

## Instruction Manual for Measurement System NivuChannel incl. accompanying Sensors

(Original Instruction Manual – German)



valid as of Software Revision No. 1.12

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### **Translation**

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

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

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### **Names**

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## EU Konformitätserklärung

*EU Declaration of Conformity*

*Déclaration de conformité UE*

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Für das folgend bezeichnete Erzeugnis:

*For the following product:*

*Le produit désigné ci-dessous:*

<b>Bezeichnung:</b>	<b>stationärer Durchflussmessumformer NivuChannel</b>
<i>Description:</i>	<i>permanent flow measurement transmitter</i>
<i>Désignation:</i>	<i>convertisseur de mesure de débit fixe /</i>
<b>Typ / Type:</b>	<b>NOM-...</b>

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

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

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

- 2014/30/EU
- 2014/35/EU

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 61000-6-2:2005
- EN 61000-6-4:2007/A1:2011
- EN 61010-1:2010

Diese Erklärung wird verantwortlich für den Hersteller:

*This declaration is submitted on behalf of the manufacturer:*

*Le fabricant assume la responsabilité de cette déclaration:*

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**Allemagne**

abgegeben durch / *represented by / faite par:*

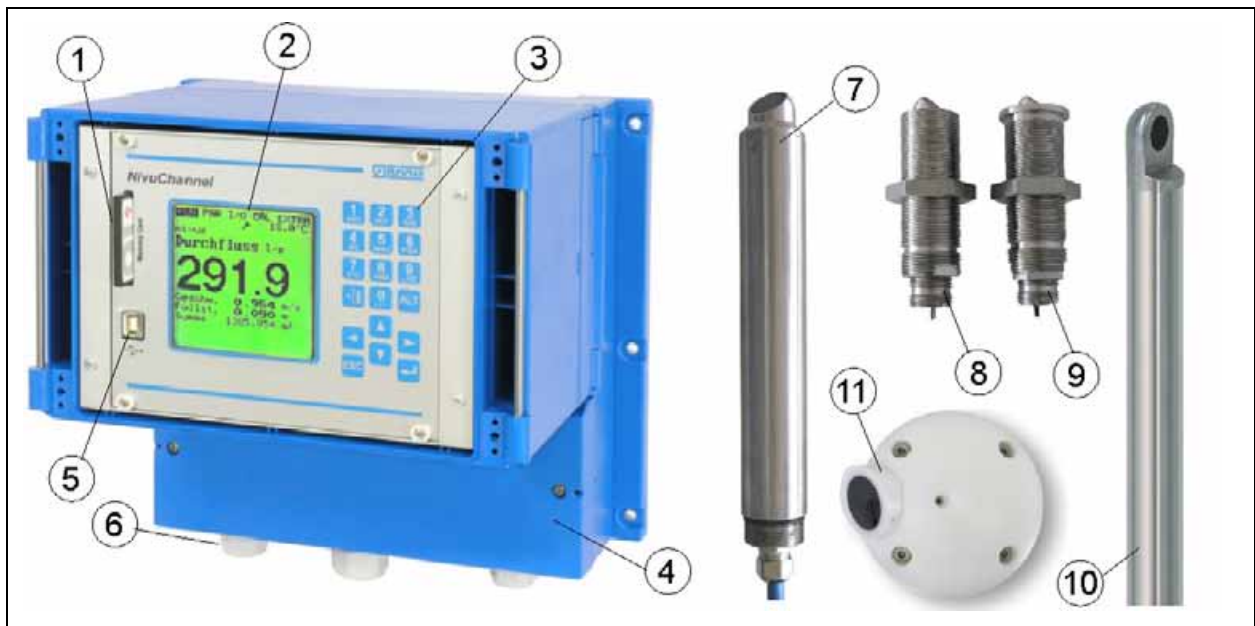
**Marcus Fischer** (Geschäftsführer / *Managing Director / Directeur général*)

Eppingen, den 20.04.2016

Gez. *Marcus Fischer*

## 2 Overview and use in accordance with the requirements

### 2.1 Overview



- 1 Slot with plugged memory card
- 2 Graphic display
- 3 Keypad
- 4 Cable glands
- 5 USB interface
- 6 Terminal clamp housing
- 7 Rod sensor for pipes
- 8 Screw-in sensor
- 9 Plug-in sensor
- 10 Rod sensor for open channels
- 11 Hemisphere with sensor

Fig. 2-1 Overview

## 2.2 Use in accordance with the requirements

The measurement device type NivuChannel including respective sensors is intended to be used for continuous flow measurement in slightly polluted to clear, clean water or equivalent media in part filled or full pipes, channels or water bodies. Here the allowed maximum values, as specified in chapter 2.3 must be strictly kept. All cases which vary from these conditions and are not passed by NIVUS GmbH in writing are left at owner's risk.



---

*The device is exclusively intended to be used for purposes as described above.*

*Modifying or using the devices for other purposes without the written consent of the manufacturer will not be considered as use in accordance with the requirements.*

*Damages resulting from this are left at user's risk.*

*The device is designed for a lifetime of approx. 10 years. After that period an inspection in addition with a general overhaul has to be made.*

---



---

*For installation and initial start-up the conformity certificates and test certificates of the respective authorities must be followed.*

---



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*The transmitter and the sensors always have to be installed outside of Ex-zones!*

---



## 2.3 Specifications

### 2.3.1 Transmitter

Power supply	100 to 240 V AC, +10 % /-15 %, 47 to 63 Hz or 24 V DC $\pm$ 15 %, 5 % residual fluctuation
Power consumption	max. 20 VA
Wall mount enclosure	- Material: Polycarbonate - Weight: approx. 2900 g - Protection: IP 65
Operating temperature	-20° C to +50° C
Storage temperature	-30° C to +70° C
Max. humidity	80 %, non-condensing
Display	Back-lit graphic display, 128 x 128 pixel
Operation	18 keys, dialog mode in German, English, French Italian, Spanish, Czech, Polish and Dutch
Inputs	- 1 x 4-20 mA or external level measurement (2-wire sensor) - 4 x 0/4-20 mA with 12 bit resolution for external level measurement, external set points and data storage - 4 x digital inputs - 2 sensor pairs directly connectable - up to 8 sensor pairs via adapter box connectable
Outputs	- 2 (4) x 0/4-20 mA (4 - Type M3), load 500 Ohm, 12 bit resolution, accuracy better than 0.1 % - 5 switchable relays, loadable up to 230 V AC / 2 A (cos. $\varphi$ 0.9) - RJ45 for Internet communication - RJ12 for modem connection
Data storage	plug-in compact flash card up to 128 MB
Data transmission	Via Compact Flash Card, open protocol via RS 485, direct Internet connection via GPRS, ISDN or analog modem. Intranet connection via Ethernet (RJ45) using TCP/IP

### 2.3.2 Water Ultrasonic Sensor / Hydro-Acoustic Converter

Measurement principle	Ultrasonic transit time
Measurement frequency	1 MHz; other frequencies upon request
Velocity range	$\pm$ 15 m/s
Channel width	0.5 m to 40 m; other path lengths upon request
Protection	IP 68
Operating temperature	-20° C to +50° C
Storage temperature	-30° C to +70° C
Cable length	10/15/20/30/50 m; via adapter box extendable up to 200 m
Type of cable	Twinax
Outside cable diameter	8.5 mm
Sensor types	- Rod sensor - Hemisphere
Medium contacting materials	- Rod sensor: stainless steel 1.4571, CFK, Viton - Hemisphere: stainless steel 1.4571, CFK, POM, PUR, Neoprene

Temperature measurement using velocity of sound	
Measurement range	0°C to +60 °C
Measurement error	± 1 K

### 2.3.3 Accessories (optional)

Memory card	Type: compact flash memory card; capacity: 128 MB; manufacturer: SanDisk
Readout adapter	Adapter for PCMCIA interface, primarily for readout using laptop / notebook
Card reader	With parallel or USB interface for PC connection. Network connection via Ethernet interface (TCP/IP), internal web-server.
Mounting system	Holders for rod sensors. Sub-construction for hemisphere sensors. Flow-optimised protection plates for rod sensors.
Evaluation software	Type: NivuDat V 2.0 for Windows NT/2000 for data readout and evaluation, hydrograph creation, averaging, hour / day and month totalising etc.

### 3 General Notes on Safety and Danger

#### 3.1 Danger Notes

##### 3.1.1 General Danger Signs



---

**Cautions**  
*are framed and labelled with a warning triangle.*

---



---

**Notes**  
*are framed and labelled with a "hand".*

---



---

**Danger by electric voltage**  
*is framed and labelled with the Symbol on the left.*

---



---

**Warnings**  
*are framed and labelled with a "STOP"-sign.*

---

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

All operations, which go beyond steps to install, to connect or to program the device, are allowed to be carried out only by NIVUS staff or authorised personnel due to reasons of safety and guarantee.

##### 3.1.2 Special Danger Notes



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*Please note that due to the operation in the waste water field, transmitter, sensors and cables may be contaminated with dangerous disease germs. Respective precautionary measures shall be taken to avoid damage to one's health.*

---

### 3.2 Device identification

The instructions in this manual are valid only for the type of device indicated on the title page.

The nameplate is fixed on the bottom of the device and contains the following:

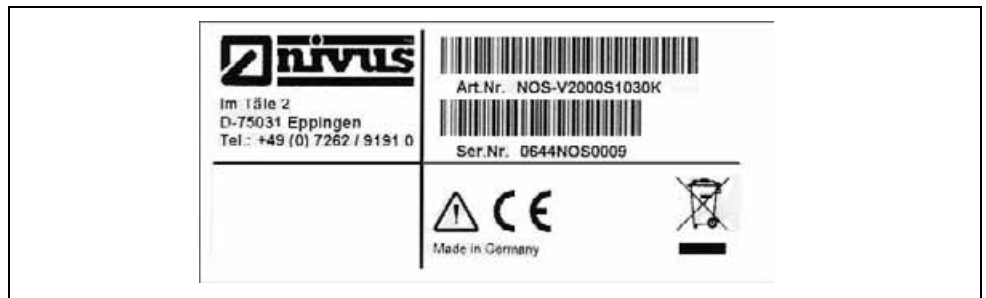
- Name and address of manufacturer
- CE label
- Type and serial number
- Year of manufacture



**Fig. 3-1 NivuChannel nameplate**

The sensor nameplate can be found on the bottom of the ground plate containing the specifications below:

- Name and address of manufacturer
- CE label
- Type and serial number
- Year of manufacture



**Fig. 3-2 Flow velocity sensor Type NOS nameplate**

An additional nameplate protected by a transparent shrunk-on hose can be found on each end of the fixed cable providing the following:

- article no. of sensors
- serial no. of sensor

It is important for enquiries and replacement part orders to specify article number as well as serial number of the respective transmitter or sensor. This ensures correct and quick processing.



*This instruction manual is a part of the device and must be available for the user at any time.*

*The safety instructions contained within shall be followed.*



---

*It is strictly prohibited to disable the safety installations or to change the way they work.*

---

### 3.3 Installation of spare parts and parts subject to wear and tear

We herewith particularly emphasise that replacement parts or accessories not supplied by NIVUS are not certified by NIVUS, too. Installation and/or utilisation of such products under certain circumstances might have negative effects on constructional qualities of the unit or even result in instrument failures. Damages caused due to using non-original parts and non-original accessories are left at user's risk.

