 7-103 Password entry

To simulate a digital output proceed as follows:

☞ Rotate the rotary pushbutton until the desired digital output is highlighted blue.

☞ Press the rotary pushbutton - the digital output is activated by ticking the respective checkbox

The same procedure applies to activate the simulation of each output.

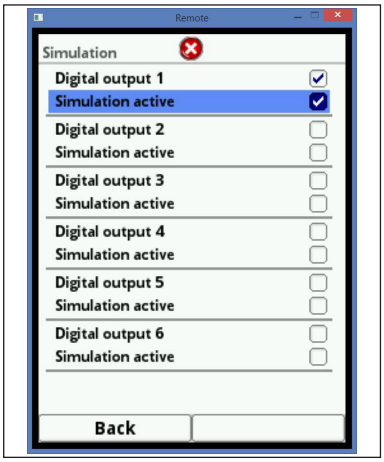


Fig. 7-104 Selecting outputs and simulation

☞ Observe that the digital output(s) will provide the current values entered as long as the simulation menu is active..

☞ Press the left-hand function key to exit the simulation menu.

7.3.6.7 Q-Control

This menu is not supported at present.

Fig. 7-105 Diagnostics Q-Control

7.3.6.8 Flow profile

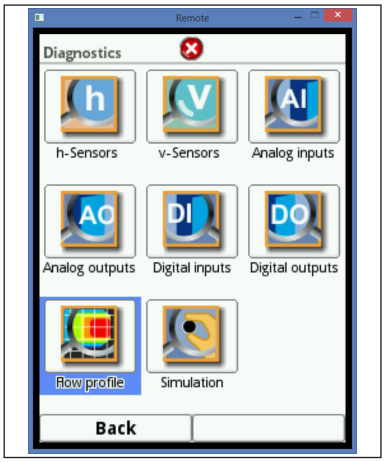


Fig. 7-106 Select 3D flow profile

This menu includes the same flow profile representation as mentioned in Fig. 7-87 and is described there.

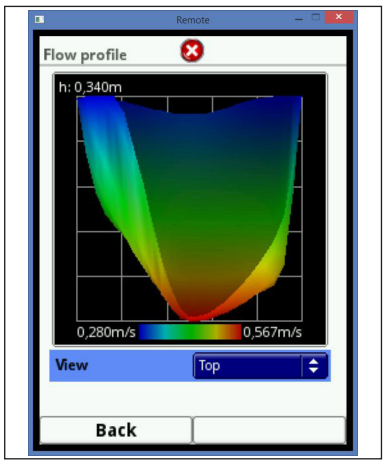


Fig. 7-107 Flow profile

7.3.6.9 Simulation

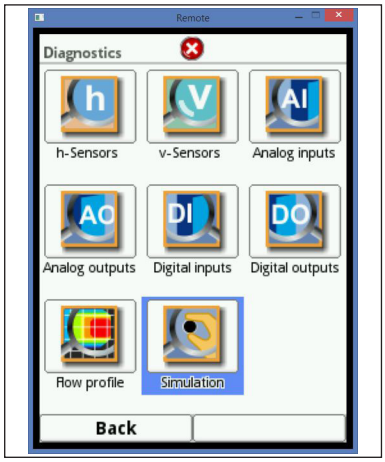


Fig. 7-108 Select Simulation mode

This menu allows to simulate theoretical flow. Simulation is carried out by entering assumed values for level and velocity. These values do not really exist.

Using the dimensions of the programmed channel as basis, the NivuFlow 750 calculates the flow rate prevailing by using the simulated values.

This rate will be issued on the analog or digital outs set previously.

DANGER

Personal injury or property damage

The simulation of analog outputs shall be executed by trained electricians only. The responsible expert personnel must have sound knowledge on the entire control procedures of the according facility.

Prepare the simulation process carefully!

- *Switch the following systems to manual operation.*
- *Disable actuating drives and similar or limit the according functions.*

It is absolutely necessary to have a safety person available!

Disregarding may lead to personal injury or damage your facility.

NIVUS herewith in advance refuse any responsibility for any possible damage to persons or objects at any extent due to the extremely high risk of danger and unforeseeable consequences in the event of incorrect or faulty simulation!

DANGER

Effects on plant sections

The simulation of NivuFlow 750 outputs will directly affect any following plant sections without any safety locking measures!

Simulations are allowed to be executed exclusively by qualified expert personnel.

Observe the hints contained within the above warning!

Note

Due to the reasons of safety mentioned before the simulation mode access is password protected.

Due to reasons of personal safety reveal your password to authorised and trained expert personnel only!

Fig. 7-109 Pass word entry

It is essential to follow the safety instructions mentioned before entering the password!

☞ Enter your password.

☞ Rotate the rotary pushbutton until the desired value to simulate (level or velocity) is highlighted blue.

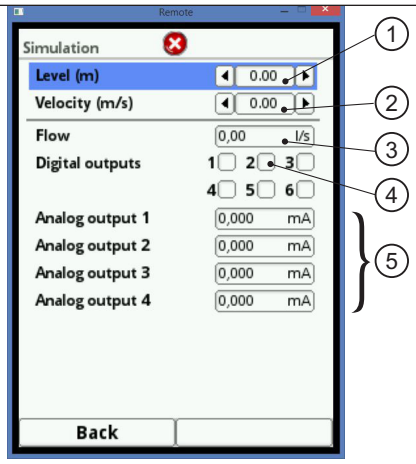
☞ Select the desired measurement value.

☞ Confirm your entry with the right-hand function key.

The output box (see Fig. 7-110, point 3) automatically shows the flow rate computed by considering the simulation data.

Digital and analog outputs possibly set behave like being actually programmed and will output these values effectively.

Issued signals and values are indicated on the display (see Fig. 7-110 points 4 and 5).



1. Input field level
2. Input field velocity
3. Readout field calculated flow
4. Display digital output status
5. Display analog outputs status

Fig. 7-110 Display of calculated values and issued conditions

7.4 Parameter Menu Data

Fig. 7-111 Menu Data

7.4.1 Trend

The trend graph is a representational recorder function. Selecting the trend graph provides access to the data previously saved (history).

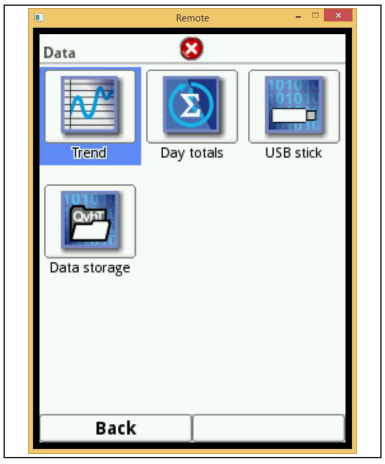
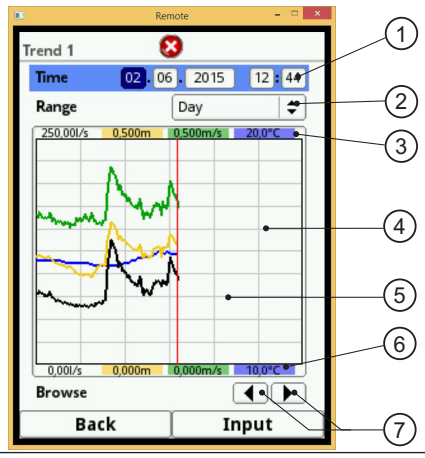


Fig. 7-112 Select Trend graph

☞ Select the desired data time range.

The selected data time range is shown. The data will not be updated automatically while viewing (the current data can be viewed in the bottom third of the main screen).

☞ Press the left-hand function key 3 times to return to the main screen.



1. Selection of time and date
2. Indication period
3. Scaling max. range
4. Display with grid lines
5. Date time line
6. Scaling 0-point
7. Browse previous / next

Fig. 7-113 Trend graph details

In the top area of the screen the date/time selection (see Fig. 7-113) can be found. The line is highlighted blue and therefore active.

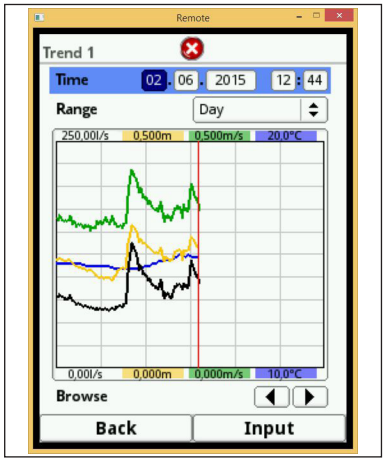


Fig. 7-114 Selecting the day

If you wish to select a certain point in time (historical data) proceed as described below:

☞ Press the rotary pushbutton - the first time range (day) is enabled.

☞ Enter the desired day.

☞ Press the rotary pushbutton once again - this takes you to the next time range (month).

☞ Repeat this procedure until the desired point in time is completely set.

☞ Confirm your entry with the right-hand function key. Your entries will be accepted.

After successful confirmation the selected data time range (Fig. 7-113, point 2) is shown.

The vertical red line in this case indicates the selected point in time.

☞ Press the left-hand function key (Back) if you wish to cancel your entry.

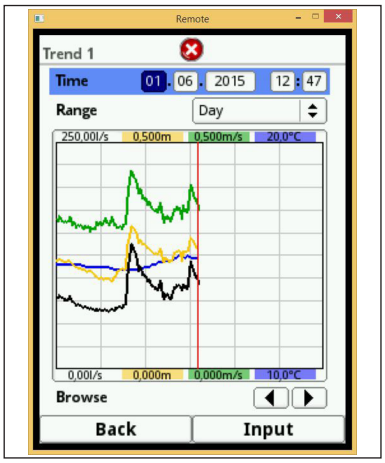


Fig. 7-115 Changing the day

The selected period is shown between the left-hand and the right-hand edge of the screen.

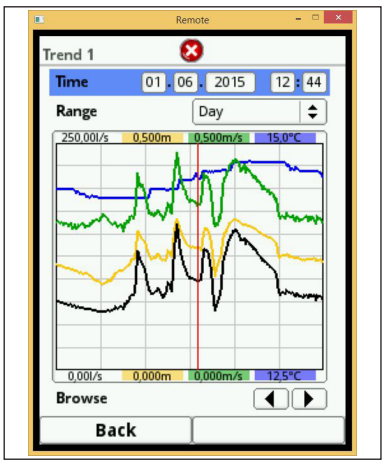


Fig. 7-116 Indication of newly selected time range

The range within data is to be shown can be modified (see Fig. 7-117). Make your settings using >Range<.

☞ Rotate the rotary pushbutton until >Range< Is highlighted blue.

☞ Press the rotary pushbutton - the selected periods become visible.

Select from the following periods:

- 1 hour
- 4 hours
- 1 day
- 1 week
- 4 weeks

☞ Rotate the rotary pushbutton until the desired period is highlighted blue.

☞ Confirm your entry with the right-hand function key. The selected range will be accepted.

The red vertical line indicates the selected point in time.

