

Instruction Manual

Flow Measurement Transmitter NivuFlow Mobile 600



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Translation

If the device is sold to a country in the European Economic Area (EEA) this instruction manual 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 manual (German) must be consulted or the manufacturer contacted for clarification.

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General

1 About this manual



Note

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

This instruction manual is an original instruction for the flow measurement transmitter NivuFlow Mobile 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 instruction.

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 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 Instruction for Transit Time Sensors
- Installation Instruction for Transit Time Sensors

These manuals are provided with the auxiliary units or sensors and/or are available as download on the NIVUS homepage.

1.2 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 selected
		or described.
	Reference to docu-	Refers to an accompanying documentation.
1	ment	



2 Connections and Operating Elements

2.1 Power Supply

2.1.1 Transmitter

The NivuFlow Mobile (Fig. 2-1 pos. 1) is supplied by rechargeable battery packs. Once plugged in the batteries are connected to the transmitter via the charging pins (Fig. 2-1 pos. 4) supplying the required operating voltage.



- 1 Transmitter
- 2 Battery compartment (two battery packs; illustration without batteries)
- 3 Guide pins for battery packs
- 4 Charging pins for AC power supply of transmitter
- 5 USB-A interface

Fig. 2-1 Power supply by battery packs (top view)

2.1.2 Rechargeable Batteries

The rechargeable batteries can be charged either in installed condition or while removed by using a battery charger (optional accessory).

There are three different options to charge the batteries while being installed:

- Power adapter 110...230 V AC using the multifunction socket (Fig. 2-2 pos. 1) on the reverse side of the enclosure
- USB-A interface (Fig. 2-1 pos. 5)
- External power source 12...32 V DC (e. g. battery, solar module, fuel cell etc.) using cable via multifunction socket



1 Multifunction socket

Fig. 2-2 Charging batteries via multifunction socket

Sensor wiring diagrams can be found in chapter "17 Sensor Connection".

2.2 NivuFlow Operating Elements

NivuFlow itself has no direct operating elements. Instrument operation and the setting of parameters are carried out completely by using smartphone, tablet, notebook and PC. Use here the PC mouse or the touchscreen.



Also refer to the instruction manuals of your preferred smartphone, tablet, notebook or PC.

2.3 Interfaces

The transmitter is equipped with various interfaces which can be found on the reverse side or on the top of the instrument.







- 1 Sensor socket v2/h
- 2 Multifunction socket I/O
- 3 Sensor socket v1
- 4 USB-A interface (accessible with open cover)

Fig. 2-3 Available interfaces



Safety Instructions

3 In general: Used symbols and signal words

3.1 Valuation of the accident level



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



Warnings in high degree of risk

Indicates a high-risk, imminently hazardous situation which will result in death or serious injury if not avoided.

WARNING



Warnings in medium degree of risk

Indicates a possible danger with medium risk which may result in a life-threatening situation or (severe) bodily injury if it is not avoided.



Warnings in low-risk or property damages



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

Danger by electric voltage



Indicates a hazard with a high risk of electric shock which may result in a life-threatening situation or (severe) bodily injury if it is not avoided.



Important Note

Contains information that should be highlighted.

Indicates a potentially damaging situation which can result in a damage of the product or an object in its environment.



Note

Contains information and facts.

3.2 Warning notices on the product (option)



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.

4 Safeguards and Precautions

Working with NIVUS instruments requires to observe and to follow the safety measures and precautions below generally and at any time. These notes and warnings will not be repeated for each description within the document.

WARNING



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

Wear protective clothing.

Germ contamination

WARNING

Observe occupational safety regulations



Before starting installation work, observing the work safety regulations need to be checked. Disregarding may lead in personal injury.



Do not disable safety devices



It is strictly prohibited to disable the safety devices or to change the way they work. Disregarding may lead in personal injury.

WARNING



Danger by electric voltage

Maintenance, cleaning and/or repairs (by qualified personnel only) may only be performed when de-energised.

Disconnect the systems from mains.

Disregarding may lead to electric shocks!



Important Note

The entire measurement system shall be installed and put into operation by rained expert personnel only.



5 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.

Operate the transmitter only in technically perfect working order.

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.

6 Use in accordance with the requirements



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 NivuFlow Mobile 600 transmitter incl. the accompanying sensors is designed for temporary flow measurement of slightly polluted to clear and clean water or equivalent media in full pipes and canals.

NivuFlow Mobile 600 is designed and manufactured in accordance with the current state of the art and with the recognised safety rules and regulations applicable at the time this document is issued. Danger to persons or material damage cannot be completely ruled out, however.

The maximum permissible limit values as specified in chapter "10 Specifications" shall be necessarily observed. Any case varying from these conditions which is not approved by NIVUS GmbH in written form is left at the owner's risk.

7 User's Responsibilities



Important Note

In the EEA (European Economic Area) national implementation of the frame-work directive 89/391/EEC and corresponding individual directives, in particular the directive 2009/104/EC 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 Industrial Safety Ordinance must be observed.

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.

8 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 contains information and facts.



Product Specification

9 Product Construction and Overview



- 1 Enclosure cover
- 2 LED (status indication) and reed contact (wake-up using solenoid)
- 3 Lock (both sides)
- 4 Sensor socket v2/h
- 5 Multifunction socket I/O
- 6 Sensor socket v1
- 7 Fastening holes for rubber buffers or hoop guards
- 8 Handle
- 9 Left battery pack receptacle
- 10 Right battery pack receptacle (position to charge the battery)
- 11 Cover (not shown) above batteries with six non-detachable hexagon socket screws
- 12 USB-A interface
- 13 NivuFlow Mobile 600 transmitter (IP67)
- 14 Enclosure (IP68 with cover closed)



9.1 Enclosure Dimensions



Fig. 9-2 Dimensions

9.2 Connectable Sensors

The photo below provides an overview on the connectable sensors.



Fig. 9-3 Connectable sensors

9.3 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 label
- Information on type and series, serial no. if available
- Power supply

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



Note

Check the delivered instrument for accordance with your order by identifying the nameplate. Check the nameplate for correct specification of the power supply.

 \Rightarrow The declaration of conformity is located at the end of the manual.

Nameplates



Fig. 9-4 Nameplate NivuFlow Mobile 600

10 Specifications

Measurement principle	Ultrasonic transit time (time of flight)				
Power supply	- 2x rechargeable batteries 12 V / 15 Ah, lead gel				
	- Battery charger 100240 V AC / 5060 Hz / 50 VA				
Enclosure	- Material: HPX high performance synthetic resin				
	- Weight: approx. 2.2 kg (without batteries and hoop guards)				
	- Protection: IP68 closed / IP67 open				
Operating temperature	-20 °C+50 °C				
Storage temperature	-20 °C+70 °C				
Max. humidity	90 %, non-condensing				
Display	Status LED (RGB)				
Operation	Solenoid switch;				
	via WLAN with display and operating module (smartphone,				
	tablet, notebook etc.)				
Number of meas. paths	2				
Inputs	- 2x 0/420 mA (active/passive)				
	- 1x 0/420 mA (passive)				
	- 1x active digital input				
	- 1x socket for power adapter or alternative power supply				
Outputs	- 1x analog output 010 V				
	- 1x potential-free digital output as SPDT / bistable				
	- 1x USB-A for readout of measurement values via USB stick				
Storage cycle	160 minutes, time-cyclic or event-based				
Data memory	Intern				
Data transmission/	- via plug-in USB stick				
communication	- via WLAN				

Sensors

The specifications of the accompanying sensors can be found in the according instruction manuals or technical descriptions.

11 Configuration

11.1 Device Types and Accessories

NFM Transmitter

- *NFM-0600:* Portable flow measurement transmitter for full pipelines
- For more information on power supply, display and operating module and more accessories see chapter "43 Accessories" starting on page 121, the current price list or contact NIVUS.

11.2 Delivery

The standard delivery of the NivuFlow Mobile 600 basically contains:

- Transmitter type NivuFlow Mobile 600 (according to shipping documents)
- Ring magnet (solenoid)
- USB stick
- Screw driver for hexagon socket screws
- PU stickers (two pieces: 31x17x3.5 mm) to avoid vacuum in the enclosure in case of being returned (via airfreight) to NIVUS (e. g. for maintenance)
- Instruction manual (incl. certificate(s) of conformity) containing any relevant information on how to operate the NivuFlow

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

11.3 Reception inspection

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 two weeks.



Note

Mistakes cannot be rectified later!

Prior to the first use:

- 1. Open enclosure cover.
- 2. Remove both PU stickers (two pieces; 31x17x3.5 mm), if available, from the left and right enclosure frame (Fig. 11-1 pos. 1). The stickers have been attached prior to shipping (via airfreight) to prevent the enclosure from getting closed and to avoid vacuum formation due to extreme temperature changes during shipping.



11.4 Storage

The permissible maximum values regarding ambient conditions such as temperature and humidity according to chapter "10 Specifications" shall be necessarily observed.

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

To store the instrument:

- 1. Remove the batteries
- 2. If the hoop guards should be mounted to attach the Connector Box remove the guards (lack of space) and attach the rubber buffers instead.



Note

Necessarily attach the rubber buffers

- to prevent the hidden fastening plates on the reverse side of the NFM 600 in the screw channel from getting lost. The fastening plates are essential since they provide the threads to fasten the hoop guards and additionally stabilise the guards on the NFM.
- because the buffers are designed as impact protection for NFM connections and protect the sockets etc. from being damaged.

11.5 Transport

Take precautionary measures and use lashing straps or similar to protect the NivuFlow from heavy shocks or vibrations.

11.6 Return

In case of a required reshipment return the unit at customer cost to NIVUS GmbH in Eppingen using the original packaging.

Insufficiently franked shipments will not be accepted!

Prior to shipping (via airfreight):

- 1. Attach PU stickers (two pieces; 31x17x3.5 mm) right and left on the enclosure frame (Fig. 11-1 pos. 1). This prevents the enclosure from getting closed and eliminates vacuum formation due to extreme temperature changes.
- 2. Place the NivuFlow Mobile 600 safely in the original packaging for transport.



Fig. 11-1 Attachment position for PU stickers

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

We herewith particularly emphasise that replacement parts or accessories not supplied by NIVUS moreover are not certified and approved by NIVUS too.

Installation and/or the use of such products hence may negatively influence predetermined constructional characteristics of the measurement system or even lead to instrument failures.

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



You can find original manufacturer spare parts or accessories in chapter "43 Accessories" and/or in the valid price list or contact NIVUS.



Functional description

12 Operating Ranges

The NivuFlow 600 Mobile is a portable measurement system for flow measurement. The instrument is designed mainly for measurement in slightly polluted to clear aqueous media of various compositions.

It is used in full pipes and rectangular geometries with different dimensions.

NivuFlow Mobile 600 with clamp-on sensors is a contactless measurement system and hence is independent from pressure. Clamp-on measurement systems are suitable only for full pipes.

An overview on connectable sensors can be found in chapter "9.2 Connectable Sensors". Using multiple sensor pairs in a common measurement place will increase the accuracy of flow velocity detection.



Note

The measurement method used to determine the flow velocity is based on the transit time difference principle. It is indispensable for the system functionality to have as little interfering particles (dirt particles, gas bubbles and similar) as possible within the medium. Such particles scatter or damp the ultrasonic signal and hence may possibly prevent the measurement.

The signal is severely reduced as soon as there are too many particles prevailing in the medium. This may lead to faulty or incorrect results.



Fig. 12-1 Signal damping due to interfering particles

13 Functional Principle

13.1 Flow Velocity Detection

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



- A Sensor 1
- B Sensor 2
- α defined angle
- t_1 Time of impulse towards flow direction
- t₂ Time of impulse in flow direction
- L Transit time

Fig. 13-1 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 requires a certain amount of time t₁
- The downstream impulse requires s shorter amount of time t₂

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 Mobile operates both using clamp-on sensors as well as wet sensors. The clamp-on 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.



The transit time difference can be approximated if:

- the main flow direction is known and
- $C >> v_{1-2}$ is assumed

Here the formula below is used:

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

assumed:

- $L_{1,2}$ = length of acoustic measurement path between sensors 1 and 2
- C = speed of sound within water
- $v_{1,2}$ = average flow velocity between sensors 1 and 2 along the measurement path

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.



- 1 Sensor 1, path 1
- 2 Sensor 2, path 1
- 3 Sensor 1, path 2
- 4 Sensor 2, path 2
- D Pipe diameter (at sensor installation in an angle of 45°)

Fig. 13-2 Two-path transit time measurement principle

If the sensors are installed in an angle of 45° the distance between sensors 1 and 3 or sensors 2 and 4 is equal to the inside pipe diameter.

If used in multi-path set-ups the angle of deviation " α " 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.

13.2 Flow Calculation

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

- $\mathsf{Q} = \upsilon_{\mathsf{average}} \bullet \mathsf{A}$
 - given
 - v_{average} = average flow velocity
 - A = cross-sectional flow area

It is required to involve a velocity coefficient "k" to compensate the difference between the measured velocity $\upsilon_{_g}$ and the average velocity $\upsilon_{_{average}}$ within the cross-sectional area.

$$k = \frac{U_{mittel}}{U_g}$$

Then the flow rate can be calculated by using the signal transit time as follows:

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



Installation and Connection

14 General

14.1 Installation Place

For safe installation at the chosen place the measures below must be taken:

- Protect the transmitter from direct sunlight. Install a protective cover if necessary.
- Observe the permitted ambient temperature.
- Do not expose the transmitter to heavy vibration or mechanical shocks.