### 3.4 Shutdown procedures



---

*For maintenance, cleaning and repairs (to be carried out by authorised expert personnel only) the device shall be disconnected from mains.*

---

### 3.5 User's responsibilities



---

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

*In Germany the Industrial Safety Ordinance shall be observed.*

---

The customer must obtain any local **operating permits** required and observe the provisions contained therein.

In addition to this, he must observe local laws and regulations on

- 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)
- environmental protection
- approvals available from local authorities.

#### **Connections:**

Before operating the device the user has to ensure, that the local regulations (e.g. for electric connection) on installation and initial start-up are taken into account, if this is both carried out by the user.

## 4 Functional principle

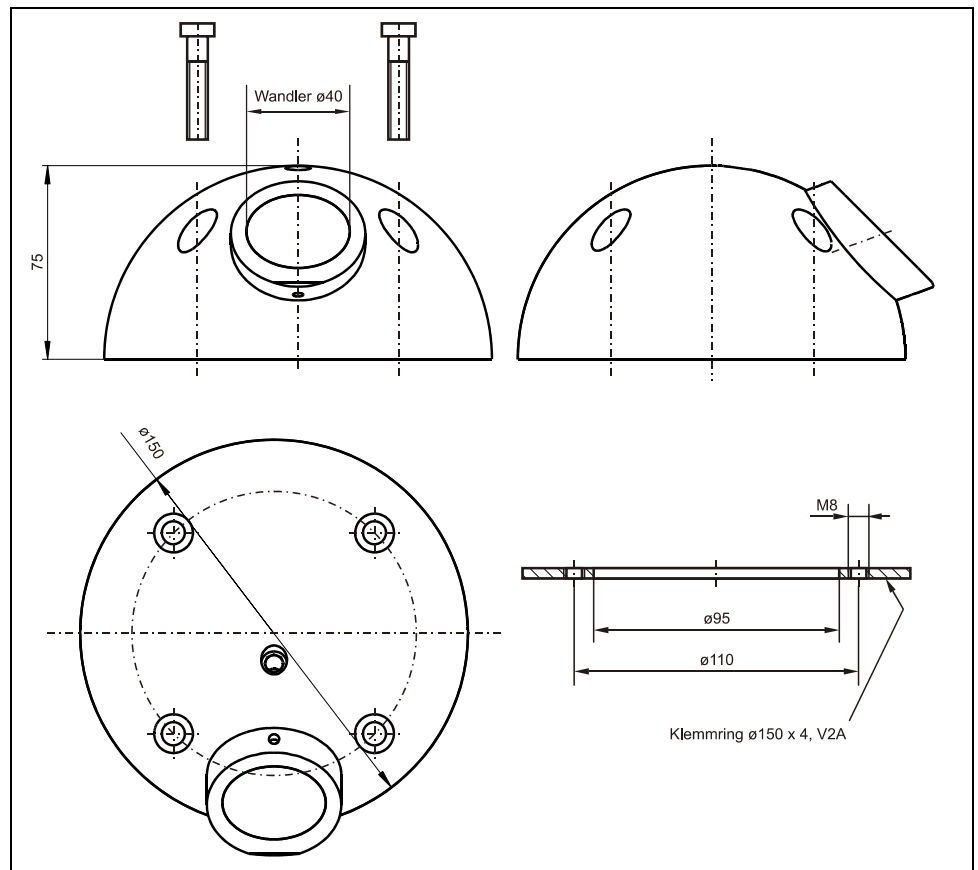
### 4.1 General

The NivuChannel is a permanent measurement system for flow measurement, storage of detected readings and remote access using TCP/IP via network connection, Intranet or Internet. It is mainly designed for use in slightly polluted to clear watery fluids of various consistencies which are to be measured in part filled and full pipes, channels and flumes with various shapes and dimensions..

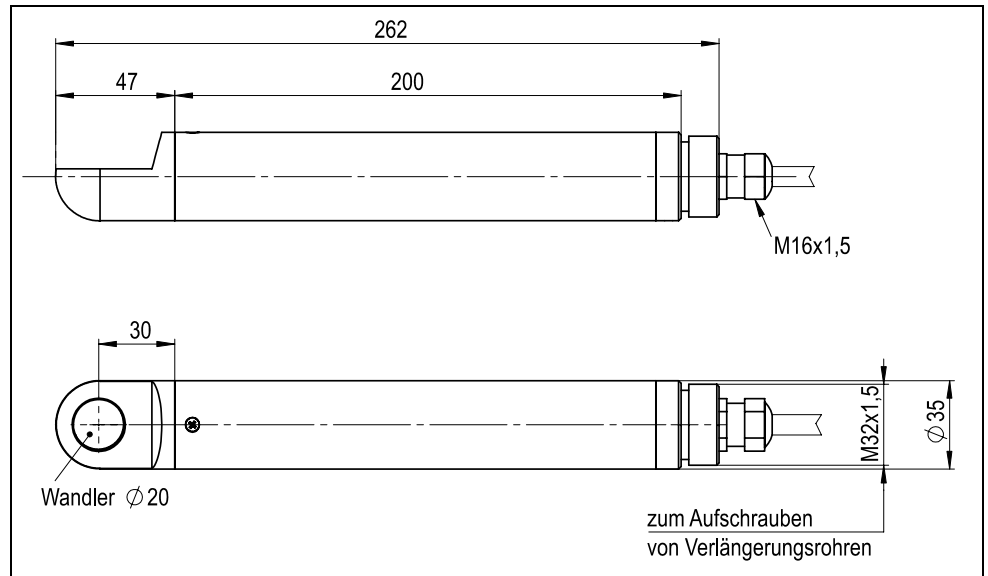


*The flow velocity measurement method is based on the ultrasonic transit time principle. Due to this reason it is indispensable for the system functionality that the solid content (dirt particles, gas bubbles or similar) is not too high to enable ultrasonic signal transmission between both sensors due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

The NivuChannel utilises a minimum of one pair of sensors for flow velocity determination.



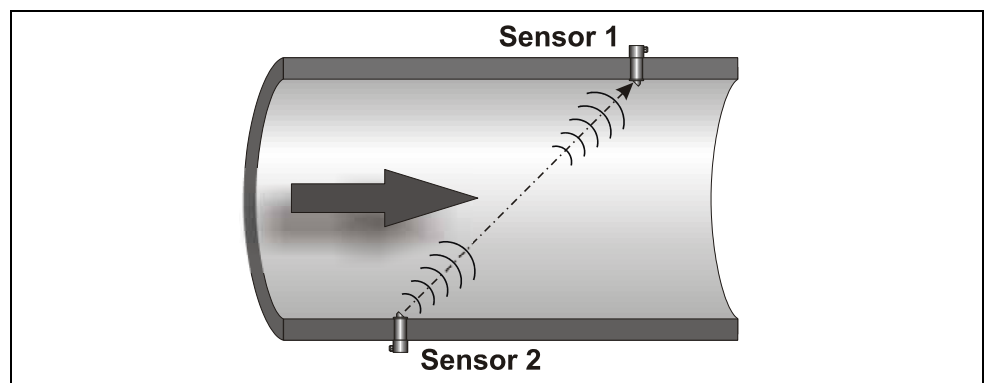
**Fig. 4-1 Construction of hemisphere sensors**



**Fig. 4-2 Construction of rod sensors**

## 4.2 Flow velocity detection

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



**Fig. 4-3 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.

A short ultrasonic impulse with a defined frequency sent towards the medium flow direction in a defined angle requires a longer transit time than another impulse being sent with the medium flow direction in an inverse angle.

The difference between the transit times is proportional to the average flow velocity within the measurement path.

Flow determination is possible as soon as both cross-sectional area as well as flow geometry of pipe, channel or water body are known.

If the geometry is not full (part filled pipe, channel or water body) it is necessary to additionally measure and define the water level as height in order to investigate the flow cross-section. In case of using the NivuChannel enter a fixed value or connect an external level measurement sensor.

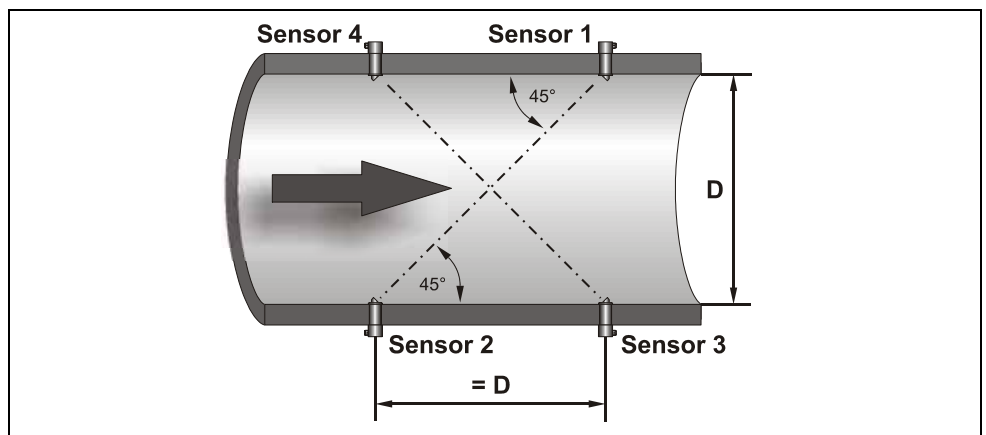
Presuming that  $C \gg v_{1-2}$  and the flow direction is known, it is possible to approach the transit time ( $\Delta t$ ) applying

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

whereat:

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

The more paths are used and installed for transit time measurement the more information on flow velocity can be gathered and the more accurate it is possible to determine flow.



**Fig. 4-4 Multi-path transit time measurement principle**

Investigate the velocity as described below presuming  $C \gg v_{1-2}$ :

$$v_{1-2} = \frac{L_{1-2}}{2 \cdot \cos(\Phi_{1-2} + \alpha)} \cdot \left( \frac{1}{t_{1-2}} - \frac{1}{t_{2-1}} \right)$$

or

$$v_{3-4} = \frac{L_{3-4}}{2 \cdot \cos(\Phi_{3-4} + \alpha)} \cdot \left( \frac{1}{t_{3-4}} - \frac{1}{t_{4-3}} \right)$$

Presuming identical flow velocities in the paths it is possible to additionally determine the deviation angle  $\alpha$  of the flow direction in multi-path installations. This angle can be derived from a comparison between the readings from the single paths.

$$\alpha = \arctan \left( \frac{v_{3-4} \cdot \cos \Phi_{1-2} - v_{1-2} \cdot \cos \Phi_{3-4}}{v_{3-4} \cdot \sin \Phi_{1-2} + v_{1-2} \cdot \sin \Phi_{3-4}} \right)$$



### 4.3 Flow calculation

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

$$Q = v_m \cdot A$$

given

$v_m$  average flow velocity  
 $A$  cross-sectional flow area

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

$$k = \frac{v_m}{v_g}$$

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

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

### 4.4 Measurement Uncertainties

An assessment of measurement uncertainties can be calculated as follows according to DIN EN ISO 6416:

$$U_q = \left[ U_p^2 + \frac{1}{P} (U_{iv}^2 + U_w^2 + U_d^2) \right]^{\frac{1}{2}}$$

given

$U_q$  flow uncertainty;

$U_p$  integration uncertainty, consisting of the applied, finite number of effective paths (from table E.4 as per ISO 748:1997) and the method of calculation (see above);

$P$  the number of paths;

$U_{iv}$  the path velocity uncertainty;

$U_w$  the mean channel width determination uncertainty; the channel width is the mean width of the measuring section at the level of each sensor pair; it is expected that the width is going to be measured at right angles to the flow direction / the banks;

$U_d$  depth measurement uncertainty.