The display grid is non-adjustable.

If “Hour“ is selected as period, the indication starts on the left-hand side at minute “0“ and ends on the right-hand side at minute “59“.

To improve readability the screen is subdivided by three vertical grid lines. Each of the resulting segments represents a period of 15 minutes.

The >Browse< function can be found below the time display.

Use the arrow buttons to move forward or back one our per key action.

If “4 Hours“ is selected as period, the start of the indication on the left-hand side depends on the point in time selected.

Indication therefore starts at:

- 00:00 o’clock or
- 04:00 o’clock or
- 08:00 o’clock or
- 12:00 o’clock or
- 16:00 o’clock or
- 20:00 o’clock

The indication range ends on the right-hand side exactly 4 hours later. This screen features 3 vertical grid lines too. The distance between each of them is equal to 1 hour.

Use the >Browse< function as described above to move back and forth by 4 hours.

If “Day“ is selected as period, the indication starts on the left-hand side at hour “0“ and ends on the right-hand side at hour “24“.

To improve readability the screen is subdivided by five vertical grid lines. Each of the resulting segments represents a period of 4 hours.

Use the >Browse< function as described above to move back and forth by 1 day.

If “Week“ is selected as period, the indication starts on the left-hand side on Monday at 00:00 o’clock and ends on the right-hand side on Sunday at 24:00 o’clock.

To improve readability the screen is subdivided by six vertical grid lines. Each of the resulting segments represents a period of 1 day.

Use the >Browse< function as described above to move back and forth by 1 week.

If “4 Weeks“ is selected as period, the indication starts on the left-hand side on Monday at 00:00 o’clock and ends on the right-hand side on Sunday at 24:00 o’clock. The time reference mark for the 4-weeks indication is the 29.12.1969, 00:00 o’clock.

To improve readability the screen is subdivided by three vertical grid lines. Each of the resulting segments represents a period of 1 week.

Use the >Browse< function as described above to move back and forth by 4 weeks.

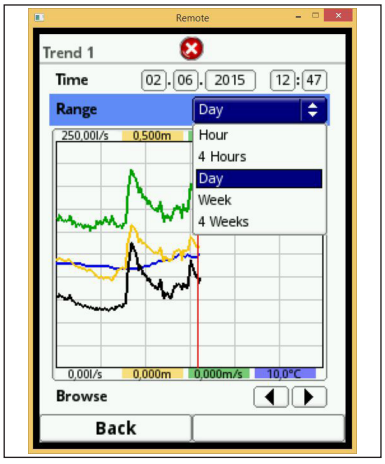


Fig. 7-117 Selecting the indication period

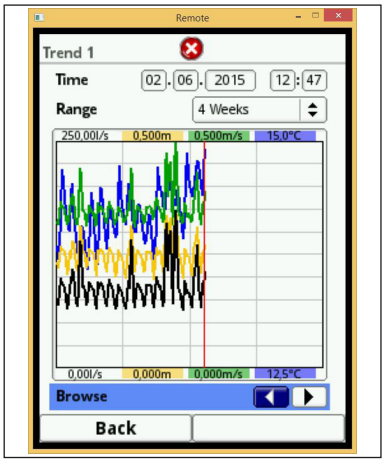


Fig. 7-118 Browse function „Back“

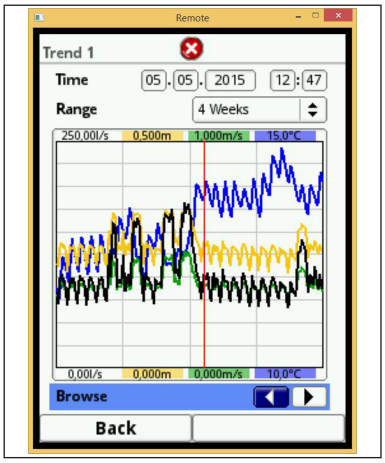


Fig. 7-119 Display period „browsed back“

Note

Selecting the period of 4 weeks may take a few seconds to completely load the required data.

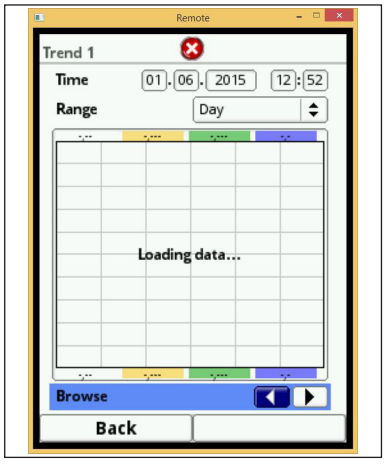


Fig. 7-120 Display while loading data

7.4.2 Day totals

This menu is to view flow rate totals in a table. Each of the indicated values represents 24 hours. Per default the start screen shows the first 14 days.

Fig. 7-121 Select day totals

A maximum of 100 totals (=100 days) will be saved. Starting with total 101, always the oldest value will be overwritten (ring-type memory).

☞ Rotate the rotary pushbutton to the right to scroll down within the table; rotate left to scroll back to the top of the table.

It is possible to view older day values as well. The prerequisite to show older values is that the instrument has been operated for a longer period.

Example: 98 values - The unit has been in operation for 98 days

Otherwise only day values are readable, when the NivuFlow 750 has been working.

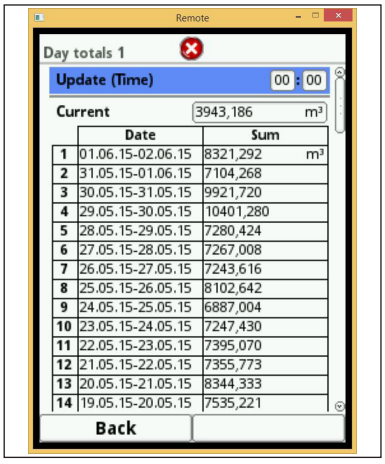
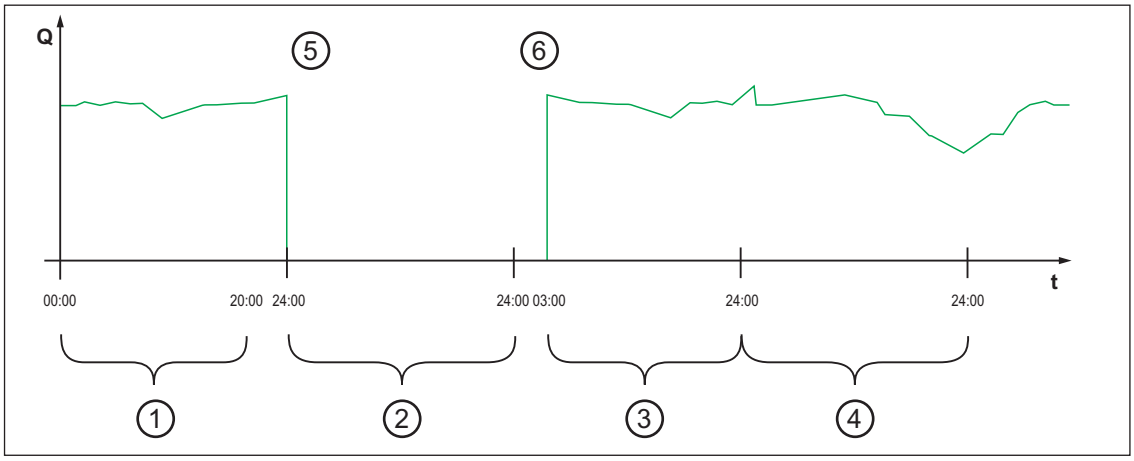


Fig. 7-122 Display 24-hours totals

If the NivuFlow 750 is shut down between two summing procedures a (sub)total is computed nevertheless. The flow rate totals of this period are missing during the shut-down time.

As soon as the NivuFlow 750 is shut down before the next summing time and remains to be off until the next summing time, no totals will be created for this 24-hours period (see Fig. 7-123). Neither a sum = 0 or a date is stored. One line in the table appears to be missing.



1. Sum 1st day: sum of 20 hours
2. 2nd day: power failure - no summing executed
3. Sum 3rd day: sum of 21 hours
4. Sum 4th day: sum of full 24 hours
5. Voltage drop
6. Power available again

Fig. 7-123 Diagrams of sum

Per default the summing time is between 00:00 o'clock and 24:00 o'clock. This means that the day totals are always created between 00:00 o'clock and 24:00 o'clock.

The default summing time is 00:00 h.

The time of summing can be modified.

☞ Rotate the rotary pushbutton until >Update (Time)< Is highlighted blue.

☞ Press the rotary pushbutton - the “hour” range is enabled.

☞ Enter the desired starting time for summing (e.g. 08:00) and move on to the minutes-section.

☞ Enter the minutes.

☞ Confirm the values with the right-hand function key >Enter<.

You have changed the summing time to 08:00 o’clock. The 24-hours value now will be created using the period from 08:00 o’clock until 08:00 o’clock the next day.

The >Current< indicator box shows the subtotal cumulated since the previous summing event.

7.4.3 USB Stick

USB stick requirements:

- The USB stick used must support USB 2.0.
- The USB stick used must be FAT 32 formatted
  (FAT 12 or FAT 16 is also possible).
- The maximum permissible memory size of the USB stick is 32 GB.

Using the USB stick

☞ Plug the USB stick into the USB port above the display!

The USB stick is used for the following functions:

- Transfer of readings to USB stick
- Backup of parameters on USB stick
- Re-transfer of parameter backups from USB stick to instrument
- Formatting of USB stick

Fig. 7-124 Select sub menu USB stick

The NivuFlow 750 has an internal data memory. It is possible to transfer either portions of your data or all saved readings to an USB stick.

This section allows you to determine the desired transmission period.

Per default the NivuFlow 750 is set as to transfer the data containing the period between the latest previous data transmission and the current time.

To save data to USB stick proceed as follows:

☞ Press the rotary pushbutton to activate the first box

☞ Rotate the rotary pushbutton to set the desired day as starting time.

☞ Rotate the rotary pushbutton again to move to the month input.

☞ Repeat the procedures until the desired date and time have been set.

☞ Confirm the starting time by pressing the right-hand function key >Enter<.

☞ Rotate the rotary pushbutton until the >to< Input box is highlighted blue.

☞ Rotate the rotary pushbutton to set the desired day as stop time

☞ To enter the stop time proceed as described before.

☞ Confirm your entries (after entering the minutes) once again by pressing the right-hand function key >Enter<.

You now have defined the data period to be transferred to the USB stick.

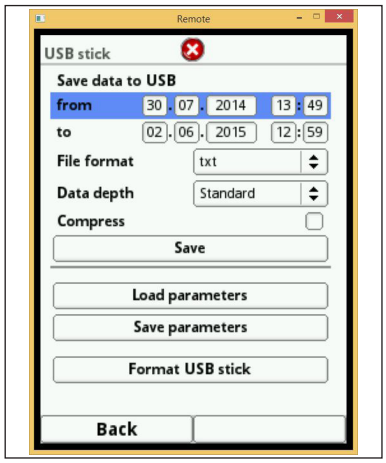


Fig. 7-125 Defined transmission period

Subsequently select the desired data format.

