FLOW

Instruction Manual

Flow Measurement Transmitter NivuFlow 600

Firmware Revision: 1.24

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

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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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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PARAMETER SETTING 59

General

1. About this Manual

Important Note

READ CAREFULLY BEFORE USE!
KEEP IN A SAFE PLACE FOR LATER REFERENCE

This Instruction manual is an original instruction manual for the flow measurement unit NivuFlow 600 and is for the intended use of the device. This manual is oriented exclusively to qualified expert personnel.

Read this instruction manual carefully and completely prior to installation and connection since it contains relevant information on this product. Observe the notes and particularly follow the warning notes and safety instructions.

Keep this manual in a safe place and make sure it is available for the users of this product at any time.

If you should have problems to understand information contained within this instruction manual either contact the manufacturer or one of the distributors for further support. The manufacturer cannot be held responsible for damage to persons or material due to incorrectly understood information in this manual.

In case of selling the instrument this instruction manual shall be provided to the purchaser since it is a part of the standard delivery..

1.1 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

1.2 Applicable documentation

For the installation and operation of the complete system extra instruction manuals or technical descriptions may be required apart from this manual.

- Technical Description for transit time sensors
- Installation instruction for transit time sensor

These manuals are provided with the auxiliary units or sensors.

1.3 Signs and Definitions used

Image	Meaning	Remark
☞	(action) step	Action to be performed by you. Note the numbering of action steps. Observe the order of the working steps!
⇨	Cross-reference	Reference to further or detailed information
>Text<	Parameter or Menu	Indicates a parameter or a menu that is select or described
	Reference to document	Refers to an accompanying documentation

1.4 Abbreviations used

Colour code for wires, single conductors and components.

The abbreviations of colours, wire and components follow the international colour code according to IEC 757.

BK	black	RD	red	TR	transparent
BU	blue	WH	white	GNYE	green/yellow
GN	green	YE	yellow	BN	brown
GY	grey	PK	pink		

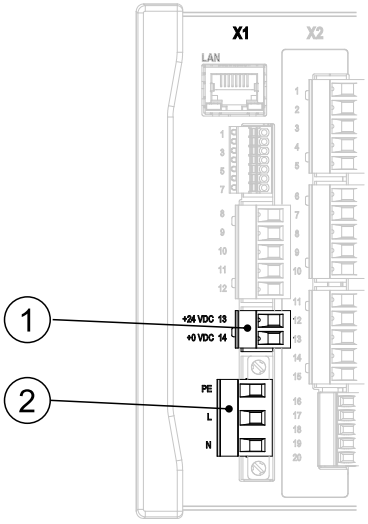
Article description

- NF NivuFlow Transmitter
- NIC0 Clamp-on-sensors
- NIS- pipe sensors and wedge sensors in closed pipelines
- NOS- pipe sensors and wedge sensors for part and full filling

2. Connections and User Elements

2.1 Power Supply

The Connection for power supply is located on the lower part of the plug-in module X1.



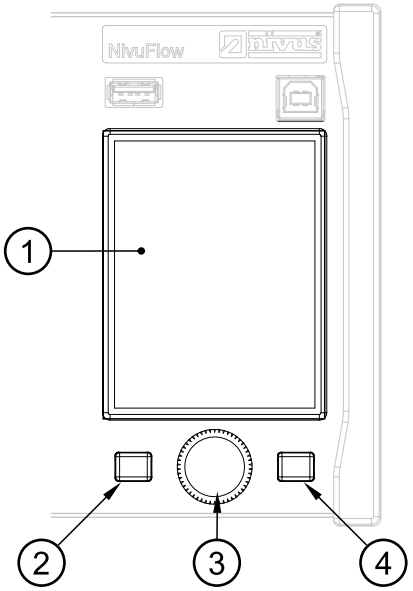
1 Power Supply DC
2 Power Supply AC

Fig. 2-1 Electrical Connections of power supply

You can find a detailed connection plan on page 44.

2.2 NivuFlow Control Elements

The NivuFlow is operated completely in dialogue 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.



1 Graphic display
2 Left function key
3 Rotary pushbutton
4 Right function key

Fig. 2-2 Control elements

2.3 Tasks of control elements

Colour display

You can read all settings, when parameter setting and in diagnostics.

Left function key

This key is required to exit menus or sub-menus.

Rotary pushbutton

Use the rotary pushbutton to enter specific sub-menus. The functions can be selected using the rotary pushbutton as well.

- Select the desired parameter or menus
- Navigation through the sub-menus and settings
- Selection of letters or numbers for parameter setting

Right function key

Initially, this key takes you to the menu. They key is also used to confirm value entries (via numeric keys or letter keys).

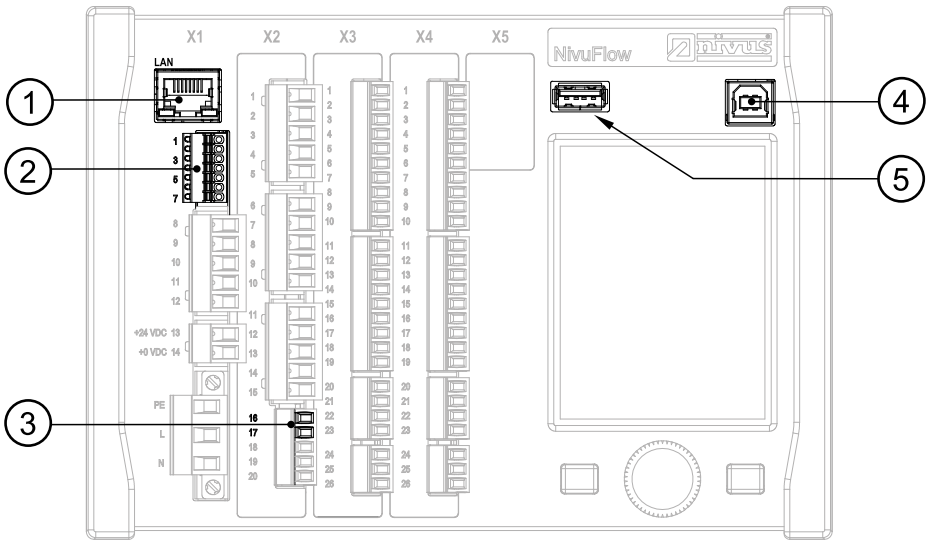
For some parameters the right function key can be used as >TAB< . This TAB function is active only with the settings below:

- Selecting several v-sensors which are connected
- Selecting analog inputs
- Selecting analog outputs
- Selecting digital inputs
- Selecting digital outputs

⇨ You will find a description on how to use the control elements from page 49.

2.4 Interfaces

The transmitter has several interfaces on the front panel.



1 Network interface (LAN)
2 Bus interface (RS-485 / RS-232)
3 HART-interface (upon request)
4 USB-B-interface (Service)
5 USB-A-interface (data transfer)

Fig. 2-3 Available interfaces

⇨ Descriptions of the individual interfaces see „Parameter menu Communication“ on page 92.

Safety Instructions

3. Used symbols and signal words

The general warning symbol indicates the risk of personal injuries or death. In the text section the general warning symbol is used in conjunction with the signal words described below.

DANGER

Warning of danger to persons

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

DANGER

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.

WARNING

Warning of danger to persons

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

CAUTION

Warning of personal injuries or material damage

Indicates a possible danger with moderate risk which may result in minor or moderate personal injury or material damage if not avoided.

Important Note

Indicates a situation which may result in damage to the instrument if not avoided. Contains information which needs to be emphasised particularly.

Note

Indicates situations that do not result in personal injury.

3.1 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 measured 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.

3.2 Safeguards and precautions

WARNING ***Germ contamination***

Please note that due to operation in the wastewater field measurement system and cables may be loaded with dangerous disease germs. Respective precautionary measures shall be taken when getting in contact with cables and sensors to avoid damage to one's health.

Wear protective clothing.

WARNING ***Observe regulations on health and safety at work!***

Before starting installation works, observing the work safety regulations needs to be checked.

Failure to observe may cause personal injury.

WARNING ***Do not modify safety devices!***

It is strictly prohibited to disable safety devices or to modify the way they work.

Failure to observe may cause personal injury as well as system damage..

WARNING ***Disconnect unit 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 entire measurement system shall be installed and put into operation only by qualified personnel.

3.3 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.

Make sure to operate the transmitter in technically perfect working order only.

Improper Use

Not being operated in accordance with the requirements may impair the safety. The manufacturer is not responsible for failures resulting from improper use.

3.4 User's Responsibilities

Important Note

In EEA (European Economic Area) the national implementation of the framework directive 89/391/EEC and corresponding individual directives, in particular directive 2009/104/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. In Germany the regulations on health and safety at work shall be followed.

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 on the following points:

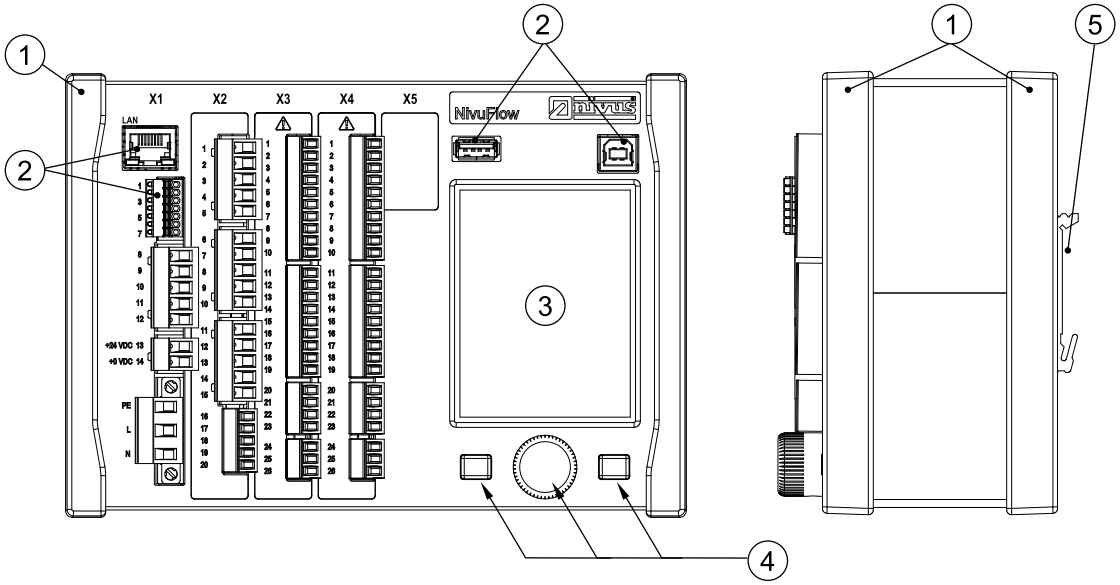
- Personnel safety (accident prevention regulations)
- Safety of work materials and tools (safety equipment and maintenance)
- Disposal of products (laws on wastes)
- Disposal of materials (laws on wastes)
- Cleaning (cleansing agents and disposal)

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.

Product specification

4 Product construction and overview



1 Trims / cover strips

2 Interfaces

3 Graphic display

4 Control Elements

5 DIN rail fastening

X1 Power supply, air ultrasonic sensor connection via RS485 (optional), Interface (LAN and Bus)

X2 Digital and analog inputs and outputs, sensor connections (Option)

X3 DSP-Card: Connections of Transit Time Sensors (2-paths)

X4 aditional DSP-Card: Connections of Transit Time Sensors (4-paths)

Fig. 4-1 Device setup NivuFlow 600

⇨ A complete overview of the NivuFlow 600 individual components is on the last page of this manual.

4.1 Dimensions

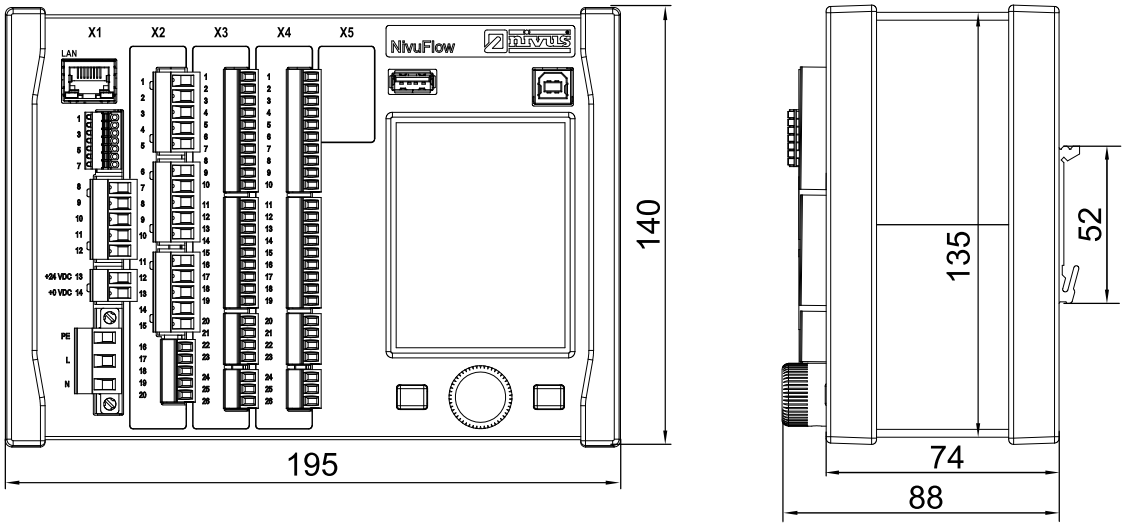


Fig. 4-2 Transmitter dimensions of NivuFlow

4.2 Intended use

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 600 including the accompanying sensors is designed for continuous flow measurement in slightly polluted to clear, clean water or equivalent media in part filled or full pipes, channels or water bodies.

The NivuFlow 600 is engineered and manufactured according to the current state of the art as well as to recognised safety regulations. Danger to persons or material, however, cannot be completely ruled out

Strictly observe the maximum permissible limit values as specified in chapter XXX.

Any case varying from these conditions which is not approved by NIVUS GmbH in written form is left at the owner's risk.

Note

For installation and commissioning the conformity certificates as well as the test certificates issued by the respective authorities shall be followed.

4.3 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 lable
- 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.

Note

Check the device nameplate to ensure that the device is delivered according to your order.. Check if the correct supply voltage is printed on the nameplate.

⇨ You can find the declaration of conformity at the end of this manual.

Nameplates

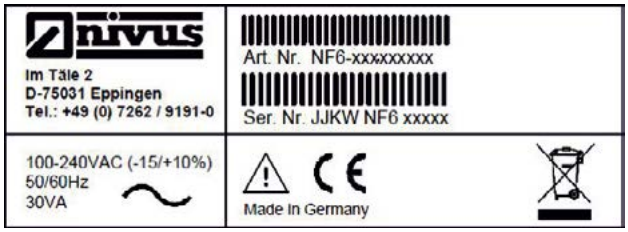


Fig. 4-3 Nameplate AC version

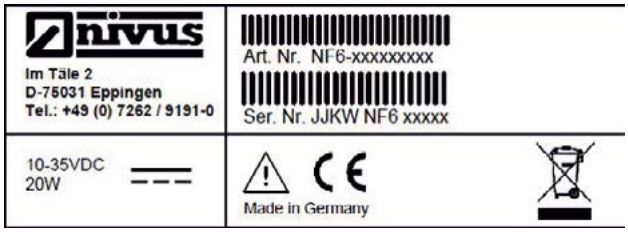
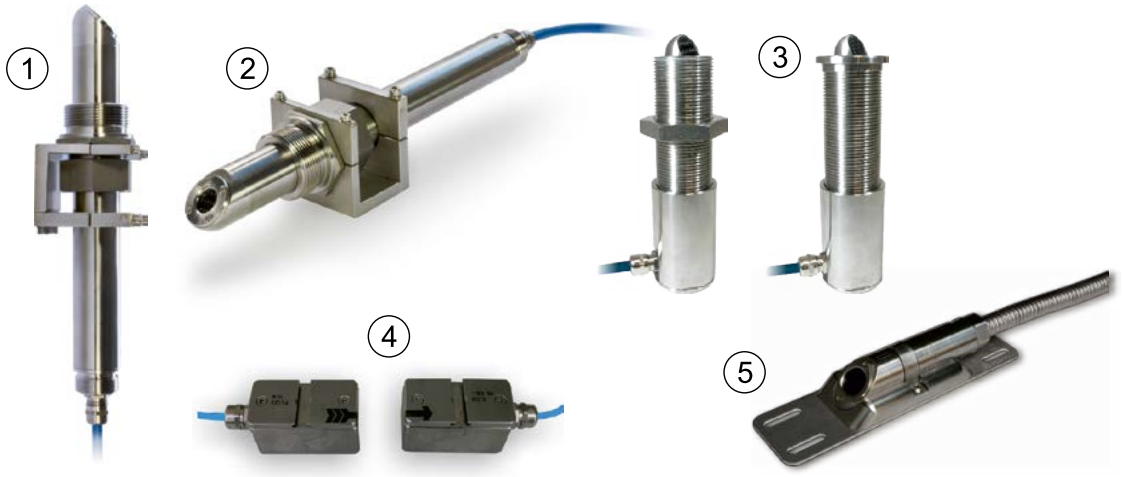


Fig. 4-4 Nameplate DC version

5. Connectable Sensors

The image below provides an overview on the connectable sensors.