Assuming appropriate calibration however it is possible to significantly stay below the specified limitations of EN ISO 6416 requirements.

## 4.5 Device variations

NivuChannel transmitter and the respective flow velocity sensors are available in different versions. The tables below provide an overview on various possibilities.

### Transmitters

The transmitters primarily vary in terms of power supply and data transmission options. The current type of device is indicated by the article number, which can be found on a weatherproof label on the bottom of the enclosure.

From this article key the type of device can be specified.

NOM-	Type
	<p><b>M3W</b> Standard version with 5 relays (230 V / AC/2A), 4x 0/4-20 mA outputs (galv. isolated), 1x 4-20 mA input ( for external level measurement) 4x 0/4-20 mA inputs (galv. isolated for additional external level measurements or setpoints). Up to 2 measurement pa</p> <p><b>Data Transmission</b></p> <p><b>IN</b> Internet communication via Intranet</p> <p><b>MA</b> Internet communication via internal analog modem</p> <p><b>MI</b> Internet communication via internal ISDN modem</p> <p><b>MG</b> Internet communication via GPRS</p> <p><b>Power Supply</b></p> <p><b>AC</b> 100-240 V AC / 47-63 Hz</p> <p><b>DC</b> 24 V stabilised</p> <p><b>Evaluation Setup</b></p> <p><b>D</b> Direct connection of sensors</p> <p><b>Z</b> Connection via adapter box*</p> <p><b>Number of Paths</b></p> <p><b>1</b> 1 Path (adapter box* optional)</p> <p><b>2</b> 2 Paths (adapter box* optional)</p> <p><b>4</b> 4 Paths (adapter box* required)</p> <p><b>8</b> 8 Paths (adapter box* required)</p>
NOM-	M3W

Fig. 4-5 NivuChannel transmitter type keys

### Ultrasonic sensors for NivuChannel

The sensors are available in various constructions (rod sensor and hemisphere) and vary in terms of cable length and connection. The article no. can be found on a nameplate on the cable end (device side) which is protected by a transparent shrunk-on hose.

NOS-	Type
	<b>V2005</b> Rod sensor made of 1.471; installation tube length 500 mm diameter 35 mm; mounting length of sensor head 47 mm; CFK sensor face (20 mm); pair of sensors required (2 pieces!)
	<b>V2010</b> Rod sensor made of 1.471; installation tube length 1000 mm diameter 35 mm; mounting length of sensor head 47 mm; CFK sensor face (20 mm); pair of sensors required (2 pieces!)
	<b>V2015</b> Rod sensor made of 1.471; installation tube length 1500 mm diameter 35 mm; mounting length of sensor head 47 mm; CFK sensor face (20 mm); pair of sensors required (2 pieces!)
	<b>V2020</b> Rod sensor made of 1.471; installation tube length 2000 mm diameter 35 mm; mounting length of sensor head 47 mm; CFK sensor face (20 mm); pair of sensors required (2 pieces!)
	<b>V3005</b> Rod sensor made of 1.471; installation tube length 500 mm diameter 35 mm; mounting length of sensor head 55 mm diameter 50 mm; CFK sensor face (40mm); pair of sensors required (2 pieces!)
	<b>V3010</b> Rod sensor made of 1.471; installation tube length 1000 mm diameter 35 mm; mounting length of sensor head 55 mm diameter 50 mm; CFK sensor face (40mm); pair of sensors required (2 pieces!)
	<b>V3015</b> Rod sensor made of 1.471; installation tube length 1500 mm diameter 35 mm; mounting length of sensor head 55 mm diameter 50 mm; CFK sensor face (40mm); pair of sensors required (2 pieces!)
	<b>V3020</b> Rod sensor made of 1.471; installation tube length 2000 mm diameter 35 mm; mounting length of sensor head 55 mm diameter 50 mm; CFK sensor face (40mm); pair of sensors required (2 pieces!)
	<b>V30BS</b> Hemispheres made of POM, sensor face (40 mm) made of CFK (Carbon); only in conjunction with sensor connection A or B and pressure level L; sensor pair (2 pieces!)
	<b>V30BX</b> Hemispheres, sensor face (40 mm); special construction; sensor pair (2 pieces!)
	<b>Pressure Level</b>
	<b>S</b> 5 bar
	<b>L</b> 1.2 bar
	<b>Path Position</b>
	<b>1</b> Path position 45° against flow direction (recommended setup angle)
	<b>Approvals</b>
	<b>0</b> non
	<b>Cable Length</b>
	<b>10</b> 10 m pre-configured
	<b>15</b> 15 m pre-configured
	<b>20</b> 20 m pre-configured
	<b>30</b> 30 m pre-configured
	<b>50</b> 50 m pre-configured
	<b>99</b> 100 m pre-configured
	<b>XX</b> Special length
	<b>Sensor Connection</b>
	<b>A</b> Connection to NivuChannel transmitter via underwater plug connection (only Type V30B)
	<b>B</b> Connection to NivuChannel transmitter via adapter box* to transmitter via underwater plug connection (only TypeV30B)
	<b>K</b> Connection to NivuChannel transmitter
	<b>Z</b> Connection to NivuChannel transmitter via adapter box*
NOS-	1 0

Fig. 4-6 Type keys for ultrasonic rod and hemisphere sensors

## 5 Storing, Delivery and Transport

### 5.1 Receipt

Please check your delivery according to the delivery note for completeness and intactness immediately after receipt. Any damage in transit must be instantly reported to the carrier. An immediate, written report must be sent to NIVUS GmbH Eppingen as well.

Please report any delivery incompleteness in writing to your representative or directly to NIVUS Eppingen within two weeks.



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*Mistakes cannot be rectified later!*

---

### 5.2 Delivery

The standard delivery of the NivuChannel measurement system contains:

- the instruction manual with the certificate of conformity. Here, all necessary steps to correctly install and to operate the measurement system are listed.
- a NivuChannel transmitter
- a min. of two ultrasonic sensors, construction:  
rod sensor or hemisphere
- readout software Type NivuDat for Windows® NT, 2000 and XP

Additional accessories such as memory cards, card readers, separate level / height measurements or similar depending on order. Please check by using the delivery note.

### 5.3 Storing

The following storing conditions shall be strictly observed:

Transmitter:	max. temperature:	+ 70°C
	min. temperature:	- 30°C
	max. humidity:	80 %, non-condensing
Sensor:	max. temperature:	+70°C
	min. temperature:	- 30°C
	max. humidity:	100 %

The devices must be protected from corrosive or organic solvent vapours, radioactive radiation as well as strong electromagnetic radiation.

### 5.4 Transport

Sensor and Transmitter are conceived for harsh industrial conditions. Despite this do not expose them to heavy shocks or vibrations.

Transportation must be carried out in the original packaging.

## 5.5 Return

The units must be returned at customer cost to NIVUS Eppingen in the original packaging.

Otherwise the return cannot be accepted!

# 6 Installation

## 6.1 General

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



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*The NivuChannel power supply must be separately protected by a 6 A slow-blow fuse and has to be isolated from other facility parts (separate turn-off, e.g. by using an automatic cut-out with >B< characteristics).*

---

Before feeding the rated voltage the transmitter and sensor installation must be correctly completed. The installation should be carried out by qualified personnel only. Further statutory standards, regulations and technical rulings have to be taken into account.

All outer circuits, wires and lines connected to the device must have a minimum isolation resistance of 250 V. If the voltage exceeds 42 V DC an isolation resistance with 500 kOhm min. is necessary.

The section dimension of the power supply wires must be 0.75 mm<sup>2</sup> (0.03 in<sup>2</sup>) and must be in accordance to IEC 227 or IEC 245. The unit protection rating is IP 65.

The maximum switching voltage on the relay contacts must not exceed 250V.

According to Ex-protection it must be checked if the devices power supplies must be integrated into the facility's emergency shutdown conception.

## 6.2 Transmitter installation and connection

### 6.2.1 General

The transmitter mounting place has to be selected according to certain criteria. Please strictly avoid:

- direct sunlight (use weatherproof cover if necessary, e.g. NIVUS weatherproof cover Art. No. ZMS0180000)
- heat emitting objects (max. ambient temperature: +50 °C)
- objects with strong electromagnetic fields (e.g. frequency converters, contactors / relays, electric motors with high rated input or similar)
- corrosive chemicals or gas
- mechanical shocks
- direct installation close to footpaths or travel ways
- vibration
- radioactive radiation

For fastening the wall mount enclosure, depending on place of mounting, use 4 machine screws size M5 in suitable length as well as the necessary nuts and shims. Or use 4 wood screws with min. diameter 4.5 mm. These screws must reach min. 40 mm into the wall or min. 50 mm into appropriate dowels (to be set).

The transparent door of the measurement transmitter is equipped with a protective foil for protection during transport and from scratches during assembly. This protective foil has to be removed immediately after assembly.



---

*If the view door with protection foil is exposed to direct sunlight for a long time, the foil cannot be easily removed.*

---

Cleaning of the front foil can be undertaken with spirit or if necessary with car polish. If this is not successful, a new front door can be ordered from NIVUS GmbH or your local representative.