☞ Press the rotary pushbutton to open the selection menu

Then select from:

- txt
- csv
- binary (for future import into NivuSoft application)

☞ Press the rotary pushbutton to accept the data format.

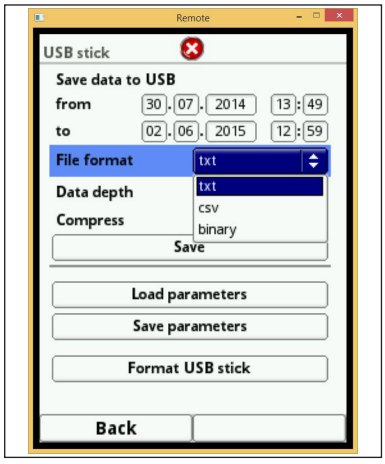


Fig. 7-126 Selecting the data format

The data depth adjustable here comprises 3 possible options:

Standard

This is the appropriate format for the most applications. The data sets saved contain the following information:

- Date and time
- Totaliser
- Calculated flow volume
- Filling level
- Average flow velocity
- Water temperature
- Air temperature (if an AUS is used)
- Current values as well as the accordingly calculated values of enabled analog inputs and digital inputs.

Extended

This option is appropriate for the verification of critical, important applications and is required mainly for servicing personnel.

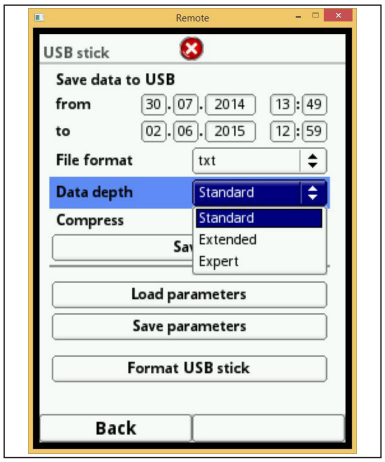
Data sets are saved including:

- Date and time
- Totaliser
- Calculated flow volume
- Filling level used for calculation
- Average flow velocity
- Water temperature
- Air temperature (if an AUS is used)
- Current values as well as the accordingly calculated values of enabled analog inputs and digital inputs
- Average flow velocities of v-sensor(s) 1, 2 and 3 (if used)
- Parameter values for the NIVUS-specific velocity evaluation method >COSP<
- Trigger and hydraulic qualities of v-sensor(s) 1, 2 and 3 (if used).

Expert

This option should be used only by trained service personnel or the manufacturer's developers. Such data sets may become very large very quickly.

Apart from the data contained with the "Extended" data set, this option includes extra information on all individual gate velocities as well as all gate positions of any connected v-sensors.



Data depth

The >Compress< function makes sense only for the transmission of large amounts of data. This function utilises the „.gz" format, which can be unzipped by using the free „7-ZIP" application.

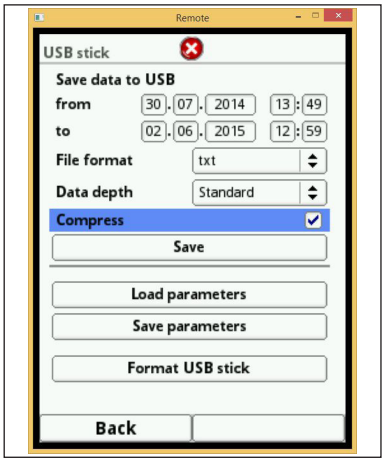


Fig. 7-127 Compression

After having defined transmission period, data format and data depth you are ready to save your data on USB stick.

☞ Enable the >Save< Box.

☞ Press the rotary pushbutton to save the data on the USB stick.

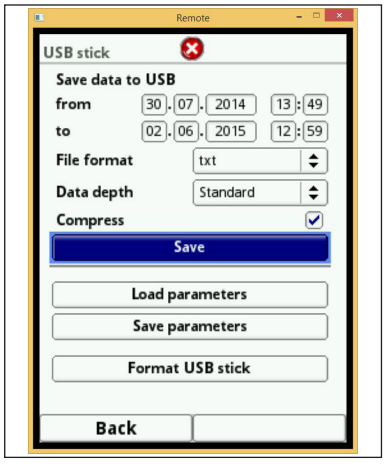


Fig. 7-128 Command for measurement data saving

Use the “Load parameters“ command to load parameter sets previously saved back from USB stick to the transmitter.

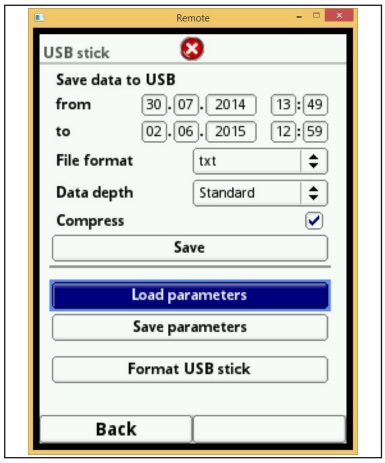


Fig. 7-129 Load saved parameter file

The “Save parameters“ function is to save measurement place parameters to USB stick. This option creates and saves 3 files.

The files have the formats below:

- XXXX_DOC_AABBCCDDEE.csv
  This file is for documentation purposes and contains basic settings as well as parameter changes.
- XXXX_DOC_AABBCCDDEE.xml
  This file is for future use with the >NivuSoft< Application and includes basic settings and parameter changes.
- XXXX_PAR_AABBCCDDEE.xml
  This file contains the entire transmitter parameter settings and is used as backup of the modified parameter settings.

File name remarks:

- XXXX = Name of the measurement place set
- AA = Year
- BB = Month
- CC = Day
- DD = Hour
- EE = Minute

Fig. 7-130 Save parameters

Unformatted or incorrectly formatted USB can be formatted correctly directly on the instrument:

☞ Rotate the rotary pushbutton until >Format USB stick< Is highlighted blue.

☞ Press the rotary pushbutton - the plugged USB stick will be formatted.

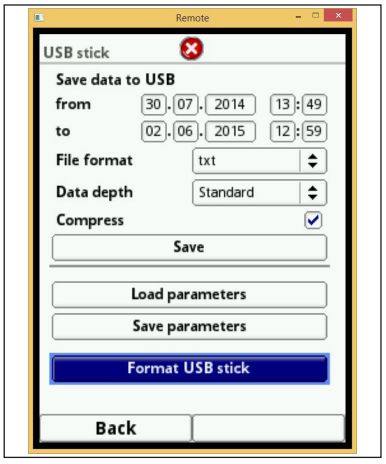


Fig. 7-131 Formatting command

As soon as the USB stick is formatted the display prompts >SUCCESSFUL<.

7.4.4 Data storage (internal)

This submenu allows to modify the storage cycle and to delete the internal memory.

Fig. 7-132 Select data storage

The storage cycle options are:

- 30 seconds
- 1 minute
- 2 minutes
- 5 minutes

The storage cycle is set to 1 minute per default.

ALWAYS the average value covering the selected cycle is saved instead of the current value at the moment of saving.

Fig. 7-133 Setting the storage cycle

The complete contents of the internal memory can be deleted. The data however are password-protected to prevent from unintentional deletion.

☞ Enter the password to delete the data.

☞ Confirm the password entry with the right-hand function key >Enter<.

Important Note

Deleted data cannot be restored again!

Fig. 7-134 Delete internal storage

7.5 System

7.5.1 Information

Fig. 7-135 Select sub menu system

This menu is for viewing only and provides the device information below:

- Serial No. And Article No.
- MAC address
- Transmitter firmware version

Moreover you can find here extra information on activated flow velocity sensors and a possibly connected AUS level sensor.

The screen shows:

- Sensor article numbers
- Sensor serial numbers
- Current sensor firmware versions

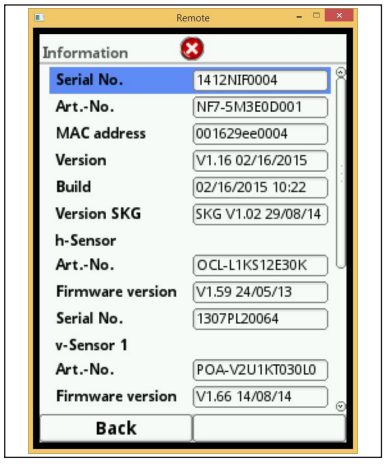


Fig. 7-136 System information display

7.5.2 Region Settings

In this menu you can do the following settings:

- Operating language
- Date format
- Units for measurement values.

Here, a distinction between displayed and stored measurement values is possible.

Fig. 7-137 Sub menu Region settings

Operating language

Following operating languages can be configured currently:

- Deutsch
- English
- Français

Fig. 7-138 Operating language settings

Date format

The following date formats can be set:

- dd.mm.yyyy (day/month/year)
- mm/dd/yyyy (month/day/year)

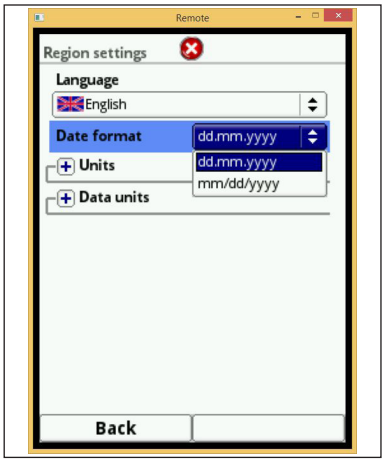


Fig. 7-139 Select date format

Units

☞ Rotate the rotary pushbutton until >Units< is highlighted blue.

☞ Press the rotary pushbutton - the left-hand PLUS toggles to MINUS and an options list opens up.

☞ Rotate the rotary pushbutton to the first option in the list. Here you can define the type of decimal separator (comma or dot)

The decimal separators determined here are used only for indication on the NivuFlow 750 display.

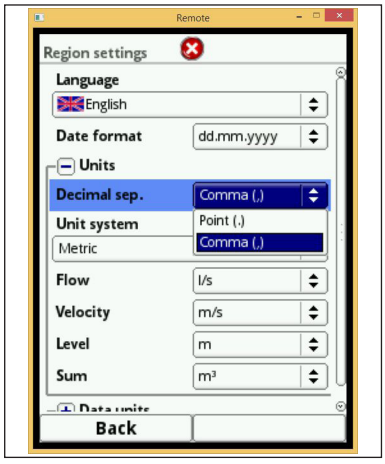


Fig. 7-140 Select Decimal separations

Next, determine the unit system. Select from:

- Metric
- English
- American

Depending on the unit system selected the units below can be chosen:

- In the metric system (e.g. Litre, cubic meter, cm/s etc.)
- In the English system (e.g. ft, in, gal/s, etc.)
- In the American system (e.g. fps, mgd, etc.)