1 Flow velocity sensor, type NIS-V200RS
2 Flow velocity sensor, type NIS-V200RT
3 Flow velocity sensor, type NOS-V2E/V2S
4 Flow velocity sensor, type NIC0K1L
5 Flow velocity sensor, type NIS-V280KS

Fig. 5-1 Connectable sensors

6. Specifications

Power supply	100 - 240 V AC, -15 % / +10 %, 50/60 Hz or 10 - 35 V DC
Supply connection	Plug with spring-cage terminal clamps
Max. power consumption	AC: 30 VA DC: 20 W
Typ. power consumption	1 relay energised, 230 V AC: (rounded) 14 W up to 8 transit time sensors 1 MHz
Enclosure	Material: aluminium and plastic Weight: approx. 1150 g
Protection	IP20, shock resistance IK08
Operating conditions	- Protection class I - Overvoltage category II - Pollution degree 2 - 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 320 pixel, 65536 colours
Programming	Dialogue mode using rotary pushbutton and 2 function keys, in German, English and French
Connection	Plug with spring-cage terminal blocks
Inputs	- 2x (Type T2) 4-20 mA with 12 Bit resolution for data storage from an external device, accuracy +/-0,4 % of measuring range final value (20 mA), load 91 Ohm - 2 x (Type T2) digital input
Outputs	- 2 x (Type T2) 0/4-20 mA, load 500 Ohm, with 12 Bit resolution, accuracy higher than ±0,1 % at 20 °C (highter than ±0,4 % at -20 °C … +70 °C) - 1x (Type T2) bistable relay SPDT, maximum load 230 V AC/2 A (cos 0,9), min. switching current 100 mA - 1x (Type T2) relay(s) SPDT, maximum load up to 230 V AC/2 A (cos 0,9), min. switching current 100 mA
Data memory	Internal 1.0 GB, for programming and readings memory via USB stick front side read out
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

Protect the NivuFlow from corrosive or organic solvent vapours, radioactive radiation as well as strong electromagnetic radiation when storing.

7. Configuration

7.1 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 (see Fig. 4-3 and Fig. 4-4).

NF6- Flow velocity transmitter type NivuFlow

Version

- **0** for permanent full filled pipes
- **5** for part filled and full filled pipes, channels and water bodies

Type

- **T2E0** up to 2 acoustic paths, 1 x air-ultrasound OCL, 2 x DI, 2 x DO, 2 x AI, 2 x AO, construction: DIN rail / control cabinet installation
- **T4E0** up to 4 aacoustic paths, 1 x air-ultrasound OCL, 2 x DI, 2 x DO, 2 x AI, 2 x AO, construction: DIN rail / control cabinet installation
- **T2W0** up to 2 acoustic paths, 1 x air-ultrasound OCL, 2 x DI, 2 x DO, 2 x AI, 2 x AO, construction: field housing
- **T4W0** up to 4 acoustic paths, 1 x air-ultrasound OCL, 2 x DI, 2 x DO, 2 x AI, 2 x AO, construction: field housing

Power

- **A0** 100 - 240 V AC
- **D0** 10 - 35 V DC

Firmware extensions

- **0** none

Number of measurement places

- **1** 1 measurement place

NF6-					

7.2 Delivery

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 600.
- a transmitter type NivuFlow 600 according to delivery paper

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

7.2.1 Receiving inspection

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.

Note

Complaints received later shall not be considered!

7.2.2 Transport

Protect the NivuFlow from heavy shocks or vibrations. Use the original packaging for transport.

7.2.3 Return

The units shall be returned at customer cost to NIVUS Eppingen using the original packaging.

Insufficiently franked shipments will not be accepted!

7.3 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 on page 112 .

Functional Principle

8. Operating Range

The NivuFlow 600 is a non-portable measurement system for flow measurement. It is used in full pipes and rectangular geometries of different dimensions.

The NivuFlow 600 in the clamp-on version is a contact-less, non-portable measurement system and it is independent of pressure. The system is only used for measurements in full filled pipes.

The entire measurement system is designed for predominant use in the field of measuring of clear, homogeneous up to slightly polluted liquids of various compositions.

Note

The measurement method for determining the flow velocity is based on the ultrasound transit time principle. Due to this reason it is indispensable for the system functionality that the solid content (dirt particles, gas bubbles or similar) is not too high to enable ultrasonic signal transmission between both sensors due to reflections and hence damping.

If there are too many particles in the media, the signal is severely reduced too much.

This can lead to incorrect or inaccurate measurements.

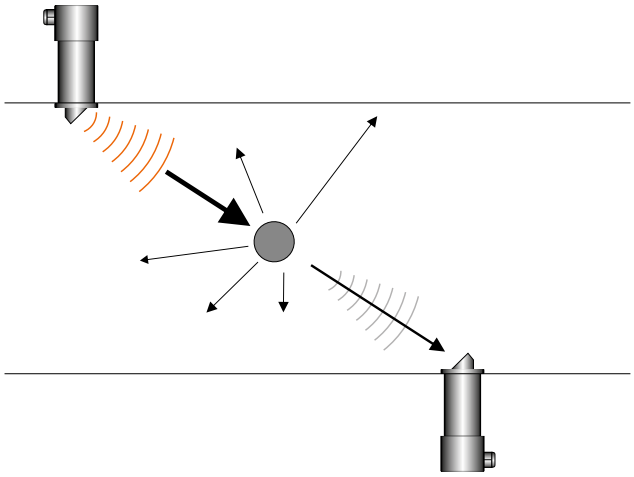


Fig. 8-1 Signal damping by interfering particles

Connectable sensors

The NivuFlow 600 is designed for connecting the following NIVUS Sensors:

Flow velocity sensors

- NIS-V200RS, NIS-V200RT
- NOS-V2E, NOS-V2H
- NIS-V280KS, NIS-V300KS

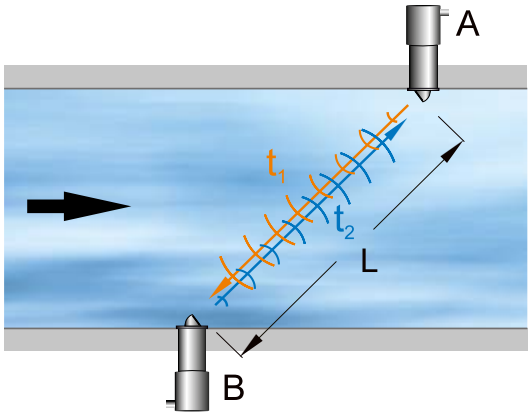
Clamp-on sensors

- NIC0K1L

9. Flow velocity detection

9.1 General

The flow velocity is determined by using the ultrasonic transit time principle.



A= Sensor 1

B= Sensor 2

a= defined angle

t1= Time of the impulse towards direction of flow

t2= Time of the impulse with direction of flow

L= Trinsit Time

Fig. 9-1 One-path transit time measurement principle

This measurement principle is based on directly measuring the transit time of acoustic signals between two ultrasonic sensors, the so-called hydro-acoustic converters.

The transit time difference method does not determine the average flow velocity, but the effective velocity of sound propagation upstream (decelerated due to flow) and downstream (accelerated due to flow).

Two sound impulses are transmitted consecutively and the different transit times between transmitter and receiver are measured

- The upstream impulse needs a time t_1
- The downstream impulse needs a shorter time t_2

Sound heading downstream will reach the receiver within a shorter period than sound heading upstream. The difference between the transit times is proportional to the average flow velocity within the measurement path.

There is no transit time difference as soon as both sensors receive the transmitted ultrasonic impulses simultaneously. There is no measurable flow available.

The NivuFlow 600 can be operated with clamp-on sensors as well. These sensors are installed on the outside of the pipe. In this case the transit time through the pipe wall is calculated and considered.

In order to determine the flow rate, the cross section as well as the flow geometry of the pipe, the canal or the water body must be known. The propagation of sound will either be decelerated (upstream) or accelerated (downstream) depending on the flow direction of the medium.

L_{1-2}	Length of acoustic measurement path between sensors 1 and 2
C	velocity of sound in water
υ_{1-2}	average flow velocity between sensors 1 and 2 along the measure-ment path

Assuming C>> υ1-2 and that the main flow direction is known, it is possible to approximately determine the transit time difference. Here the formula below is used:

$$\Delta t = \frac{2L_{1-2} \cdot \upsilon_{1-2}}{c^2}$$

More information on the flow velocity can be gathered if two paths instead of on path is used for the transit time measurement.

The more paths are used for transit time measurement and the more paths are used to cover the wetted cross section, the higher the accuracy of the flow measurement.

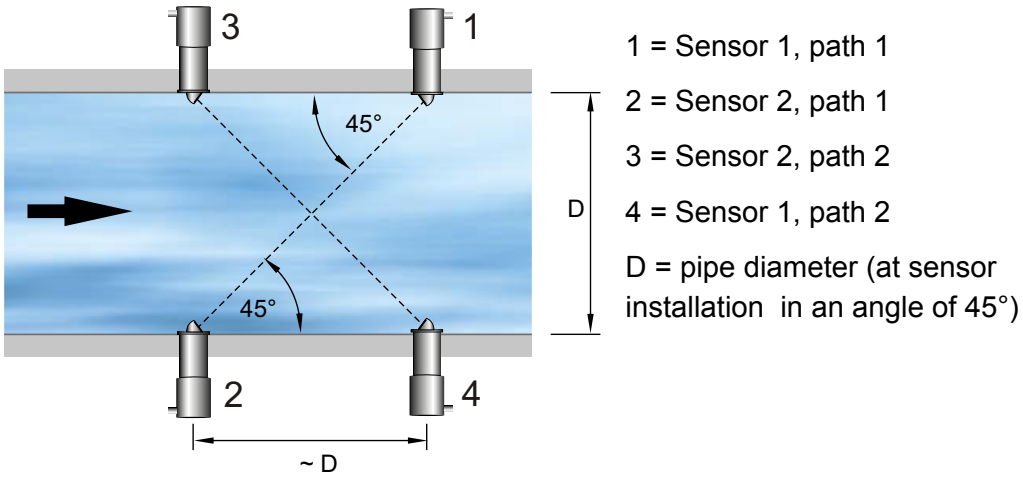


Fig. 9-2 Multi-path transit time measurement principle

If the sensors are installed in an angle of 45° the distance between sensor 2 and sensor 4 is equal to the inside pipe diameter.

If used in multi-path setups the angle of deviation “a” of the flow direction can be determined additionally by assuming identical flow velocities.

This angle can be calculated by comparing the measurement results from the individual paths.

9.2 Flow calculation

In case of using single-path or multi-path installations in one level under the condition

$Q = \upsilon_{mittel} \cdot A$

given:

υ_{mittel}	average flow velocity
A	cross-sectional flow area

it is required to involve a velocity coefficient k in order to compensate the difference between measured velocity and average velocity $\upsilon_{average}$ within the cross-sectional area.

$$k = \frac{\upsilon_m}{\upsilon_g}$$

Using the transit time of the signal it is possible to calculate flow subsequently as described below:

$$Q = k \cdot A \cdot \upsilon_g = k \cdot A \cdot \frac{L_{1-2}}{2 \cdot \cos\Phi_{1-2}} \cdot \left(\frac{1}{t_{2-1}} - \frac{1}{t_{1-2}} \right)$$

Installation and Connection

10 General Installation Conditions

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!

DANGER

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..

10.1 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

10.2 Choosing the installation place

The NivuFlow with DIN rail fastening is conceived for installation in switching cabinets.

☞ Pay attention for adequate ventilation at the installation place for example by ventilator or heat exchanger

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

The NivuFlow can be also installed in field enclosures or similar. Due to the protection degree, NivuFlow is not suitable to be installed directly on site without protective measures.

10.3 Installation Instructions

For safe installation the measures below must be taken:

☞ protect the device from direct sunlight. Install a sun protection if necessary

☞ observe the permitted ambient temperature

☞ Do not subject the measurement transmitter to heavy shock and vibration

Strictly avoid when installing the device:

- corrosive chemicals or gases
- radioactive radiation
- installation close to footpaths or travel ways

10.3.1 Fastening

Note

Mounting materials and tools are not parts of the standard delivery.

☞ For fastening use a DIN rail type TS35 according to EN50022 with a mini-mum length of 140 mm.

1. Fasten the rail horizontally in the intended enclosure/switching cabinet by using at least two screws
2. Hook the NivuFlow into the DIN rail from below and then it snapped into place diag-onally downwards by exerting slight pressure from the front

Now you can start with the electrical installation and connection of the sensors.

11. Electrical Installation

DANGER ***Disconnect the unit from mains power***

All work on electrical connections may only be carried out with the supply voltage turned off. Observe electrical data specified on the nameplate.

Note

Observe the national installation instructions.

For electric installation the regulations in the respective countries must be referred to.

For installation in wet environments or in areas featuring the risk of flooding it may be necessary to install extra protective measures such as a residual current device (RCD) if required.

☞ Check if the power supply of the units must be integrated into the facility's emergency shutdown conception.

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.

⇨ The connection of sensors is described starting at page 39, how to feed the supply power can be found on page 47.

11.1 Supply and Relay Connections

11.1.1 Connection clamp for protective earth conductor and AC power supply

DANGER ***Risk of electric shock***

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 lange.

Disregarding may result in personal injuries.

⇨ You can find the requirements for the connection of the terminal clamp block in chapter 15.2

11.1.2 DC Power supply

The DC version 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.

11.1.3 AC Power supply

DANGER ***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.

The AC version of NivuFlow 600 can be directly operated from the low-voltage network. The AC power supply requirements are described in chapter „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.

11.1.4 Relays

The reliability of the switching contact deteriorates if the minimum switching current is lower than specified.

⇨ Observe the connection and switching specifications in chapter 6 .

DANGER ***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.

DANGER ***Risk of electric shock***

The relay contacts of the instrument shall be protected using 6A 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.

12. Sensor Installation

This chapter describes the sensor types and where they are usually installed. You can find detailed installation instructions for the individual sensor types in the installation instruction for transit time sensors.

Note

Always ensure compliance with the safety regulations during the installation work.

The transit time difference method always uses 2 sensors per measurement path. These sensors shall be aligned to exactly face each other. Both sensors of a measurement path serve both as transmitter and receiver of ultrasonic signals. The sensor pairs are matched to each other per default. As a principle, the path sensors have the same cable length. Moreover the sensors within a path can be identified by the serial number.

12.1 Sensor Installation Basics

The sensor installation at the measurement place extremely depends on the conditions on site. Therefore always make sure that there are proper hydraulic conditions and an appropriate calming section available on site. Sensor type and sensor fastening need to be determined depending on the measurement place.

Detailed information on how to select a calming section and the installation of sensors can be found in the >Installation Instruction for Transit Time Sensors<.

For transit time measurement first the type of measurement place needs to be set. This setting determines whether sensors with medium contact or clamp-on sensors are used.

⇨ Information on how to set the type of measurement place can be found in chapter >PARAMETER SETTING< starting at page 62.

12.2 Installation of Insertion Sensors

Note

The installation of wetted sensors shall be executed by a pipeline company or a plumber only.
The tightness of pipes must be guaranteed at all times.

12.2.1 Possible Sensors for insertion (wet) Measurements

Pipe sensors

The pipe sensors are designed exclusively for full pipelines. These sensors are installed in pipelines from the outside by using a welding nozzle (90°) and a fastening element. If using standard pipe sensors, the measurement paths are always directed through the pipe centre (diametrical).

In wet measurement situations the sensors are installed into the pipe from the outside (except of wedge sensors). Therefore, the measurement is not influenced by the pipe material and the pipe thickness.