## 6.2.2 Enclosure dimensions

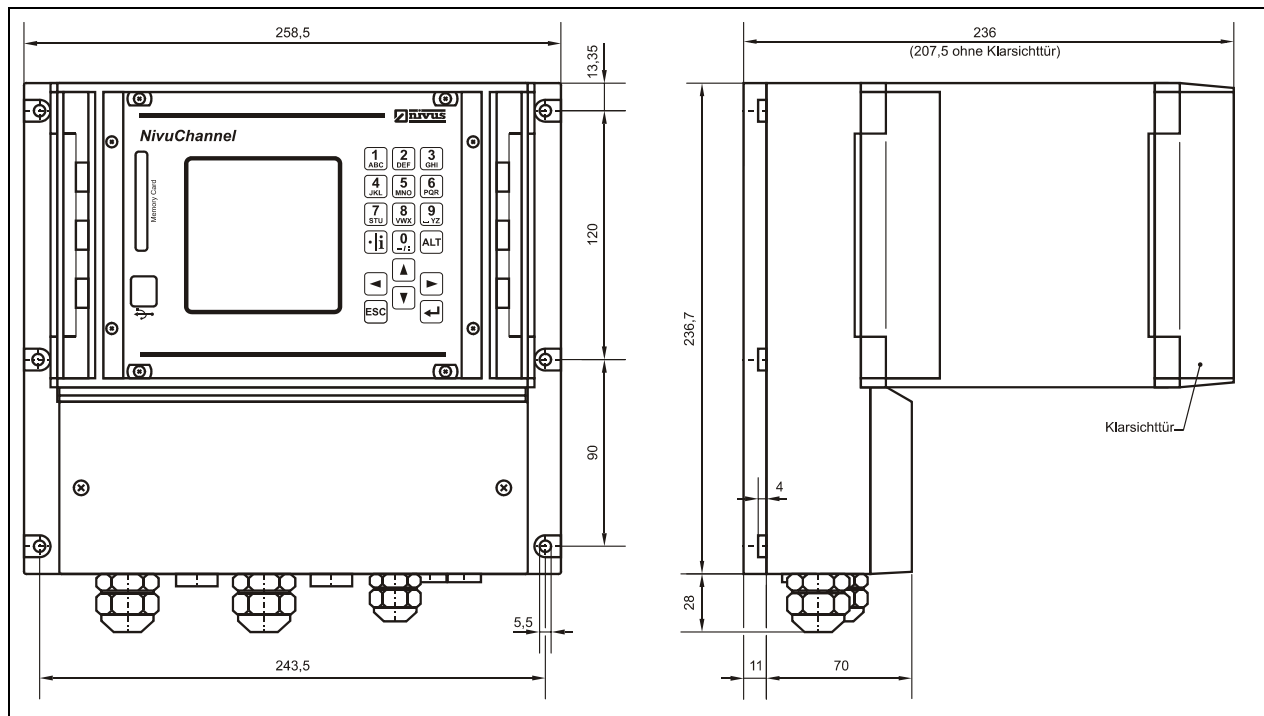


Fig. 6-1 NivuChannel wall mount enclosure

## 6.2.3 Transmitter Connection

### General

The wall mount enclosure is equipped with cable glands and dummy plugs which have been installed or added as spare parts for replacement purposes.

### Transmitter Type NivuChannel:

- 2 glands M20 x 1.5
- 2 dummy plugs M20 x 1.5
- 1 gland M16 x 1.5
- 2 dummy plugs M16 x 1.5

Using the accompanying cable glands the following outer cable dimensions can be reliably connected:

- M16 x 1.5 3.5 mm – 10.5 mm
- M20 x 1.5 6.0 mm – 14.0 mm

To be able to use cable diameters outside of the tolerance, glands must be used which ensure IP 65 minimum protection.

Unused wire lead-ins have to be locked with an appropriate dummy plug before the initial start-up.

The transmitter clamp terminals ensure a safe connection of single- and multi-wired cables with cross-sectional dimensions of 0.18-2.5 mm<sup>2</sup>.

Due to reasons of better handling the flow velocity sensors (or 2-wire level sensors) are connected using plug connections. The pre-configured NIVUS sensor cable ends or single- as well as multi-wired cables with cross-sectional dimensions of 0.18-2.5 mm<sup>2</sup> can be connected to these plug connections.

The 7-pole plug connections of the flow velocity sensors can be interchanged. It however is impossible to interchange 7-pole and 9-pole plug rail (9-poles = flow velocity sensor or adapter box connection) due to mechanic construction.

For connection to terminal clamps use a flat-bladed screwdriver with a blade width of 3.0 mm or 3.5 mm. To connect the sensors to the plugs use a flat-bladed screwdriver with a blade width of 2.0 mm or 2.5 mm.

The terminal clamps are normally unscrewed on delivery. Nevertheless this must be checked before connecting the power supply or the signal wires.



---

*Before the first connection it is necessary to have a slight pressure on the screw of the clamping connection to ensure safe opening and proper contacting.*

---



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*Please use the supplied lid and both accompanying screws to lock the terminal clamp housing in a way that protects water or dirt from leaking into the enclosure.*

---



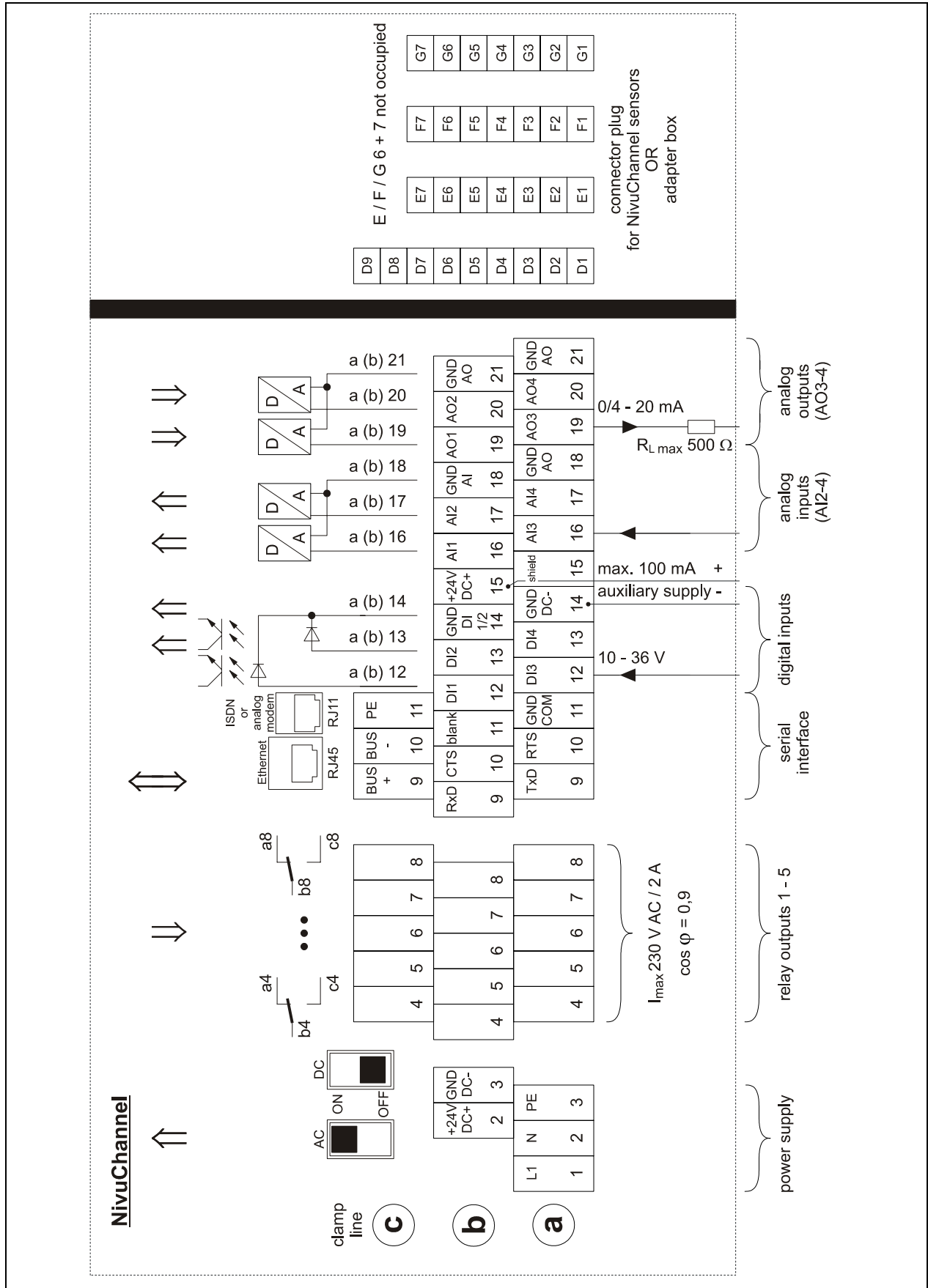


Fig. 6-2 Clamp wiring NivuChannel wall mount enclosure

## 6.3 Sensor Installation and connection

### 6.3.1 Sensor installation



Prior to beginning installation please necessarily verify compliance with regulations on safety at work.



To avoid disturbances from electrical interferences, the sensor cable must not be laid close to engine (motor) lines or main power lines. The installation of sensors in open channels or water bodies always requires previous planning since mounting options might be very individual.

#### Rod sensor

Install the holder bracket for the tube holder (stainless steel tube) of the sensor head horizontally or vertically above the water surface (NIVUS recommends to use wedge anchors and key screws with M12 metric thread). It is necessarily required to install the holder bracket in a way which enables to accurately adjust the sensors to one another after installation (recommended angle 45° horizontally). This can be achieved by visible adjustment and by analysing the impulse signal. Adjust the sensor faces (carbon pads) exactly to one another since otherwise measurement is not guaranteed to operate without any problems. Please carefully check the sensor positions. Since sensor installation on measurement places extremely depends on local conditions it is necessary to let trained expert personnel choose sensor type as well as installation method prior to installation. For installation of rod sensors on vertical channel walls or similar we recommend to use the NIVIS sensor holder for vertical or horizontal sensor adjustment.

In case of expecting heavy flow conditions we recommend to install a flow-optimised baffle plate (see accessories list) at the sensor holder. This may avoid sensor vibration as well as damage caused by debris/flotsam or similar.