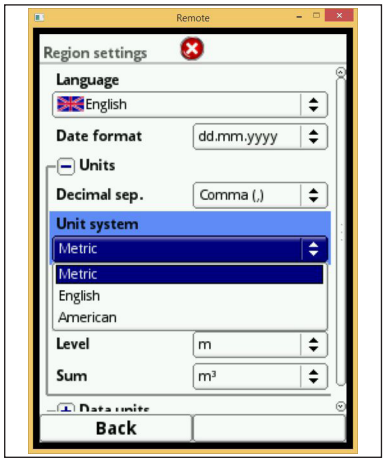


Fig. 7-141 Unit system in metric system

Now set the units used for display indication:

- Flow
- Velocity
- Level
- Sum

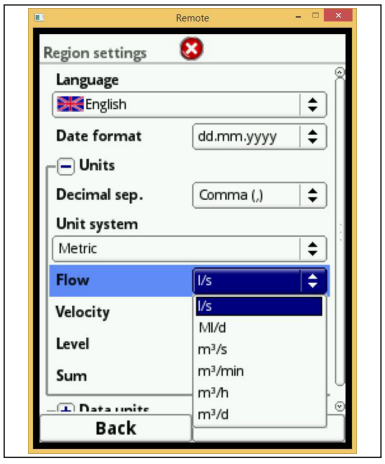


Fig. 7-142 Display units in metric system

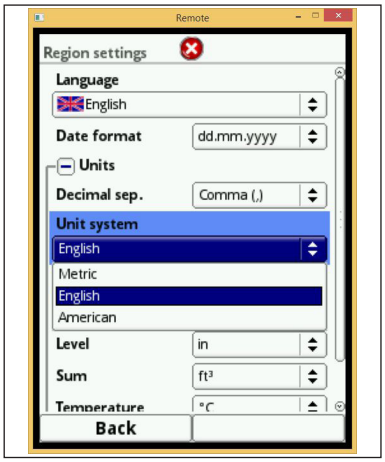


Fig. 7-143 Unit system settings English

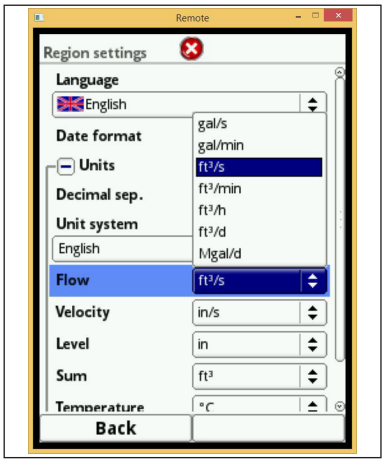


Fig. 7-144 Unit system settings in English system

When setting the >Units memory< proceed exactly as described in >Units<. In >Units memory< the readings are converted and saved according to the selected unit.

Choose between >Comma< or >Dot< As decimal separator.

Specifying the decimal separator is relevant for correct data import. Particularly in case of using foreign software applications (such as foreign Excel) to evaluate readings, observe to specify the correct decimal separators.

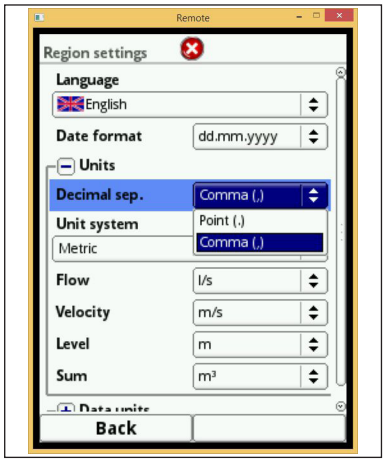


Fig. 7-145 Change decimal separators

Depending on the intended use select from the units below for storage:

- In metric system e.g. l/s, m³/s, m³/d, cm/s etc.
- In English system e.g. ft³/s, in, gal/min, Mgal/d, in/s, yd/s etc.
- In American system e.g. gps, gpm, cfs, cfm, cfh, cfd, mgd etc.

Now set the units used to save the readings:

- Flow
- Velocity
- Level
- Sum
- Temperature

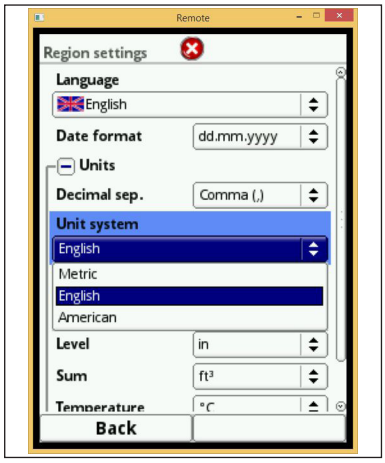


Fig. 7-146 Storing of unit systems settings

7.5.3 Time/Date

Use this sub-menu to modify the current date and the transmitter system time.

This function is required to change between summer time and winter time or if the internal buffer battery is exhausted and after mains power failure. If the transmitter is operated for a long time internal clock deviations must be expected. The deviations can be corrected here.

Note

Changing the system time has an effect on the storage of data. If the data storage option is enabled, duplicate data or data gaps may occur after the system time has been modified.

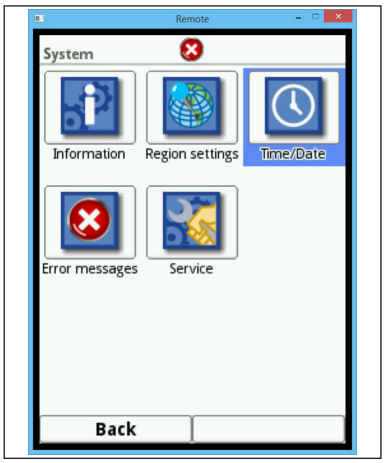


Fig. 7-147 Select submenu Time/Date

Here you can set the current system time as well as the time difference (UTC or GMT) relative to the zero meridian.

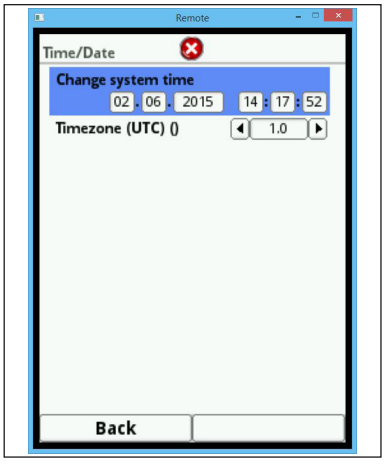


Fig. 7-148 Date and time settings

7.5.4 Error Messages

Use this menu to recall the currently active queued error messages.

This sub-menu however can be used to delete the error message memory too.

Fig. 7-149 Select submenu error messages

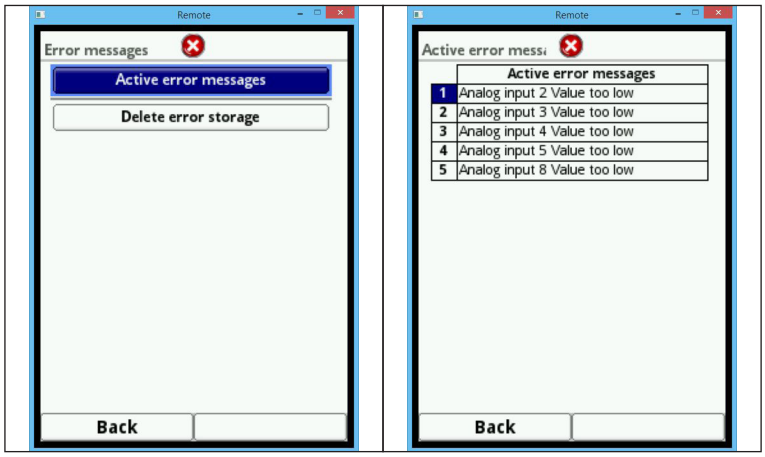


Fig. 7-150 Current error messages displayed

Before you can delete the error storage, you need to enter the password. This prevents unauthorized or unintentional deletion.

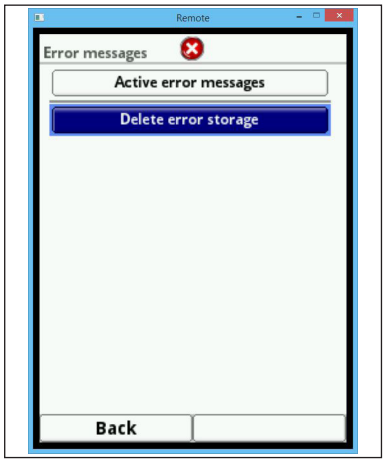


Fig. 7-151 Delete current error messages

7.5.5 Service

This sub menu contains the following functions:

- Activating access to service level
- Changing password
- Reboot of the system

Fig. 7-152 Select sub menu Service

Service level

The service level is reserved for NIVUS customer service or authorised companies.

Systemically relevant changing as well as special settings for special applications must be set here.

These changes shall exclusively be preformed by NIVUS commissioning personnel!

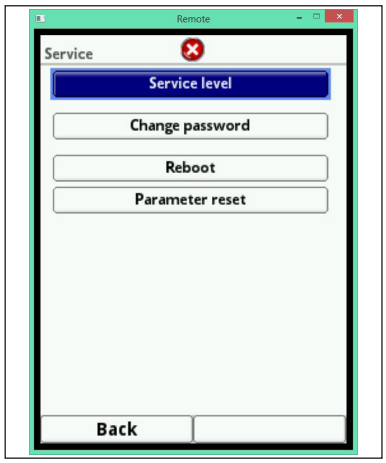


Fig. 7-153 Service level selected

Change password

The default password is >2718<. NIVUS recommends to change the password to save the system against unauthorized access. You can use any values or characters for the password.

The password length is limited to 10 characters.

Note

Do not make the password available to unauthorised persons.
Write down the password and keep it in a safe place.
Once you have modified the password, your old password CANNOT be restored by NIVUS!
Should the password get lost a general reset of the complete system needs to be executed.
A general reset will result in loss of modified parameter settings.

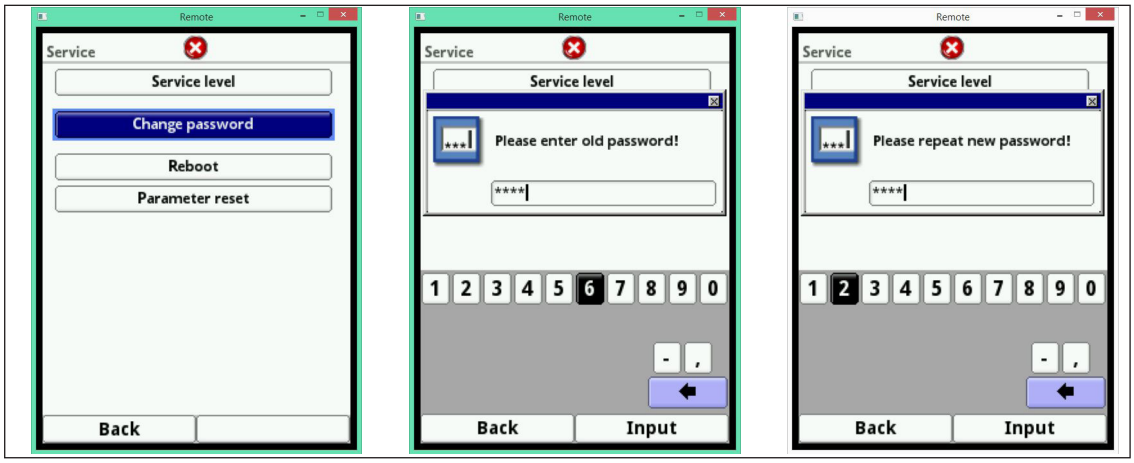


Fig. 7-154 Changing the password for service level

Reboot

A transmitter reboot interrupts the currently active measuring process.