The sensors or the nozzles required to insert the sensors can be pre-installed following the specifications. To do so, the number of paths as well as the path arrangement need to be determined first.

Screw-in and Plug-in Sensors

These sensors are used for multi-path measurements with up to 8 measurement paths. The sensors can be installed in various angles and in different layers (chordal). Positioning the sensors requires to accurately determine the sensor position by using spirit level and laser level.

Wedge sensor

Wedge sensors are designed to be used mainly in full pipelines. The sensors are installed on the channel wall by using 4 stainless steel screws. Make sure that the sensors are fastened durably and safely. Observe proper protection for the cable layout during installation.

Detailed information on the installation of the several sensors can be found in >Installation Instruction for Transit Time Sensors<.

12.2.2 Parameter Entry

Before you can enter sensor positions and sensor arrangement it is necessary to enter some parameters.

The parameters below are required to set up the measurement place:

- Pipe outside diameter, internal pipe diameter or pipe circumference
- Pipe wall thickness
- Wall material
- Medium to be measured

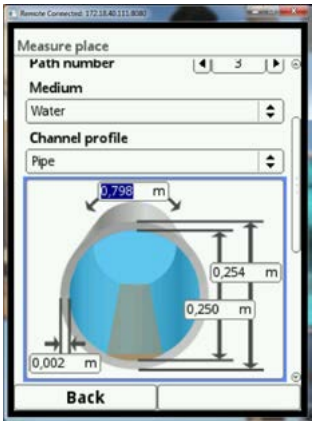


Fig. 12-1 Entering the pipe dimensions

Based on these values the transmitter calculates the sensor positions as well as the path lengths needed for future measurements.

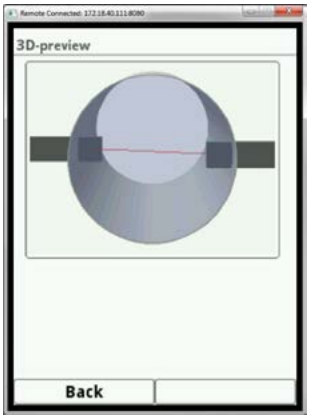


Fig. 12-2 One-path measurement, diametrically opposed \-mode

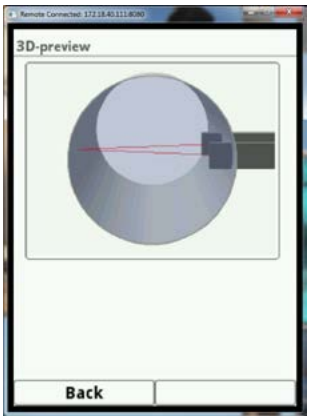


Fig. 12-3 One-path measurement, diametrically opposed V-mode

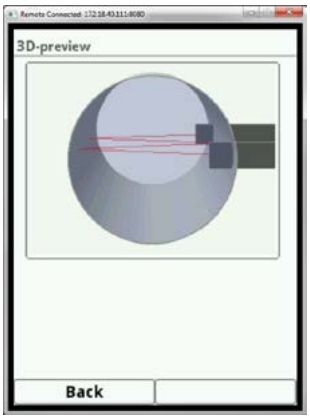


Fig. 12-4 One-path measurement, diametrically opposed W-mode

When positioning sensors or nozzles make sure to observe a parallel distance of 1 x diameter (guideline) between the sensor centres per pipe crossing. If NIVUS pipe sensor are used the installation angle shall be 45°.

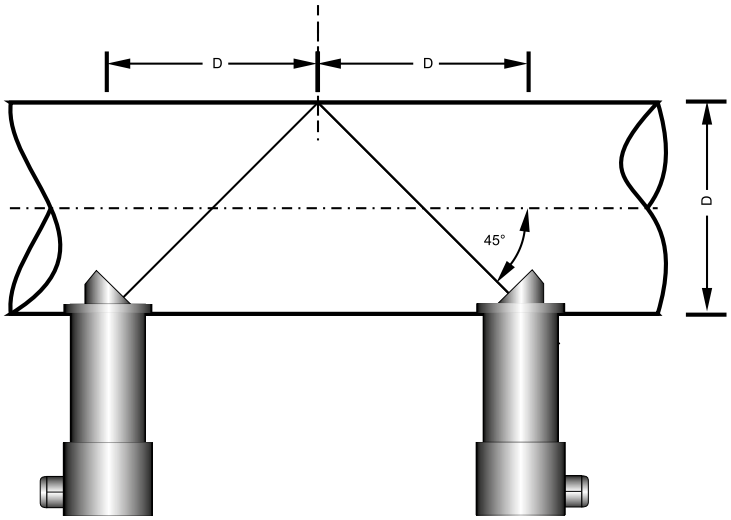


Fig. 12-5 Sensor distance to diameter

The parameter setting of the measurement place (selection of the measuring method and number of the measuring paths) is done via the menu >measurement place<.

Here the accurate parallel distance of the sensors is shown for optimal measurement results.

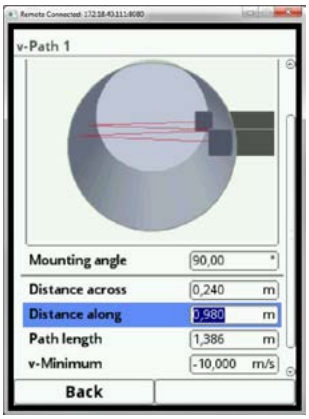


Fig. 12-6 Display distance along

The modification shall be entered in menu v-paths as soon as the paths are to be positioned out of the centre of the cross section.

The selected sensor position can be set for each measurement path separately. To go to the next path press the right function key (Tab).

12.3 Installation of Clamp-on Sensors

The clamp-on sensors enable the contactless measurement in closed pipe systems and full pipelines. The sensors are strapped on the pipe from the outside. There is no effect of the liquid by the measurement and the flow profile is not modified either.

Before you begin to install the clamp-on sensors some parameters need to be set on the transmitter first.

The following settings are required for the installation of clamp-on sensors:

- Pipe outside diameter
- Pipe wall thickness
- Wall material
- Medium to be measured (type of liquid)

Based on these settings the transmitter calculates the accurate position data for the sensor installation. These data can be directly read from the display.

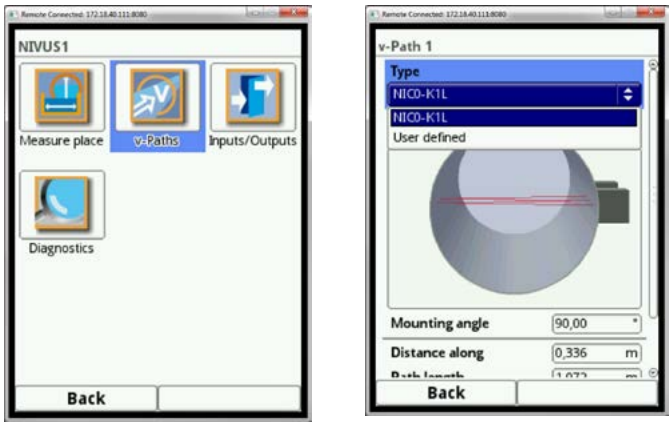


Fig. 12-7 Issuance of mounting data

Following path arrays are common with clamp-on flow measurements:

- V-mode
- W-mode
- Z-mode

The mounting distance between the two sensors is the „clear dimension“.

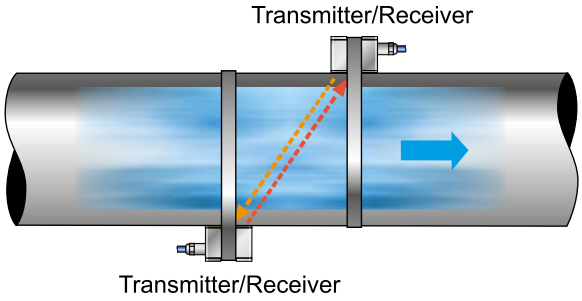


Fig. 12-8 Example of a Z-mode

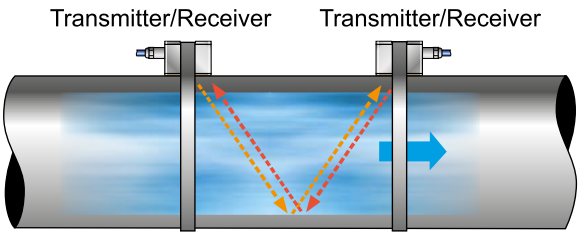


Fig. 12-9 Example of a V-mode

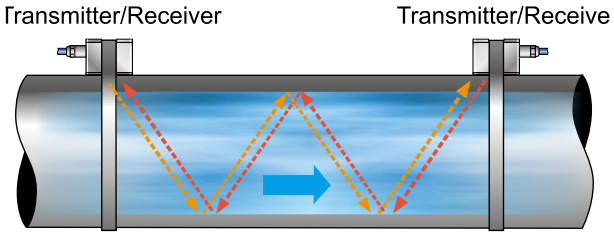


Fig. 12-10 Example of a W-mode

13. Sensor Connection

CAUTION

Operate the device only with the clamping connections plugged

During operation on the terminal clamps for piezo sensors (X3 connections 6 to 16) voltages of up to 85 V are present.
Make sure to use appropriate touch protection while installing the sensors.
The unit shall be operated only if the accompanying four plug sockets for the sensor connections X3 contacts 6 to 17 are plugged.

Disregarding may result in personal injuries.

13.1 Cable for sensor connection

The sensors are available with permanently attached cable (cable type: LIYC 11Y 2x1,5 mm² + 1x2x0,34 mm²).

The sensors of a measurement path basically have the same cable length.

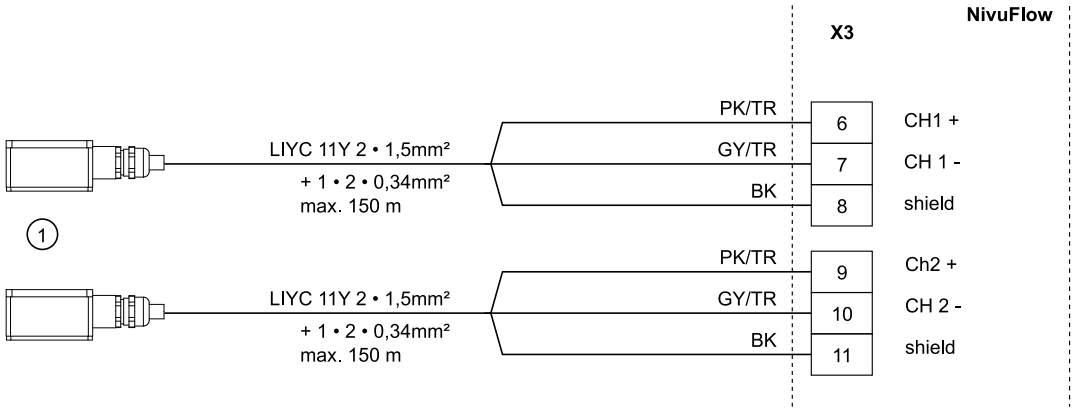
It is not allowed to extend or shorten the sensor cable.

13.1.1 Sensor connection 1-path Measurement

Following flow velocity sensors can be connected to the NivuFlow 600:

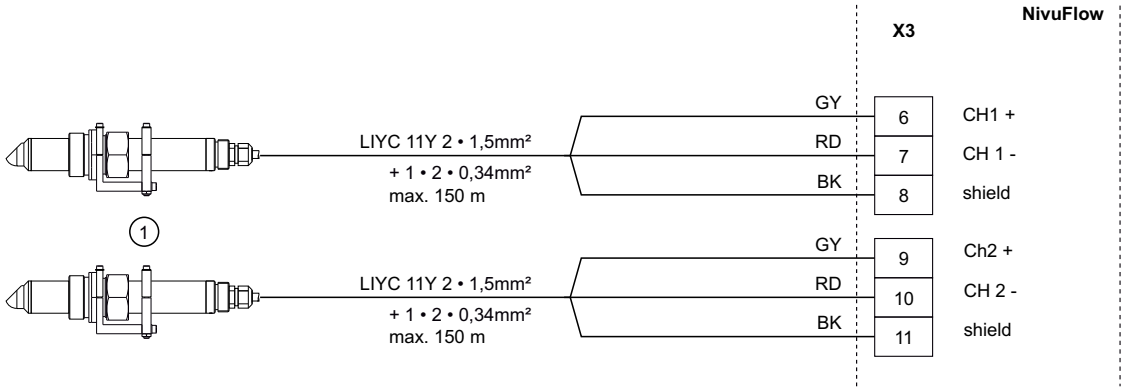
- NIS-V200 pipe sensor
- NIS-V280KS wedge sensor
- NOS-V2E00 screw-in sensor
- NOS-V2S00 plug-in sensor
- NICO K1L clamp-on sensors

Wiring diagrams for the sensors can be found in the >Technical Description for transit Time Sensors<.



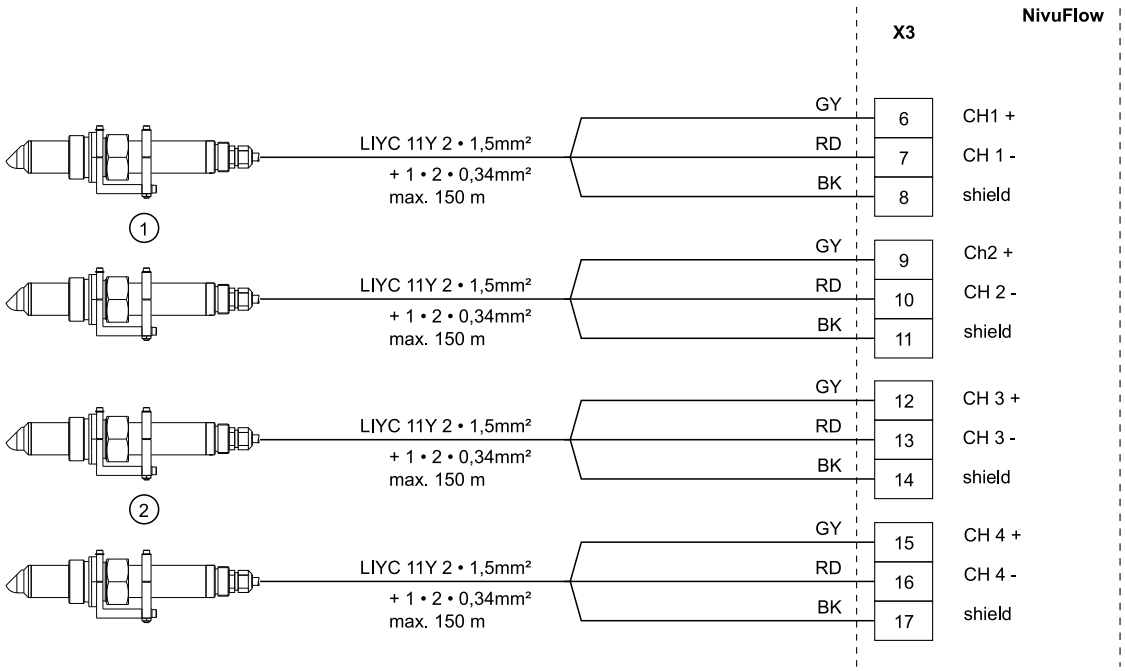
1 = connectable sensors

Fig. 13-1 Connecting 1 pair of flow velocity sensors to type T2



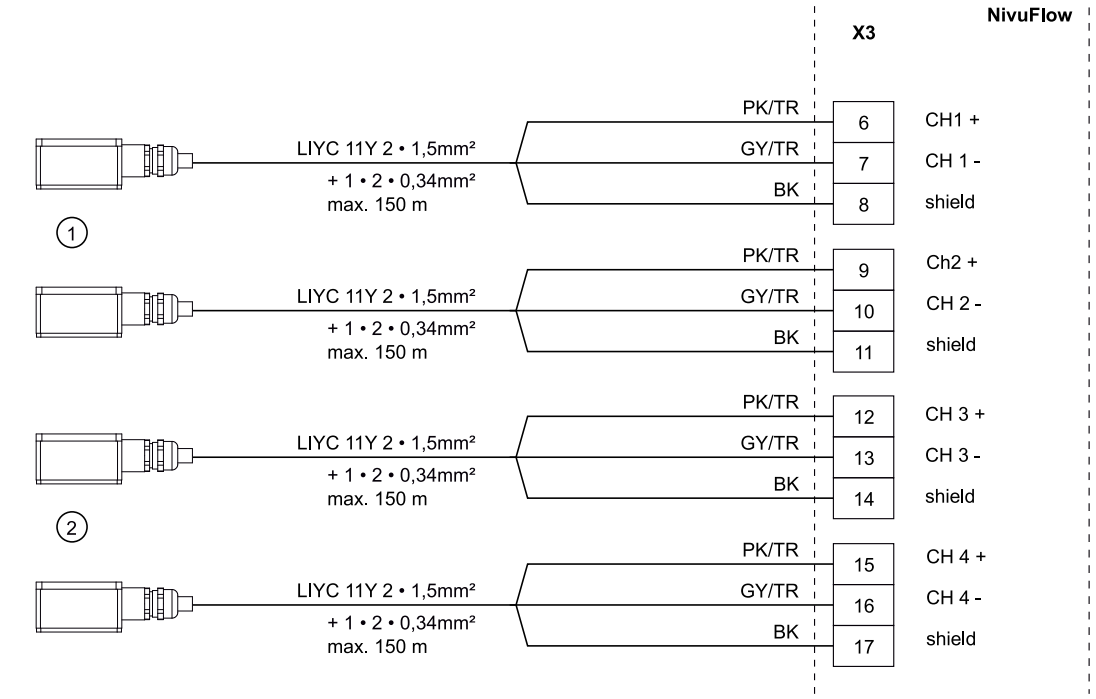
1 = connectable sensors

Fig. 13-2 Connecting 1 pair of clamp-on sensors to type T2



1 + 2 = Sensor pair per path

Fig. 13-3 Connecting 2 pairs of flow velocity sensors to type T4



1 + 2 = Sensor pair per path

Fig. 13-4 Connecting 2 pairs of clamp-on sensors to type T4

14. 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 used NIVUS sensors 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.