Selecting the installation place strictly avoid:

- Corrosive chemicals or gases
- Radioactive radiation
- Installation close to footpaths or travel ways

14.2 Before Installation

CAUTION Suspend the instrument only by using appropriate safety belts



The instrument shall be suspended into shafts or manholes only by using the carrying handle and appropriate belts, ropes or similar.

It is not allowed to suspend the device by the sensor cable since this may lead to cable break, leaky plug connection or the transmitter may be torn off.

14.2.1 PU stickers on enclosure frame

Prior to first use of the NivuFlow Mobile 600 make sure that the PU stickers have been removed. If not, remove the stickers and clean the enclosure frame if necessary.



See chapter "11.3 Reception inspection".

14.2.2 Gaskets

- Check the gaskets on the enclosure cover.
 Before closing the cover make sure that the gasket is clean and undamaged, so:
 - remove debris and/or dirt
 - replace defective gaskets
 - apply silicone grease if necessary

Gaskets

The manufacturer cannot be held responsible for any instrument damage resulting from the use of defective or leaking gaskets.

14.2.3 Securing the Instrument

Secure the transmitter from being washed away. When installed in shafts or canals tending to overflow the transmitter shall be secured against being washed away unintentionally (use suspension bracket, plastic/stainless steel rope, chain or similar).

14.2.4 Connection Sockets

To protect open, unused connection sockets on the reverse side of the instrument from dirt or shocks lock the sockets by using the attached caps prior to installation.

The protection degree of the (closed) instrument is IP68 even with open connection sockets. Damaged or lost caps can be purchased from NIVUS.

15 Electrical Installation/Power Supply

WARNING



Remove the rechargeable batteries from the instrument and if connected to mains power via the multifunction socket disconnect from mains.

Working on the electric connections may induce the risk of electric shocks. Observe electric specifications as specified on the nameplate.

Disregarding may lead to personal injury.

Danger due to electric voltage



Note

Observe the local installation directives.

Make sure to fulfil the requirements mentioned below:

- 1. Observe that the installation shall be carried out only by qualified expert personnel.
- For electric installation follow the legal requirements of the according country (in Germany: e. g. VDE 0100).
- 3. Observe further (local) statutory standards, regulations and technical rulings.
- 4. Before feeding the rated voltage the installation of transmitter and sensors must be completed. Verify whether the installation is correct.

 \Rightarrow A description on how to connect the sensors can be found starting page 36.

CAUTION

Do not loosen any screws

Do not loosen any screws on the transmitter except the undetachable hexagon socket screws of the battery compartment cover!

Keep the battery compartment locked during operation.



15.1 Rechargeable Battery Pack

NivuFlow Mobile is equipped with a rechargeable lead gel battery pack by default. This readyto-use battery pack allows for long measuring periods.

The battery pack is in the according battery compartment. An additional battery pack can be plugged right next to it. Since both sockets are almost equivalent the battery socket can be selected freely if only one battery pack is used.

- While Charging only the battery plugged into the right socket is charged however.
- When **Discharging** the battery with the higher capacity (independent of the socket) is used until the capacity of both batteries has reached the same level. After that both batteries are discharged equally.

Moreover, the battery type used or the number of inserted batteries should be specified in the >Battery (12V)< menu to correctly indicate the remaining battery power in the >System< / >Information< menu.

The battery compartment is locked with a cover and six non-detachable hexagon socket screws.



Installation of spare parts/parts subject to wear and tear

The use of spare parts/parts subject to wear and tear (such as rechargeable batteries) not approved by NIVUS will invalidate the guarantee.

15.1.1 Removing/Inserting the Rechargeable Battery Pack

The rechargeable battery can be replaced even in damp weather conditions or during rain. The battery compartment is completely separated from the transmitter.

- Procedure:
 - 1. Loosen the six non-detachable hexagon socket screws of the cover.
 - 2. Remove the cover.
 - 3. Remove the plugged battery on the grip belt.
 - 4. After reinserting the rechargeable battery refit the cover and tighten the non-detachable hexagon socket screws of the cover finger-tight.

15.1.2 Charging the rechargeable battery pack

The rechargeable battery is normally shipped in discharged condition. Fully charge the inserted battery **prior to the initial instrument start**.



Power adapter/battery charger

To charge the rechargeable battery pack use the NIVUS power adapter/battery charger (Fig. 15-1; art.-no. NFM0 ZLAD) only. Observe the specifications attached on the power adapter/battery charger.

Using inappropriate battery chargers may destroy the battery (e. g. due to leaking of battery cells, explosion or similar).



- 1 Power adapter/battery charger with connection cable for the multifunction socket on NFM or the charging tray
- 2 LED indicating the charging status

Fig. 15-1 Power adapter/battery charger

Disconnect the power adapter/battery charger from mains power (Fig. 15-1) before you connect/disconnect it to/from a rechargeable battery.

The built-in LED (Fig. 15-1 pos. 2) indicates the charging status.

Colour/LED Status	Description
Yellow	Charging process
Green	Trickle charging
LED not lit	Reversed polarity, short circuit or no mains power

Charging the inserted battery pack

See chapter "15.1.3 Operation/Charging with direct connection to mains power".

Charging the removed battery pack

- Procedure:
 - 1. Plug the battery pack (Fig. 15-2 pos. 1) into the charging tray (Fig. 15-2 pos. 2) with the upside down.
 - Plug the power adapter/battery charger (with connection cable for multifunction socket) into the charging socket (Fig. 15-2 pos. 3) and connect to mains power supply. The batteries are charged via the charging contacts (Fig. 15-2 pos. 4). Observe the LED colour/status on the power adapter/battery charger.





- 2 Charging tray
- 3 Charging socket for connection of power adapter/charger
- 4 Charging contacts

Fig. 15-2 Rechargeable battery pack in charging tray

The maximum battery capacity will decrease over time. This impairs the battery life which, however, cannot be considered by the integrated battery life calculation.

If exposed to very low or very high ambient temperatures and long periods of use the capacity of the battery pack will decrease.



Battery life

Rechargeable batteries are wear parts and must be replaced once the charge capacity decreases considerably. The battery life depends on the frequency of use.

Use for measurements

The battery should be charged every time before the NivuFlow Mobile is used. Remove unused battery packs from the battery compartment after the last measurement and store them in a dry and frost-free place.

Installation of parts subject to wear and tear

The use of replacement parts/parts subject to wear and tear (e. g. rechargeable batteries) which are not approved by NIVUS invalidates the guarantee.

Battery disposal

Always observe environmentally compatible disposal of rechargeable batteries. Worn batteries can be either returned to the manufacturer or can be taken to respective collecting points.

15.1.3 Operation/Charging with direct connection to mains power

Thanks to the combined power adapter/battery charger (see Fig. 15-1) NivuFlow Mobile can be also operated directly with 100...240 V AC mains power.

Plug the battery to charge into the right battery socket and connect the power adapter/battery charger (Fig. 15-1) to the multifunction socket of the NivuFlow Mobile. Leave the battery in the instrument to charge it during mains power operation. In case of power failure the battery is the used as buffer.



Charge/Discharge battery sockets

While charging only the battery plugged into the right socket is charged however.

When discharging the battery with the higher capacity (independent of the socket) is used until the capacity of both batteries has reached the same level. After that both batteries are discharged equally.

15.1.4 Alternative Power Supply

By using the multifunction socket the NivuFlow Mobile can be also operated with alternative power sources such as solar panels. NIVUS provides a particular 2-wire connection cable (art.-no. NFM0 ZVER PS) with open cable ends on one side and a plug for the multifunction socket on the other side.

The NivuFlow Mobile power input accepts 12...32 V and is protected against overvoltage, overcurrent and reverse polarity.



Charge/Discharge battery sockets

While charging only the battery plugged into the right socket is charged however.

When discharging the battery with the higher capacity (independent of the socket) is used until the capacity of both batteries has reached the same level. After that both batteries are discharged equally.

16 Installation of Sensors

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 installation works.

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.

16.1 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 according installation instruction.

The measurement place parameters need to be set prior to installation. Appropriate preparation measures and the measurement place dimensions can be taken from the respective plant documents.

\Rightarrow

Information on how to set measurement place parameters can be found in chapter "Parameter Setting" starting at page 61.

16.2 Installation of Clamp-On Sensors

Clamp-on sensors allow for contactless measurement in closed and full pipelines. Here the sensors are clamped from the outside onto pipes. The measurement itself **will not** influence the liquid and **will not** change the flow profile of the medium.

The following parameters must be specified before installing the clamp-on sensors:

- Pipe material
- Pipe outside diameter
- Pipe wall thickness



- Material of pipe lining
- Medium to measure (type of liquid)

Based on these specifications the transmitter calculates the accurate position data for the sensor installation. The mounting data can be viewed on the display and operation module (smartphone, tablet, notebook etc.).

Back	Application	Back		v-Path 1
			-CO01	1
Measure place	v-Paths Inpu	uts/Outputs Mour	nting angle	90,00 °
		Dista	nce along	0,811 m
		Path	length	2,136 m
Diagnostics		v-Mir	nimum	-10,000 m/s
		v-Ma	ximum	10,000 m/s

Fig. 16-1 Output of mounting data

The path arrangements below are usual for clamp-on flow metering:

- "Diametrical \" mode
- "Diametrical V" mode
- "Diametrical W" mode

The mounting distance between both sensors is the "clear distance".







Fig. 16-3 Example "Diametrical V" mode



Fig. 16-4 Example "Diametrical W" mode

16.3 Installation of wet Sensors



Important Note

Wet sensors shall be installed only by a pipeline company or a plumber. The tightness of pipes must be guaranteed at any time.

The measurement is not influenced by pipe material or pipe wall thickness if wet sensors are used.

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. The measurement paths are always directed through the pipe centre (diametrical).

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.

The measurement place parameters (selection of measurement method and number of paths) can be set in the >Measure Place< menu. The >v-Paths< menu is used to choose the sensor position for each path separately. To switch to the next path choose the according tab (1 or 2) on the top right.

The following parameters need to be specified:

- Pipe material
- Pipe outside diameter, internal pipe diameter or pipe circumference
- Pipe wall thickness
- Medium to measure

Back	Measure place		Back	v-Path 1	
Name of measureme	nt place	İ	Туре		
Transit time mode	Insertion	-	NIS-V200R		
Path setup	Diametral \ Mounting angle		90,00		
Path number	• 1	+	Distance across	0.980	
Medium			Distance slave	0.080	
Water		-	Distance along	0,980	
Temperature	15.0	°C	Path length	1,386	
			v-Minimum	-10,00	
Pipe		-	v-Maximum	10,000	
→ (0,050 m	- Input	m Cancel			
Wall material					
Stainless steel		-			
Lining					
None		-			
Sludge level	0,000	m			
+ Low-flow suppr	ession	1			

Fig. 16-5 Entering pipe dimensions and mounting angle



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

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



Fig. 16-6 Sensor distance - diameter (principle)

17 Sensor Connection

17.1 Cable for Sensor Connection

The sensors are equipped with a 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 cables.

17.2 Sensor Connection

A list of connectable flow velocity sensors can be found in chapter "9.2 Connectable Sensors".



Fig. 17-1 Connection of flow velocity sensors, 1 pair


Fig. 17-2 Connection of flow velocity sensors, 2 pairs

18 Single external Connection for Inputs/Outputs

If there is **one** additional sensor or actuator to be connected by using the inputs/outputs besides the sensors connected for flow velocity measurement, this can be done directly via the connection cables for the multifunction socket. Depending on the intended purpose there are different cable types available. All cables feature open cable ends on one side and a plug for the multifunction socket on the other side.

- For article numbers see chapter "43 Accessories" starting at page 121.
- For more than one external connection see chapter "19 Connecting the Connector Box for Inputs/Outputs".

19 Connecting the Connector Box for Inputs/Outputs

A Connector Box (Fig. 19-1 pos. 6) must be used if you wish to additionally connect more than one sensor or actuator using the inputs/outputs besides the two maximum paths (four sensors) used for flow velocity measurement on the NivuFlow Mobile 600 (Fig. 19-1 pos. 1).

For only one single external connection refer to chapter "18 Single external Connection for Inputs/Outputs".



Important Note

The Connector Box can either be fastened directly on the NivuFlow Mobile by using the hoop guards (Fig. 19-1 pos. 2) or can be put/fastened to any other place.





Fig. 19-1 NFM with Connector Box (example)

- How to fasten the Connector Box on the NivuFlow Mobile:
 - 1. Remove the rubber buffers (not depicted) from the reverse side of the NivuFlow Mobile (Fig. 19-1 pos. 1). Both fastening plates (now loose, Fig. 19-1 pos. 3) within the screw channels (Fig. 19-1 pos. 4) are already required for the next step.
 - 2. Fasten the hoop guards (Fig. 19-1 pos. 2) on the NivuFlow Mobile by using the accompanying screws.
 - 3. Fasten the Connector Box (Fig. 19-1 pos. 6) on the hoop guards by using the accompanying screws.
 - 4. Connect the sensors to the Connector Box. See terminal wiring diagram (Fig. 19-2).
 - 5. Plug (Fig. 19-1 pos. 5) the connection cable from the Connector Box into the multifunction socket on the NivuFlow Mobile.

For article numbers see chapter "43 Accessories" starting at page 121.



Fig. 19-2 Connector Box terminal wiring



Putting into Operation

20 Notes to Users

Before connecting and operating the NivuFlow Mobile follow the instructions below.