The system will boot using the newly set parameters. After booting, the system behaves as if restarted (like a PC). This option hence eliminates the need to actually shut down and restart the system.

All parameters, counters and saved data remain.

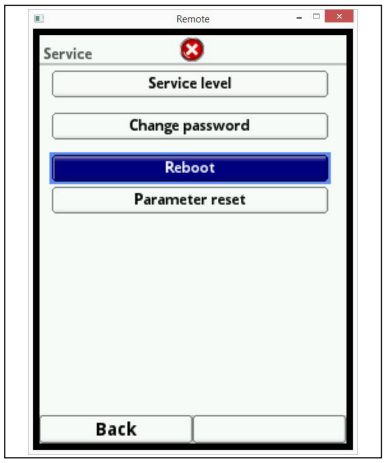


Fig. 7-155 Reboot of the system

Parameter reset

During a parameter reset all parameters are reset to their default settings. Counter readings, changed passwords and saved readings will not get lost.

The actual parameter reset will not be executed before you exit the parameter menu (back to main menu) and confirm the storage. Therefore, it is still possible to abort the process.

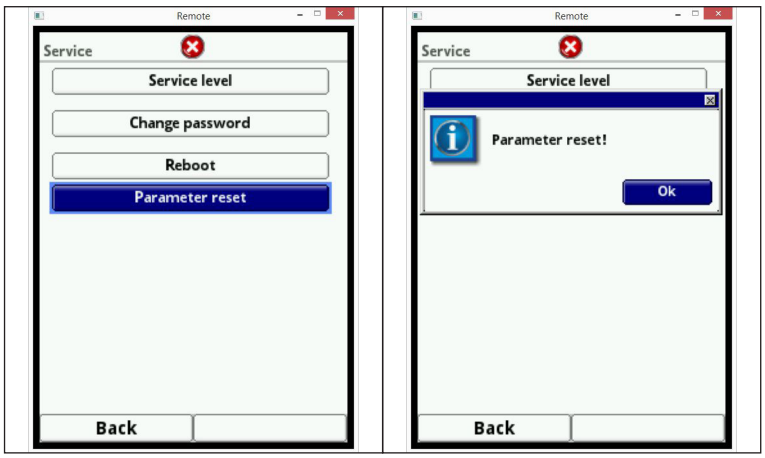


Fig. 7-156 Reset the parameters to default values

7.6 Communication

This menu allows to establish communication to other devices. The transmitter can be integrated into networks here as well.

Integration into networks demands to have already knowledge about such procedures.

This is why no further details will be described in this respect here.

If you should not have basic knowledge on network integration, such tasks should be left to IT experts or NIVUS commissioning personnel.

Fig. 7-157 Select sub menu communication

The TCP/IP menu allows to set options for data transport in a decentralised network.

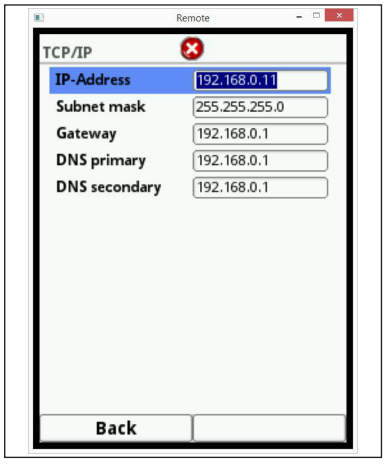


Fig. 7-158 TCP/IP settings

The internal WEB browser is currently not supported.

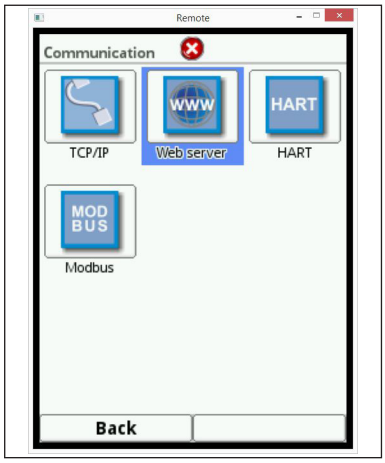


Fig. 7-159 WEB-Server

In preparation

In future the NivuFlow 750 can be used as a HART slave subordinated systems.

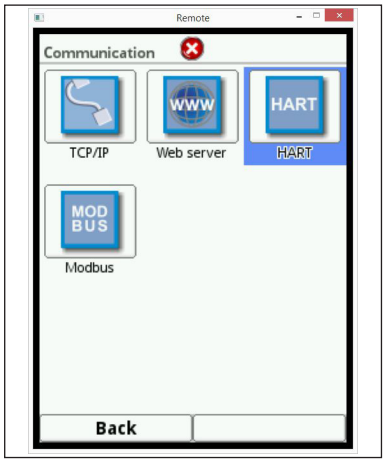


Fig. 7-160 HART interface programming

You can integrate the NivuFlow 750 in other systems by Modbus TCP.

If required, the Modbus protocol is available upon request. Please contact the NIVUS GmbH head office in Eppingen.

Fig. 7-161 Modbus programming selection

Here the following features are available:

- Interface selection (RS232 or RS485)
- Baud rate selection (between 9600 and 15200)
- Slave address (1 to 247)

In addition you can adjust the scaling:

- Scaling flow
- Scaling level
- Scaling velocity
- Scaling temperature
- Scaling analog

Fig. 7-162 Interface settings

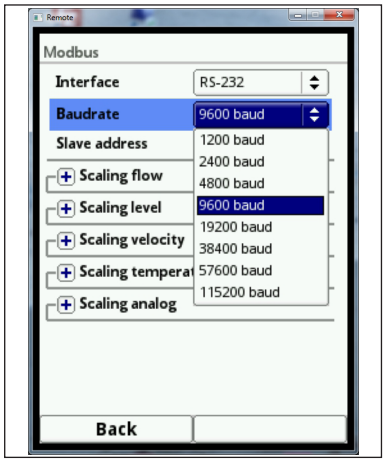


Fig. 7-163 Baud rate settings

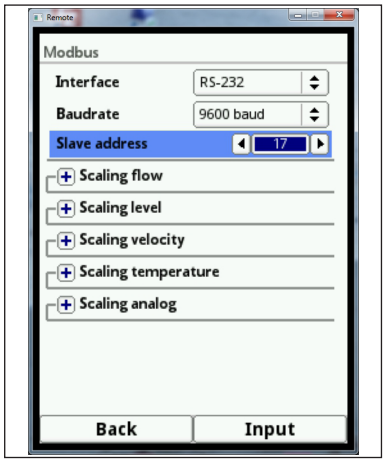


Fig. 7-164 Slave address definition

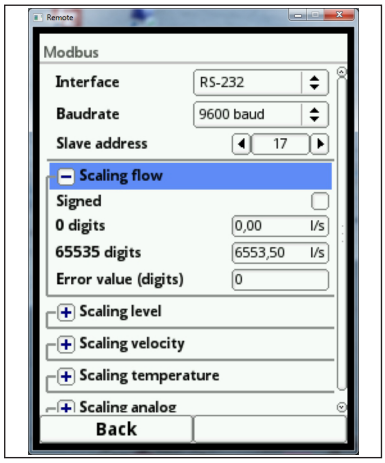


Fig. 7-165 Programming scale values

7.7 Display

Use the display menu to change the following settings:

- Backlight
- Labels of the 5 main display output fields
- Decimal digits of individual values

Fig. 7-166 Select sub menu display

The backlight intensity can be changed in 10 steps.

Adjust the backlight according to the ambient conditions. Avoid setting the display too bright.

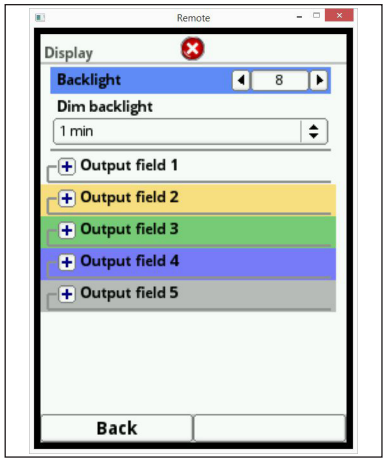


Fig. 7-167 Setting display backlight

NIVUS recommend to use automatic backlight dimming. Dimming protects the display and helps to extend display life. The display will be dimmed automatically if not in use over a certain period. The delay time can be determined in advance.

As soon as settings are made on the NivuFlow 750 (e.g. if a key is pressed) the display instantly switches over to standard brightness.

Dimming is set to brightness level 2 per default.

Fig. 7-168 Delay time until backlight dimming

The 5 main display output fields (Flow, Level, Velocity, Temperature and Sum) can be defined freely regarding name as well as decimal digits.

The output field colours correspond to the value colours in the main display.

Unfold an output field to change its label.

☞ Untick >Default label<.

☞ Enter a new name. You are free to use any desired name up to a maximum of 16 characters.

The entered name however does not influence or change the values indicated in the main display output fields in any way.

Note

It is NOT POSSIBLE to modify the assignment of output fields and values. Example: the "Flow" field will ALWAYS output flow values, no matter if the label has been set to >Temperature< or similar.

Fig. 7-169 Select output field 1

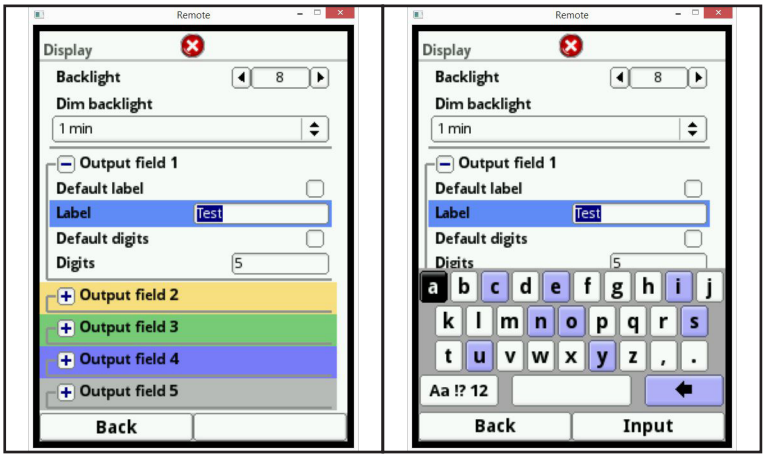


Fig. 7-170 Entering the output field label

The number of decimal digits can be modified the same way as described before.