Note

The line resistance is 0.3 Ohm/wire. This resistance must be taken into account considering the allowed total resistance (see "Technical Instructions for Transit Time 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!

Do not reverse protected (p) and unprotected sides of overvoltage protection!

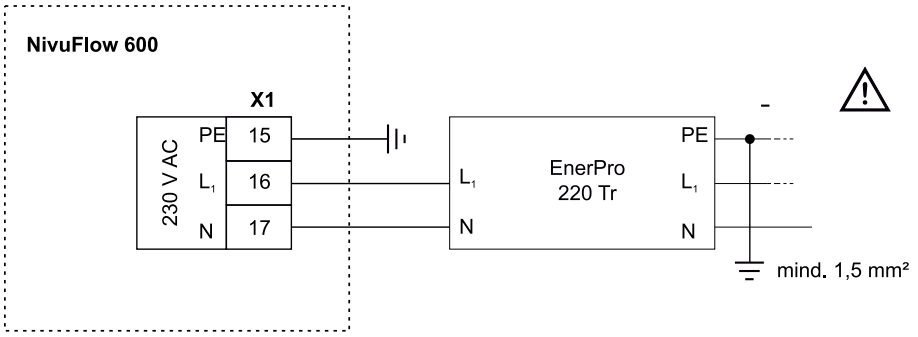


Fig. 14-1 Overvoltage protection for power supply AC

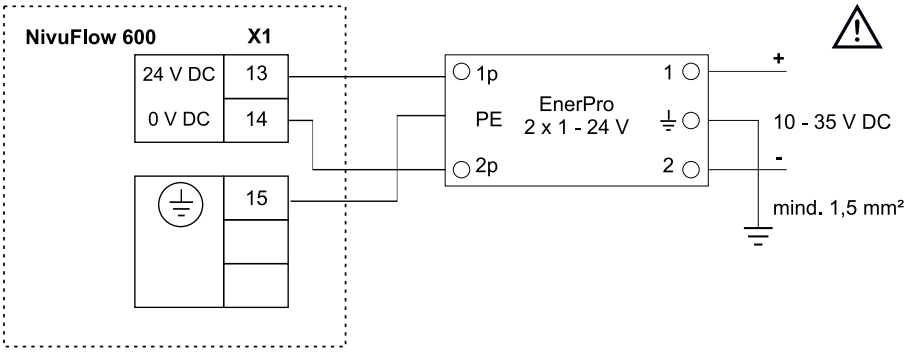


Fig. 14-2 Overvoltage protection for power supply DC

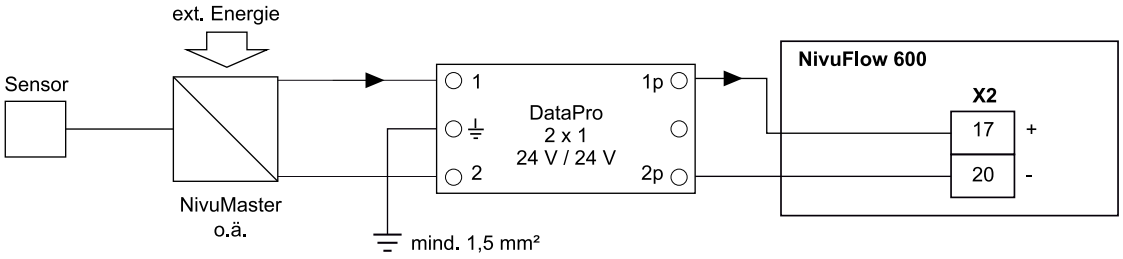


Fig. 14-3 Overvoltage protection analog input from external transmitter

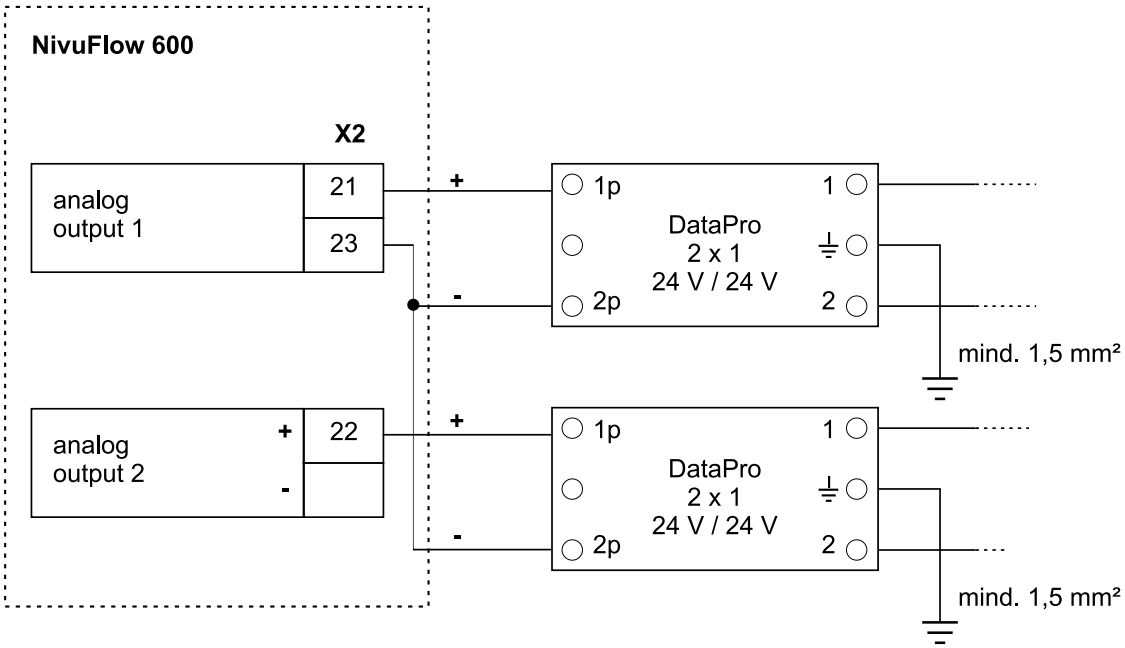


Fig. 14-4 Overvoltage protection analog outputs NivuFlow 600, type M3

15. Transmitter Connection

15.1 Types of Measurement Transmitter

The NivuFlow 600 measurement transmitter is available in 2 different versions:

- Type T2 - Standard version each for 2 paths, one level sensor and the option to additionally connect an external level sensor
- Type T4 - Connection for up to 4 paths, extended connection options ffor up to 3 flow velocity sensors

Both versions have the same clamp designations. These blocks are functionally assigned to the different connection areas. The transmitter type T4 has additional terminal blocks.

15.2 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.

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.

Terminal block	Power supply	Bus-/ Network	Terminals A/I 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]	**Only 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]	**Only 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**

15.3 Connection Diagrams

DANGER

Risk of electric shock

Never remove the terminal block from board X1 (connections 15-17).

This terminal block is for the connection of the protective conductor as well as the AC power supply and is a fixed component of the instrument. The instrument shall be operated only with the terminal block screwed on tightly.

Disregarding may cause personal injury.

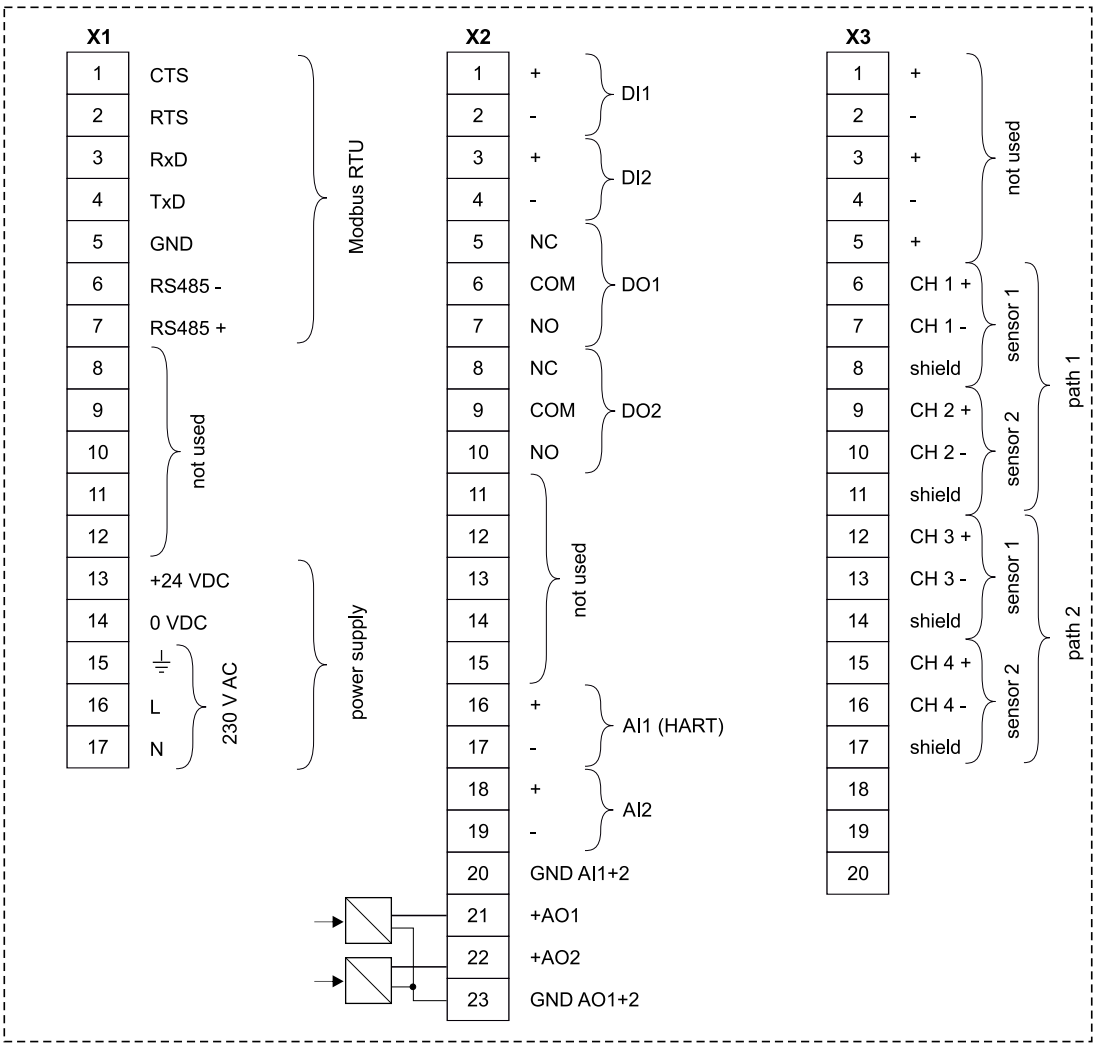


Fig. 15-1 General connection diagram, NivuFlow 600, type T2

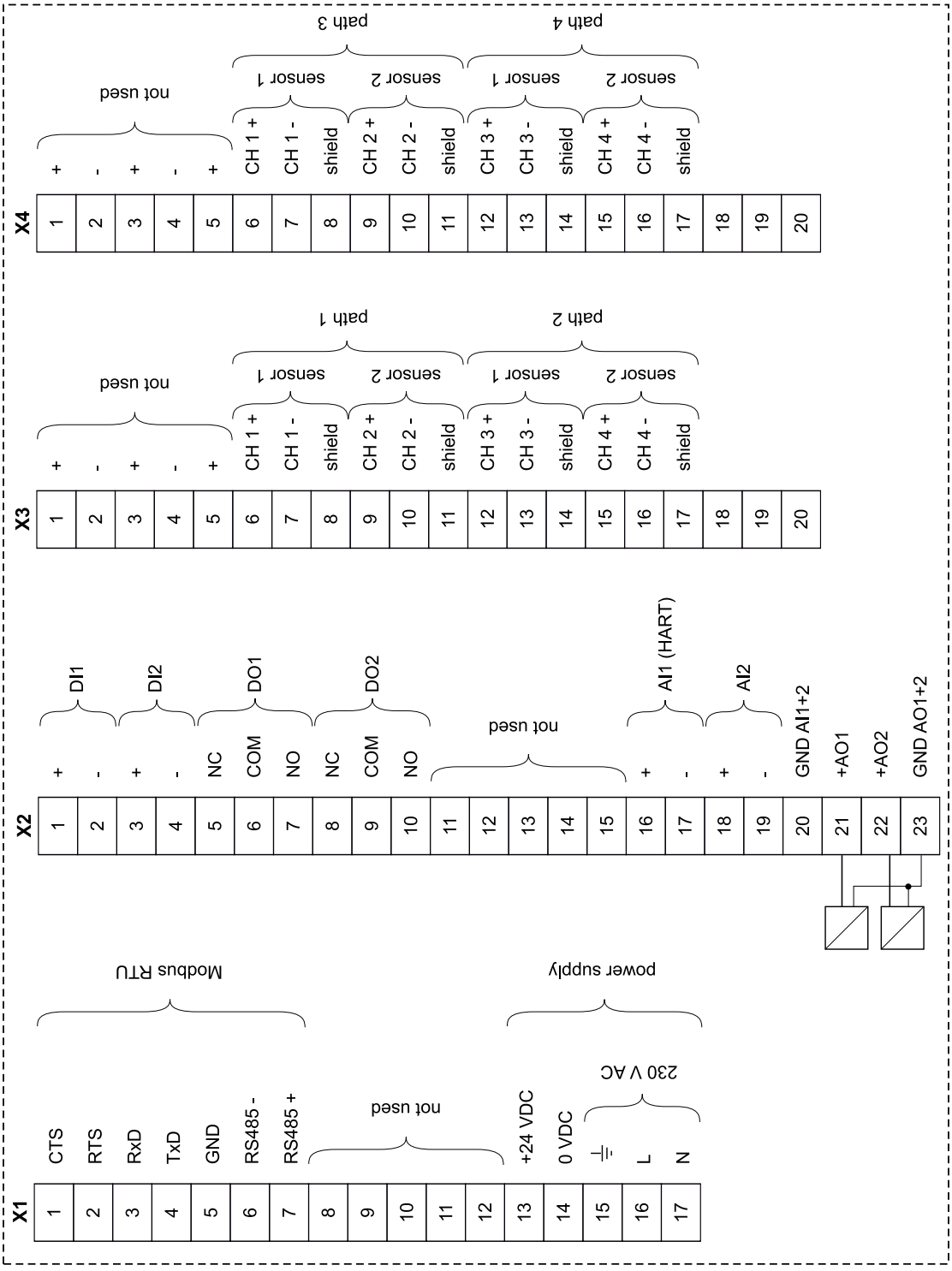
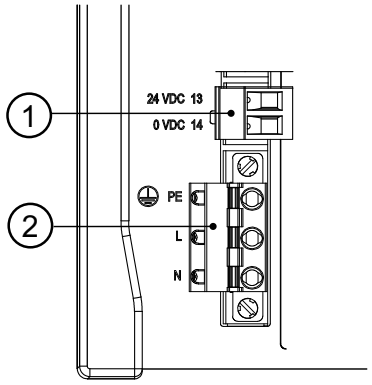


Fig. 15-2 General connection diagram - NivuFlow 600, type T4

15.4 Switching on voltage supply

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



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

Fig. 15-3 Electrical Connections of power supply NivuFlow

Note the warning on page 45!