This instruction manual contains any information required for the setting of parameters and the operation of the instrument. The manual is intended for technically qualified personnel. Appropriate knowledge in the areas of measurement system, automation technology, control engineering, information technology and wastewater hydraulics are prerequisites to put the NivuFlow Mobile into operation.

Carefully read this instruction manual in order to guarantee proper function of the NivuFlow Mobile. Connect the NivuFlow Mobile according to chapter "17.2 Sensor Connection". In case of doubt regarding installation, connection or the setting of parameters contact our hotline:

• +49 (0) 7262 9191 955

General Principles

Do not put the system into operation before the installation has been completely finished and checked.

Follow the hints in the instruction manual to eliminate the risk of faulty or incorrect parameter settings. Get familiar with the transmitter operation before you begin to set the parameters. After transmitter and sensors are connected (according to chapters "16 Installation of Sensors" and "17 Sensor Connection") the measurement place parameters can be set.

In most cases it is sufficient to set:

- shapes and dimensions of the measurement place
- sensors used and the according positions
- display units
- storage mode

The NivuFlow Mobile user surface is easy to understand. The basic settings can be easily adjusted by users themselves.

A startup wizard is available to facilitate the initial startup. The wizard will guide the user through the most important parameter settings in easy steps (see chapter "34 Parameter Menu Quick Start" starting at page 105).

21 Setting Up Connection

21.1 General

The NivuFlow Mobile is operated completely by using a standard smartphone/tablet or via notebook/PC. Use the preferred display and operation module according to the respective manufacturer specifications.

The following sections describe the connection setup procedures for Android, iOS and Windows.

21.2 Android OS

- Preparing the NivuFlow Mobile:
 - Ensure power supply: a minimum of one completely charged rechargeable battery pack either plugged into the instrument or alternatively connected via the multifunction socket (see chapter "15.1.4 Alternative Power Supply"). The following step "Wake-Up" can be skipped as soon as the battery pack is inserted now or when voltage is fed and the connection is set up within the following five minutes.
 - "Waking up" NivuFlow Mobile: hold the accompanying magnet (solenoid, Fig. 21-1 pos. 2) to the reed contact (Fig. 21-1 pos. 1; on front side of NFM) until the LED is lit.



Fig. 21-1 Waking up the NivuFlow Mobile

Steps on the display and operation module (smartphone, tablet, notebook, PC etc.):

- 1. Start the display and operation module.
- 2. Use the "Settings" symbol (Fig. 21-2 pos. 1) to open the according menu.



Fig. 21-2 Settings symbol (example)

3. Select WLAN (Fig. 21-3 pos. 1).





Fig. 21-3 WLAN symbol

4. From the list of available WLANs select the NFM (Fig. 21-4 pos. 1) with the according SSID (default state = serial no.).

Wi-Fi r	networks	∪ Connecting	
a	NFMvonRW Obtaining IP address		
	NIVUS-Data Secured		
((;	NIVUS-Guest		
	CHANGE_ME Not in range		1
	NFM0008		

Fig. 21-4 WLAN List

5. Enter the password for server access (default state = PUK) (Fig. 21-5 pos. 1) and connect (Fig. 21-5 pos. 2).



Fig. 21-5 Enter password (example here fd671a105c5d) and connect

- 6. Start the Internet browser.
- Type "192.168.1.1" into the IP address field and open. The NivuFlow Mobile display (Fig. 21-6) is indicated as soon as the connection has been established successfully.



Fig. 21-6 NFM display in browser

8. To set a link on your "Home screen" (for direct access) use the "Tabs and Settings" symbol (Fig. 21-6 pos. 1) and select "Add to Home screen" (Fig. 21-7 pos. 1).



Fig. 21-7 Add to Home screen

9. Use "Add" to confirm (Fig. 21-8 pos. 1).





Fig. 21-8 Confirm adding

The link (Fig. 21-9 pos. 1) is indicated on the tart screen and can be used for instant access without the need to specify the IP address.

This link can be used for each further NivuFlow Mobile transmitter after it has been selected from the WLAN list.



Fig. 21-9 Link in the start screen (example)

After five minutes of inactivity on the display and operation module the message "Session Timeout" (Fig. 21-10) is shown. Access can be restored instantly by selecting the symbol within one minute.

Longer periods of inactivity require a restart of the connection process.

Session Timeout



Fig. 21-10 Session Timeout

21.3 iOS Operating System

- **Preparing the NivuFlow Mobile:**
 - Ensure power supply: a minimum of one completely charged rechargeable battery pack either plugged into the instrument or alternatively connected via the multifunction socket (see chapter "15.1.4 Alternative Power Supply"). The following step "Wake-Up" can be skipped as soon as the battery pack is inserted now or when voltage is fed and the connection is set up within the following five minutes.
 - "Waking up" NivuFlow Mobile: hold the accompanying magnet (solenoid, Fig. 21-11 pos. 2) to the reed contact (Fig. 21-11 pos. 1; on front side of NFM) until the LED is lit.





Steps on the display and operation module (smartphone, tablet, notebook, PC etc.):

- 1. Start the display and operation module.
- 2. Use the "Settings" symbol (Fig. 21-12 pos. 1) to open the according menu.





Fig. 21-12 Settings symbol

3. Select WLAN (Fig. 21-13 pos. 1).

No SIM		* 🗖
	Settings	
≁	Airplane Mode	0
?	Wi-Fi •	NIVUS-Guest >
*	Bluetooth	On >
('A')	Mobile Data	No SIM >

Fig. 21-13 WLAN symbol

4. From the list of available WLANs select the NFM (Fig. 21-14 pos. 1) with the according SSID (default state = serial no.).



Fig. 21-14 WLAN list

5. Enter the password for server access (default state = PUK) (Fig. 21-15 pos. 2) and join (Fig. 21-15 pos. 1).



Fig. 21-15 Enter password and join

- 6. Start the Internet browser.
- Type "192.168.1.1" into the IP address field and open. The NivuFlow Mobile display (Fig. 21-16) is indicated as soon as the connection has been established successfully.

ı : I/s
l/s
l/s
,
m/s
,
m³
,
-,-

Fig. 21-16 NFM display in browser

8. Use the symbol "Provide" (Fig. 21-17 pos. 1) to set up a link on your home screen (for direct access).



Fig. 21-17 Set up link

9. Select "To Home Screen" (Fig. 21-18 pos. 1).





Fig. 21-18 To Home Screen

10. Confirm with "Return" (Fig. 21-19 pos. 1).



Fig. 21-19 Confirm adding

The link (Fig. 21-20 pos. 1) is indicated on the tart screen and can be used for instant access without the need to specify the IP address.

This link can be used for each further NivuFlow Mobile transmitter after it has been selected from the WLAN list.



Fig. 21-20 Link in the start screen

After five minutes of inactivity on the display and operation module the message "Session Timeout" (Fig. 21-21) is shown. Access can be restored instantly by selecting the symbol within one minute.

Longer periods of inactivity require a restart of the connection process.

Session Timeout

Fig. 21-21 Session Timeout





- **Preparing the NivuFlow Mobile:**
 - Ensure power supply: a minimum of one completely charged rechargeable battery pack either plugged into the instrument or alternatively connected via the multifunction socket (see chapter "15.1.4 Alternative Power Supply"). The following step "Wake-Up" can be skipped as soon as the battery pack is inserted now or when voltage is fed and the connection is set up within the following five minutes.
 - "Waking up" NivuFlow Mobile: hold the accompanying magnet (solenoid, Fig. 21-22 pos. 2) to the reed contact (Fig. 21-22 pos. 1; on front side of NFM) until the LED is lit.



Fig. 21-22 Waking up the NivuFlow Mobile

- Steps on the display and operation module (smartphone, tablet, notebook, PC etc.):
 - 1. Start the display and operation module.
 - 2. Go to the list of available (WLAN) networks (Fig. 21-23 pos. 2).
 - 3. From the list select the NFM (Fig. 21-23 pos. 1) with the according SSID (default stat = serial no.).



Fig. 21-23 List of (WLAN) networks (example)

4. Enter the security key (password) (default state = PUK; example here fd671a105c5d) (Fig. 21-24 pos. 1) and connect.

Sicherheitstyp:	WPA2-Personal	•
/erschlüsselungstyp:	AES	•
Sicherheitsschlüssel	fd671a105c5d	

Fig. 21-24 Enter security key and connect (example)

5. Start the Internet browser.

Neuer	Tab	×	
\leftrightarrow \rightarrow	C	192.168.1.1	

Fig. 21-25 Address field (example)

6. Type "192.168.1.1" into the IP address field (Fig. 21-25) and open. The NivuFlow Mobile display (Fig. 21-26) is indicated as soon as the connection has been established successfully.





Fig. 21-26 NFM display in browser

 To create a browser favourite (for direct access) click the "Favourites" star (Fig. 21-27 pos. 1, example here Google Chrome) and confirm with "Finished" (Fig. 21-27 pos. 2).

			् 🗼	1
Leseze	eichen			hen
Name:	NIVUS NivuFlow			
Ordner:	Lesezeichenleiste	e	•	
	Entfernen	Bearbeiten	Fertig	

Fig. 21-27 Set up favourites (example)

The bookmark is shown in the bookmarks list (Fig. 21-28 pos. 1) and can be used for instant access without the need to specify the IP address.

This link can be used for each further NivuFlow Mobile transmitter after it has been selected from the WLAN list.



Fig. 21-28 Link in the bookmarks bar (example)

After five minutes of inactivity on the display and operation module the message "Session Timeout" (Fig. 21-29) is shown. Access can be restored instantly by selecting the symbol within

one minute.

Longer periods of inactivity require a restart of the connection process.

Session Timeout



Fig. 21-29 Session Timeout

22 Menu Operation/Overview

22.1 Display Overview

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

5





- 1 Menu / Back (depending on display view)
- 2 Display area 1 (output field 1)
- 3 Display area 2 (output field 2...5)
- 4 Display area 3 (graphic)
- 5 Name of measurement place
- 6 Possible error message, information or indication of active service mode (shown only once as separate window in the centre of the screen right after opening; close with "Ok")

Fig. 22-1 Display



22.2 Saving Parameters

After changing parameters and scrolling back in the menu pages the paths must be rearranged and the modified parameters must be saved for the modifications to take effect. Once saved the status message "Successful" (Fig. 22-2) is shown.



Fig. 22-2 "Rearrange Paths" and "Save Parameters"

For saving procedures see chapter "25.1 Save Parameters".

22.3 Menus

All menus are described in chapter "Parameter Setting" as logical programming sequence starting at page 61.

The main menu contains seven basic menus which can be viewed and selected either by choosing the "Menu" field (from the main screen) or "Back" (from within the submenus).

The menus are:

Application	Guides the commissioning personnel through the entire setting of parameters for the dimensions of measurement places, selection of
	sensors, analog/digital inputs and outputs and diagnostics
Data	 Graphic representation of historic data on flow rate, level and (average) flow velocity
	- Indication of 24-hour day totals as tables
	- Saving of data
	- Saving and loading of parameters
System	 Basic information (serial no., version, article no. etc.) on the trans- mitter (required by manufacturer in case of requests)
	 Language and date format settings under >Country Settings
	 System time and time zone settings under >Time/Date
	 Error messages under >Error Messages
	- Service levels
	- Configuration of storage cycle
	- Parameter/System Reset
	- Instrument shutdown (powerdown)
	- Information on batteries and the current capacity
Communication	Parameters for the configuration of NivuFlow Mobile communication
	interfaces
Display	Output fields settings (text, decimal places etc)
Battery	To choose the batteries/rechargeable used
Quick Start	Guided, quick parameter settings for simple measurement places



Start-Up Examples

23 Measurement with Clamp-On Sensors

23.1 General

Measurements with clamp-on sensors can be carried out very easy and with little effort. The sensors are installed on the outside of the pipe.

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

- Number of paths and path arrangement
- Medium to measure
- · Pipe circumference or inside pipe diameter or outside pipe diameter
- Wall thickness
- Wall material
- Inner lining material if available

The transmitter uses these settings to calculate the positions of the clamp-on sensors.

After the measurement place parameters have been set the sensor position data can be directly viewed on the display of the operation module.



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

23.2 Programming a 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 chapter "25 General Programming" starting at page 61. Chapter "28.1 Menu Measure Place" starting at page 72 describes how to set the measurement place parameters.

23.2.1 Simple Parameter Setting

Application Specifications:

- Stainless steel (steel)
- No inner lining
- No sediments in the pipe
- "diametrical \" path arrangement
- 1 path

Procedure:

- 1. Select "Menu" (top left).
- 2. Open >Application< menu.
- 3. Open >Measure Place< Menu.

- 4. Specify measurement place name and confirm with "Enter".
- 5. Select transit time mode >Clamp-On<.
- 6. Specify path arrangement ("diametrical \") and number of paths (1 path).







Hints on the Medium

If you cannot find your medium to measure within the list select "User defined". Another menu opens up which can be used to specify e. g. the speed of sound within the medium.

Tipp:

Various speeds of sound can be found in the Internet or contact the manufacturer.

- 7. Use the selection menu to specify the medium to measure and to select/specify the current medium temperature.
- 8. Set the channel profile to "Pipe". The graphics area indicates a pipe featuring four input fields.
- 9. Enter the pipe data (example: DN1000). Two specifications are sufficient to enter the pipe dimensions such as inside diameter and wall thickness in this example.