A maximum of 5 decimal digits can be specified.

Note

Observe if the number of decimal digits makes sense regarding the sensors. Furthermore observe the number of decimal digits in relation to the used measurement units. The maximum resolution e.g. of the temperature sensor is within a grid of 0.1 K.

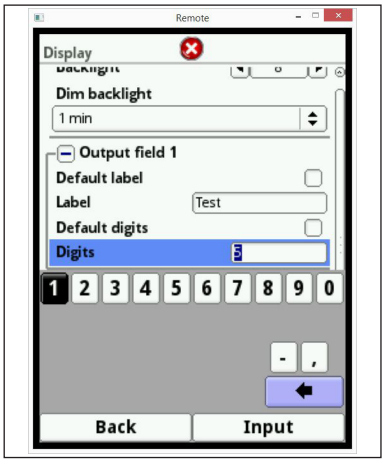


Fig. 7-171 Changing decimal digits

7.7.1 Connections

This sub-menu is required as soon as the flow velocity sensors are not directly connected to the transmitter but by using the Type iXT Ex Separation Interface or the Type MPX sensor multiplexer.

Fig. 7-172 Select sub menu connections

Mark the checkbox, if you use an iXT or MPX. Otherwise sensor and module will not be detected.

Fig. 7-173 Activation when using an iXT or MPX

8. Main Display

When in operation mode, the NivuFlow 750 indicates the following important readings:

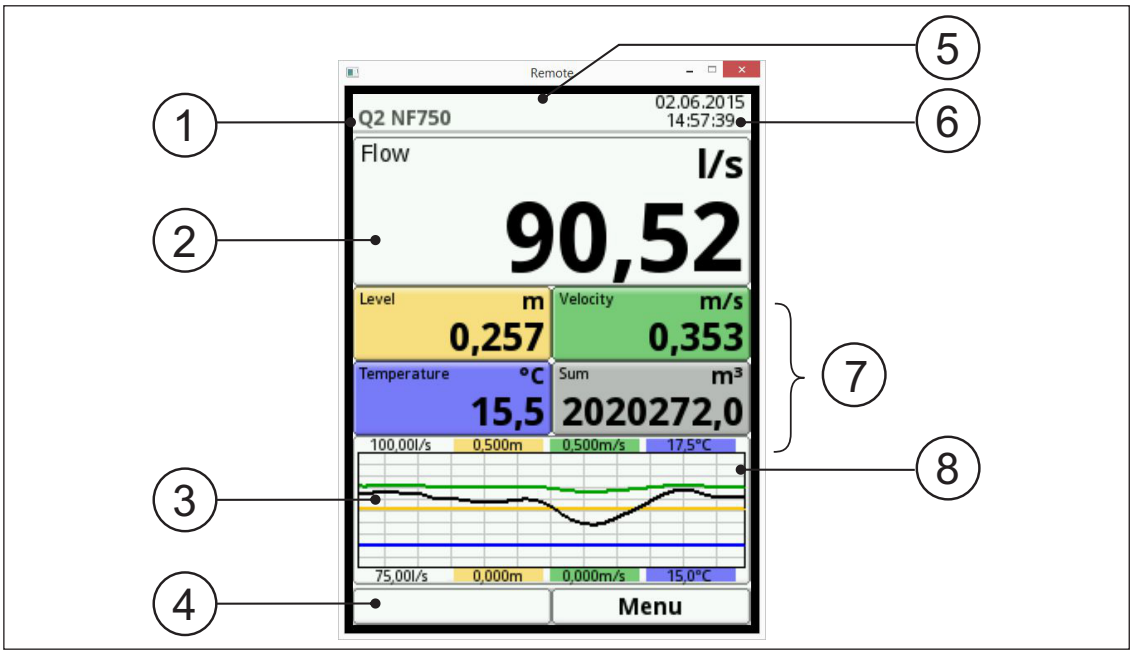
- Flow quantity
- Current fill level (for calculation)
- Velocity (calculated average flow velocity)
- Medium temperature
- Sum

The following information can be found in the top display line:

- Name of measurement place
- Date
- Time

The red full circle with white cross in the top display line indicates current malfunctions of system or individual sensors.

The bottom line of the display shows a trend graph (hydrograph) as well as the current functions of both function keys.



1. Name of measurement place
2. Flow display
3. Display hydrograph
4. Lower scaling range
5. Error message (acknowledged, pending)
6. Date / Time
7. Display for single measurement values
8. Upper scaling range

Fig. 8-1 Main screen

The menu allows to directly access the most relevant settings and information.

☞ Rotate the rotary pushbutton until the desired section is highlighted in black.

☞ Press the rotary pushbutton - the according section will open a dialog window.

Fig. 8-2 Flow volume section selected

8.1 Flow screen

You can access the individual sections directly after the dialog window is activated.

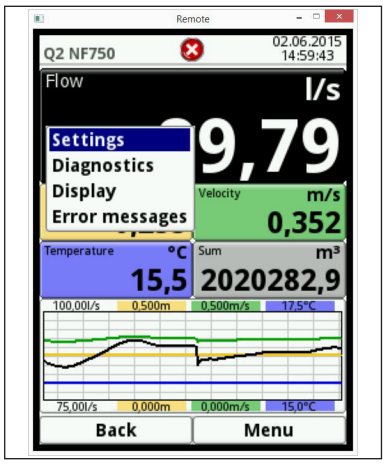


Fig. 8-3 Possible access options

The flow volume screen allows to directly access the measurement place settings below:

- Measurement place names
- Channel profile type and dimensions
- Sludge level input
- Low flow suppression
- Stability
- Damping

Parameter settings can be modified here directly.

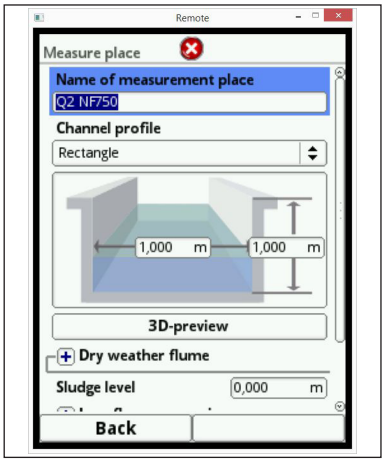


Fig. 8-4 Measurement place settings

By directly accessing the diagnostic menu you can instantly carry out verifications within the limits of the application programmed:

- Connected level and flow velocity sensors
- Physical condition of analog and digital inputs
- Output command to die analog and digital inputs
- Controller functions
- Simulation of any flow value
- Indication of the prevailing flow profile

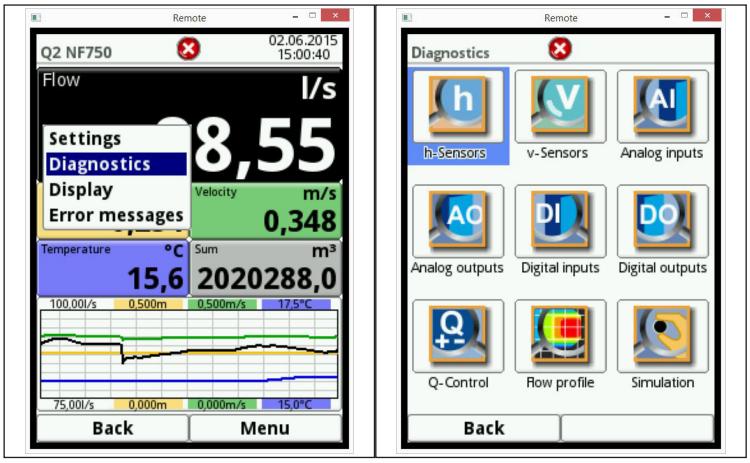


Fig. 8-5 Selecting the Diagnostics menu and its options

The menu screen allows to dim the display back-light (dimming). More over you can modify the text of any of the 5 readings output fields.

The number of digits of readings can be adjusted here too.

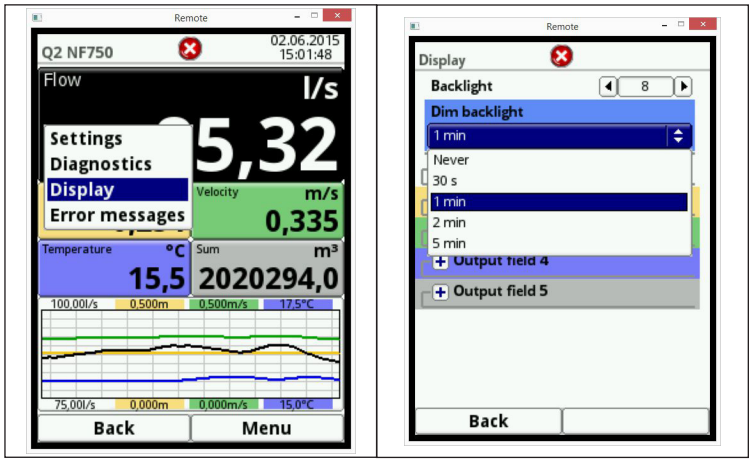


Fig. 8-6 Adjust dimming

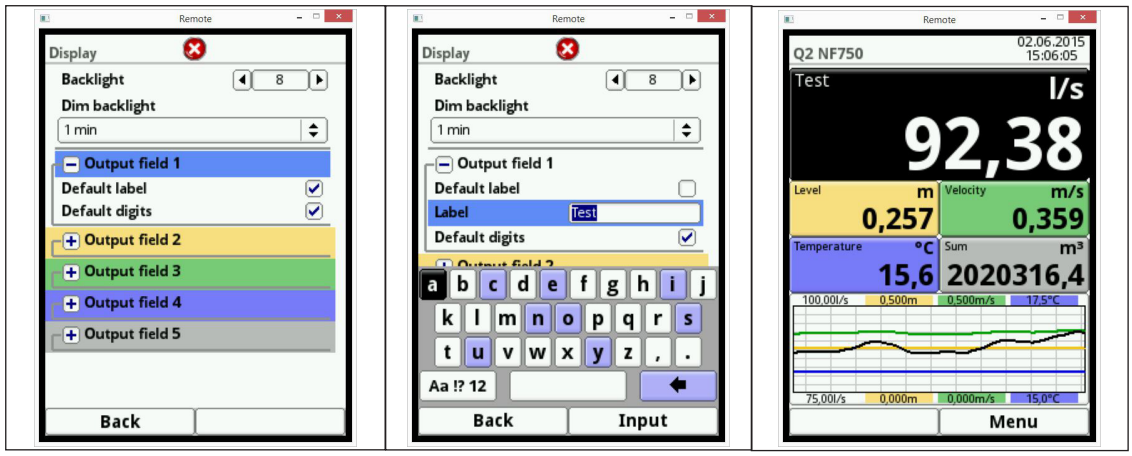


Fig. 8-7 Change text for measurement value

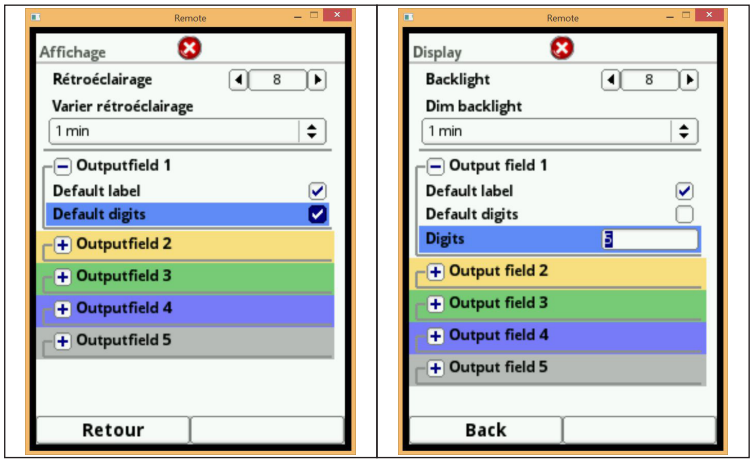


Fig. 8-8 Change digits

After having modified the system-specific parameters, you need to confirm that the modifications are saved.