Note

The series resistance is 0.3 Ohm/wire. This resistance shall be added to the permissible total resistance; see >Technical Description for Transit Time Sensors<.

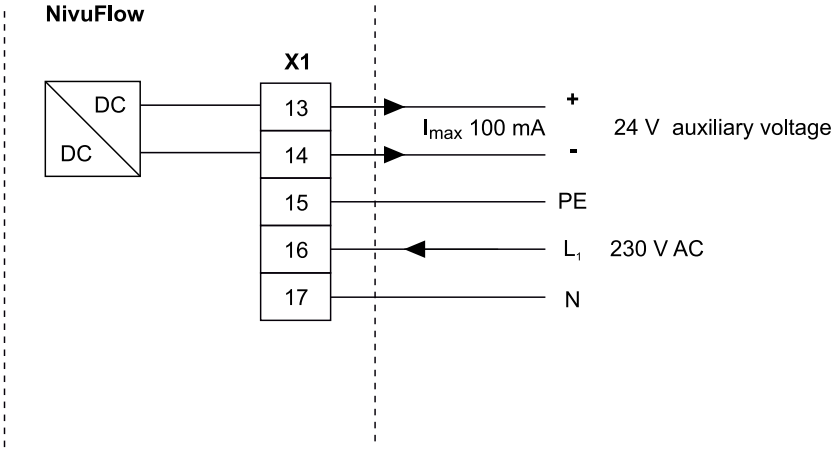


Fig. 15-4 AC connections of power supply

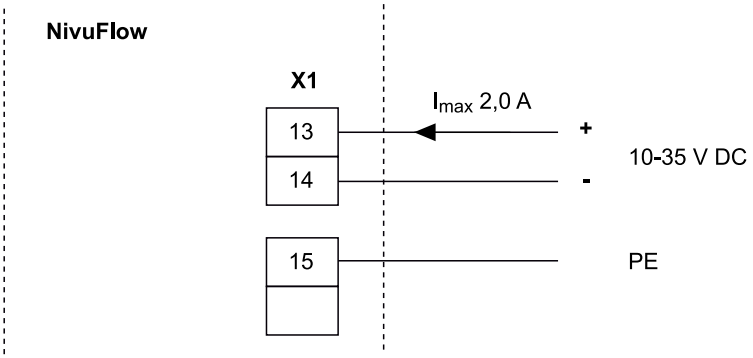


Fig. 15-5 DC connections of power supply

Putting into Operation

16. Notes to users

Before connecting and operating the NivuFlow 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. The NivuFlow shall be wired according to the wiring diagram in chapter 15.3. 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 chapter 15.3) 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
- Expert personnel
- If the service specification requires a protocol on settings and errors

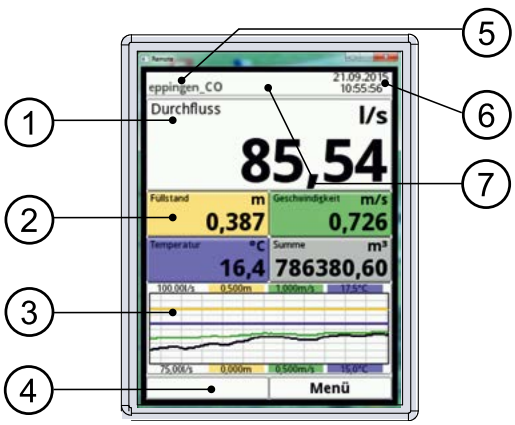
17. Operation Basics

The complete operation of the NivuFlow is handled via control elements.

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

The display at any time display provides information on where you currently are within the menu structure and which entries you are about to modify.

17.1 Display Overview



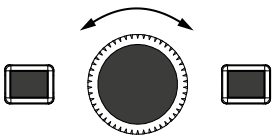
1 Display area 1 (Output field 1)
2 Display area 2 (Output fields 2-5)
3 Display area 3
4 Functions
5 Name of measurement place
6 Date / time
7 Error message sent or display for active service mode

Fig. 17-1 Display

17.2 Using the Control elements

☞ First, select the >main menu<. Press the right hand function key.

1. Turn the rotary pushbutton to scroll through the menu. A sub-menu can be selected, as soon as it is highlighted blue.
2. Press the black part of the rotary pushbutton - you will get to the next parameter level or you can enter parameter settings.



3. Repeat this process until you arrived at the desired menu or parameter.

Here you can enter names or numbers in parameters..

⇨ also see page 49 and page 50

Press the left hand function key to exit the menus step by step. .

The transmitter in the background operates with the settings which have been entered at the beginning of the parameter setting.

The following request is prompted on the display not before the current parameter setting has been finished and confirmed.

Fig. 17-2 Confirmation after parameter setting

☞ Confirm the entry with >YES<.

The password query for the parameter settings appears:

Fig. 17-3 Password query for parameter settings

☞ Enter the password (as described

After accepting the new parameters the NivuFlow continues to operate using these data.

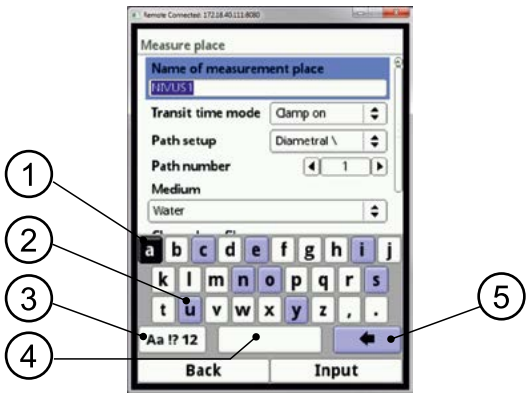
17.3 Use / Entry using the Letter block

Certain parameters can be labelled with names or designations. A virtual keypad is indicated in the bottom section of the display if such a parameter has been selected.

Detailed information on how to use the keypad can be found here. Later sections of this manual will merely prompt you to enter names or designations.

To enter designations such as the measurement place name proceed as follows:

1. Turn the rotary pushbutton to scroll to the lower half of the display. A virtual keypad featuring individually selectable letters is indicated.
2. Turn the rotary pushbutton to navigate through the virtual keypad. Characters highlighted blue (2) feature dual functions. Holding the button depressed for approx. 1 sec. switches over to alternative function.
3. Press the rotary pushbutton until the desired character is highlighted black. By pressing the character is applied to the text box automatically.
4. 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. 17-4 Keypad

A shift key ban be found at the bottom left of the keypad (3).

☞ Activate this shift key by rotating the rotary pushbutton until the shift key is highlighted black.

The functions of the shift key are:

- Upper case
- Lower case
- Special characters
- Digits

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

17.4 Use / Entry using the numeric Keypad

In certain parameters it is possible to enter dimensions or other numeric values. A number field is indicated in the bottom section of the display if such a parameter has been selected.

The use of the number field has the same structure as the keypad. Later in the manual, you will only be prompted to enter dimensions or numerical values.

Press the rotary pushbutton - a numeric field will appear.

☞ Now enter the values digit by digit. Proceed the same way as described before in the keypad section

☞ When entering the dimensions observe the correct decimal places. The channel profile dimension e.g. is set to METER per default

If multiple dimensions shall be entered consecutively (e.g. for rectangular profiles), you can get to the next dimension by rotating the rotary pushbutton after your former entry has been confirmed.

☞ For the next entry proceed right as described before.

17.5 If typed wrong:

Incorrect entry can be deleted letter by letter or digit by digit by pressing the back button.

1. Open the keypad.
2. Turn the rotary pushbutton until you get to the >back arrow< (back button).
3. Press the rotary pushbutton - this will erase the wrong letter or number.
4. Write subsequently until the complete name or dimension arrears in the display.
5. Confirm the entry with the right hand function key.

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

17.6 Menus

All menus are described in chronological order in chapter “Parameter Setting”.

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

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.

Quick-Start - Start-up Examples

18 Measurement with installed (insertion) Pipe Sensors

18.1 General

Pipe sensors are preferably used for measurements in full filled pipelines The pipe sensors can also be used in the drinking water sector. These sensors are certified with a WRAS approval (see Technical Instruction for transit time sensors).

Before setting the measurement parameters, the sensors have to be installed.

To guarantee the tightness of the pipeline the installation shall be executed by a pipeline company or plumber.

For programming the measuring point you need the basic settings:

- Medium being measured
- Pipe circumference
- Internal pipe diameter
- Pipe outside diameter
- Wall thickness
- Material of pip wall
- Inner lining material and thickness, if necessary

All measurement place parameters can be read from the graphic display.

Observe the instructions on how to prepare the measuring section in the >Installation Instruction for Transit Time Sensors<.

18.2 Programming of an 1 path diametrically opposed measurement

In order to set the parameters of a diametrical 1-path measurement it is necessary to enter all measurement place data into the transmitter. Prior to programming we recommend you to become familiar with the operation basics as described in chapter 15. Chapter 21.1 describes how to set the measurement place parameters.

18.2.1 Simple parameter setting

Application specifications:

- Stainless steel (steel)
- No inner lining
- No sediments in the pipe
- Z-mode (diagonal)
- One path

☞ First open the >Application menu<

Start data entry via the symbol >Measurement place<:

1. Enter the selected name of measurement place in >Name of measurement place<. Enter the values using the keypad
2. Set the >Transit time mode< to >Insertion<
3. Now select the >Path setup< (Diametral \) and the >Path number< (1 path)

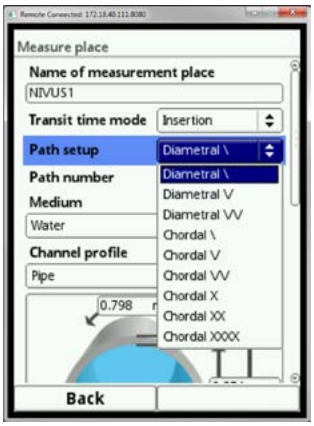


Fig. 18-1 Path setup selection

Hints on the medium

Select "User-defined" if you cannot find your measurement medium in the selection. This will open another menu point which allows additional entries such as the sound velocity within the medium.

⇨ *Lists providing the according sound velocities are available either from the Internet or the manufacturer*

4. Select de medium to be measured from the drop-down menu
5. Set the Channel profile to >Pipe<

☞ In the graphic section enter the pipe data (e.g. DN 1000). Two entries are sufficient to enter the pipe dimensions. Example:
- Inside diameter
- Wall thickness

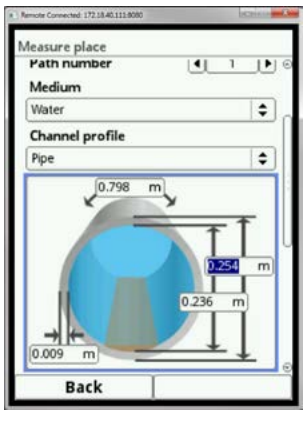


Fig. 18-2 Entering pipe data

The transmitter automatically adds outside diameter and pipe circumference as soon as inside diameter and wall thickness have been entered. The same applies if you enter circumference and wall thickness. The transmitter then completes the missing parameters.

☞ Finally select the >Wall material< from the drop-down menu (stainless steel)

There are no further entries required – the following parameters (lining, sludge level,...) remain to be set to default.

As soon as relevant parameters in the measurement place menu or the v-paths are modified the path arrangement must be reinitialised. This allows to recalculate path lengths and sensor positions for graphic representation.

Exit the measurement place menu to modify the measurement path settings.

☞ Go back to the main menu

The display indicates the following prompt:

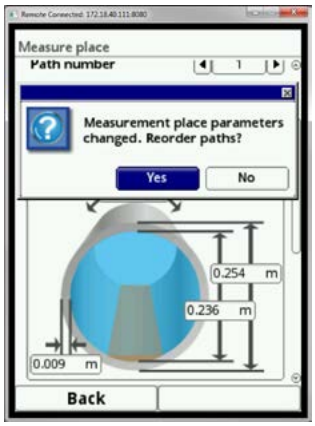


Fig. 18-3 Accept modified measurement place parameters

☞ Confirm the modified measurement place parameters

After confirming with >Yes< a message appears on the display confirming that the paths have been reinitialised and recalculated.

Selecting sensors and entering the mounting angle

☞ Select the symbol >v-Paths<

1. Select the sensor type you are using for your measurement
2. Scroll to the mounting angle
3. Enter the mounting angle using the keypad (+45° or -45°)
4. Confirm your entries with the right function key

All following parameters are read-only parameters or remain to be set to default.

If you have entered all necessary parameters for the measuring place, you must save the parameters.

☞ Exit the menu by using the left-hand function key, until >Save parameters?< appears in the display

☞ Select >YES<

☞ Then enter the password

The NivuFlow is now ready for operation and works with the parameters you have set.

19. Measurement with Clamp-on sensors

19.1 General

Clamp-on sensors are mainly used for measurements in homogeneous media (such as chemical substances or in large temperature ranges). Here the sensors are installed on the pipe outside.

Prior to the installation of clamp-on sensors the measuring section shall be prepared and the measurement place parameters must be set. For the measurement place basically the parameters below need to be set:

- Medium being measured
- Pipe circumference
- Internal pipe diameter
- Pipe outside diameter
- Wall thickness
- Material of pip wall
- Inner lining material, if necessary

All measurement place parameters can be read from the graphic display.

Observe the instructions on how to prepare the measuring section in the >Installation Instruction for Transit Time Sensors<.

19.2 Programming of an 1 path diametrically opposed measurement

In order to set the parameters of a diametrical 1-path measurement it is necessary to enter all measurement place data into the transmitter. Prior to programming we recommend you to become familiar with the operation basics as described in chapter 15. Chapter 21.1 describes how to set the measurement place parameters.

19.2.1 Simple parameter setting

Application specifications:

- Stainless steel (steel)
- No inner lining
- No sediments in the pipe
- Z-mode (diagonal)
- One path

☞ First open the >Application menu<

☞ Start data entry via the symbol >Measurement place<

1. Enter the selected name of measurement place in >Name of measurement place<. Enter the values using the keypad
2. Set the >Transit time mode< to >Clamp-on<
3. Now select the >Path setup< (diametral \) and the >Path number< (1 path) .

☞ From here proceed as described in „„Path setup selection“ on page 54“ .

Once entered, all required measurement place parameters need to be saved.

Selecting sensors and entering the mounting angle

Additional information required to calculate the sensor position is the sensor type.

☞ Change back to the Application Menu and elect the symbol >v-Paths<

1. Select the sensor type you are using for your measurement
2. Scroll to the mounting angle
3. Enter the mounting angle using the keypad (+45° or -45°)
4. Confirm your entries with the right function key

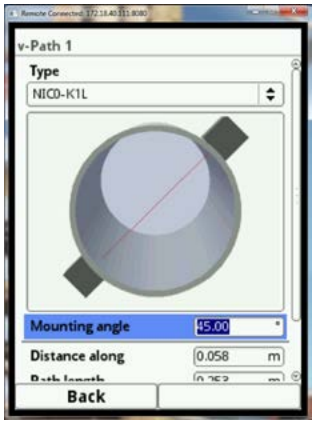


Fig. 19-1 Enter >Mounting angle<

The >Distance along< field on the display indicates the distance between both sensors.

The indicated distance is always the clearance between both sensors.

Once entered, all required measurement place parameters need to be saved.

☞ Use the left function key to exit the menus step by step until >Save Parameters?< is shown on the display

☞ Select >YES<

☞ Then enter the password

The NivuFlow 600 is now ready for operation and uses your parameters.

19.2.2 Extended Parameter Setting

More specifications:

- Pipe with inner lining
- Sedimentation within the pipe

For pipes with inner lining:

Until point 6 proceed right as described before.

☞ Then select the material of the inner lining

In the graphic section now you are prompted to enter an additional parameter. The NivuFlow 600 requires this extra parameter value to perform calculations including the lining:

☞ In the graphic section additionally enter the thickness of the inner lining

If moreover there should be sedimentation within the pipe enter the according value in >Sludge Level<.