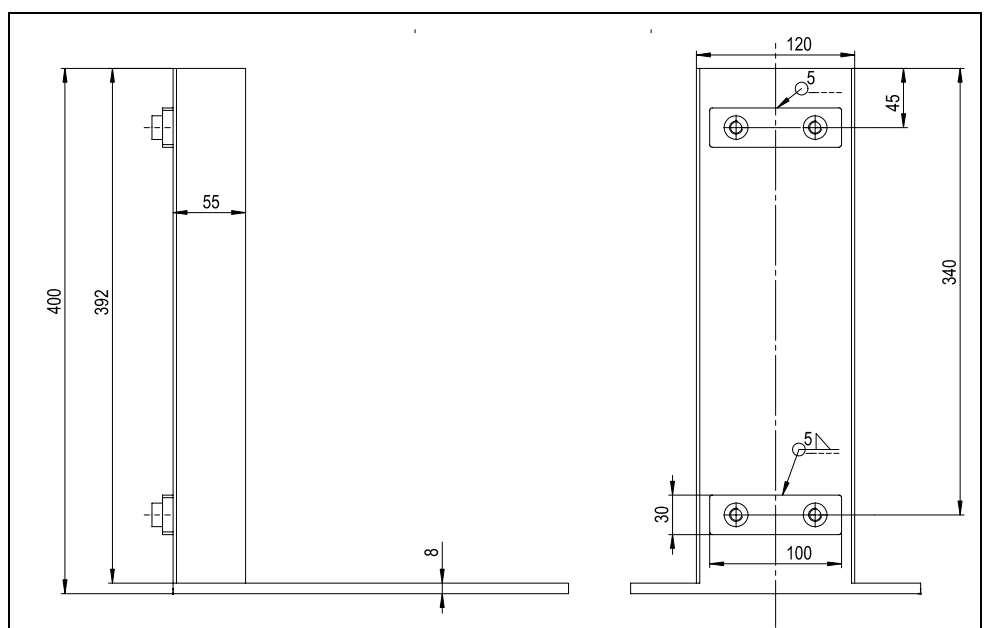


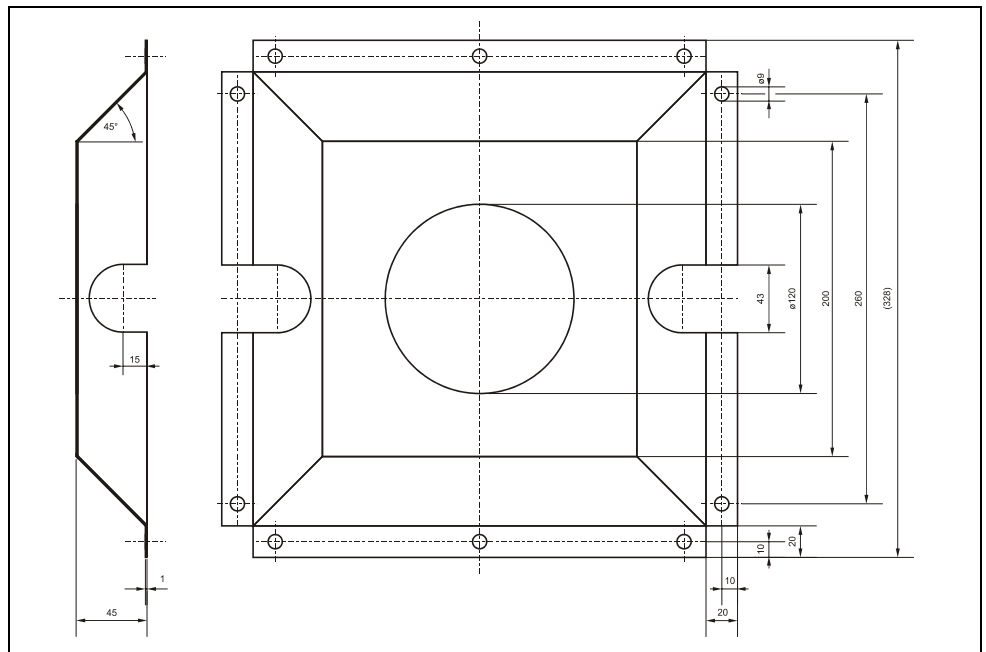
Fig. 6-3 Holder bracket for rod sensor

### Hemisphere

The hemisphere for the velocity sensor has been designed for use on vertical **and** non-vertical water body boundaries. Using the hemisphere allows to adjust angles in two different levels which enables to adjust sensors to one another. Its shape has almost no effect on the flow behaviour and helps to avoid the risk of build-up caused by debris or solids (paper, foliage, grass or similar).

The connection to sensor cable can be made using the pre-configured underwater plug connection (up to 12 m water column).

Complete installation as depicted in the example below.



**Fig. 6-4** Holder bracket for hemisphere fastening

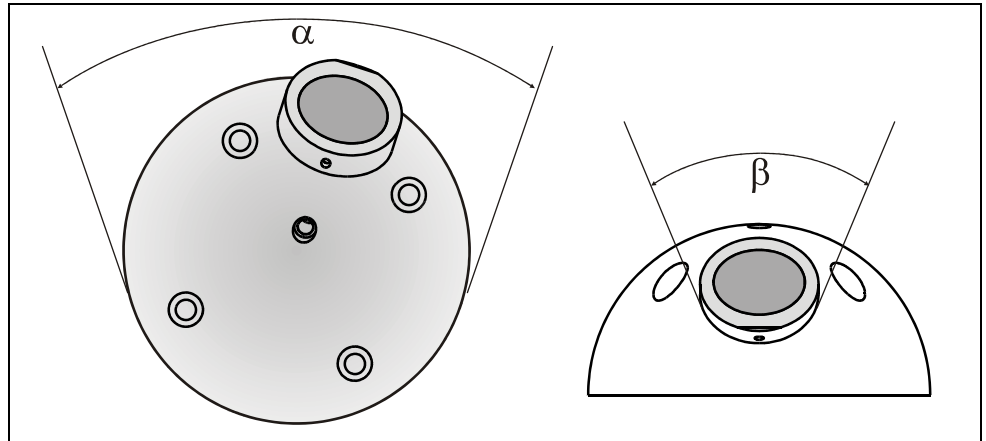


*Please note that using the flow-optimised hemisphere might require divers (aquanauts) for installation / mounting.*



*Diving works require compliance with particular regulations on safety at work. Carefully prepare this measure and consult the respective bodies for according approvals.*

Visibly adjust the sensor to one another vertically as well as horizontally after installation.



$\alpha$  = revolving sensor on ground plate

$\beta$  = rotary sensor head

**Fig. 6-5 Angular motion of hemisphere sensor**

### 6.3.2 Choosing Sensor Position and Calming Sections

Clear and defined hydraulic conditions are indispensable prerequisites for accurate measurements. This is why one has to be especially attentive to the required hydraulic calming sections.



*In case of installation in open channels or water bodies select the measurement place according to PEGELVORSCHRIFT, ANLAGE –D- and EN-ISO 748.*

- Strictly avoid falls, steps or obstructions, fittings, profile change of channels or supplies from the side upstream as well as downstream of the measurement point!
- If measuring in open channels and rivers please observe that measurement places should have a defined wetted cross-sectional area and a well formed flow profile with a constant flow velocity.
- Measurement sections have to be selected in a way that there is no sedimentation (sand, grit, sludge) arising under standard operating conditions. As from a filling level of approx. 80 % of the nominal diameter closed pipes are tending to sudden short-term impoundage. To avoid pulsation within the measurement section due to that circumstance construct the required diameter in a way that the filling level never exceeds 80 % independent from  $Q_{\min}$  or  $Q_{\max}$  in case of standard discharge ( $2 Q_{TW}$ ).
- Avoid changes of slopes within the measurement section.

### 6.3.3 Sensor connection

Connect individual path sensors either directly to the NivuChannel transmitter (one or two sensor pairs) or via adapter box (up to 8 Sensor pairs). Operate and/or extend the adapter box only with the special cable available from NIVUS which may be ordered using the according article no. (see Fig. 4-6).

The signal cable fixed on the sensor is not designed to be laid in the ground permanently. If you wish to lay signal cables into soils, concrete or similar please use additional protective pipes or hoses with sufficient inner diameters. Please select inner diameter, bending radius and layout of protective pipes and hoses in a way which enables to remove old signal cables and to draw in new ones without any problems.



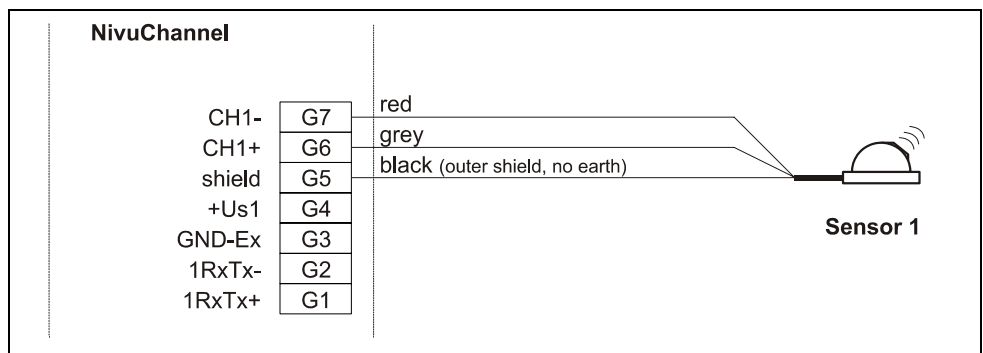
*When extending the sensors please note that extension is allowed to be carried out using the special cable available from NIVUS and appropriate connection methods (joint box, cast-resin straight-through joints and similar). Do not exceed an overall length of 100 m.*



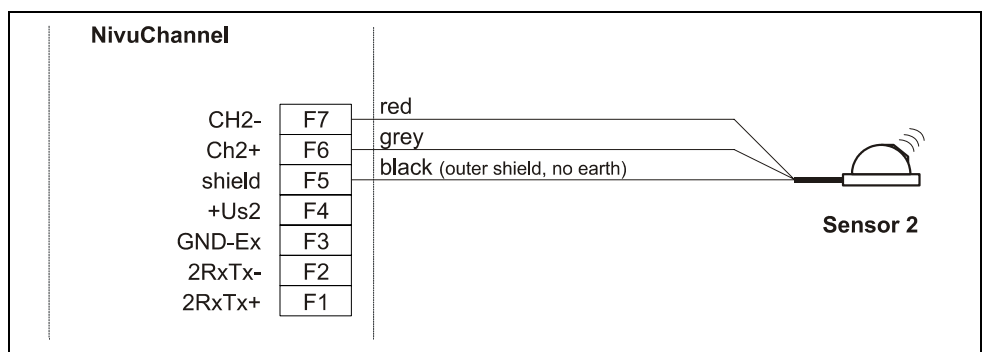
*It is not allowed to use common extensions in case of different applications or to use a common signal cable to extend separate level and flow velocity measurements.*



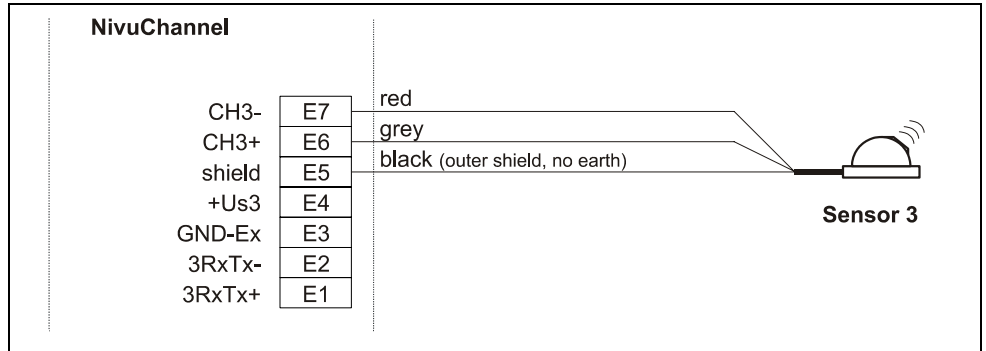
*Operating sensors with integrated pressure measurement cell without pressure compensation element for a longer period of time may lead to irreversible damage of sensor electronics.*



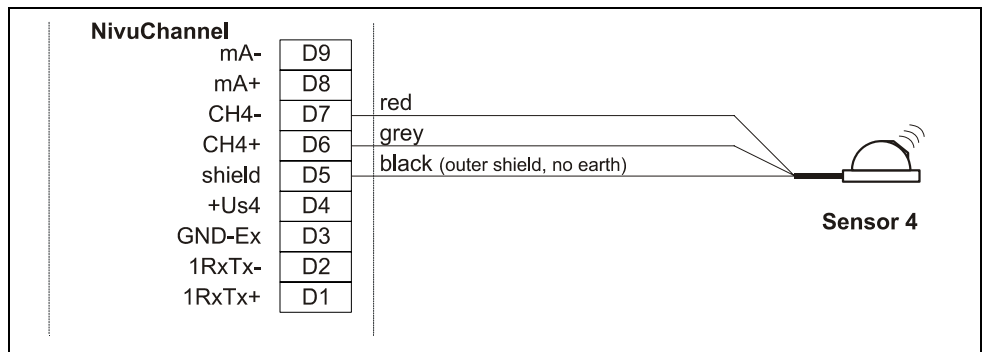
**Fig. 6-6 Connection of sensor 1 to the NivuChannel**



**Fig. 6-7 Connection of sensor 2 to the NivuChannel**



**Fig. 6-8 Connection of sensor 3 to the NivuChannel**



**Fig. 6-9 Connection of sensor 4 to the NivuChannel**



*Improper connections which lead to higher transition resistance or the use of other cables may lead to disturbance and errors in the measurement.*

## 6.4 NivuChannel Power Supply

Depending on the type of NivuChannel used, it can be supplied with 85-260 V AC. Also possible is a 24 V DC supply (see chapter 4.5)

The two slide switches located above the terminals serve as additional power switch.