A table indicating the wording of the current error message will come up as soon as the >Error messages< option is activated.

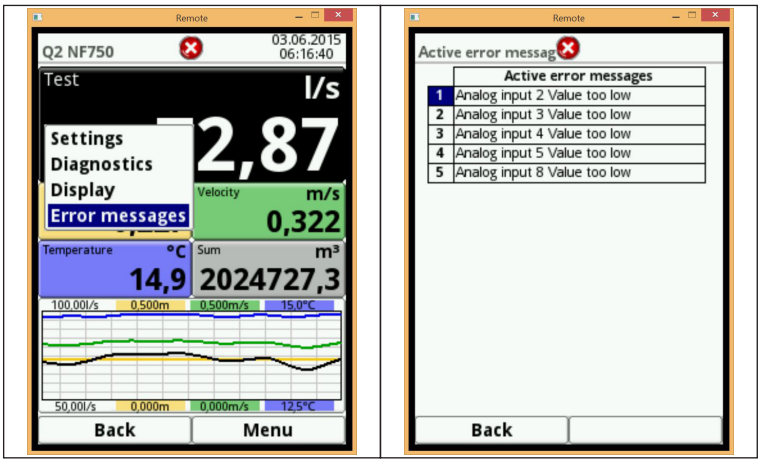


Fig. 8-9 Selection and display of error messages

8.2 Display Level

This dialog allows to directly access the settings of the programmed level sensors. The level sensors can be selected individually. The dialog shows:

- Firmware version
- Article number
- Serial number

The current echo profiles of used NIVUS ultrasonic sensors can be assessed here.

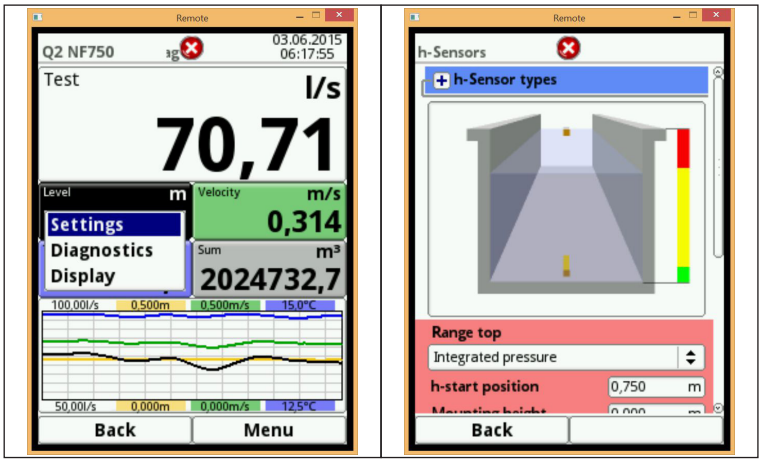


Fig. 8-10 Level sensor settings and their operation ranges

Fig. 8-11 Direct selection of individual sensor diagnostics

Fig. 8-12 Pressure sensor screen

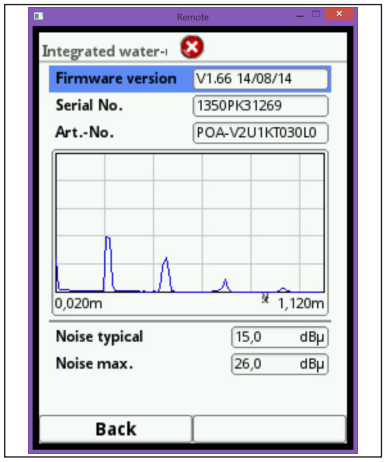


Fig. 8-13 Screen Water-US

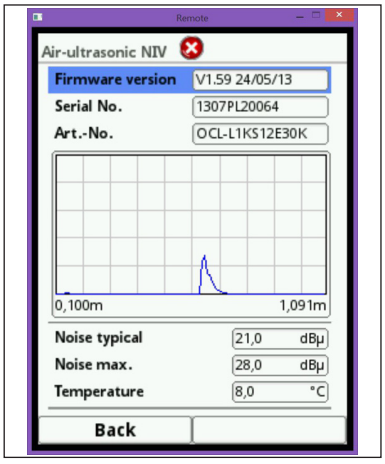


Fig. 8-14 Screen Echo Air-US

You can get directly from here to the general display menu by using the display selection. The section has been previously described in Chapter 8.1.

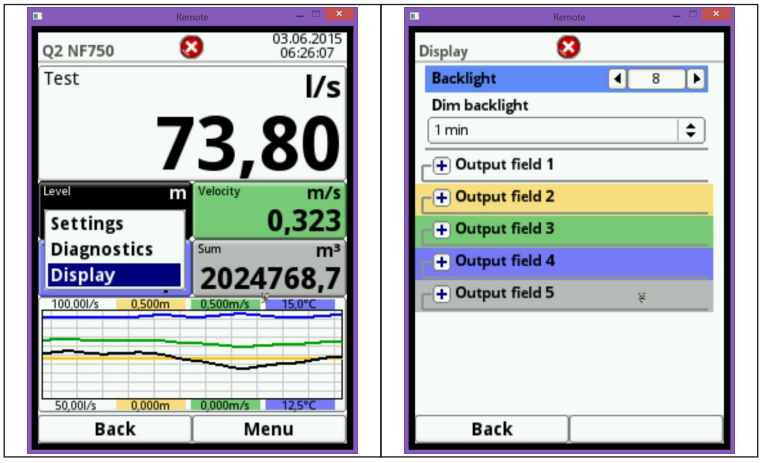


Fig. 8-15 Display menu

8.3 Display flow velocity

This dialog allows to directly access the settings of the programmed flow velocity sensors.

The following parameters can be edited here:

- Settings of the programmed flow velocity sensors
- Sensor constructions
- Installation positions and directions
- Correct reviews
- Modify limitations of flow evaluation

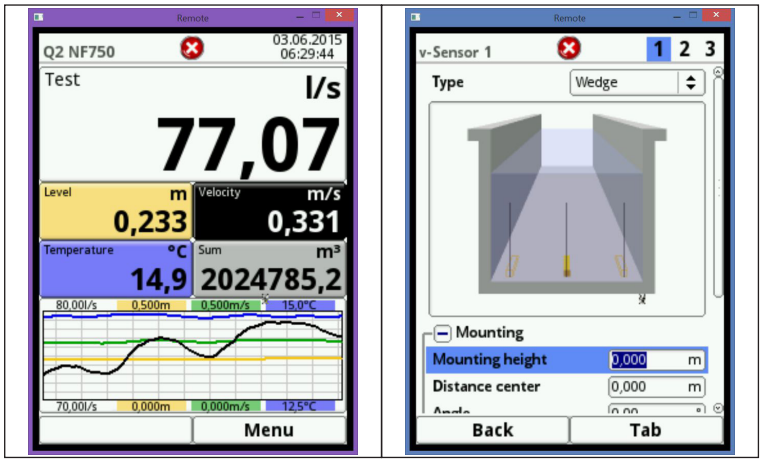


Fig. 8-16 Settings and positions of flow velocity sensors

The dialog shows:

- Article no. and serial no. of individual sensors
- Firmware version of individual sensors
- Calculated average flow velocity
- Measured flow velocity profile (graph)

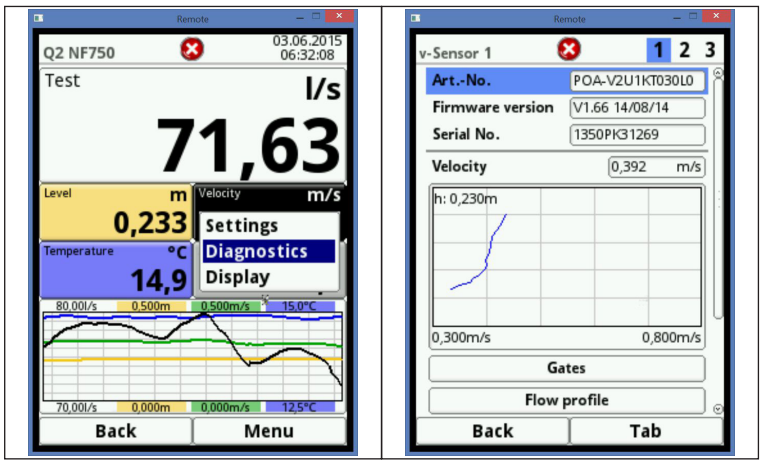


Fig. 8-17 Information on the flow velocity sensor

Using the gate information it is possible here to indicate the measured individual velocities as well as the corresponding measurement level. The information is shown as table.

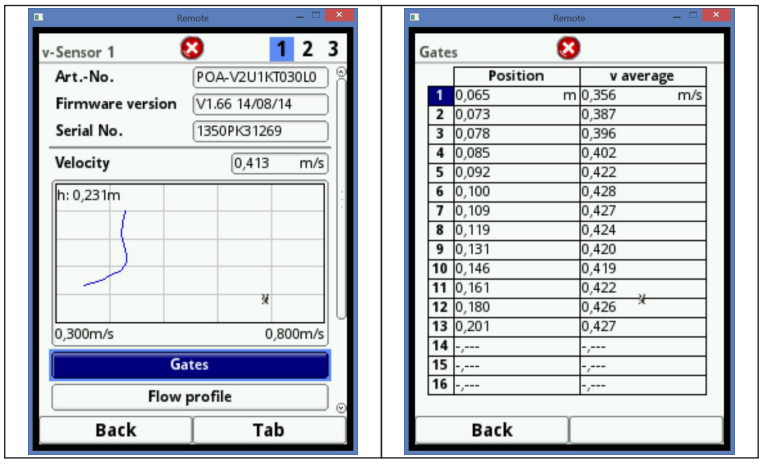


Fig. 8-18 Table of measured individual velocities

After having the flow profile selected, the calculated profile is created. The individual velocities within the flow cross-section are used for calculation.