Fig. 23-2 Specifying pipe dimensions

As soon as inner diameter and wall thickness are specified the transmitter automatically adds outside diameter and pipe circumference. The same applies after circumference and wall thickness have been specified. The transmitter will add the rest of the parameters.

10.Select the wall material from the menu (stainless steel).

More specifications are not required – the following parameters (lining, sludge level, ...) remain to default state.

Once a relevant parameter in menus >Measure Place< or >v-Paths< has been changed it is necessary to re-initialise the path arrangements in order to recalculate path lengths and sensor positions.

Exit menu "Measure Place" menu to adjust the Measurement Path Settings.

 Go to >Application< menu. The following query appears on the display:

	+		
NIVUS1	it place		
Transit time mode	Clamp or	1	-
Path setup	Diametra	IX.	•
Path number		1	+
Medium			
Water			-
Temperature		15,0	°C
Channel profile			
chumier prome			
Pipe Measureme paths?	nt place para	meters change Yes	ed. Reorde
Pipe Pipe Pipe Pipe paths?	nt place para	meters change Yes	ed. Reorde No
Pipe Measureme paths?	nt place para	Yes	ed. Reorde No
Pipe Pipe Measureme paths?	nt place para	Yes	no m
Pipe Pipe Pipe Pipe Pipe Pipe Pipe Pipe	nt place para	Yes	ed. Reorde No
Valimetral Stainless steel		Yes	ed. Reorde No
Measureme paths? Measureme paths? Measureme paths? Measureme paths? Measureme paths? Measureme m		Yes	ed. Reorde No

2. Confirm modified parameters and path rearrangement. The display shows "Initialised!" after confirmation with >Yes<.

Sensor Selection and Specification of Mounting Angle procedures:

- 1. Select menu >v-Paths<.
- 2. Choose the sensor type used.
- 3. Enter the mounting angle $(+45^{\circ} \text{ or } -45^{\circ})$ and confirm.

		1
Туре		
NIC-CO01		•
Mounting angle	90,00	0
Distance along	0,811	m
Path length	2,136	m
v-Minimum	-10,000	m/s
v-Maximum	10.000	m/s
	10,000	
	TOURS	

Fig. 23-4 Enter the mounting angle (Clamp-On)

The >Distance along< field on the display indicates the distance between both sensors. The indicated distance is always the clearance between both sensors.

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

Once entered, all required measurement place Parameters need to be saved:

- 1. Use "Back" to exit the menus until >Save Parameters?< is shown on the display.
- 2. Confirm >YES<. The message "Successful!" appears.

NivuFlow Mobile goes to the main screen and continues operation using the newly saved parameters.

23.2.2 Extended Parameter Setting

More specifications:

- Pipe with inner lining
- Sedimentation within the pipe

For pipes with inner lining:

- **Procedure**:
 - 1. Execute steps 1 ("Menu" field, page 56) up to and including 10 ("Wall Material"; page 58) as described in chapter "23.2.1 Simple Parameter Setting".
 - Select the >Lining< material. The thickness of the lining is now included in the graphics area. The NivuFlow Mobile requires this extra value for calculations **including** the lining.



- 3. The lining thickness is indicated in the graphics area.
- If moreover there should be sedimentation within the pipe enter the according value in >Sludge Level< and confirm. The transmitter then will subtract this sludge level from the wetted hydraulic total area while calculating the flow rate.
- 5. To save your entries go "Back" and confirm the path modification/arrangement with >Yes<.
- Menu >v-Paths<: choose sensor and specify the mounting angle. Here you can read the >Distance along< and the >Path Length< values required to install the clamp-on sensors.

24 Measurement with wet Sensors

The setting of parameters for a measurement place using wet sensors is essentially in line with the parameter setting procedures used for clamp-on sensors.

When selecting the >Transit Time Mode<, consider that the >Path Arrangement< option provides more variations and >Distance across< is indicated additionally when viewing the mounting values.

Parameter Setting

25 General Programming

As a principle, modified parameters do not become effective before they have been saved. The instrument verifies whether parameters have been changed when you exit menus by using "Back". Finally, you will be prompted to eventually save modified parameters.

- >Yes<: modified parameters are accepted and saved.
- >No<: parameter modifications are rejected and the instrument will exit the menus.
- >Abort<: you will exit the prompt. Parameters remain to be modified, however will not become effective and will not be saved.



Tip to repeatedly measure the same measurement places

If certain measurement places are to be measured not only once, but again and again it is recommended to save the according parameter settings and readings (if required) on USB stick. This eliminates the need to readjust parameters for the next measurement at the respective measurement place by simply reloading the required data from the stick to the transmitter.

For more details see chapter "29.3 Data Memory" starting at page 91.

25.1 Save Parameters

Once all necessary (measurement place) parameters are specified, the data must be saved in order to become effective.

- Procedure (2 stages):
 - Select "Back": the message >Measurement Place Parameters modified. Reorder Paths?< is shown. Confirm with >Yes< *1.

The "Initialised!" message indicates successful initialisation.

*1 Initialise modified parameters (in current menu) with >Yes<; >No< will abort initialisation process, the last modified values remain active and the initialisation process (in current menu) can be continued; to actually abort initialisation select >No< if prompted >Save Parameters?< in the next step.

 Select "Back" twice: a window opens asking >Save Parameters?<. Confirm with >Yes< *².

The message "Successful!" indicates that the parameters have been saved.

*² >Yes< saves the new parameters; >No< will abort the saving process leaving the last modified parameters active again; >Abort< will abort the saving process, the last modified parameters remain active and the initialisation process can be continued.



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25.2 Change WLAN Password

The WLAN password is is set to an individually determined ID **per default**. This ID can be found on a label on the top of the instrument (inside of the enclosure).

The default password can be changed as described below. The new password must have between 8 and 32 characters.

Procedure:

- 1. Open the main menu with "Menu".
- 2. Open >Communication<.
- 3. Open the >WLAN< menu.
- 4. Select >Password<.
- 5. Enter the new password and confirm.

Up to four users may have access to transmitter and parameters simultaneously via WLAN. Simultaneous access will not be indicated or logged.

Necessarily observe to agree parameter changes in order to avoid several users accessing the parameters at the same time. Always the latest saving process applies.

Important Note

Never give the password to unauthorised persons! If you need to note down the password always keep it in a safe place.

25.3 Change Instrument SSID

The SSID is set to the serial number of the instrument **per default**. The serial number can be found on the nameplate on the side of the enclosure.

The default SSID can be changed as described below. A new SSID must have between 8 and 32 characters.

- Procedure:
 - 1. Open main menu via "Menu".
 - 2. Open >Communication< menu.
 - 3. Open >WLAN< menu.
 - 4. Select >SSID< field.
 - 5. Enter new name and confirm.

25.4 Lost Password

Each NivuFlow Mobile is shipped with an individual PUK ("Personal Unblocking Key" or Super-PIN) which permits to create a new password and to reactivate the instrument.

The PUK is identical to the default WLAN password and can be found on a label attached on the transmitter top (inside of enclosure).

- Procedure:
 - 1. Open cover.
 - 2. Loosen hexagon socket screws of battery compartment cover and remove the cover.
 - 3. Remove the rechargeable batteries.
 - Hold the magnet to the reed contact and plug a battery simultaneously. The magnet must be held to the reed contact for at least 15 seconds until the LED

flashes red several times. The NivuFlow Mobile is "woken up".

- 5. The WLAN list indicates the NFM with the default SSID (identical to the serial no. of the according instrument as specified on the nameplate).
- 6. Enter the default PUK as password.
- 7. Enter new password and, if required, SSID according to chapters "25.2 Change WLAN Password" and "25.3 Change Instrument SSID".
- 8. To accept the new password/the new SSID reinitialise the instrument by removing and reinserting the rechargeable batteries.
- Activate the NFM within the next five minutes. Otherwise the modified password will not be accepted, the instrument will continue to use the default ID and will only respond to the default password.
- 10.Insert second battery if required.
- 11. Refit the battery compartment cover using the hexagon socket screws and close the cover.

25.5 Automatic Data Transmission to USB Stick

In standard situations data stored in the NivuFlow Mobile are transmitted to the display and operation module via WLAN.

See chapter "25.1 Save Parameters".

If, in exceptional cases, this should not be possible e. g. due to the lack of WLAN, display and operation module malfunction or empty batteries, it is possible to read out the data memory automatically by using a plugged USB stick.

- Procedure:
 - 1. Open enclosure.
 - 2. Plug USB stick.
 - "Wake up" the NivuFlow Mobile with the magnet (solenoid). The transmitter automatically transmits the entire content of the measurement data memory to the plugged USB stick as soon as no WLAN connection is available within 10 minutes. The status LED on the transmitter flashes green during transmission.
 - 4. Data transmission is finished once the status LED has stopped flashing. The USB stick can then be removed.



26 Parameter Setting using Quick Start

This menu allows easy setting of parameters for elementary measurement places with the aid of default settings for various parameters.

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The >Quick Start< menu is described in greater detail in chapters "27.2.1 Menu - Application" and "25 General Programming".

Procedure:

- 1. Open main menu.
- Select >Quick Start< menu. The query >Create new Measurement Place?< appears.



Fig. 26-1 Quick Start with query

 Choosing >No< opens the >Region Settings< page of the >Quick Start< menu. Choosing >Yes< will ask >Sure? Old parameters and archived data will be erased!<. Selecting >Yes< here will erase the old parameters and archived data and indicates "Successful!" once the procedure is completed. >No< erases nothing and opens the >Region Settings< page.



Fig. 26-2 Confirmation prompt "Erasing Parameters and Data"

4. On page >Region Settings< set the language, the date format, the required units and the storage mode (operating mode and storage cycle).

Back	Quickstart	
/4 - Region settings		< >
Language		
🔀 English		*
Date format	dd.mm.yyyy	
🛨 Units		
+ Data units		
storage mode		
Operating mode	Continuous operation	•
Storage cycle	2 min	-

Fig. 26-3 >Country Settings< menu

- 5. Use the arrow keys to go to the next page >Measure Place<.
- 6. Set the measurement place parameters: specify name, transit time mode, path arrangement, number of paths, medium, temperature (of medium), channel profile including dimensions, wall material and lining if available.



Duck	Quickstart	-	Back	Quickstart
- Measure place	<	: >	1/3 - Region setti	ngs
lame of measurement	t place		Language	
NIVUS1			🔀 English	
Transit time mode	Clamp on	-	Date format	dd.mm.yyyy
Path setup	Diametral \	•	+ Units	
Path number	· 2	+	+ Data units	
Medium				
Water		-	storage mode	
Temperature	15,0	°C	Operating mode	Continuous operation
Channel profile			Storage cycle	2 min
Pipe		-	Courses	
<	4,712 m			Yes No Ca
→ 0,050 m	4,712 m	n		Yes No Ca
0,050 m Wall material	4,712 m	n		Yes No Ca
0.050 m Wall material Stainless steel	4,712 m	n		Yes No Ca
Vall material Stainless steel	4,712 m x	n -		Yes No Ca

Fig. 26-4 >Measure Place< menu

7. Use the arrow keys to go to the next page. You will be prompted to save parameters.

Choosing >Yes< confirms the saving process to be "Successful!". Selecting "OK" opens the next page >v-Path 1<.

>No< will not save anything and takes you to the next page >v-Path 1<. Choosing >Abort< remains the current page >Measure Place< open enabling to continue the setting of parameters here.

Page >v-Path 1< (in case of two paths there is also page >v-Path 2<) is a readonly page. Here the mounting data of the flow velocity sensors as well as the signal strength can be viewed.



Fig. 26-5 >v-Path 1< menu

- 8. Use "Back" to return to the main menu.
- 9. Use "Back" once more to go to the main screen.

27 Parameter Functions

27.1 Main Menu

The NivuFlow Mobile 600 parameters can be set using a total of seven menus which are described in greater detail starting with chapter "25 General Programming". The main menu indicates seven icons containing the functions described in the following chapters:



Fig. 27-1 Overview Main Menu

27.2 Functions of the first Menu Level

27.2.1 Menu - Application



Fig. 27-2 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 menu includes diagnostic options for:

- Sensors
- Inputs and Outputs
- Total 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

27.2.2 Menu - Data

₽	$(\mathbf{\Sigma})$	QVhT
Trend	Day totals	Data storage

Fig. 27-3 Menu Data

The data menu contains all internal stored measurement values. Following functions are available:

- Graphic representation of measurement values
- List of the 100 latest 24h day totals
- Communication and transmitting option of internal data
- Transfer of adjusted parameters to and from USB stick
- Options to set and to erase the internal data memory

27.2.3 Menu - System



Fig. 27-4 Menu System

This menu contains information on the transmitter:

- Firmware version
- Article number
- Serial number
- Information on battery voltage and credits/licenses

The following settings can be adjusted additionally:

- Language
- Units
- Date and time correction
- Read active error messages
- Erase error memory
- Configure storage cycle
- Parameter/system reset
- Instrument shutdown (Powerdown)



27.2.4 Menu - Communication

	Ľ
WLAN	
WLAN	

Fig. 27-5 Menu Communication

This menu includes settings required for communication with other systems:

• WLAN

27.2.5 Menu - Display

Back		Display	
+ Out	put field 1		
+ Out	put field 2		
+ Out	put field 3		
+ Out	put field 4		
+ Out	put field 5		

Fig. 27-6 Menu Display

This menu defines the five display fields of the main screen.