☞ Confirm your entries using the right function key

The transmitter now will subtract the sludge level from the inside diameter.

Go to the **sensor selection and the mounting angle entry** in the v-Paths menu. Here you can find any information required to install the clamp-on sensors.

19.2.3 Calculation of sensor position

After all parameters for sensors and measurement place have been entered you are now ready to have the positions for the sensor installation indicated on the display.

☞ Scroll to >Initialise paths< and rotate the rotary pushbutton

Then the sensors can be installed on the pipe according to the mounting specifications.

You can find information on the installation of clamp-on sensors in the >Installation Instruction for Transit Time Sensors<.

Parameter setting

20 Parameter Principles

In principle, modified parameters do not become effective before the have been saved. The unit is checking whether parameters have been changed when you exit menus. Finally you will be prompted to eventually save modified parameters.

- >yes<: modified parameters are accepted and saved
- >no<: parameter modifications are rejected and the unit will exit the menus
- >Abort<: you will exit the prompt. The parameters remain to be modified, however will not become effective and will not be saved.

20.1 Save parameters

If you wish to accept and to save modified parameters it is necessary to enter a valid password first. Enter the new password in the New password field.
The default setting for the password is 2718.

20.2 Change Password

You can change the default password at any time. However observe that changing the password will protect all changes of transmitter settings. The input is limited to 10 digits.

To change the password, proceed as follows:

☞ Open the menu >System<.

1. Select submenu >Service<
2. Activate the options >change password<
3. Enter the existing password using the number field
4. Enter the new password in the new password field (max. 10 characters)

The transmitter will accept the new password and saves all settings on the NivuFlow 600.

Important note

Never give the password to any unauthorised persons!
If you need to note down this password, keep it in a secure places.
If the password should get lost contact the manufacturer.

21. Parameter Functions

21.1 Main menu

The complete parameter settings of the NivuFlow 600 are possible via six setup menus. The individual menus are described in chapter . The options can be found in the main menu as described in the figure below:

Fig. 21-1 Main menu display

Please note the general procedure for parameter settings on page 49.

21.2 Functions on the first menu level

21.2.1 Menu - Application

This is one of the most relevant basic menus when it comes to setting parameters. The Application Menu contains four sub-menus where shapes and dimensions of measurement places can be set. It is used to define the flow velocity sensors used as well as to set mounting position data.

Moreover the required analog and digital inputs and outputs can be defined here:

- Functions
- Measurement ranges
- Measurement spans
- Limit values

This this menu also contains the diagnostic possibility of:

- the sensors
- the inputs and outputs
- the complete system

Use this menu to enter or change:

- Constant, fixed sludge levels
- Low flow suppression
- Damping and signal evaluation and signal output
- Stability of signal evaluation and signal output

21.2.2 Menu - 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

21.2.3 Menu - 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. The error message memory can be reset from here as well.

21.2.4 Menu - Communication

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

- TCP/IP
- Server
- HART (in preparation)
- Modbus

21.2.5 Menu - Display

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

22. Parameter Description

The following sections describe the general procedures for the setting of parameters.

Parameters for measurements using wet or clamp-on sensors are set in different ways. The parameter setting procedures for the submenus >Measurement Place< and >v-Paths< vary depending on the transit time mode.

Due to this, both submenus will be described separately.

Accept Measurement place parameters

After being set completely, the parameters for the respective measurement place need to be saved. The memory is password-protected.

☞ Enter the password on the numeric keypad.

The default setting for the password is 2718

☞ First open the >Application menu<.

Fig. 22-1 Application menu

22.1 Measurement Place Settings

The sub-menu >Measurement place< 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
- Medium and Pipe material
- Possible solid sediments settings
- Low-flow suppression
- Measurement damping and stability

22.1.1 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.

☞ Write subsequently until the complete name is in the text box

☞ Confirm the entry with the right hand function key.

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

22.1.2 Transit Time mode

Use >Transit Time Mode< to choose the measurement method. Select from:

- Insertion (using installed sensors)
- Clamp-On (sensors mounted on the outside)

The view of the following menus will change depending on your choice.

Select Measurement Method – Parameter Setting

Sequence and view of the menus >Measurement Place< and >v-Paths< vary depending on the >Transit Time Mode< selected.

Both methods are described here.

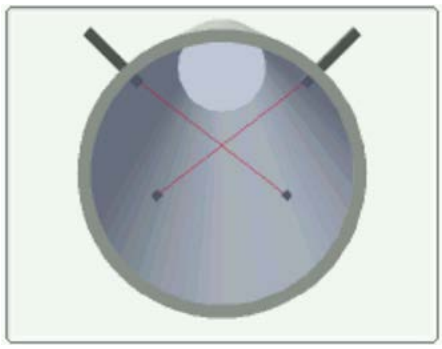
23. Parameter setting for transit time mode >Insertion<

23.1 In the Menu Measurement Place

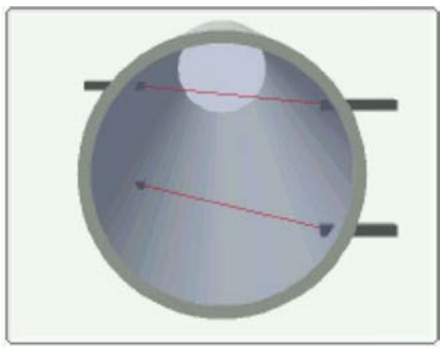
23.1.1 Path setup

The measurement >Insertion< includes the path setup possibilities:

Diametrical



Chordal



Enter the number of paths after selecting the path setup.

23.1.2 Path Number

By turning the rotary push button you can set the number of measurement paths.

- In the version >T2< a maximum of two paths can be programmed.
- In the version >T4< up to four paths are available.

☞ Confirm with „Enter“.

23.1.3 Medium

These information are necessary for the NivuFlow to calculate the sound propagation time of the measurement.

Medium Selection

Choose “User defined” if your medium is not water. This action opens up another menu point which prompts you to enter e.g. the medium sound velocity.

⇨ *You can find lists specifying the sound velocities of various media in the Internet or contact the manufacturer.*

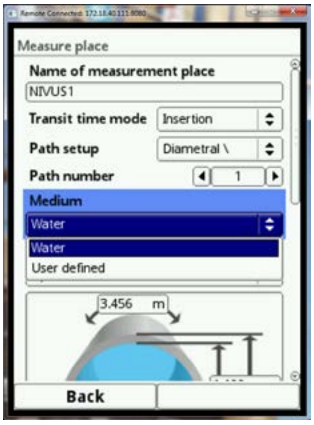


Fig. 23-1 Measurement Medium Selection

23.1.4 Channel Profile

The NivuFlow 600 is designed for full filled profiles.

Choose between 2 channel profiles

- Pipe: for insertion sensors and clamp-on
- Rectangle: only for insertion sensors

The profile chosen is shown as graph in the 3D preview box if selected.

Enter the dimensions of the selected profile here consecutively. 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.

☞ After choosing the appropriate profile enter the dimension values digit by digit.

☞ Observe the measurement unit (decimal places). Per default the channel profile dimensions are set to METER.

23.1.5 Wall Material

Different pipe materials feature varying properties in terms of sound velocities. The most common pipe materials can be found in the selection list.

Based on this selection and the specified measurement medium the NivuFlow calculates the appropriate sound transit time of the measurement.

Wall material selection

Choose “User defined” if your pipe material is not in the list. This action opens up another menu point which prompts you to enter e.g. the sound velocity of the pipe material.
The default setting is 300.000 m/s

⇨ *Regarding the sound velocity of the pipe material contact the pipe manufacturer.*

23.1.6 Lining

In practice some pipelines may be equipped with an inner lining. This inner lining may serve to e.g. protect the outside material of the pipe (chemical substances) or to compensate temperature variations.

The most common lining materials can be found in the selection list. Choose “User defined” if your material is not in the list and contact the pipeline manufacturer.

Based on this selection and the specified measurement medium the NivuFlow calculates the appropriate sound transit time of the measurement.

23.1.7 Sludge Level

In horizontal laid pipes it can cause deposits (sediments) on the base of pipes, depending on measured medium and flow velocity.

This parameter can be used to enter a fixed sedimentation level within the pipe as >Sludge level<. The sludge level entered is calculated as non-moving horizontal partial surface on the flume bottom. The according height is subtracted from the wetted total hydraulic surface prior to executing the flow calculation.

23.1.8 Velocity evaluation

Here you can choose the method of calculation for determining the flow rate.

Mode

Selection:

- NIVUS
- Free

By choosing >NIVUS< hydraulic factors are considered to calculate the average flow velocity $V_{average}$ and for flow calculation.
By choosing >Free< only the average value of the individual path velocities is considered for flow calculation.

23.1.9 Low-flow suppression

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

☞ Place a check mark in the box >Active<

It opens another input option. Here you can enter the value you wish to suppress e.g. in case of lowest discharge rates.

The low-flow suppression is used to avoid the detection of lowest velocity variations. These variations may cause apparently high fluctuations of the measurement volumes over long periods.

Flow velocities lower than the parameter value set will be “suppressed” and hence no volume is detected. The NivuFlow does not store the values.

Only positive values are allowed to be set.

23.1.10 >Q supressed<

Enter a flow rate 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 are allowed to be set. These values are going to be considered as absolute values and therefore affect positive as well as negative velocities!

23.1.11 >v supressed<

Low-flow volumes in applications with large profiles and filling levels can be suppressed by means of this parameter. 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 are allowed to be set. These values are going to be considered as absolute values and therefore affect positive as well as negative velocities!

23.1.12 Damping

This menu enables to adjust the display and analog output damping in seconds. Damping relates to all flow velocity values which are available as input. Damping relates to all flow velocity values which are available as input.

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. This average value is used for further calculation of the flow rate.

The input occurs in five-second steps.

Factory default: 30 s

23.1.13 Stability

The stability parameter defines the period the NivuFlow bridges values without having valid measurement events available. During this period the NivuFlow 600 operates using the latest valid reading. If the specified period is exceeded without detecting a correct value the NivuFlow goes back to reading >0< considering the damping set.

The NivuFlow does not store the values (invalid value).

The input occurs in seconds.

Factory default: 30 s

23.2 Parameter setting in v-Paths Menu

Setting the parameters of the flow velocity sensors is another important issue beyond the measurement place. In addition to type and number of paths, this menu moreover comprises the spatial position. Specifications within this menu relate to the defined channel in terms of shape and spatial dimensions (see „23.1.4 Channel profile“).

23.2.1 Number of Velocity Sensors

Depending on the type of transmitter up to 8 flow velocity sensors (4 paths) can be connected to the NivuFlow 600.

The number of connectable sensors depends on the measurement transmitter type.

- NivuFlow 600 type T2 - 4 flow velocity sensors (2 paths)
- NivuFlow 600 type T4 - 8 flow velocity sensors (4 paths)

☞ Open the v-Paths Menu

In the top right-hand corner is shown a selection box with the number of available paths. This box can be used to set the parameters of all connected sensors (paths) following each other.

Per default path 1 is always activated.

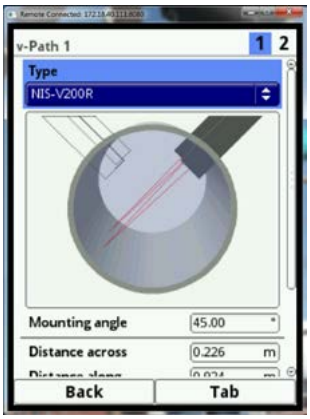


Fig. 23-2 v sensor selection transmitter type T2

☞ Press the right-hand function key (Tab) to move to the next path.

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

23.2.2 Sensor types

Determination and representation of sensors (paths) depend on the measurement method selected in chapter “22.1.2 Transit Time Mode“.

Fig. 23-3 Insertion Sensor selection

23.2.3 Sensor mounting position

Mounting angle:

Notes to the mounting angle

In case of horizontally laid pipes avoid pipe top and pipe bottom as mounting place (risk of soiling or air bubbles)

NIVUS recommends a mounting position of 45° to the horizontal (pipe).

Here you can adjust the angle at which the sensors are installed into the pipe.
In diametrical measurement:

- 0° = pipe crown - pipe bottom
- 90° = across the pipe

In case of chordal measurement the path moves up/down!
The range of angle input is from -180 ° to + 180 °!

The mounting angle shall be entered for each path separately.

☞ Enter the mounting angle of the first path.

The right function key >Tab< takes you to the next path.

☞ Then enter the mounting angle of the next path.

The sensor positions are shown on the display once the angles have been entered. This helps you to make sure the angles have been entered correctly for your application.

The path currently being set is indicated in colour in the graph, too.

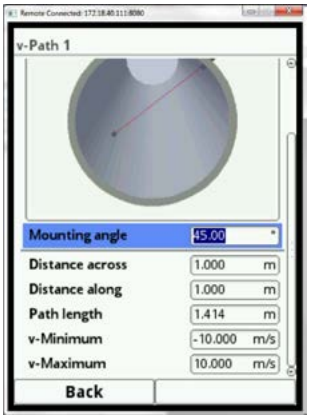


Fig. 23-4 Mounting angle example 45°

23.2.4 Transverse Distance, Distance along and Path length

These parameters and their modification are expressively reserved to service personnel

23.2.5 Weighting

In the event of using 2 or more paths 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 %.

23.2.6 Limiting the velocity evaluation

The both input fields >v-Minimum< and >v-Maximum< are relevant for the limiting of the flow velocity evaluation. Here you can enter the maximum permissible negative as well as positive velocity values.

A typical case of application is to avoid the evaluation of negative flow velocities (backwater). To do this, simply set the maximum value of the negative flow velocity to >0<.

24. Parameter setting for transit time mode >Clamp-On<

24.1 Path setup

The clamp-on method allows diametrical measurements only. The most selected option is the diagonal measurement or as v-Echo (see example).

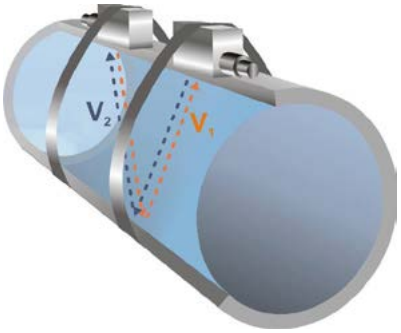


Fig. 24-1 1-Path application, Path setup: v-echo

24.1.1 Path Number

At clamp-on measurements (selecting in chapter „24.1.2 Transit Time mode“ on page 63) the paths selection is limited to 2.

24.1.2 Medium

These information are necessary for the NivuFlow to calculate the sound propagation time of the measurement.

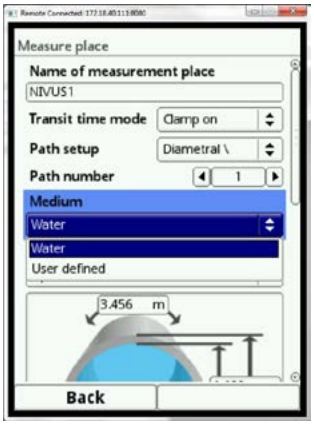


Fig. 24-2 Medium selection

Medium selection

Choose “User defined” if your medium is not in the list. This action opens up another menu point which prompts you to enter e.g. the medium sound velocity.

⇨ *You can find lists specifying the sound velocities of various media in the Internet or contact the manufacturer.*

24.1.3 Channel Profile

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.

After choosing the appropriate profile enter the dimension values digit by digit.

Observe the measurement unit (decimal places). Per default the channel profile dimensions are set to METER.

Entering pipe dimensions

Two specifications are enough for entering the pipe dimensions:

- Pipe circumference or inner diameter or outside diameter
- Wall thickness

Once inside diameter and wall thickness are specified the transmitter automatically adds outside diameter as well as pipe circumference. The same applies as soon as circumference and wall thickness are entered. The transmitter adds the missing parameters.

For pipes with inner lining it is necessary to additionally specify the thickness of the lining material.

The transmitter then calculates the correct inside diameter by considering this extra material thickness.

24.1.4 Wall Material

Different pipe materials feature varying properties in terms of sound velocities. The most common pipe materials can be found in the selection list.

Based on this selection and the specified measurement medium the NivuFlow calculates the appropriate sound transit time of the measurement.

Wall material selection

Choose “User defined” if your pipe material is not in the list. This action opens up another menu point which prompts you to enter e.g. the sound velocity of the pipe material.

The default setting is 300.000 m/s

⇨ *Regarding the sound velocity of the pipe material contact the pipe manufacturer.*

24.1.5 Lining

In practice some pipelines may be equipped with an inner lining. This inner lining may serve to e.g. protect the outside material of the pipe (chemical substances) or to compensate temperature variations.