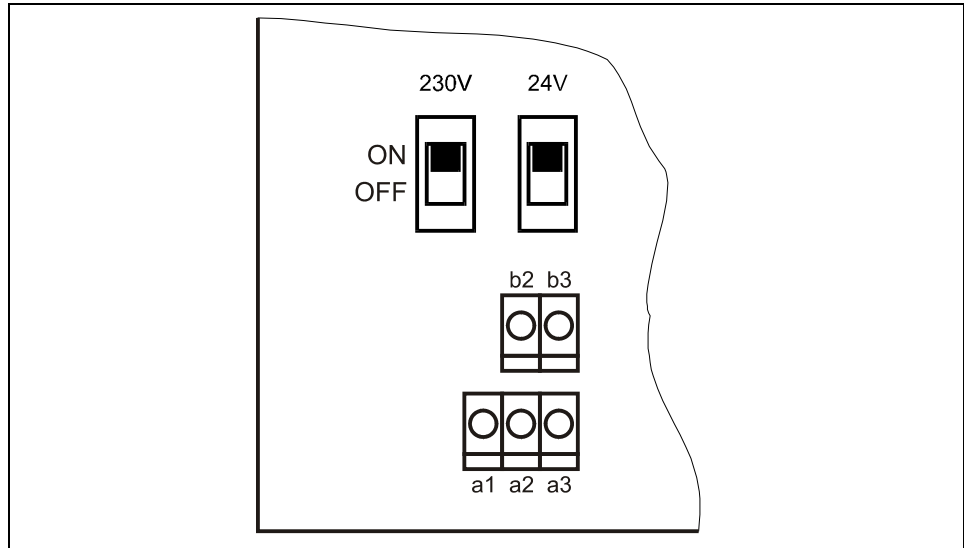


Fig. 6-10 Slide switch position on the bus board



*A transmitter with 24 V DC cannot be operated with alternating current, just as it is impossible to operate a 230 V AC transmitter with direct current.*

During AC operation the DC supply clamps b2 and b3 provide an auxiliary voltage of 24 V DC with a maximum rating of 100 mA (turn on 24 V-switch!). If using this auxiliary voltage (e.g. for feed control signals to digital inputs) please observe not to loop it through the entire switching circuit in order to keep the risk of inductive interference as low as possible.

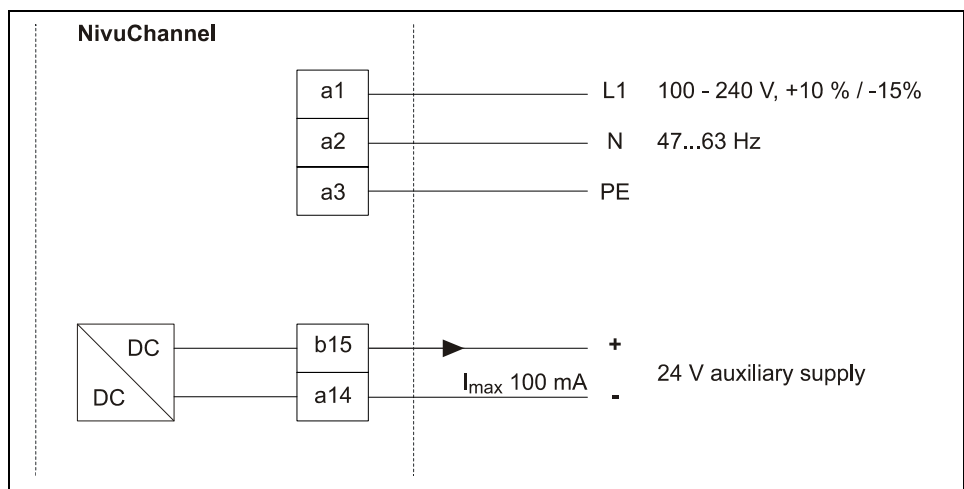
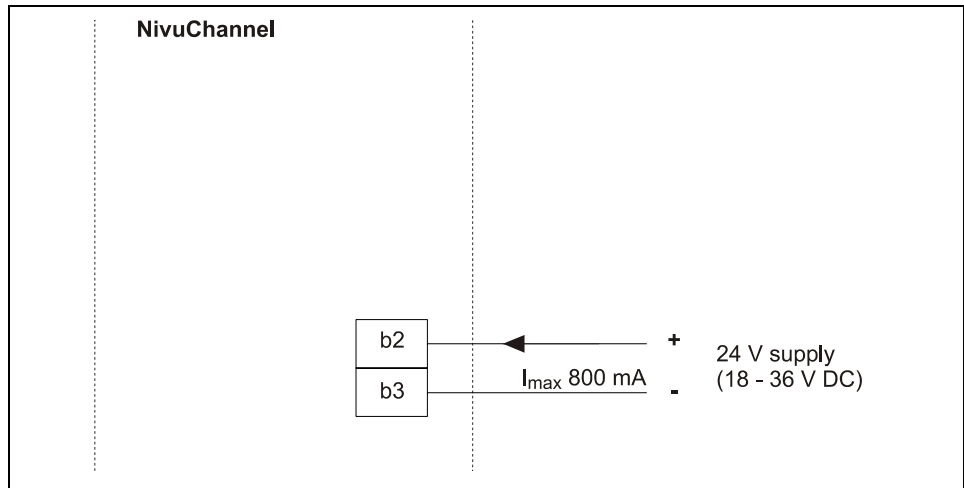


Fig. 6-11 AC model power supply



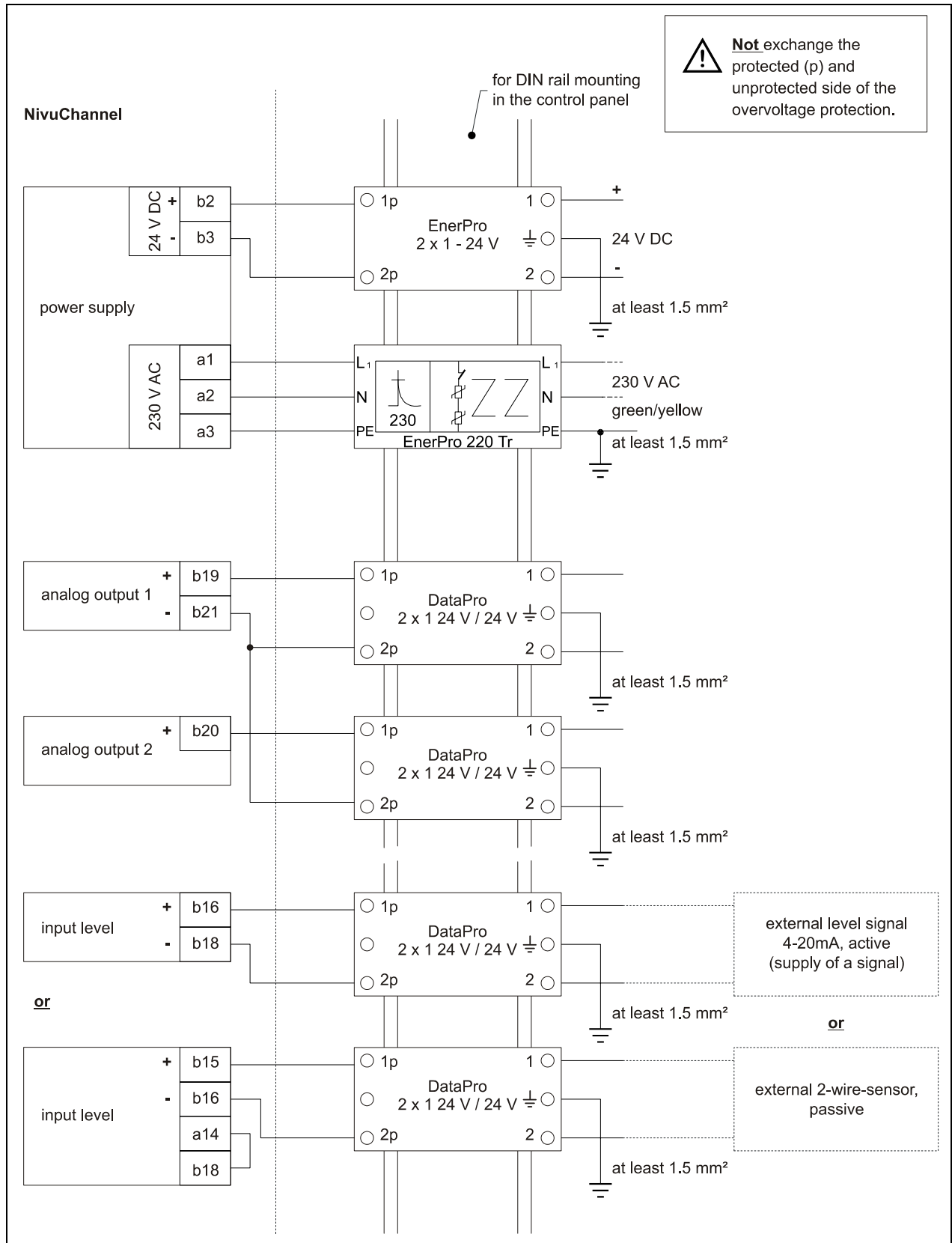
**Fig. 6-12 DC model power supply**

## 6.5 Overvoltage Protection Precautions

For effective protection of the NivuChannel transmitter it is necessary to protect power supply; mA-outputs and inputs.

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





**Fig. 6-13** Connecting the overvoltage protection for power supply and analog inputs and outputs

## 6.6 Communication

### 6.6.1 General

The NivuChannel allows remote access via Ethernet. This means that the unit can be operated via internal web-server using its self-created website. Perform remote access as if being on-site.

Requirements:

- Intranet or TCP/IP network or:
- Internet access via provider (if connected via ISDN modem or GSM / GPRS modem)
- new Internet browser
- Java<sup>®</sup>

There is no need to install any additional software if there is the latest Internet browser and the latest Java plug-in available on your network PC/Laptop.

If you wish to access the unit via the NIVUS Internet portal it is necessary to have a permanent Internet connection established (modem or DSL). Once having programmed the NivuChannel and setting up data transmission the unit can be accessed from any PC in the world!