27.2.6 Menu - Battery (12V)

Back	Battery (12V)			
Battery (12V)		12,28	V	
Battery type				
2 x NFM0 ZAP	8 1215			

Fig. 27-7 Menu Battery (12V)

This menu is used to choose type and number of the batteries used.



Correct Capacity Indication

The capacity indication in the >System< / >Information< menu works reliably only as long as completely charged batteries are used and the type and number of the batteries used are specified here.

27.2.7 Menu – Quick Start



Fig. 27-8 Menu Quick Start 1...3/4

This menu allows easy setting of parameters for elementary measurement places with the aid of default settings for various parameters.

Depending on the number of paths the >Quick Start< menu includes either three or four pages. Page 1 >Region Settings<



- Page 2 >Measure Place<
- Page 3 >v-Path 1<
- Page 4 >v-Path 2< (if available)

28 Application Parameters Menu





The following sections describe the general parameter setting procedures.

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

Due to this, both submenus will be described separately.

28.1 Menu Measure Place

The >Measure Place< submenu is one of the most relevant basic menus when it comes to setting parameters. The parameter set of a measurement place contains basic settings for:

- Name of measurement place
- Transit time mode
- Arrangement and number of paths
- Measurement medium and medium temperature
- Type and dimensions of channel profile
- Pipe material (incl. lining)
- Possible solid sediments settings (sludge level)
- Low-flow suppression
- Measurement damping and stability
28.1.1 Name of Measurement Place

This is where you can set the name of the measurement place. **Default setting**: "NIVUS1".

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

Type the desired name of the measurement place into the text field and confirm with "Enter". The name will be accepted and is shown in the main screen.

28.1.2 Transit Time Mode

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

- Clamp-On (sensors attached from the outside)
- Wet (installed sensors with direct medium contact)

The appearance of the following menus will vary depending on your choice. In such a case both versions are described in the according section of the respective instruction manual.

Path Arrangement in >Clamp-On< Mode

Clamp-on measurements are set up diametrical. The most common variants are measurements in diagonal direction ("diametrical \") or as V-Echo ("diametrical V") (Fig. 28-3).



Fig. 28-2 1-Path measurement, path arrangement: "diametrical V"

Select from:

- Diametrical \
- Diametrical V
- Diametrical VV

Path Arrangement in >Wet< Mode

Measurements with wet sensors can be set up either diametrical or chordal. Select from:

- Diametrical \
- Diametrical V
- Diametrical VV
- Chordal \
- Chordal V
- Chordal VV
- Chordal X



28.1.3 Number of Paths

In general, the number of paths for NivuFlow Mobile is limited to 2. Set the number of paths by using "+" and "-". The number is shown in the text field between both symbols.

28.1.4 Medium

Select between "Water" and "User defined". The "Water" option features fixed properties, while "User defined" requires to specify medium properties such as speed of sound, start, particle entrainment, damping and density when setting parameters.

Transit time mode			
manant time mode	Clamp o	n	-
Path setup	Diametra	al \	•
Path number	-	1	+
Medium			
User defined			*
 Medium 			
Sound velocity	_		_
Entries	-	11	+
	Table		
Attenuation		0,025	dB/m
Density		0,998	g/cm3
Temperature		15,0	°C
Channel profile			
Pipe			*

Fig. 28-3 Selecting the measurement medium



Selecting the measurement medium

Choose "User defined" if your medium to measure is not in the list.

This action opens another menu point where you need to specify e. g. the speed of sound within the medium.

Tip:

Lists providing various speeds of sound can be found in the Internet or from the manufacturer.

28.1.5 Medium Temperature

The medium temperature is required to compute the sensor distance and must be specified as accurate as possible.

28.1.6 Channel Profiles

The NivuFlow Mobile with clamp-on measurement permits to select between "Pipe" and "Rectangular". "Pipe" is circular, not elliptic.

The selected profile is indicated as a graph in the preview field. The graphic representation, however, does not coincide with the dimensions (in relation) specified. There is **no visual control** available.

Select Profile.

The dimensional values are entered as soon as the profile has been chosen. The unit is set to meter [m] per default. This can be changed in the >System< / >Region Settings< / >Units< / >Level< menu (Fig. 28-4).



Fig. 28-4 Setting the units

Entering the channel dimensions

For **pipes** it is sufficient to enter two values to specify the pipe dimensions:

- Pipe circumference or inside/outside diameter
- Wall thickness

Entering inside diameter and the wall thickness causes the transmitter to add outside diameter and pipe circumference automatically. The same applies once 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 includes the material thickness with the calculation and uses it to compute the correct inside diameter.

For **rectangular profiles** width, height and wall thickness are required. If the channel is equipped with a lining the thickness of the lining needs to be specified too.



28.1.7 Wall Material

Different pipe materials feature varying properties regarding the speed of sound.

The most usual pipe materials can be found in the selection menu.

Considering this selection as well as the specified measurement medium the transmitter computes the sound transit time required for the measurement.



Selecting the wall material

If you cannot find the material of the pipe at the measurement place in the list select "User defined". This action opens up another menu point which prompts you to specify e. g. the speed of sound of the pipe material.

Tip:

When it comes to determine the speed of sound within the pipe material contact the pipeline manufacturer.

28.1.8 Lining

In practice, cases occasionally arise in which pipelines are equipped inner linings. The most usual lining materials can be found in the selection menu.

Considering this selection as well as the specified measurement medium the transmitter computes the sound transit time required for the measurement.



Selecting the lining material

If you cannot find the lining material in the list select "User defined" and contact the pipeline manufacturer for details on the speed of sound within the lining material.

28.1.9 Sludge Level

Depending on measurement medium and flow velocity horizontal pipelines may tend to sedimentation on the pipe bottom.

The "Sludge Level" parameter permits to specify a certain sedimentation level within the pipe. The sedimentation is then considered as non-moving partial area on the channel bottom with horizontal surface. Prior to computing the flow rate this level height is subtracted from the wetted hydraulic total area.

28.1.10 Low-Flow Suppression

This parameter is used to suppress lowest movements or apparent flow rates. The main area of use is the measurement of discharge volumes in permanently filled constructions.

Check >Active< and enter the desired value in >Q suppressed< or >v suppressed<.</p>

The low-flow suppression disregards the detection of very low flow velocity fluctuations.

>Q suppressed

Enter the flow rate as positive value.

Negative values are not possible. The specified value is considered as absolute value and is effective in both positive and negative directions. The measurement system will automatically reset the readings to "0" if the values should be lower than the value specified here.

>v suppressed

This parameter permits to suppress apparent flow rates in applications featuring large profiles and high levels. Very low velocity fluctuations may cause heavy apparent flow rate fluctuations over a long period which cannot be suppressed using the >Q sup-

pressed< function. The measurement system will automatically reset the readings to "0" should the flow velocities be lower than the value specified here.

This will set also the calculated volume to "0".

Only positive values can be entered here. The specified value is considered as absolute value and is effective for both positive as well as for negative velocities.

28.1.11 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. It is not possible to select individual values and to damp single values in different ways.

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.

Input the value in steps of one second.

Factory default: 30 s

28.1.12 Stability

The stability parameter defines the period the transmitter bridges values without having valid measurement events (e. g. in case of invalid flow velocity readings) available. During this period the NivuFlow Mobile 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.

Input the value in steps of one second.

Factory default: 30 s



28.2 Menu v-Paths

The specifications in this menu point refer to the channel as defined in the >Measure Place< menu.

Moreover, this menu permits to enter some specifications required to calculate the sensor positions. In this menu the NivuFlow Mobile shows the sensor mounting distances after the specifications are completed.

The >v-Paths< menu provides tabs for the v-paths 1 and 2 on the top right.

The basic structure applies for all menus, the indicated sensors and values, however, may vary depending on the application.

28.2.1 Sensor Types in >Clamp-On< Transit Time Mode

The same selection of sensors (Fig. 28-5) is available for both v-paths. Select from >Automatic Detection<, >NIC-CO01< and >User defined<.



Fig. 28-5 Sensor Selection Menu

Select Sensor Type:

- >NIC-CO01<: The values for the sensor itself are pre-set and cannot be selected or changed.
- >Automatic Detection<: The NivuFlow Mobile detects the values without the need to previously select the sensor type; mandatory requirement here is the use of NIVUS sensors however.
- >User defined<: The values for >Angle<, >Frequency<, >Offset< and >Coupling Wedge Speed of Sound< must be specified.

Factory default: Automatic Detection

28.2.2 Sensor Types in >Wet< Transit Time Mode

The same selection of sensors (Fig. 28-6) is available for both v-paths. Select from >NIS-V200R< and >User defined<.

ype User defined ♥ Sensor Mounting angle 90,00 * Jistance across 1,000 m histance along ~,~ m ath length 1,000 m/s NIS-V200R User defined 1000 m/s	Back V-I	Path 1	
yye User defined			1
User defined ♥	Туре		
Acounting angle Social Sensor Acounting angle Social Sensor Acounting angle Social Sensor State elong -Minimum -Minimum -Maximum Uppe User defined	User defined		•
Adounting angle 90,00 ** Distance along	+ Sensor		
Distance across 1,000 m Distance along m hath length 1,000 m/s -Maximum 710,000 m/s NIS-V200R User defined	Mounting angle	90,00	*
histance along	Distance across	1,000	m
Atah length 1.000 m/s -Maximum -10.000 m/s NIS-V200R User defined	Distance along		m
-Minimum -10.000 m/s -Maximum Type 1000 m/s NIS-V200R User defined	Path length	1,000	m
-Maximum Type),000 m/s NIS-V200R User defined	v-Minimum	-10,000	m/s
User defined	v-Maximum NIS-V2	Type),000 200R	m/s
	User d	efined	

Fig. 28-6 Sensor Selection Menu

- Select Sensor Type:
 - >NIS-V200R<: The values for the NIS-V200RL0 sensor itself are pre-set and cannot be selected or changed.
 - >User defined<: The values for >Angle<, >Frequency<, >Offset< must be specified.

Factory default: NIS-V200R

28.2.3 Sensor Mounting Position

Mounting Angle, Distances and Path Length



Hints on the Mounting Angle

In horizontal pipelines do not use pipe bottom or pipe crown as mounting places (risk of soiling, air bubbles).

NIVUS recommends a mounting angle of 45°.

Set the angle in which the sensors are clamped onto or installed into the pipe here. The mounting angle must be specified for each path separately, all paths, however, must have the same mounting angle.



Procedure to set the Sensor Parameters:

1. Enter the >Mounting Angle<.

In combination with the measurement place parameters entered so far the transmitter calculates >Distance along< or >Distance across< and the >Path Length<. These values are read-only values and can be used for sensor fastening. The >Distance along< parameter is the clear distance between both sensors.



2. Specify >Weighting< and >Hydraulic Factor< if required. The default setting is 100 % or 96 %.

By modifying the >Weighting< value the involved paths can be weighted and prioritised differently.

By modifying the >Hydraulic Factor< it is possible to include particular hydraulic conditions prevailing at the measurement place (e. g. to calibrate a measurement place). Upon request NIVUS provides technical support.

3. Repeat the previous steps for path 2 in line with path 1.

28.2.4 v-Minimum and v-Maximum

The >v-Minimum< and >v-Maximum< settings define the limit values for the velocity measurement. The transmitter ignores occasional higher and lower velocities which hence will not be shown. Permanently measured deviations are indicated as "0". Only the next realistic readings will be indicated correctly.

Values within a range of -15 to +15 m/s can be set.

Default setting:

- • v-Minimum: -10 m/s
- • v-Maximum: 10 m/s

28.3 Menu Inputs/Outputs (analog and digital)

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 >Inputs/Outputs< Menu from >Main Menu< / >Application<.</p>

The inputs/outputs menu is subdivided into four parts:

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



Fig. 28-7 Inputs/Outputs Menu



28.3.1 Analog Inputs

The transmitter is equipped with three analog inputs. The inputs are indicated in the top right display corner from where they can be selected individually. The selected analog input is highlighted and the clear name is indicated in the headline.

Default setting: Input not active

Alternatively, the transmitter can be used as an extra data logger for measurement values from external systems or for supply of analog sensors. This, however, does not influence the instrument's capabilities as flow meter.

		1	2 3
Туре			
External reading			
Input range	4-20 mA		
Unit	pH		
Linearisation	2-Point		-
Value at 4 mA		0,0000	pН
Value at 20 mA		1,0000	pH

Fig. 28-8 Analog input as external reading

The values below must be chosen/entered in >External Reading<.

 Selection/Input Options: Input Range: >0-20 mA< or >4-20 mA< Unit: manual input Linearisation: >2-Point< or >Table< For >2-Point< linearisation: manual input of values for 4 or 20 mA. For >Table< linearisation: manual input of the number of >Entries<, then select >Table<, complete and confirm.

28.3.2 Analog Outputs

The transmitter is equipped with one analog output 0-10 V. **Default setting:** output not active

The following different functions can be assigned to the analog output.



Fig. 28-9 Analog output activation

Flow

The application flow rate (calculated from average flow velocity and wetted cross section) is available on the selected analog output.

• Selection/Input Options:

Output range:	>0-5 V< or >0-10 V<
Value at 0 V:	manual input
Value at 10 V:	manual input
Value at error:	>0 V< or >Hold value< or >10 V<

Flow Velocity

The calculated average flow velocity (calculated even from two or three sensors) used to compute the current flow rate is available on the selected analog output.