The most common lining materials can be found in the selection list. Choose “User defined” if your material is not in the list and contact the pipeline manufacturer.

Based on this selection and the specified measurement medium (water) the NivuFlow calculates the appropriate sound transit time of the measurement.

24.1.6 Low-flow suppression

The Low-flow suppression for clamp-on has the same function as for insertion sensors.

☞ Place a check mark in the box >Active<

☞ Proceed as described in chapter 22.1.2.

24.2 Parameter setting in v-paths menu

The specifications in this menu relate to the defined channel regarding shape as well as spatial dimension (see „25.1.4 Channel Profile“).

Moreover this menu can be used to enter some specifications required to calculate the sensor positioning. The NivuFlow 600 then indicates the mounting distances of the clamp-on sensors.

24.2.1 Sensor types

Definition and representation of sensors (paths) depends on which measurement method has been selected in chapter „24.1.2 Transit Time mode“.

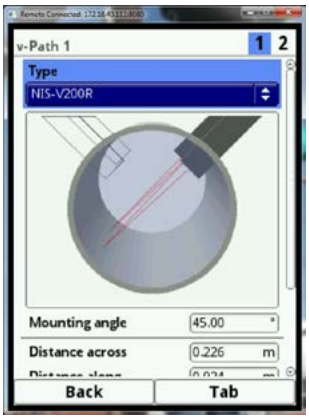


Fig. 24-3 Clamp-on sensor selection

Once entered, all required parameters for the measurement place need to be saved.

☞ Select >Initialise Parameters<

The transmitter loads the parameters into an internal memory.

24.2.2 Sensor mounting position

Mounting angle:

Notes to the mounting angle

In case of horizontally laid pipes avoid pipe top and pipe bottom as mounting place (risk of soiling or air bubbles)

NIVUS recommends a mounting position of 45° to the horizontal.

Here you can adjust the angle in which the sensors are strapped to the pipe.

NIVUS recommend a mounting angle of 45°.

For each path the mounting angle must be entered separately.

☞ Enter the mounting angle of the first path.

By pressing the right-hand >Tab< function key you can move to the next path.

☞ Then enter the mounting angle for the next path.

Distance along:

The transmitter will output the value of this parameter. This is a read-out parameter which cannot be changed.

Per default the indication on the sensor distance given is METER.

The >Distance along< provides the calculated distance between both sensors on the display.

The distance information always specifies the clear distance between the sensors.

24.3 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 spans, offsets, limit values, error reactions etc. can be set here as well.

☞ Open the menu input/output via main menu.

The input/output menu is subdivided in four parts:

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

24.3.1 Analog inputs

The number of analog inputs is depending on the device type. For device type T2 and T4 there are two analog inputs available for each.

The available analog inputs are indicated in the top right corner of the display. By pressing the right-hand >Tab< function 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.

Currently the analog inputs can be used as external readings only. Therefore, the NivuFlow 600 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. 24-4 Parameter setting analog input

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

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 „22.1.1.

☞ Finally set the scale to save.

24.3.2 Analog outputs

The number of analog outputs is depending on the device type. 2 analog inputs becomes available for the device type T2 and T4.

The available analog outputs are indicated in the top right corner of the display. By pressing the right-hand >Tab< function 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.

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

Following functions of the analog output are possible:

- **Output inactive**
  not usable

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

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

- **Water temperature**
  The calculated medium temperature is available at the selected analog output.

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

- **Path velocity**
  In the event of using multiple paths and if the average flow velocity of the individual measurement paths is to be determined, the desired path can be selected here.

The measuring value is output in analog form.

Fig. 24-5 Select path 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.

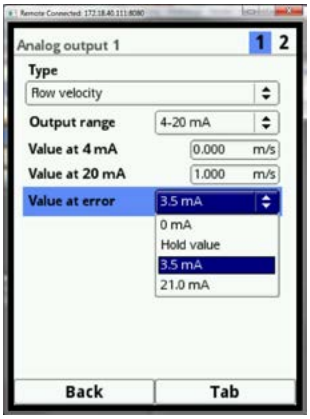


Fig. 24-6 Possible options in event of errors

If readings should fail on the analog output it is possible to set actions in case of error. Select from the settings below:

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

24.3.3 Digital inputs

The number of digital inputs is depending on the device type. For device type T2 and T4 there are two digital inputs available for each.

The available digital inputs are indicated in the top right corner of the display. By pressing the right-hand >Tab< function 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.

☞ Enable the desired digital inputs.

The following functions can be assigned to the digital inputs:

- **Block v-measurement**
  By using an external contact the flow measurement can be blocked as long as a signal is available at the am digital input.
  If this function is selected the logic can be additionally modified as follows:
  - non-inverted
  - inverted

- **Hold measurement**
  The value is on hold as long as the input is switched active.

- **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 modified as follows:
  - non-inverted
  - inverted

- **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
  - inverted

24.3.4 Digital outputs

The number of digital outputs is depending on the device type. For device type T2 and T4 there are two digital outputs available for each.
The available digital outputs are indicated in the top right corner of the display. By pressing the right-hand >Tab< function key you can select the digital outputs successively. The selected outputs is shown as clear text message in the top right display corner.

In the default setting the digital outputs are inactive.

☞ Enable the desired digital output

Fig. 24-7 Activation of digital outputs

The following functions can be assigned to the digital outputs:

- **Sum impulse**
  The parameters below can be set here:
  - Logic (normally closed / normally open)
  - Negative sum impulse (as a check mark)
  - Volume (impulses per volume)
  - 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.

- **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. 24-8 Programming limit contact

- **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 transmitter uses the calculated average flow velocity (calculated even by using 2 or more paths).
If this function is selected the logic can be set as follows:
- Normally closed
- Normally open

- **Limit Contact Water Temperature**
  The digital signal in case of exceeding an adjustable water temperature limit value is put out here.

☞ Proceed as described in >Limit contact flow<.

- The transmitter uses the calculated average water temperature (calculated even by using 2 or 4 paths).
  If this function is selected the logic can be set as follows:
  - Normally closed
  - Normally open

- **Limit Contact External Reading**
  The digital signal in case of exceeding an adjustable external limit value is put out here.

☞ Proceed as described in >Limit contact flow<.

- The transmitter uses the calculated average value of the external reading.
  If this function is selected the logic can be set as follows:
  - Normally closed
  - Normally open

- **Error message**
  You can assign individual error types to the digital output.

☞ To do this enable the according selection boxes.

Then you can toggle between “normally closed” and “normally open” output logics.

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.

- **Modbus Slave**
  The digital output can be used via Modbus to output controlled signals from other systems. >Logic< is selectable.

24.3.5 Diagnostics

The diagnostics menu is a menu used for indication and simulations. Here among other things it is possible to simulate individual analog outputs.

The output simulation procedure does affect following plant sections.

Simulation shall be executed by trained expert personnel only!

⇨ You can find a detailed description of the diagnostics menu in chapter „Diagnostics“ on page 101.

25. Parameter Menu Data

The data menu contains all internally saved readings and is subdivided in 4 submenus.

Fig. 25-1 Parameter menu data

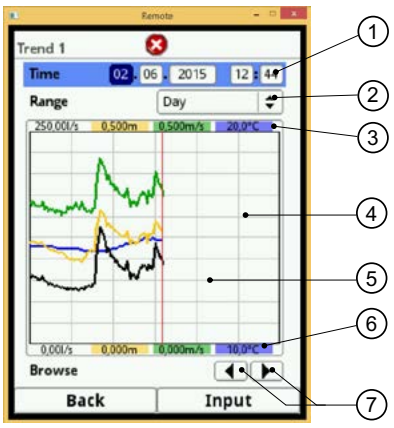
25.1 Trend

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

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



1 Selection Date / time
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. 25-2 Trend graph details

In the top area of the screen the date/time selection can be found. The line is highlighted blue and therefore active.

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

1. Press the rotary pushbutton - the first time range (day) is enabled
2. Change the day number by rotating the rotary pushbutton
3. Press the rotary pushbutton again as soon as the desired day is selected
4. Repeat this procedure for month, year and time until the desired point in time is set completely
5. Confirm your entry with the right-hand function key

After successful confirmation the selected data time range is shown. The vertical red line in this case indicates the selected point in time (Fig. 25-2, number 5)

The selected period is indicated from the left to the right display edge.

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

The range within data is to be shown can be modified. Make your settings using >Range<.

☞ Go to >Range< input parameter and select the following periods:

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

☞ Confirm your entry.

The red vertical line indicates the selected point in time.

The display grid is permanently set internally.

If **>1 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“.

Note

For better reading the display with setting >1 hour< is subdivided by 3 vertical auxiliary lines. These subdivisions represent a period of 15 minutes each.

Other display settings use more red lines to subdivide time periods accordingly. This will be described in the following section.

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 **>1 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 **>1 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.

Note

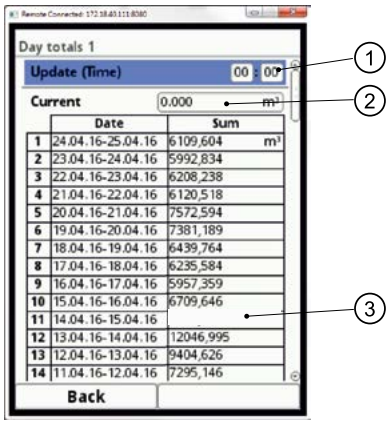
Selecting the period of 4 weeks may take a few seconds to completely load the required data.

25.1.1 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.

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



1 Time of totalising. The point in time can be modified

2 Subtotal since latest totalising event

3 No values available between two totalising events

Fig. 25-3 Display 24-hours totals

Scroll up and down within the value table by using the rotary pushbutton. 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.

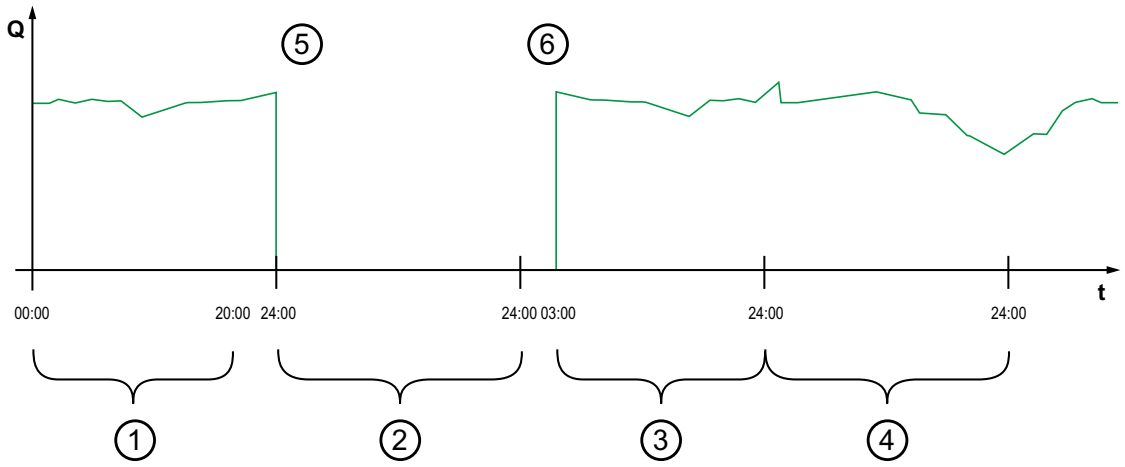
Example: 98 values - The unit has been in operation for 98 days.

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

If the NivuFlow 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 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 (, Punkt 3). 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. 25-4 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.

The >Update (Time)< option must be highlighted blue and hence is active.

1. Enter the desired starting time for summing (e.g. 08:00) and move on to the minutes-section
2. Enter the minutes
3. 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.

25.2 USB Stick

25.2.1 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.

25.2.2 Using the USB stick

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

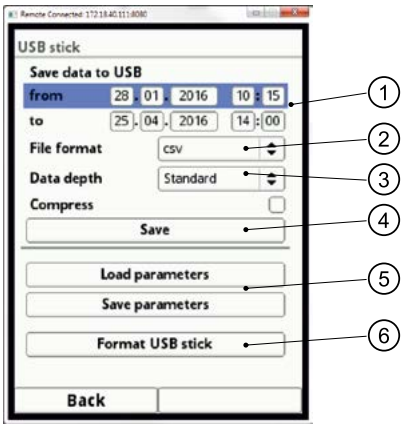
The USB stick is used for the following functions:

- 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

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



1 Set the extension period
2 File format of the data
3 Adjust data depth
4 Save command for measurement data
5 Parameters form USB stick
6 Parameters to USB stick

Fig. 25-5 Save date on USB memory stick

☞ Save the data on USB stick as described in chapter “Trend“.

1. Enable the first number field (day) >from< (see above drawing, Nr. 1)
2. Change the starting time by rotating the rotary pushbutton
3. After the desired day is selected, press the rotary pushbutton
4. Repeat the procedures for month, year and time until the desired date and time have been set
5. Confirm your entries by pressing the right-hand function key >Enter<
6. To enter the stop time >to< proceed the same way

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

☞ Subsequently select the desired data format

1. Open the selection menu
2. Confirm the data format

Then select from:

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

The data depth adjustable here comprises 3 possible options:

Fig. 25-6 Data depth selection

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
- Average flow velocity
- Water temperature
- 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
- Average flow velocity
- Air temperature (if an air ultrasonic measurement is used)
- Water temperature
- Current values as well as the accordingly calculated values of enabled analog inputs and digital inputs
- Average flow velocities of v-path(s) 1, 2, etc. (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.

Note

The >Compress< function makes sense only for the transmission of large amounts of data.

In this case the selected files are compressed creating a ".gz" format file.

>Compress< is enabled by ticking the box.

These files can be unzipped by using the free "7-ZIP" application.

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

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

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 current parameter settings.

File name remarks:

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

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

☞ Therefore select the parameter >Format USB stick<.

Please Note

Remember that all data are lost during reformatting the USB stick!

25.3 Data storage (internal)

This sub-menu allows to modify the storage cycle and to delete the internal memory.
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.

Important Note

Please note that deleted data cannot be restored !

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<.

26. Parameter menu System

This menu System contains general information about the Measurement transmitter.

Fig. 26-1 Parameter menu system

26.1 Information

This menu is a display menu. It provides the device information below:

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

Moreover you can find here extra information on activated DSP-Cards.
The screen shows:

- DSP firmware version
- FPGA Core versions

26.2 Region Settings

In this menu you can make country-specific settings as well as the language setting:

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

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

26.2.1 Operating language

Following operating languages can be configured currently:

- Deutsch
- English
- Français
- Svensk

26.2.2 Date format

The following date formats can be set:

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

26.2.3 Units

A list to select from can be found in the >Units< parameter. Change the PLUS to MINUS by pressing the rotary pushbutton.

☞ First select the decimal separator (comma or dot)

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

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.)

Now set the units used for display indication:

- Flow
- Velocity
- Sum
- Level (fixed value)

To set the >Units Memory< proceed right as described under >Units<. Change the PLUS to MINUS by pressing the rotary pushbutton.

In >Units memory< the readings are converted and saved according to the selected unit.

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

Important Note

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.

26.3 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.

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

26.4 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. 26-2 Current error messages displayed

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

26.5 Service

This sub menu contains the following functions:

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

Service level

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

This is why the setting will not specified here.

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

Change password

The default setting for the password is 2718. You can change this password if desired

⇨ Continued in chapter 20.2 on page 59.

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.

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.

27. Parameter menu Communication

27.1 Menu Settings

This menu comprises the settings for various communication interfaces with other communication systems:

- TCP/IP
- WEB server
- HART (in preparation)
- Modbus

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.

TCP/IP

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

For data transport in this menu the network interface (LAN) on the unit front plate is used.

⇨ See “Available Interfaces“ on page 15

WEB server

The internal WEB browser is currently not supported.

HART

This function is already “in preparation”. In future the NivuFlow 600 can be used as a HART slave subordinated systems.