---

*Do not confuse NivuChannel remote access and process conducting systems. The NivuChannel requires direct dialog with the user via PC. There is no real-time access. It is not possible to carry out automatic data transmission.*

---

Depending on the user's status the following functions are either accessible or locked:

#### Viewer

- operational conditions, progress lines, sensor status etc. can be selected and viewed
- saved data and parameter files can be downloaded
- settings can be selected but cannot be modified permanently
- data files cannot be deleted
- no transmitter updates possible

#### Operator

- operational conditions, progress lines, sensor status etc. can be selected and viewed
- saved data and parameter files can be downloaded
- device settings can be modified permanently
- data files can be deleted
- memory card can be formatted
- device updates possible

### Administrator

All rights see operator level. Additionally:

- setting up new units
- administration of unit levels, sub-users and operating levels

Depending on the type of transmitter (see Chapter 4.5) there are various ways for data communication. Select from:

- Ethernet
- Analog modem
- ISDN-Modem
- GSM/GPRS modem



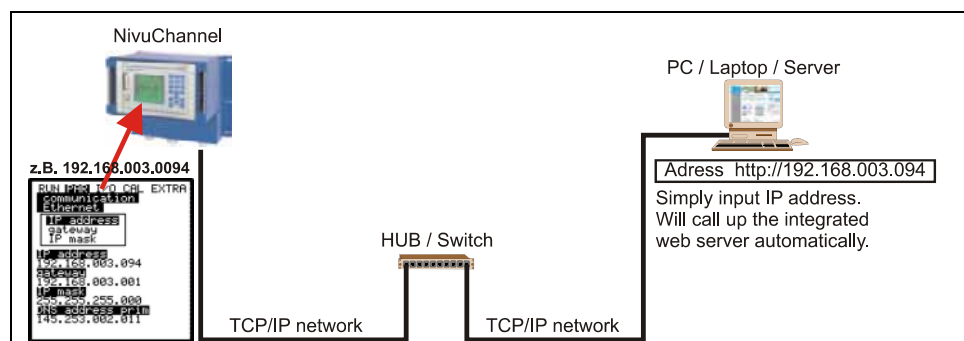
*Remote access will cause access expenses on behalf of the unit as well as on behalf of the viewer/operator. These expenses may vary in terms of different providers, time online, flat rate or similar agreements and are not influenced by NIVUS.*

*The system administrator is responsible for the amount of future communication expenses arising.*

## 6.6.2 Communication Options

There are several different options available for communication with the NivuChannel. Nachfolgend handelt es sich um:

- direct Ethernet connection between PC/Laptop and NivuChannel using a cross-link cable.
- Ethernet level connection via TCP/IP, network connection via Ethernet hub or switch. It is required to use patch cables.
- connection via network server using DHCP (Dynamic Host Configuration Protocol) and/or DNS (Domain Name Server).  
See a diagram depicted in Fig. 6-15.
- Internet connection via access portal (see Fig. 6-16)  
It is required to use a NivuChannel equipped with according hardware such as analog modem, ISDN modem or GPRS to set up such a connection.  
The setup is described in Chapter 6.6.3.



**Fig. 6-14 Communication without Server**

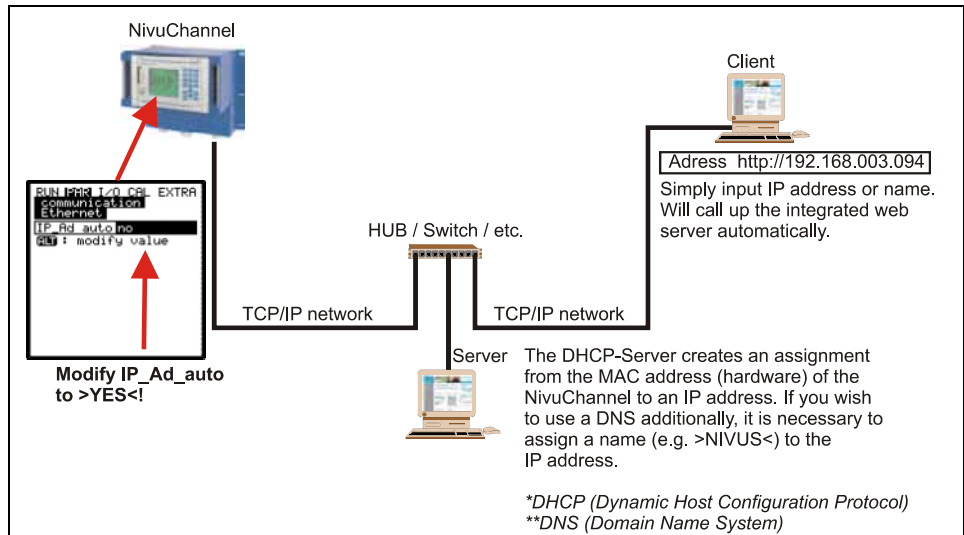


Fig. 6-15 Communication with server

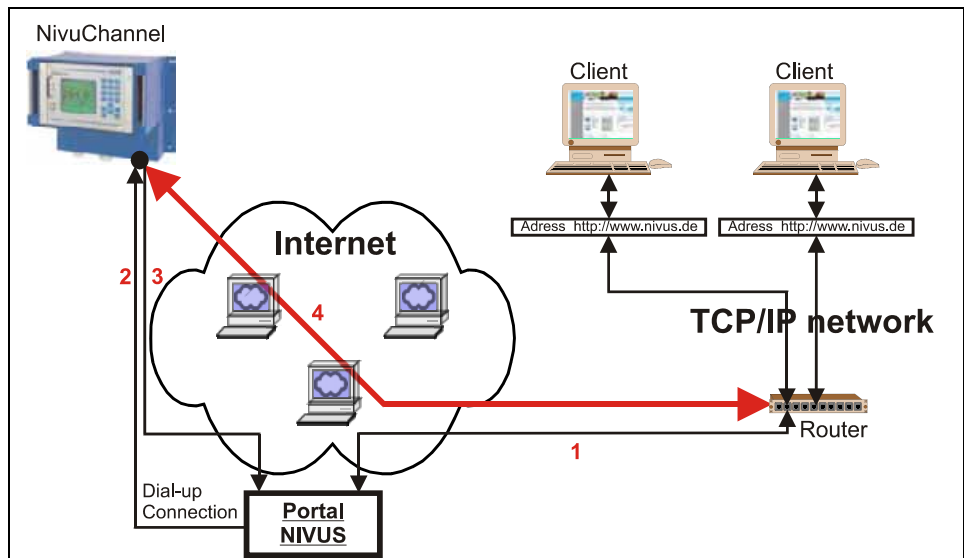


Fig. 6-16 Communication via Internet

### 6.6.3 Communication Setup and Connection via Access Portal



Setting up an Internet communication for one or several NIVUS flow measurement units requires an initial setup by NIVUS or a company which is authorised by NIVUS.



Setting up a modem connection (analog, ISDN, GPRS or similar) will cause communication expenses depending on the connection chosen. Please observe while transmitting data.

After the initial setup has been finished successfully following units, which are equipped with the same transmission system, can be set up by the customer or the customer's system administrator.

Starting the Internet connection requires a Portal. This Portal is available on the NIVUS homepage.

To start communication enter the following address in your Internet Explorers:

[www.nivus.de](http://www.nivus.de) or [www.nivus.com](http://www.nivus.com)

The start screen of the NIVUS homepage will appear.

On the right-hand side of the start screen you can find the measurement technology online login area with the fields „User Name“ and „Password“.

You are going to receive both codes after the initial setup has been carried out by NIVUS. We highly recommend to change the password during the first log-in.



Fig. 6-17 Start of communication



*Do not forward user names and passwords to unauthorised persons!  
Keep user names and passwords separated from each other and in a way which avoids misuse.*

After entering the valid user name and password a selection page will appear. This page indicates any measurement place registered for this user. The measurement places can be selected directly from here.



**Fig. 6-18 Measurement place selection**

After selecting the desired measurement place and clicking the >Connect< button communication with the selected NivuChannel will be established. User name and password are going to be verified again and the homepage contained in the NivuChannel will be transmitted.

This may take between 15 and 120 seconds depending on modem type and quality of connection.



**Fig. 6-19 Connecting**

### 6.6.4 Data Transmission

After connection has been established successfully, first of all a static page with current measurement values (flow, fill level and flow velocity) will be indicated on the right-hand side of the screen. These numeric values can be refreshed automatically in intervals of 2, 5 or 10 seconds by clicking the according field below and setting the cycle time subsequently.



**Fig. 6-20 Static communication page**

Clicking the >Remote Control< button on the left-hand side of the screen will initially start a JAVA<sup>®</sup> applet. If the JAVA<sup>®</sup> software is not installed on the PC, it can be downloaded for free by clicking the JAVA<sup>®</sup> button (next to the word >Remote Control<) which will open up a direct link to JAVA<sup>®</sup>.



*Remote control is not possible if the „JAVA<sup>®</sup>“ software is not installed on the operator PC!*

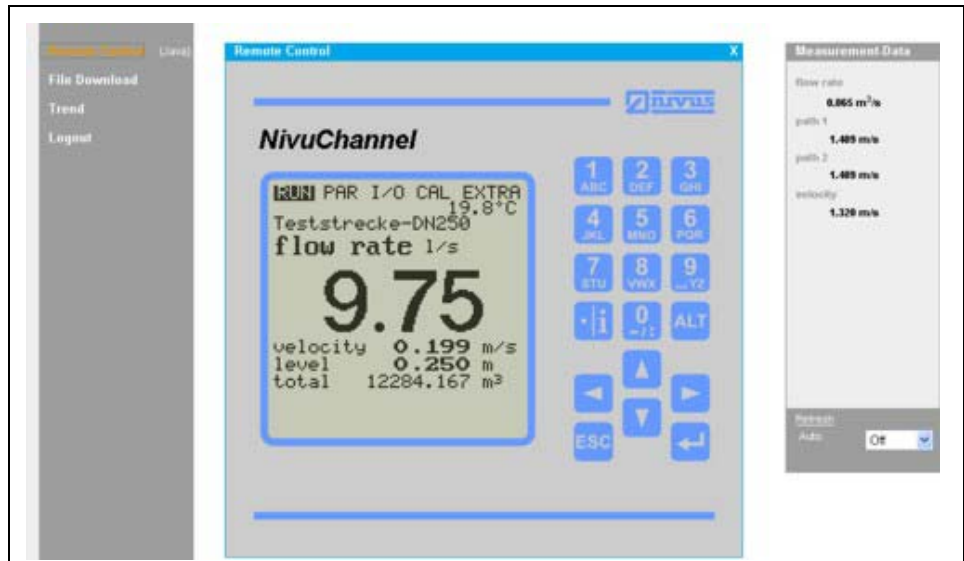
*Download and installation of programs or software may damage your computer and is therefore completely left at user's risk!*



**Fig. 6-21 JAVA<sup>®</sup>-Applet starting**

After starting JAVA® successfully, the NivuChannel display now is indicated in the same manner as if being on-site.