Selection/Input Options:

•	
Output range:	>0-5 V< or >0-10 V<
Value at 0 V:	manual input
Value at 10 V:	manual input
Value at error:	>0 V< or >Hold value< or >10 V<

Water Temperature

The medium temperature calculated based on the transit times is available on the selected analog output.

Selection/Input Options:

Output range:	>0-5 V< or >0-10 V<
Value at 0 V:	manual input
Value at 10 V:	manual input
Value at error:	>0 V< or >Hold value< or >10 V<



External Reading

Possibly linearised measurement values available at the analog input are available here.

Selection/Input Options:

•
>Input 1< or >Input 2< or >Input 3<
>0-5 V< or >0-10V<
manual input
>0 V< or >Hold value< or >10 V<

Path Velocity

If more than one flow velocity sensor is used and if the average flow velocity of the individual measurement paths is to be determined it is possible to select the desired flow velocity sensor and to output the according measurement value.

Selection/Input Options:

v-Path:	>Path 1< or >Path 2< depending on the number of connected
	paths
Output range:	>0-5 V< or >0-10 V<
Value at 0 V:	manual input
Value at 10 V:	manual input
Value at error:	>0 V< or >Hold value< or >10 V<

28.3.3 Digital Inputs

The transmitter is equipped with one digital input. **Factory default:** Input not active

The following different functions can be assigned to the digital input.



Fig. 28-10 Digital input activation

Run Times

The system detects and saves the duration of the ongoing signal at the digital input. Such records are used to gather information e. g. on pump run times or other equipment run times.

 Selection/Input Options: Logic: >not inverted< or >inverted<

Impulse Counter

The system counts and saves the number of ongoing signals at the digital input. The counter simply counts the status changes detected at the digital input (1->0 or 0->1).

 Selection/Input Options: Edge: >rising< (status change from "0" to "1") or >falling< (status change from "1" to "0")

28.3.4 Digital Outputs

The transmitter is equipped with one digital output. **Factory default:** Output not active

The following different functions can be assigned to the digital output.



Fig. 28-11 Digital output activation

Sum Impulses

Output of flow-proportional sum impulses.

 Selection/Input Options: Logic: >Normally open< or >Normally closed<
 Negative sum impulses: check box Quantity: manual input
 Duration: manual input

Limit Contact Flow

Exceeding the >Threshold on< value will output a digital signal, falling below >Threshold off< will reset the digital signal = hysteresis function to avoid output flutter.

Selection/Input Options:		
Logic:	>Normally open< or >Normally closed<	
Threshold on:	manual input	
Threshold off:	manual input	
Value at error:	>Off< or >On< or >Hold Value<	
	Selection/Input C Logic: Threshold on: Threshold off: Value at error:	



Limit Contact Velocity

Exceeding the >Threshold on< value will output a digital signal, falling below >Threshold off< will reset the digital signal = hysteresis function to avoid output flutter. The calculated average flow velocity (calculated even from multiple paths) is used.

Selection/Input Options:

Logic:	>Normally open< or >Normally closed<
Threshold on:	manual input
Threshold off:	manual input
Value at error:	>Off< or >On< or >Hold Value<

Limit Contact Water Temperature

Exceeding the >Threshold on< value will output a digital signal, falling below >Threshold off< will reset the digital signal = hysteresis function to avoid output flutter.

Selection/Input Options:

Logic:	>Normally open< or >Normally closed<
Threshold on:	manual input
Threshold off:	manual input
Value at error:	>Off< or >On< or >Hold Value<

Limit Contact External Reading

Exceeding the >Threshold on< value will output a digital signal, falling below >Threshold off< will reset the digital signal = hysteresis function to avoid output flutter.

Selection/Input Options:

Logic:	>Normally open< or >Normally closed
Analog input:	>Input 1< or >Input 2< or >Input 3<
Threshold on:	manual input
Threshold off:	manual input
Value at error:	>Off< or >On< or >Hold Value<

• Error Message

By activating individual selection fields (check box) it is possible to assign individual error types to the digital output. Moreover the output logic can be switched between normally open and normally closed.

Selection/Input O	ptions:
Logic:	>Normally open< or >Normally closed<
v-Measurement:	Check box
h-Measurement:	Check box
T-Measurement:	Check box
External value:	Check box
System:	Check box

28.4 Diagnostics Menu

The "Diagnostics" menu is described separately in greater detail in the "Diagnostics" chapter starting at page 108 of the instruction manual.

29 Parameter Menu Data



Fig. 29-1 Data Menu

29.1 Trend

The Trend graph is a representational recorder function. Choosing the trend graph provides access to current and previously saved (historic) measurement data.



- 1 Date/Time selection
- 2 Indication period
- 3 Automatic scaling max. range
- 4 Display with grid lines
- 5 Date/Time line (selected point in time)
- 6 Automatic zero point scaling
- 7 Browse (next/back)

Fig. 29-2 Trend Graph Details



Current Measurement Data

O Procedure to view current measurement data:

- 1. Select the desired range (Indication period; Fig. 29-2 pos. 2). The selected range will be indicated. The measurement data will not be automatically updated during indication.
- 2. Use the arrows (Fig. 29-2 pos. 7) to browse next or back if required leaving the basic display settings unaltered.
- 3. Use "Back" to go back to the main screen.

Selecting Time/Date

Opening the Trend menu shows the current date and time. If you wish to view historic readings/a particular point in time select the desired period from the Date/time selection screen (Fig. 29-2 pos. 1). Here the selection mask below opens up (Fig. 29-3). The readings are indicated (depending on the period set) in the subsequent screen once a start date is selected.



Fig. 29-3 Selecting Time/Date

Range (Indication Period)

The range selection determines the period to indicate on the screen.

Selection	Representation on th	ne display	
	Left Margin	Right Margin	Grid Lines
Hour	0 minutes	59 minutes	15 minutes each
4 Hours	0/4/8/12/16/20	4 hours later	1 hour each
	o'clock, depending		
	on the time set		
Day	0 o'clock	24 o'clock	4 hours each
Week	Monday, 0 o'clock	Sunday, 24 o'clock	1 day each
4 Weeks	Monday, 0 o'clock	4 weeks later,	1 week each;
		Sunday, 24 o'clock	start reference time:
			29.12.1969,
			0 o'clock

29.2 Day Totals

The table below shows the flow rate totals taken in the last 24 hours.

Bac	:k	Day totals
Jpd	ate (Time)	00:00
urr	ent	-774,729 m
	Date	Total
1	21.08.2017 00:00:00	0,000 m ³
2	20.08.2017 00:00:00	0,000 m ³
3	19.08.2017 00:00:00	0,000 m³
4	18.08.2017 00:00:00	0,000 m ³
5	17.08.2017 00:00:00	0,000 m ³
6	16.08.2017 00:00:00	0,000 m ³
7	15.08.2017 00:00:00	0,000 m ⁴
8	14.08.2017 00:00:00	0,000 m ³
9	13.08.2017 00:00:00	0,000 m ³
10	12.08.2017 00:00:00	0,000 m ³
11	11.08.2017 00:00:00	0,000 m ⁴
12	10.08.2017 00:00:00	0,000 m ^a
13	09.08.2017 00:00:00	0,000 m ^a
14	08.08.2017 00:00:00	0,000 m ³
15	07.08.2017 00:00:00	0,000 m ³
16	06.08.2017 00:00:00	0,000 m ³
17	05.08.2017 00:00:00	0,000 m ³
18	04.08.2017 00:00:00	0,000 m ³
19	03.08.2017 00:00:00	0,000 m ³
	02 00 0017 00 00 00	0.000

Fig. 29-4 Selection Day Totals

Up to 100 totals (= 100 days) are saved. Starting with the 101st value the oldest value will be overwritten (ring memory).

A **prerequisite** to indicate older values is that the instrument has been running for a longer period.

Example: 98 values – the unit has completed 98 totalising processes, so it must be running for at least 98 days.

In general, only day totals can be viewed which have been created while the instrument was actually in operation.

As soon as the NivuFlow Mobile is shut down between two totalising events (< 24 hours) the transmitter creates a total using **measured** values. Such totals are **not equal to the actual day total** but reflect the total measured by the transmitter while being in operation.

As soon as the transmitter is shut down before the next totalising event and remains to be off until the next totalising (> 24 hours) no totals will be created for this period (Fig. 29-5 pos. 2). No data will be stored and no name will be created for this period. This "gap" can be identified from the completely missing entry (date/values) within the listed sequence. **No empty lines** will be created.





- 4 Total Day 4: Total covering 24 hours
- 5 Power failure
- 6 Power available again

Fig. 29-5 Totalising scheme

- Per **default** the **totalising period** is between 00:00 o'clock and 24:00 o'clock. This means that day totals are always created between 00:00 o'clock and 24:00 o'clock.
- The default totalising time is at 00:00 o'clock.

The totalising time can be modified using >Update (Time)< (Fig. 29-6). Once modified the totalising will start at the time set and stops 24 hours later.



Fig. 29-6 Updating the totalising time

The value shown in >Current< is the subtotal since the last totalising.

29.3 Data Memory

Image: Day totals Image: Data storage Save data from 26.07.2017 11:46 to 21.08.2017 15:40 File format csv Image: Data storage Data dopth Standard Image: Data storage Data dopth Standard Image: Data storage Data dopth Standard Image: Data storage Download Delete storage Load parameters Save parameters	Back	Data		Back	Data storage
Trend Day totals Data storage Trend Day totals Data storage Data depth Standard Compress Save data to USB Download Delete storage Load parameters Save parameters Save parameters			QvbT	Save data from	26.07.2017 11:46
Trend Day totals Data storage File format Cov Compress Compress Save data to USB Download Delete storage Cad parameters Save parameters Save parameters		4		to	21 08 2017 15:40
Data depth Standard ▼ Compress Save data to USB Download Delete storage Load parameters Save parameters	Trend	Day totals	Data storage	File format	
Compress Save data to USB Download Delete storage Load parameters Save parameters				Data denth	Standard
Compress Save data to USB Download Delete storage Load parameters Save parameters				Data depth	Stanuaru
Save data to USB Download Delete storage Load parameters Save parameters				Compress	
Download Delete storage Load parameters Save parameters					Save data to USB
Delete storage Load parameters Save parameters					Download
Load parameters Save parameters	Delete s		Delete storage		
Save parameters					Load parameters
					Save parameters

Fig. 29-7 Data Memory Menu

The NivuFlow has an internal data memory (max. 182.398 measurement cycles, more cycles will start overwriting). It is possible to transfer either portions of your data or all saved readings to an USB stick.

USB Stick Requirements

- Supports USB 2.0
- FAT 32 (or FAT 12 or FAT 16) formatted
- Max. permissible capacity 32 GB

21.08.2017 15:40 csv ts depth standard 5200 data to USS 5200 data to USS 24. 5. 2015 09: 44 25. 6. 2016 10: 45 26. 7. 2017 11: 46 26. 7. 2017 11: 46 27. 8. 2018 12: 47 28. 0 2019 32: 49 Input Cancel	om			26.07.2017 11:46				
c format ta depth standard mpress Save data to USS from 24. 5. 2015 09: 44 25. 6. 2016 10: 45 26. 7. 2017 11: 46 27. 8. 2018 12: 47 28. 0 2019 13: 49 Input Cancel	to File format			21.08.2017 15:40				
ta depth mpress Save data to USS				csv				
mpress Save data to USS 700 24. 5. 2015 09: 44 25. 6. 2016 10: 45 26. 7. 2017 11: 46 27. 8. 2018 12: 47 28. 9. 2019 12: 48 Input Cancel	ata dep	oth		Standard				
Save data to USS from r 24. 5. 2015 09: 44 25. 6. 2016 10: 45 26. 7. 2017 11: 46 27. 8. 2018 12: 47 28. 9. 2019 12: 48 Input Cancel	ompres	is					(
from 24. 5. 2015 09: 44 25. 6. 2016 10: 45 26. 7. 2017 11: 46 27. 8. 2018 12: 47 28. 9. 2019 12: 48 Input Cancel			9	Save data to	USB			
24. 5. 2015 09: 44 25. 6. 2016 10: 45 26. 7. 2017 11: 46 27. 8. 2018 12: 47 28. 9. 2019 12: 48 Input Cancel				from	-	-		
25. 6. 2016 10: 45 26. 7. 2017 11: 46 27. 8. 2018 12: 47 28. 9. 2019 12: 48 Input Cancel		24.	5,	2015	09;	44		
26. 7. 2017 11: 46 27. 8. 2018 12: 47 28. 9. 2019 13: 48 Input Cancel		25.	6.	2016	10:	45		
27. 8. 2018 12: 47 28. 9. 2019 13: 48 Input Cancel		26.	7.	2017	11:	46	-	
28. 9. 2019 13: 48 Input Cancel		27.	8.	2018	12:	47	-	
Input Cancel		28.	9.	2019	13:	48		
				Inpu	1	Cancel		
		-	-	-	-	-		

Fig. 29-8 Specify Start/End time

>from< / >to

This section allows you to determine the desired transmission period. Define the period in some kind of calender (Fig. 29-8).

Per default the transmitter is set as to transmit the data containing the period



between the latest previous transmission and the current time.

File Format<

>csv< or >txt<

>Data Depth

Data depth is subdivided into four sections:

>Standard<</p>

This is the appropriate format for the most applications and hence is the factory default setting.