Select from the following views:

- Perspective
- Top view
- Bottom view
- Front view
- Side view

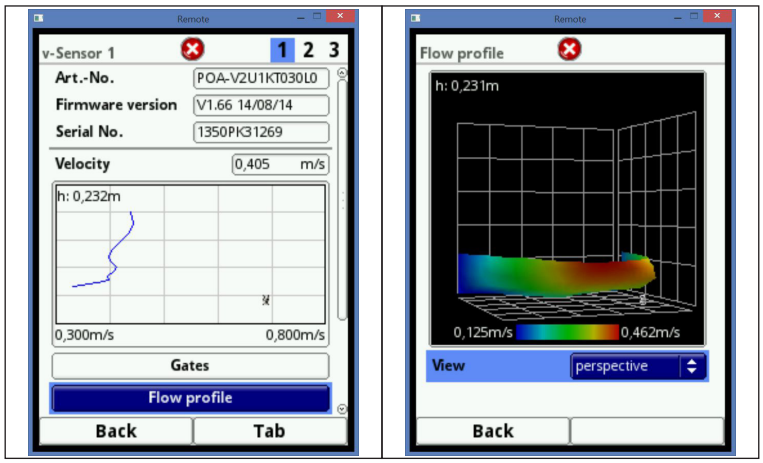


Fig. 8-19 3D indication of velocity distribution

8.4 Temperature and sum screen

Flow velocity sensor 1 is equipped with a temperature sensor, from which the temperature is read out and indicated automatically. The sum is calculated mathematically using the current flow volume integrated during a certain period. That is why both values neither can be edited nor can they be used for diagnostic options. Selecting temperature or sum takes you back to the general display menu.

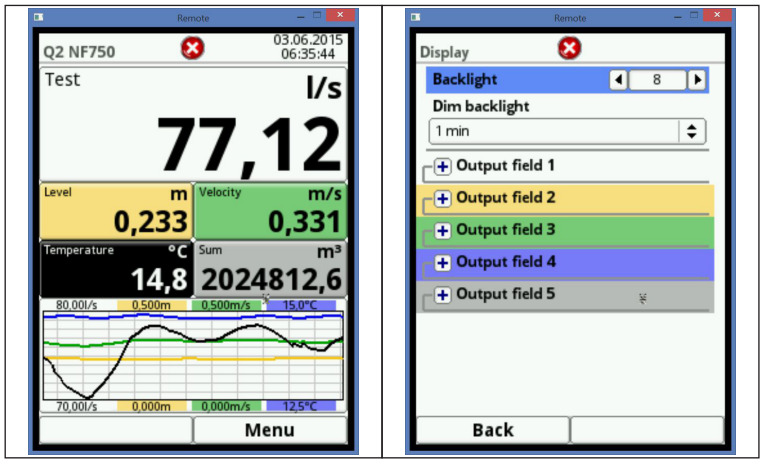


Fig. 8-20 Display menu

8.5 Display Trend/Hydrograph

If more comprehensive and in-depth graphs should be required, the graph section can be selected directly.

Here you can specify display period as well as the display range.

The >browse< function is located below the display.

Browse next or back within the selected period using the arrow keys.

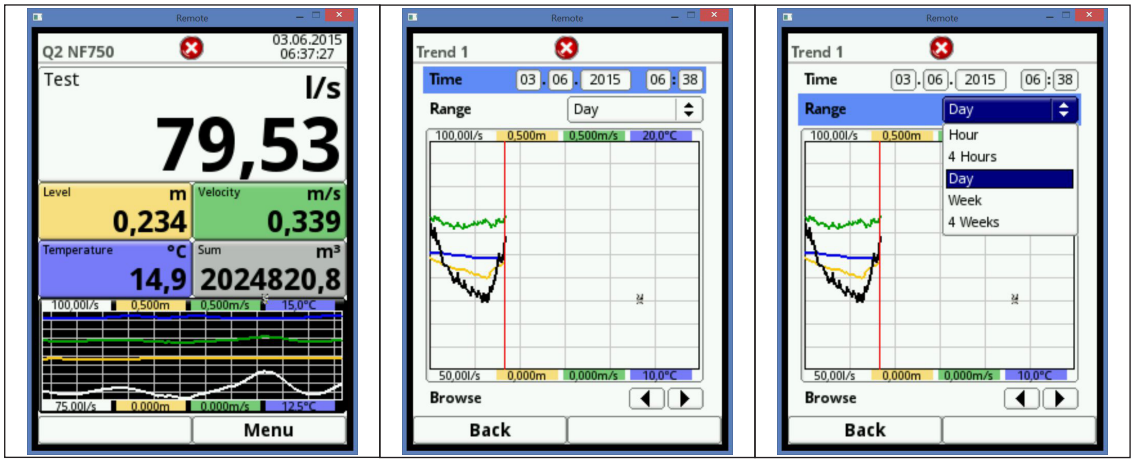


Fig. 8-21 Adjustable trend display

9. Maintenance and Cleaning

DANGER

Disconnect instrument from mains

Disconnect the instrument from mains power and safeguard the higher system against restart before you begin maintenance works.
Disregarding may lead to electric shocks.

WARNING

Exposure to germs

Make sure to wear protective clothing before you begin maintenance works.
Due to being frequently used in wastewater applications, some portions of the measurement system may be loaded with hazardous germs. This is why precautionary measures shall be taken while being in contact with the system, cables and sensors.
Disregarding ma lead to personal injury.

9.1 Maintenance Interval

NIVUS recommend to have the entire measurement system inspected by the NIVUS customer service once per year.

Depending on the area of use the maintenance intervals however may be shorter.

Extent and intervals of maintenance depend on the following conditions:

- measurement principle of the level sensor
- material wear
- measurement medium and hydraulic conditions of the channel
- general regulations for the operators of the measurement facility
- ambient conditions

After 10 years the measurement system shall be completely inspected by the manufacturer.

9.2 Transmitter Cleaning

DANGER

Disconnect instrument from mains

Disconnect the unit from mains power before cleaning. This particularly applies as soon as the enclosure surface is cleaned with a damp cloth.
Disregarding may lead to electric shocks.

The Type NivuFlow transmitters are conceived to be virtually free of calibration, maintenance and wear.

Clean the transmitter enclosure if required using a dry, lint-free cloth. For stubborn dirt the enclosure can be cleaned using a damp cloth.

Do not use sharp cleansing agents or solvents! Light household cleaners or soapy water can be used.

Do not use the damp cloth to wipe over the terminal clamp blocks!!

9.3 Sensor Cleaning

The hints on how to maintain and clean the sensors shall be necessarily observed. These hints can be found in the “Technical Instruction for Correlation Sensors”. This instruction is part of the standard sensor delivery!

9.4 Customer Service Information

For annual inspection of the entire measurement system contact our customer service:

NIVUS GmbH - Customer Service
Phone +49 (0) 7262 9191 - 922
Kundencenter@nivus.com

9.5 Accessories

iXT0-xxx	Intelligent Ex-Separation Module
ZUB0 USB 08	8 GB USB stick for readout of parameters and readings
SW0N SPRO	Evaluation software, NivuSoft Professional with matched functions: documentation of measurement sites, output as graphs and tables, creation of statistics/reports etc.
BSL0xx	Overvoltage protection for transmitters and sensors

You can find more accessories in the current NIVUS price list.

9.6 Dismantling/Disposal

- ☞ Disconnect the unit from mains power.
- ☞ Use appropriate tools to remove the connected cables from the faceplate of the instrument.
- ☞ Remove the transmitter from the DIN rail.

EC WEEE-Directive logo

This symbol indicates that the Directive 2002/96/EG on waste electrical and electronic equipment requirements shall be observed on the disposal of the equipment.
The unit contains a buffer battery (Lithium coin cell), which must be disposed separately.

Improper disposal may be harmful to the environment.

- ☞ Always dispose equipment components and packaging materials according to applicable local regulations on environmental standards for electronic products.

11. Certificates and Approvals

DE / EN / FR

EU Konformitätserklärung

EU Declaration of Conformity

Déclaration de conformité UE

NIVUS GmbH
Im Täle 2
75031 Eppingen

Telefon: +49 07262 9191-0
Telefax: +49 07262 9191-999
E-Mail: info@nivus.com
Internet: www.nivus.de

Für das folgend bezeichnete Erzeugnis:
For the following product:
Le produit désigné ci-dessous:

Bezeichnung:	**Durchflussmessumformer stationär mit internem 2G/3G/4G Modem zur Datenfernübertragung NivuFlow 7xx/6xx/5xx/Energy Saver**
Description:	*Permanent flow measurement transmitter with internal modem for remote data transmission*
Désignation:	*Transmetteur de débit stationnaire avec modem intégré pour transmission de données*
Typ / Type:	**NF7-… / NR7-…**

erklären wir in alleiniger Verantwortung, dass die auf dem Unionsmarkt ab dem Zeitpunkt der Unterzeichnung bereitgestellten Geräte die folgenden einschlägigen Harmonisierungsvorschriften der Union erfüllen:
we declare under our sole responsibility that the equipment made available on the Union market as of the date of signature of this document meets the standards of the following applicable Union harmonisation legislation:
nous déclarons, sous notre seule responsabilité, à la date de la présente signature, la conformité du produit pour le marché de l'Union, aux directives d'harmonisation de la législation au sein de l'Union:

- 2014/53/EU
- 2011/65/EU

Bei der Bewertung wurden folgende einschlägige harmonisierte Normen zugrunde gelegt bzw. wird die Konformität erklärt in Bezug die nachfolgend genannten anderen technischen Spezifikationen:
The evaluation assessed the following applicable harmonised standards or the conformity is declared in relation to other technical specifications listed below:
L'évaluation est effectuée à partir des normes harmonisées applicable ou la conformité est déclarée en relation aux autres spécifications techniques désignées ci-dessous:

- EN 61010-1:2010
- EN 61326-1:2013
- Draft ETSI EN 301 489-1 V2.2.0
- EN 301 511 V12.5.1 (GSM/2G)
- EN 301 908-2 V11.1.2 (UMTS/3G)
- EN 62311:2008
- Draft ETSI EN 301 489-52 V1.1.0
- EN 301 908-1 V11.1.1 (UMTS/3G, LTE/4G)
- EN 301 908-13 V11.1.2 (LTE/4G)

Diese Erklärung wird verantwortlich für den Hersteller:
This declaration is submitted on behalf of the manufacturer:
Le fabricant assume la responsabilité de cette déclaration:

NIVUS GmbH
Im Taele 2
75031 Eppingen
Allemagne

abgegeben durch / *represented by / faite par:*
Marcus Fischer (Geschäftsführer / *Managing Director / Directeur général)*

Eppingen, den 25.03.2021

Gez. *Marcus Fischer*