Modbus

The NivuFlow 600 can be integrated into other systems via Modbus. If required, the Modbus protocol is available upon request. Please contact the NIVUS GmbH head office in Eppingen

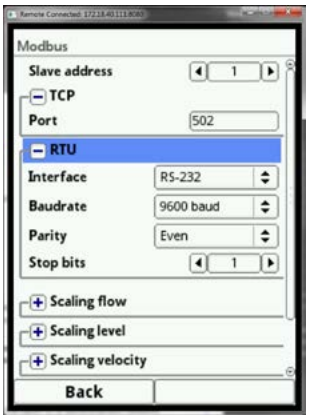


Fig. 27-1 Modbus display

Here the following features are available:

- Slave address (1 to 247)
- TCP Port settings
- Interface selection (RS232 or RS485)
- Baud rate selection (between 9600 and 115200)
- Parity
- Stop bits

In addition you can adjust the scaling:

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

Use the BUS interface on the device faceplate.

⇨ See “Available Interfaces“ on page 15.

27.2 Interfaces

NivuFlow 600 has 4 hardware interfaces on its faceplate.

⇨ You can find an overview on “Available Interfaces“ on page 15.

The utilisation of the individual interfaces is divided into several submenus.

Network interface (LAN)

This interface is for data transfer and can be accessed from the >Communication< parameter menu.

⇨ Continued on page 92

BUS interface (RS-485 / RS-232)

This interface can be used to integrate the NivuFlow 600 into other systems. You can access the interface from the >Communication< parameter menu.

⇨ Continued on page 92

USB-A interface

This interface is to transfer data to an USB stick. Programmed device parameters e.g. can be saved on USB stick. Can be accessed from the >Data< parameter menu.

⇨ Continued on page 84

USB-B interface

This interface is reserved for extended access for authorised service personnel only and will therefore not be described in detail here.

28. Parameter menu Display

Use the display menu to change the following settings:

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

Backlight

The backlight intensity can be changed in 10 steps.

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

Lighting (backlight) dim

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 600 (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. 28-1 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.

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.

29. Parameter menu Connections

This menu is not used in this version.

Main Menu

Quick access

You can directly access the main set-up parameters by using the main display.

30. General Overview

When in operation mode, the NivuFlow 600 indicates the following important readings:

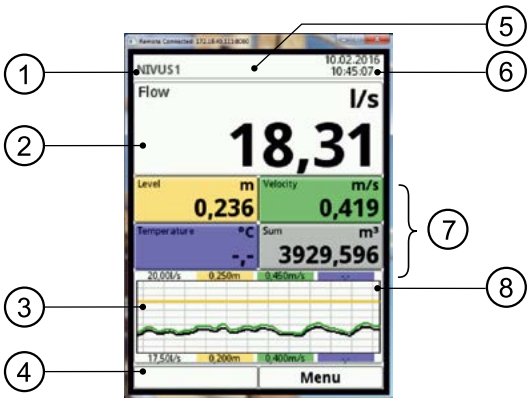
- Flow quantity
- Fill level for calculation (depending on geometry)
- Velocity (calculated average flow velocity)
- Medium temperature (calculated)
- Sum

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. 30-1 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. 30-2 Flow volume section selected

30.1 Flow screen

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

☞ Press the rotary pushbutton 2x to access possibilities.

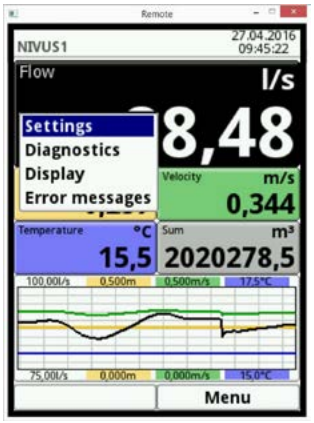


Fig. 30-3 Possible access options

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.

Variations during Quick Access

During quick access observe that sequence and view of the >Measurement place< and >v-paths< menus vary depending on the selected >Transit Time Mode< (see chapter „Transit Time mode“ on page 63.

Fig. 30-4 Measurement place settings

Diagnostic

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

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

Display

The following modifications can be carried out via the display menu as quick access:

- Dimming the display back-light
- modify the text of any of the 5 readings output fields.
- Number of digits

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

Error messages

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

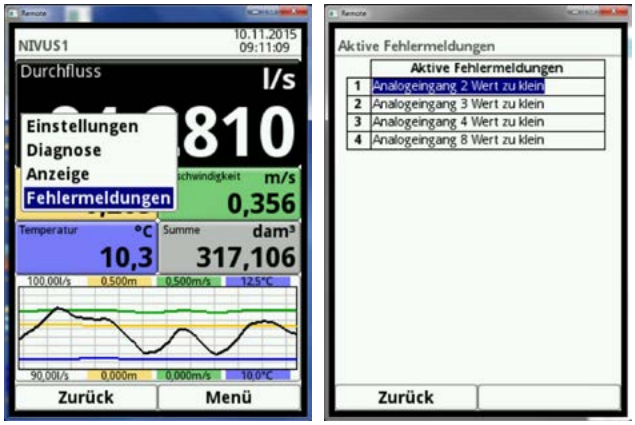


Fig. 30-5 Selection and display of error messages

30.2 Display Level

Only the display parameters can be modified here since it is not possible to adjust the level on the NivuFlow 600 (full filling).

30.3 Display flow velocity

This dialogue 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

The dialogue shows:

- Firmware version of measurement transmitter and used DSPs
- Calculated average flow velocity
- Transit Time difference
- Transit time (time on fight)

Diagnostic

Here you can adjust the settings described in chapter „v-Path“ on page 102 and verify the alignment of the sensors (paths).

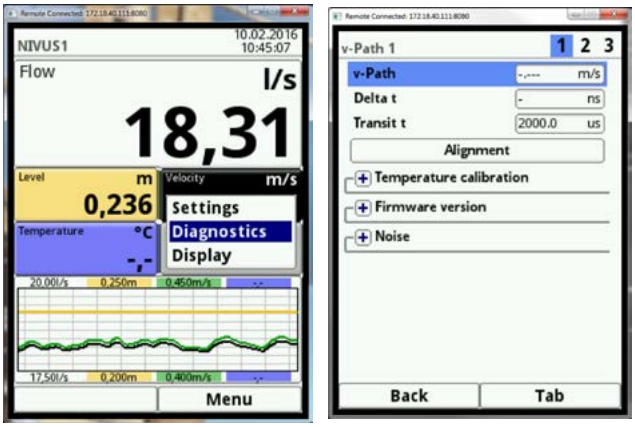


Fig. 30-6 Information on the flow velocity sensor

30.4 Display Temperature and sum screen

The temperature is calculated from the transit time and the value is shown. 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.

31. 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.

⇨ The adjustable trend display procedure can be found in chapter „Trend“ on page 80.

Diagnostics

32. Diagnostics menu Principles

The Diagnostics menu can be found in the Applications menu. The diagnostics menu is subdivided in 3 submenus.

Fig. 32-1 Sub-menu Diagnostic

The diagnostics menu is a menu used for indication and simulations.
The settings below can be verified or checked here:

- Path functions
- Sensor software versions
- Inputs and outputs
- Simulation

Important Note

It is essential to follow the safety instructions regarding simulation page 105.

33. Diagnostics v-Paths

This menu is required for analytic only.

In case of errors or uncertainties with transit time measurements various factors can be used here to investigate the reasons.

33.1 v-Path

This is a display parameter.

v-Paths shows individual velocities.

The right function key (TAB) can be used to view each path individually.

Prerequisite: one 2-path measurement must be available at least.

33.2 Delta t

Delta t is the measured transit time difference.

The transmitter uses this value to compute the velocity (v).

The value is indicated in nanoseconds.

33.3 Transit t

This term describes the average signal transit time between sensor 1 and sensor 2 of the according path.

The value is indicated in microseconds.

33.4 Alignment

By pressing the button >Alignment< the display changes to a graph.

This parameter indicates the signal strength of the sensors in % (0-120 %). The higher the percentage, the better the path alignment.

The minimum value should be higher than 80 %.

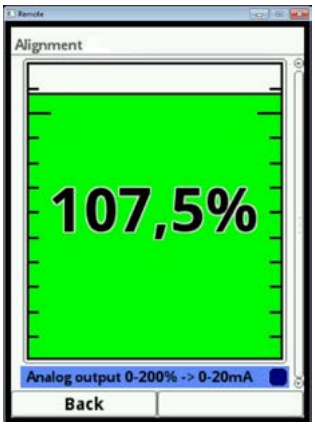


Fig. 33-1 Alignment

Activation analog output 1

The checkbox at the bottom of the graph serves as an aid for later alignment of path sensors. This function is useful particularly if the transmitter is not installed in close proximity to the sensors.

CAUTION

Analog output values can access to plant section

During the period of activation the value on analog output 1 will be overwritten.

Always make sure not to use any safety related signals or values on analog output 1 at the moment of activation!

During the testing period following safety circuits shall be deactivated.

Failure to observe may cause personal injury and lead to system damage!

Important Note

Due to the risks mentioned before the activation of analog input 1 is password protected. Due to reasons of personal safety reveal your password to authorised and trained expert personnel only!

With the checkbox ticked the percentage is put out as mA signal on analog output 1.
The sensor position can be optimised by readjusting the sensor with the aid of a multimeter.
The scale for readjustment is 0-20 mA; 0-200 %

The checkbox is unticked automatically when you exit the menu.

33.5 Temperature calibration

Select the drop-down menu >Temperature calibration<. The view of the button changes from + symbol to - symbol.
The following temperatures can be read here:

- Path temperature (of the active path); calculated from sound velocity
- The sound velocity (in meter per second)

The other both parameters can be set in order to adjust the correct medium temperature:

- **Offset (Transit Time)** - this value is set automatically once an entry has been specified in >Calibr. temperature<. If you wish to reset the offset enter here >0<.
- **Calibr. temperature** - enter the actual medium temperature here. The actual temperature must be determined before (measure/sample).

Fig. 33-2 Diagnostic Temperature calibration

33.6 Firmware version

This menu contains the Firmware of the transmitter used.

Please quote this information in all queries about the device.

FPGA Core 1 and FPGA Core 2 are Firmware versions of DSP components.

These specifications are relevant for service personnel and will not be explained here any further.

33.7 Noise

This submenu can be used to recall information on noise. This is important when it comes to analyse poor signal values.

Noise values indicate unwanted background noise at signal evaluation.

These values provide information on the ambient conditions to the service personnel.

- Upstream typical
  a continuous level (noise), transmitted in the area against the flow direction.
- Upstream max.
  Here signal components known as peaks become visible. These peaks are short-term disturbances such as pumps etc. which here are detected against the flow direction.
- Downstreem typical
  a continuous level (noise), transmitted in the area with the flow direction.
- Downstreem max.
  Here signal components known as peaks become visible. These peaks are short-term disturbances such as pumps etc. which here are detected with the flow direction.

A rule of thumb is: the higher the value the worse the signal.

34. Diagnostic Inputs/Outputs

34.1 Important Information on the Simulation

DANGER

Personal injury and damage caused by improper simulation handling

The simulation will directly affect to following plant sections .

The simulation 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

DANGER

Effects on plant sections

The simulation of NivuFlow 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!

Important Note

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!

34.2 Analog Inputs

This menu can be used to indicate the current values on the NivuFlow 600 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 T2 = 2 Analog inputs
- Type T4 = 2 Analog inputs

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

34.3 Analog Outputs

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 T2 = 2 Analog outputs
- Type T4 = 2 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.

This menu allows to simulate the individual analog outputs.

Here it is essential to observe the hints on safety as well as possible consequences to following plant sections.

Fig. 34-1 Simulation mode selected

Important Note

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

See password entry page <ÜS>.
Due to reasons of personal safety reveal your password to authorised and trained expert personnel only!

Before you enter the password necessarily observe the according hints on safety!

Fig. 34-2 Password query prior to simulation

☞ To simulate an analog output proceed as follows:

1. Select the desired analog output by using the rotary pushbutton
2. Tick the checkbox to activate the analog output.
3. Then enter the desired output current as numeric value.
4. Observe that the analog output(s) will provide the entered current values until you finish the simulation menu.
5. Press the left-hand function key to exit the simulation menu

34.4 Digital Inputs

This menu indicates the signals available on the digital inputs.

The number of digital inputs depends on the instrument type:

- Type T2 = 2 Digital inputs
- Type T4 = 2 Digital inputs

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

Enabled digital inputs feature a ticked checkbox.

34.5 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 T2 = 2 Digital outputs
- Type T4 = 2 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.

This menu allows to simulate individual digital outputs.

Before you enter the password necessarily observe the hints on safety on page 105.

☞ To simulate a digital output proceed as follows:

1. Select the button >Simulation< by using the rotary pushbutton
2. Enter the password
3. Select the required function from

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

Please note that the digital output / digital outputs provide the registered current values until you finished the simulation menu.

Press the left function key to exit the simulation menu!

35. Simulation

DANGER

Effects on plant sections

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

It is essential to observe the hints on safety on page 105.

When selecting the “simulation”, the password is required in principle.

This menu allows to simulate theoretical flow. Simulation is carried out by entering assumed values for velocity (Level results indirectly by the complete filling).

These values do not really exist.

Using the dimensions of the programmed geometry as basis, the NivuFlow 600 calculates the flow rate prevailing by using the simulated values.

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

It is essential to follow the safety instructions mentioned before entering the password on page 105.

☞ Enter your password.

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

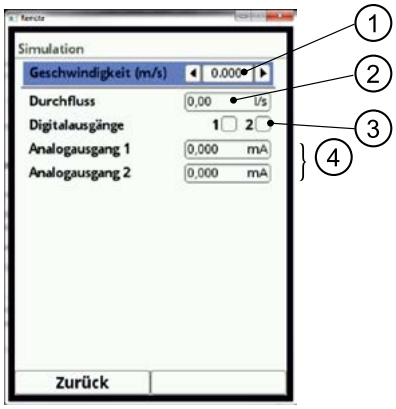
☞ Select the desired measurement value.

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

The output box (see Fig. 35-1, point 2) 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. 35-1, point 3 and 4).



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

Fig. 35-1 Display of calculated values and issued conditions

Maintenance and Cleaning

WARNING ***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***

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.

Wear protective clothing.

36. Maintenance

36.1 Maintenance interval

The Type NivuFlow transmitters are conceived to be virtually free of calibration, maintenance and wear (Requirements of the Industrial Safety Regulations are unaffected.)

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 vary.

Extent and intervals of maintenance depend on the following conditions:

- material wear
- general regulations for the operators of the measurement facility
- ambient conditions

After 10 years the measurement system should be completely inspected.

(The verification of instruments / sensors is a basic measure executed by NIVUS GmbH in order to improve operational reliability and to increase the lifetime).

36.2 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

37. Cleaning

37.1 Transmitter

WARNING ***Disconnect instrument from mains***

Disconnect the unit from mains power before cleaning.

Disregarding may lead to electric shocks.

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.

Caution:

Do not remove the blue plastic rails to clean the enclosure!

Important Note

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

37.2 Sensors

The hints on how to maintain and clean the sensors shall be necessarily observed. These hints can be found in the >*Technical Instruction for Transit Time Sensors*<.

This instruction is part of the standard sensor delivery!

38. Dismantling/Disposal

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.

☞ 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.

39. Accessories

ZUB0 SPSYS08	Clamping system for clamp-on measurements, consisting of tensioning belt, width 8 mm (length 10 m for 2 x 5 m) and 2 turn-buckles for fastening of 2 sensors; incl. coupling paste
ZUB0 CORAIL	Rail system for clamp-on measurements, consisting of tensioning belt, length 10 m, 2 turnbuckles and split, movable sensor receptacles for easier sensor installation
ZUB0 STU XXX	Welding nozzle for pipe sensors, 1½“ inner thread, in various materials
ZUB0 HAHNR15	Stop ball valve 1½“ for removal of pipe sensors from pipes without pressure; Material: stainless steel 1.4408
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.

Index

Glossar

This product uses codes of the following open source projects:

Contact opensource@nivus.com in regard of all licensing issues

- Nanox/nxlib (http://www.microwindows.org)
- Freetype FreeType Team (http://www.freetype.org)
- FLTK (http://www.fltk.org)
- Libpng (http://www.libpng.org)
- The Independent JPEG Group‘s JPEG software (http://www.ijg.org)
- MiniXML (http://www.msweet.org)
- TinyGL (http://bellard.org/TinyGL)
- Zlib (http://www.zlib.net)
- Duktape (http://www.duktape.org)

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 NivuFlow 6xx**
Description:	*permanent flow measurement transmitter*
Désignation:	*convertisseur de mesure de débit fixe*
Typ / Type:	**NF6-…**

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:

- 2014/30/EU
- 2014/35/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 61326-1:2013
- EN 61010-1:2010

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 20.04.2016

Gez. *Marcus Fischer*