- The saved data sets contain the following information:
- Date and time
- Totaliser
- Calculated flow rate
- Average flow velocity
- Water temperature

- Current values as well as the accordingly calculated values of enabled analog and digital inputs

- Battery voltage
- NFM power consumption

>Extended<

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

The saved data sets contain the following information:

- Date and time
- Totaliser
- Calculated flow rate
- Average flow velocity
- Water temperature

- Current values as well as the accordingly calculated values of enabled analog and digital inputs

- Average flow velocities of v-Paths 1 and 2 (if used)
- >Expert<</p>

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

>Day Totals<</p>

This option saves only the day totals, no individual values.

>Compress

This function is useful to transmit large data sets. In this case the selected files are zipped as ".gz" files. The files can be unzipped by using the free "7-ZIP" software application.

>Save Data to USB

This function permits to save measurement data covering a previously determined period to USB stick.

>Download

Use this Function to save measurement data covering a previously determined period to the operating unit (smartphone, tablet, notebook etc.).

>Delete Storage

This function can be used to completely erase the internal data memory. Selecting this option will prompt you to confirm. After confirmation with >Yes< the data will be erased, >No< will abort the process.

>Load Parameters<

Use this function to load a parameter files previously saved to USB stick or the operating module back to the transmitter again.

>Save Parameters

The measurement place parameter sets can be saved to USB stick here. Only two files with the formats below will be created and saved:

XXXX_DOC_AABBCCDDEE.pdf

This file is for documentation purposes and contains basic settings as well as parameter changes.

XXXX_PAR_AABBCCDDEE.xml

This file contains the entire transmitter parameter settings and is used as backup of the current parameter settings.

Remarks on file names:

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



30 System Parameter Menu

30.1 Information



Fig. 30-1 System Information Menu

>Information< is a read-only menu and provides the instrument information below:

- Serial No. and Article No.
- MAC address
- Firmware version of the transmitter
- Data on boot loader and WLAN version
- Date of the latest software update (firmware) and the last storage of the parameter sets
- Current battery charging status (when using two batteries the battery with the higher capacity is used until the capacity of both batteries has reached the same level; after that both batteries are discharged equally)
- Information on credits and licenses

30.2 Region Settings

The following settings can be configured here:

- (Operation) Language
- Date format
- Units for measurement values Here it is possible to distinct between stored and displayed measurement values.



Fig. 30-2 Region Settings - Language – Date Format

30.2.1 (Operation) Language

All listed languages (Fig. 30-2) either contain wordings in the according language or alternatively in English.

30.2.2 Date Format

The date formats below can be set:

- DD.MM.YYYY (Day/Month/Year)
- MM/DD/YYYY (Month/Day/Year)

30.2.3 Units

This menu can be used to adjust various country-specific and unit-specific settings for the indication of measurement values.

>Decimal Separators<

- Comma
- Point

The decimal separators specified here are used only for representation on the operation module display.



	Region settings		Back	Region settings
Language			Language	
📧 English		-	English	
Date format	dd.mm.yyyy	-	Date format	dd.mm.yyyy
- Units			- Units	
Decimal sep.	Comma (,)	-	Decimal sep.	Comma (,)
Unit system			Unit system	
Metric		-	Metric	Flow
Flow	1/s	-	Flow	I/min *
Velocity	m/s	-	Velocity	
Level	Unit system	-	Level	1/s
Total	Metric	-	Total	MI/d
	English			m³/s
Data units	American		Data units	m³/min
				m ³ /h
				III 711
				m³/d



>Unit System<

Select from:

- Metric
- English
- American

The adjustable units depend on the previously chosen unit system:

- Metric system e. g. l, m³, cm/s etc.
- English system e. g. ft, in, gal/s etc.
- American system e. g. fps, mgd etc.

Units for Display Representation

- Flow
- Flow Velocity
- Level
- Total

30.2.4 Units Memory

The >Units Memory< settings are in line with the >Units< settings.

In >Units Memory< the measurement values are converted and saved according to the selected units.

>Decimal Separators<

- Comma
- Point

Specifying the decimal separators 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.

Units for storage

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

Units for the storage of measurement values

- Flow
- Flow Velocity
- Level
- Total
- Temperature

30.3 Time/Date

This submenu allows you to modify the current date and the transmitter system time. The system time is based on the coordinated universal time UTC (French: "Temps universel coordonné") with "Plus-" or "Minus-Hours" symbols defining the time zones compared to UTC.

NIVUS highly recommends to leave the transmitter system time unchanged and to define your time zone as well as summer and winter times by using the >Time Zone (UTC)< function. Modifications in the >Time/Date< menu may be necessary to switch from summer time to winter time, due to internal buffer battery failure or after power failure.

The internal clock may deviate when the transmitter has been operated for a long time. Such 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.

				000	+
	_	Change sy	stem time	-	_
19.	ΰ.	2015	14:	04:	53
20.	7.	2016	15:	05:	54
21.	8.	2017	16:	06:	55
22.	9.	2018	17:	07:	56
23.	10.	2019	18:	08:	.57
			Input	c	ancel

Fig. 30-4 System Time

The current system time can be set in the menu above (Fig. 30-4). Set the time difference (UTC or GMT) to the prime meridian with "+" and "-":

- -- = decrease by 1 hour each
- = decrease by ½ hour each



- + = increase by ½ hour each
- ++ = increase by 1 hour each

30.4 Error Messages

Use this menu to recall the currently active queued error messages and to erase the error message memory.

The content of the error memory will be instantly erased by choosing >Erase Error Memory<, no security prompt will come up.



Fig. 30-5 Error Messages

30.5 Service

This submenu contains the following functions:

- Service levels (password-protected); the service levels are reserved exclusively for NIVUS service personnel
- Restart (of system)
- Powerdown (transmitter goes to energy saving mode)
- Parameter reset (back to default settings)
- System reset (back to default settings plus erasure of all saved data)

Back	Service	_
	Service level	
	Reboot	
	Powerdown	
	Parameter reset	
	System reset	

Fig. 30-6 Service

30.5.1 Service Level

The service levels are split into different, accordingly password-protected access levels.

The possible settings as well as the information available here require comprehensive expert knowledge and are not needed for standard applications. This is why the service level is reserved for NIVUS service personnel exclusively.

30.5.2 Restart

A transmitter restart interrupts the current measuring process.

The system will boot using the parameters previously set (saved). After the boot process the system behaves as if being switched on (analog to a PC).

This menu point saves you from shutting down and restarting the system. All saved parameters, counters and data will be preserved.

30.5.3 Powerdown

The >Powerdown< function switches the transmitter to energy saving mode. The instrument will not resume measuring before it has been "woken up".



30.5.4 Parameter Reset

A parameter reset will reset all parameters to factory default settings.

Counter readings, modified passwords and saved measurement data are preserved.

The parameters will not be actually reset before you exit the service menu (back to main menu) and confirm the storage process. At this point you can still abort the reset.



Fig. 30-7 Resetting parameters to factory default settings

30.5.5 System Reset

A system reset will reset all parameters, counter readings, modified passwords and saved measurement data to default factory settings.

The system will not be actually reset before you exit the service menu (back to main menu) and confirm the storage process. At this point you can still abort the reset.

30.6 Storage Mode

The >Storage Mode< menu determines the >Operating Mode< and the >Storage Cycle<.

Back	storage mode	Ba	ick	storage mode
Operating mode Storage cycle	Continuous operation 2 min	▼ Opr ▼ Sto	erating mode rage cycle	Continuous operation
			Cyc Eve Eve	Operating mode cle mode ent mode ent cont. mode ntinuous operation

Fig. 30-8 Storage Mode – Operating Mode

Operating Mode, Storage Cycle and Event Interval

The operation mode determines when and how often the transmitter shall measure and when and how often the measurements shall be saved. Storage cycle and event interval can be adjusted depending on the operation mode.

To choose the >Operation Mode< select from

>Cycle Mode

The transmitter wakes up at the intervals set in storage cycle, executes a brief measurement and saves the data. After that the transmitter goes back to "sleep mode" until the next measurement.

>Event Mode<

On one hand, the transmitter behaves like being in cyclic operation, however it is possible to additionally set an event interval. The transmitter then wakes up at previously defined events, measures and saves data at the adjusted event intervals.

Continuous Event Mode<

In this mode the transmitter basically operates like being event operation, however measures continuously during the event. The instrument saves the data at the adjusted event intervals.

>Continuous Operation

The transmitter measures continuously, however will save the data only at the intervals set with the storage cycle.

>Event<

Currently the function "Digital Input on" is invariably saved as event.

This setting may be extended in later firmware versions possibly presenting a selection menu.



Available >Storage Cycle< settings:

- 1 min
- 2 min
- 5 min
- 10 min
- 30 min
- 1h

Available >Event Interval< settings:

- 1 min
- 2 min
- 5 min

31 Parameter Menu Communication

This menu is used to set up communication with the display and operation module (smartphone, tablet, notebook etc.) or other devices.

The transmitter communicates via WLAN.

Communication	Back WLAN	
	SSID	
	NFM0008	
	Password	
	connectone1	
	Communication	Communication Back WLAN SSID NFM0008 Password connectore1

Fig. 31-1 Menu - Communication

The >WLAN< menu provides information on SSID and the WLAN password. This is a readonly menu.



To change the WLAN password see chapter "25.2 Change WLAN Password".

32 Parameter Menu Display

Use the display menu to determine main screen attributes. Variable settings:

- Names of the five main screen output fields
- Decimal places of individual values

Menu	NIVUS1		Back	lisplay
Flow		l/s	• Output field 1	
			• Output field 2	
		,	Output field 3	
Level	m Velocity 1,000	m/s	Default label Label Ve	locity
Temperature	°C Total	m ³	Digits	3
	,	0,000	• Output field 4	
	1,100m -,		8	Digits null Input Cancel
-,	1,000m			
•				



Output Fields

The five main screen output fields (Flow, Level, Velocity, Temperature and Total) can be specified freely in terms of name and the number of decimal places.



Note

The ASSIGNMENT of values and fields CANNOT be changed.

Example: the "Flow" field will ALWAYS indicate output values even if the name should be changed to "Temperature".

- Procedure to change the name:
 - 1. Drop down the desired output field.
 - Uncheck >Standard Name<. Specify the new name. The name can be selected freely, however more than 16 characters will not be accepted.
 - 3. The new name does not change the field value in the main screen.
 - 4. Go "Back" several times to save the parameters.



To save see chapter "25.1 Save Parameters".

Procedure to change the number of decimal places:

- 1. Drop down the desired output field.
- 2. Uncheck >Default Digits<.



3. Specify the new number of digits.

Here you can enter any desired number, however more than a maximum of five digits will not be accepted.

4. Go "Back" several times to save the parameters.



Note

When setting the number of digits observe the measurement accuracy of the sensors and the measurement units set.

Example: the maximum resolution of the temperature sensor is 0.1 K.

33 Parameter Menu Battery (12V)

Use this menu to define the (rechargeable) battery type used as well as the according number of batteries.



Correct Indication of Battery Capacity

The capacity indication in the >System< / >Information< menu is reliable only as long as fully charged batteries are used and the battery type used as well as the according number of batteries are specified here..

Select from:

• 1 x NFM0 ZAPB 1215

One NIVUS rechargeable battery installed. The battery specifications are known and available from the software.

Setting the number of the NIVUS batteries used enables the correct indication of the battery performance in the >System</>Information< menu.

• 2 x NFM0 ZAPB 1215

Two NIVUS rechargeable batteries installed.

BATTERY_MODE_USER

The capacity [Ah] must be specified to correctly indicate the (rechargeable) battery performance in the >System</>Information< menu.



Fig. 33-1 Menu Battery (12V)

34 Parameter Menu Quick Start

The >Quick Start< parameter menu is subdivided into three or four pages (depending on the number of v-paths). The pages >Region Settings< and >Measure Place< are input pages used to define the indication of measurement values and the measurement place itself. Pages >v-Path 1< and >v-Path 2< are read-only pages and provide information on the sensor installation positions and the signal strength.



The parameter setting procedure is described in chapter "26 Parameter Setting using Quick Start".

34.1 Menu >Quick Start< / >Region Settings<

Back	Quickstart	
/4 - Region settings		< >
Language		
🔀 English		•
Date format	dd.mm.yyyy	-
+ Units		
+ Data units		
storage mode		
Operating mode	Continuous operation	•
Storage cycle	2 min	-

Fig. 34-1 Region Settings

Use >Region Settings< to adjust the parameters below:

- (Operation) Language
- Date Format
- Units and Memory Units
- Storage Mode
 - Operating Mode
 - Storage Cycle

The settings are explained in greater detail in chapters "30.2 Region Settings" and "30.6 Storage Mode".



34.2 Menu >Quick Start< / >Measure Place<



Fig. 34-2 Measurement Place

Use the >Measure Place< menu to adjust the parameters below:

- Name of Measurement Place
- Transit Time Mode
- Arrangement and Number of Paths
- Medium and Medium Temperature
- Channel Profile and Dimensions
- Wall Material and Lining

The individual settings are explained in greater detail in chapter "28.1 Menu Measure Place".

34.3 Menu >Quick Start< / >v-Path 1<



Fig. 34-3 v-Path 1

Under >v-Path 1< and >v-Path 2< the parameters below are indicated:

- Distance along
- Path Length
- Signal Strength

The values shown in >Distance along< and >Path Length< can be used for sensor installation. The >Signal Strength< is an additional information: the higher the percentage the better the signal.



Diagnostics

35 Diagnostic Menu Principles



Fig. 35-1 Diagnostics Menu

The >Diagnostics< menu can be found in the >Application< menu and is split into four submenus.

This menu and all its submenus are read-only and simulation menus.

This section permits to view or to simulate settings on the areas below:

- v-Paths
- Inputs/Outputs
- Signal analysis (Scan)
- Simulation



Important Note

Necessarily observe the safety information on simulation on page 110.
36 Menu Diagnostics v-Paths

Back	v-Path 1			Back	Alignmen		
			1	Distance along		0,586	
v-Path			m/s	Path length		1,495	
Delta t			ns				
Transit t			us				
Transmit power	Low						
Angle		20,53	٥				
	Alignment						
Temperature cal	ibration						
Path temperature			°C			_	
Sound velocity			m/s		-,-	•	
Offset (transit time)		0	ns				
Calib. temperature			°C				
Zero calibration							
Offset (difference)		0	ns				
	Calibration						

Fig. 36-1 v-Paths / Alignment

This menu is required only for analytical purposes.

In case of errors or problems with the transit time measurement various factors can be used in order to determine the cause.

The following points are shown:

- >v-Path
 Indication of individual path velocities (switch by using the tabs top right).
- >Delta t<
 <p>Transit time difference in nanoseconds (to calculate the velocity v).
- >Transit t<
 Mean signal runtime between sensor 1 and sensor 2 of the according path in microseconds.
- >Transmission Power
- >Angle
- >Alignment

Selecting this option indicates a graph (Fig. 36-1) showing the sensor signal strength in %. Possible values: 0-120 %.

The higher the value the better the path alignment. For sufficient measurement results a minimum signal strength of 80 % is required.

- >Temperature Compensation< (calculated)
 - >Path Temperature
 Path temperature calculated from the speed of sound.
 - >Speed of Sound<
 Fixed value, depends on the medium.
 - >Offset (Transit Time)<
 Calculated value referring to the value specified in "Compensation Temperature".
 To reset the value enter "0" manually.



- >Compensation Temperature
 Manual entry of the ACTUAL medium temperature measured. Required to calculate the offset (transit time).
- >Zero Point Adjustment<
 - >Offset (Difference)< and >Adjustment<
 <p>Detected velocity value available under "Delta t" in full filled channel with the discharge closed. Set to negative once selecting >Adjustment< and will be included with calculation accordingly.</p>

37 Diagnostic Inputs/Outputs

37.1 Important Information on the Simulation

DANGER



The simulation will directly affect following plant sections. Disregarding may lead to personal injury or damage your facility.

The simulation shall be executed by trained electricians only who shall 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.

Personal injury and damage caused by improper simulation handling

It is absolutely necessary to have a safety person available!



Effects on plant sections

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

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!

This menu is divided in analog inputs, analog outputs, digital inputs and digital outputs.



Fig. 37-1 Menu Inputs/Outputs

>Analog Inputs
 Indicates the current values available at the according analog inputs.

Analog output 1	0,00	V
		°C
Simulation		~
Voltage		V

Fig. 37-2 Analog Outputs

>Analog Outputs
 Indicates the available voltage values and the detected medium temperature.
 By checking the Simulation box it is possible to simulate a voltage (Fig. 37-2).
 Necessarily observe the previous safety information on the simulation and the possible risks (effects on following plant sections) on page 110!



- >Digital Inputs<
 Signals oncoming at the digital inputs are indicated by a checked/unchecked box.
- >Digital Outputs<
 <p>Active digital outputs are checked.



Note

The actual state of the real relay cannot be indicated, but only the signal transmitted to the relay.

This menu cannot be used to obtain information on external faulty wiring.



Fig. 37-3 Digital Output

A **Simulation** of the digital output can be executed by either selecting >No Simulation<, >On< or >Off< (Fig. 37-3).

Necessarily observe the previous safety information on the simulation and the possible risks (effects on following plant sections) on page 110!

38 Diagnostic Menu Signal Analysis

This menu is used to scan and to review the incoming signal from the sensor. Moreover the sensor function can be tested here.

can	Inactive	*
	Scan	
	Search scan	
	Signal scan	
	Signal scan env.	
	Correlation	
	Tx signal	
	Noise	
	Sensor test	

Fig. 38-1 Signal Analysis menu

Select from the options below:

- >Inactive
 No signal scan/evaluation
 - >Search Scan< (Coarse) signal scan based on customer settings and possibly extended ranges.

>Direction< (Fig. 38-2):

- Upstream (towards flow direction)
- Downstream (in flow direction)
- Up-/Downstream

>Scaling< of chart:

- Time
- Distance





Fig. 38-2 Search Scan

>Signal Scan<
 More accurate signal indication

>Direction<:

- Upstream (towards flow direction)
- Downstream (in flow direction)
- Up-/Downstream

>Scaling< of chart (Fig. 38-3):

- Time
- Distance

The >Scaling< is not available once the >FFT< (representation of the frequency spectrum) box is checked.





>Signal Scan Envelope<
 <p>Detection of the real start of the incoming signal (due to double reflection of the signal).

>Direction< (Fig. 38-4):

- Upstream (towards flow direction)
- Downstream (in flow direction)
- Up-/Downstream

>Scaling< of chart:

- Time
- Distance



Fig. 38-4 Signal Scan Envelope



>Correlation< Visual comparison of both signals



Fig. 38-5 Correlation

>Tx (Transmitter) Signal<
 Visual representation/signal shape



Fig. 38-6 Transmitter signal

>Noise

Indication of unwanted background noise with signal evaluation

>Direction< (Fig. 38-7):

- Upstream (towards flow direction)
- Downstream (in flow direction)
- Up-/Downstream

Check the >FFT< box to indicate the frequency spectrum.



Fig. 38-7 Noise

 >Sensor Test
 Functional test of the connected sensor, detects obstacles such as air or sedimentation.

>Direction<:

- Upstream (towards flow direction)
- Downstream (in flow direction)
- Up-/Downstream

>Scaling< of chart (Fig. 38-8):

- Time
- Distance



Fig. 38-8 Sensor test



39 Simulation

DANGER



Effects on plant sections

The simulation of NivuFlow Mobile outputs will directly affect any following plant sections without any safety locking measures. Observe the hints contained within the warning on page 110!

Stop the simulation with "Back".

This menu allows simulation of theoretical flow. Simulation is carried out by entering assumed velocity values. These values do not really exist.

Use either the >--<, >-<, >+< or >++< fields to enter smaller steps or specify absolute values (higher steps) directly in the >Velocity< field.

- -- each step decreases the velocity by 1/100 m/s
- each step decreases the velocity by 1/1000 m/s
- + each step increases the velocity by 1/1000 m/s
- ++ each step increases the velocity by 1/100 m/s

By using the simulated values (based on the channel dimension parameters set) NivuFlow Mobile 600 calculates the prevailing flow.

Choosing >Flow< automatically indicates the calculated value.

The >Analog Output< option will output the voltage at the previously determined output.

Velocity	 0,000m/s	+ ++
Velocity	0,000	m/s
Flow	0,00	I/s
DO 1 (Output inactive)		
Analog output 1	0,00	V

Fig. 39-1 Simulation

Maintenance and Cleaning

WARNING



Disconnect instrument from mains power

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 Germ contamination possible



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 cables and sensors. Wear protective clothing.

40 Maintenance

40.1 Maintenance Interval

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

NIVUS, however, 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 may vary.

Extent and intervals of maintenance depend on the following conditions:

- Measurement principle of sensors
- Material wear
- · Measurement medium and hydraulic conditions
- · General regulations for the operators of the measurement facility
- Ambient conditions

In addition to the annual inspection NIVUS recommends a complete maintenance of the measurement system by the manufacturer after ten years the latest.

In general, the inspection of instruments/sensors is a basic measure which helps to increase operational safety as well as the lifetime.

40.2 Customer Service Information

For annual inspection of the entire measurement system or complete maintenance after ten years the latest contact our customer service:

NIVUS GmbH – Customer Service

Phone +49 (0) 7262 9191 - 922 Kundencenter@nivus.com



41 Cleaning

41.1 Transmitter

WARNING



Observe to disconnect the transmitter from mains power. Disregarding may induce the risk of electrical shocks.

Disconnect instrument from mains power

When closed and locked the NivuFlow Mobile enclosure complies with IP68 protection degree and hence is less sensitive. Do not use high-pressure cleaners however. Do not use sharp cleansing agents or solvents. Light household cleaners or soapy water can be used instead.

41.2 Sensors

Information on how to maintain and to clean the sensors shall be necessarily observed. Such information can be found in the according technical description or instruction manual. Technical description or instruction manual are part of the sensor delivery.

42 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.
 - 1. Disconnect the instrument from mains power.
 - 2. Remove connected cables.
 - 3. Remove batteries and if defect dispose accordingly
 - 4. Remove the transmitter's buffer battery and separately dispose accordingly.



EC WEEE-Directive

This symbol indicates that the Directive 2012/19/EU 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.

43 Accessories

NFM0 ZAPB 1215	Rechargeable battery pack with sockets; nominal voltage: 12 V; capacity: 15 Ah
NFM0 ZLAD	Power adapter/battery charger for NFM / NFM battery pack;
	supply voltage: 100240 V AC, 50/60 Hz
NFM0 ZVER PS	2-wire connection cable for external power supply connection to NFM (one side
	with plug for multifunction socket, other side with open cable ends);
	cable length 5 m
NFM0 ZAB 01	Display and operation module for NFM:
	IP67-certified 8" outdoor tablet; resolution: 1280x800; operating system: Android;
	device communication: WLAN; other communication modes: USB, Bluetooth,
	modem 2G, 3G and 4G
NFM0 ZVER AA	Connection cable, NFM analog output (one side with plug for multifunction socket,
	other side with open cable ends); cable length 10 m
NFM0 ZVER AEA	Connection cable, NFM analog input; supplied by NFM (one side with plug for
	multifunction socket, other side with open cable ends); cable length 10 m
NFM0 ZVER AEP	Connection cable, NFM analog input; external power supply (one side with plug
	for multifunction socket, other side with open cable ends); cable length 10 m
NFM0 ZVER DE	Connection cable, NFM digital input (one side with plug for multifunction socket,
	other side with open cable ends); cable length 10 m
NFM0 ZVER DA	Connection cable, NFM relay output (one side with plug for multifunction socket,
	other side with open cable ends); cable length 10 m
NFM0 ZVER MU	Connection cable, NFM – all inputs and outputs (one side with plug for multifunc-
	tion socket, other side with open cable ends); cable length 10 m
NFM0 ZVER NLM	Connection cable between NFM and NivuLog Easy (one side with plug for multi-
	function socket, other side with open cable ends); cable length 5 m
NFM0 ZVS1	Connector Box, IP67 with NFM connection plug for connection to NFM
ZUB0 KAB NMC 10	2-pole, preconfigured cable with open cable ends for connection to Connector
	Box; cable length 10 m
ZUB0 KAB NMC 20	2-pole, preconfigured cable with open cable ends for connection to Connector
	Box; cable length 20 m
ZUB0 KAB NMC 30	2-pole, preconfigured cable with open cable ends for connection to Connector
	Box; cable length 30 m
NFM0 ZSBL IRE	Hoop guards (pair), for protection of connection sockets and to fasten the Con-
	nector Box on the NFM
NFM0 ZHAK NFM 01	Suspension bracket to fasten the NFM on step irons incl. brackets for suspension
	of sensor cables; material: stainless steel 1.4571
NFM0 ZHAK NFM 02	Suspension bracket to fasten the NFM on step irons;
	material: stainless steel 1.4571
NFM5 GUMMI PUFFER	Rubber buffers, set of 4 pcs.



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EU Konformitätserklärung

EU Declaration of Conformity Déclaration de conformité UE

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

Bezeichnung:	Durchflussmessumformer NivuFlow Mobile 600
Description:	Mobile flow measurement transmitter
Désignation:	Convertisseur de mesure de débit mobile
Тур / Туре:	NFM-060000

erklären wir in alleiniger Verantwortung, dass die auf dem Unionsmarkt ab dem Zeitpunkt der Unterzeichnung bereitgestellten Geräte die folgenden einschlägigen Harmonisierungsvorschriften der Union erfüllen:

we declare under our sole responsibility that the equipment made available on the Union market as of the date of signature of this document meets the standards of the following applicable Union harmonisation legislation:

nous déclarons, sous notre seule responsabilité, à la date de la présente signature, la conformité du produit pour le marché de l'Union, aux directives d'harmonisation de la législation au sein de l'Union:

• 2014/53/EU • 2011/65/EU

Bei der Bewertung wurden folgende einschlägige harmonisierte Normen zugrunde gelegt bzw. wird die Konformität erklärt in Bezug die nachfolgend genannten anderen technischen Spezifikationen:

The evaluation assessed the following applicable harmonised standards or the conformity is declared in relation to other technical specifications listed below:

L'évaluation est effectuée à partir des normes harmonisées applicable ou la conformité est déclarée en relation aux autres spécifications techniques désignées ci-dessous:

• EN 61010-1:2010 • EN 62311:2008 • EN 61326-1:2013 • EN 300 328 V 1.8.1

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 28.07.2017

Gez. Marcus Fischer



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EU Konformitätserklärung

EU Declaration of Conformity Déclaration de conformité UE

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

Bezeichnung:	Ladeschale NFM Netzteil / Ladegerät
Description:	charging station NFM power adapter / battery charger
Désignation:	station de charge NFM
Тур / Туре:	NFM02 LADESCH

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:

• 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 50581:2012

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 14.07.2016

Gez. Marcus Fischer