The NivuChannel can now be operated by using the PC keyboard (arrow keys >left<, >right<, >up<, >down< and >Enter<, >ESC< and >ALT<) exactly the same way as if using the keys on the unit front board. It is possible to operate the virtual keys on the screen by clicking with the mouse as well. Please observe the delay occurring due to the kind of transmission (→ no quick consecutive control entries, but always one movement at a time after the previous command has been executed visibly).



**Fig. 6-22 Visualisation of online connection**

By clicking the control element >File Download< underneath the >Remote Control< button it is possible to directly download data from the plugged memory card. Information on the card will NOT be deleted automatically which ensures data to be available on later downloads.

After double-clicking the desired file can be either opened directly or downloaded in uncompressed original format or as compressed gzip-file.

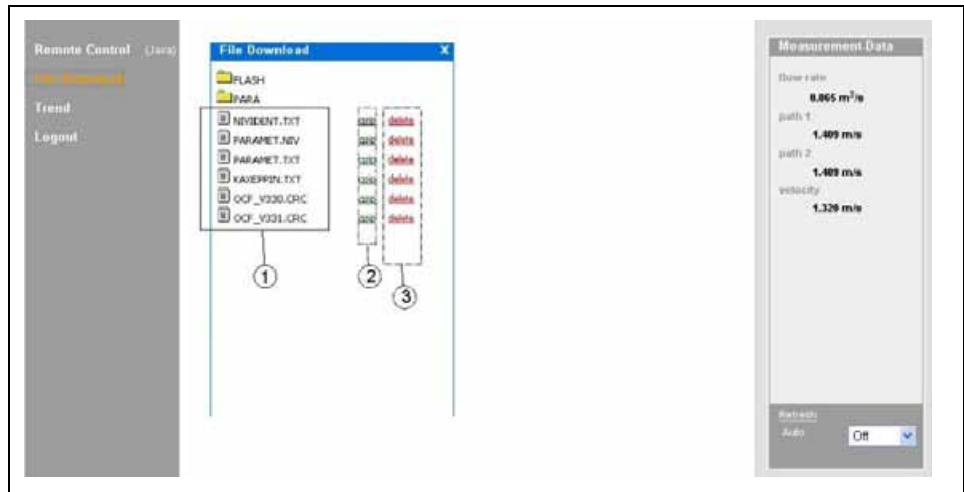
The .gz-files can be unpacked for further use with WinZip. The file size will be reduced by approx. 75 % by using the .gz-format and hence is recommended particularly if large measurement place files have to be transmitted via analog modem and GPRS (reduces expenses).

You can find more information on the NivuChannel file structure and how to use the single files in chapter 8.5.9.



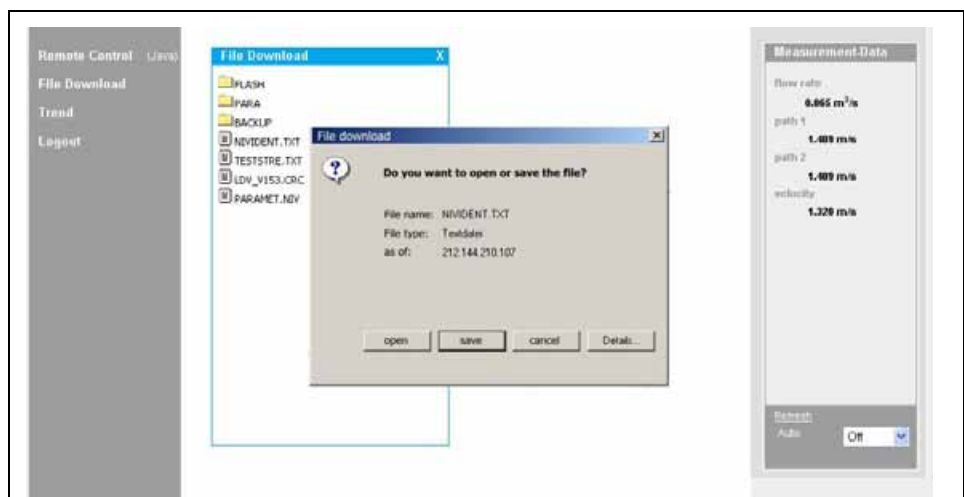
*It is not possible to transfer data files if the memory card is not plugged and storage is disabled!*





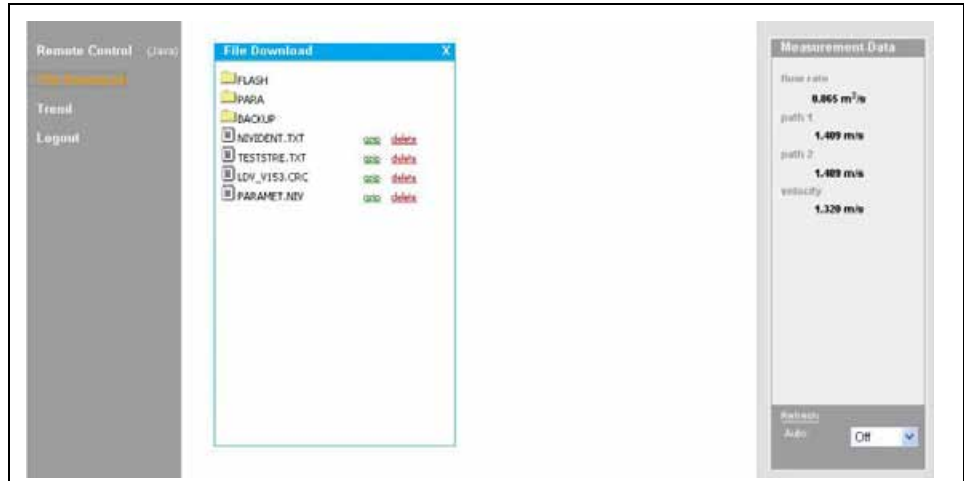
- 1 Uncompressed downloadable files in original format
- 2 ZIP-file area
- 3 Delete area (to be moved into backup folder)

**Fig. 6-23** Selecting the file to transmit or to delete



**Fig. 6-24** Saving transmitted files on PC

The selected file can be deleted by double-clicking it in area 3 (see Fig. 6-25). In order to be able to read or to transmit the file later, this action will move the file into a backup folder which has been created automatically.

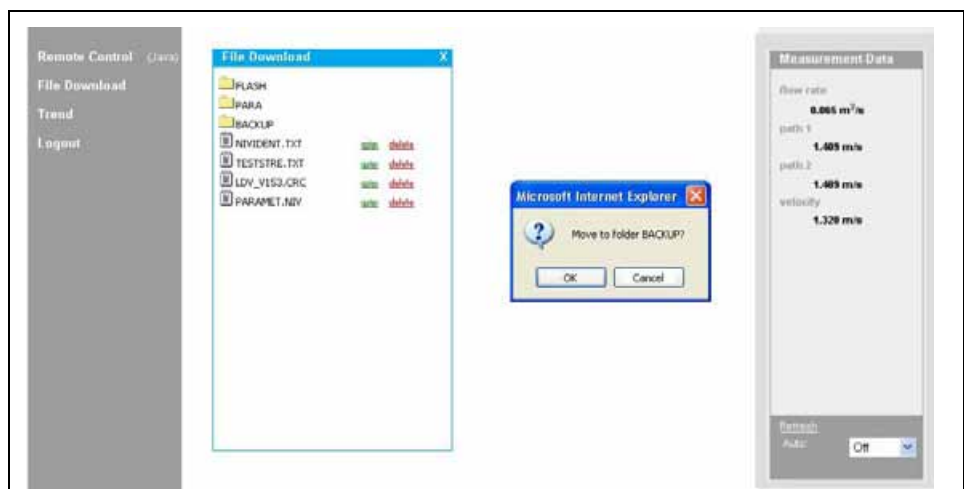


**Fig. 6-25 Created backup folder**

Files which have been moved into the backup folder will be deleted irrevocably from the memory card if clicked again for deleting.



**Fig. 6-26 Contents of created backup folder**



**Fig. 6-27 Permanently deleting a file**



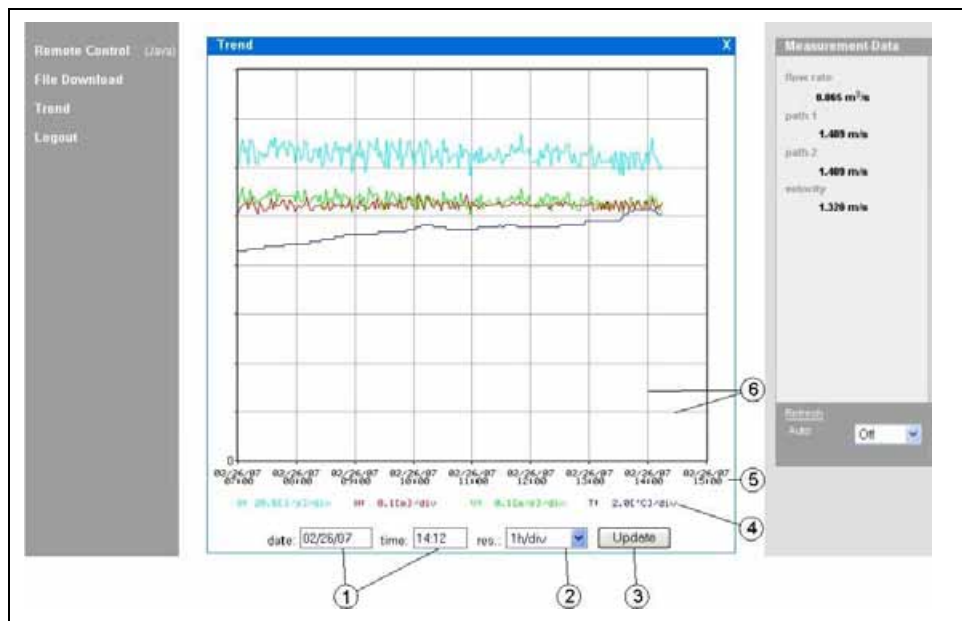
*Transmitting the measurement place file without deleting it or moving it into the backup folder will cause to attach all future readings to the transmitted file. This is going to blow up the size of the file as old data which have been transmitted before are going to be transmitted again!*



*Deleting a file (moving it into the backup folder) while having a file with the same name in the target folder will cause the older file to be overwritten without any additional warning!*

A click on the >Trend< button on the left-hand side enables to indicate a trend graph parallel to the trend screen indicated on the NivuChannel to visualise data stored in the internal unit memory. The range of data to be indicated covers a maximum of 90 days.

**The screen below comes up after clicking:**



- 1 Display range
- 2 Resolution
- 3 Update button
- 4 Scale of readings
- 5 Time axis
- 6 Scale grid

**Fig. 6-28 Online trend graph**

Flow volume, fill level, average flow velocity and medium temperature are going to be indicated as coloured progress lines. The units here are equal to the units indicated on the NivuChannel display (see chapter 8.4)

The readings on the y-axis are going to be scaled according to a grid in steps of 0,1; 0,2; 0,5; 1; 2; 5; 10 ..... up to a maximum of 10000. Here the selected scale unit is equal to a horizontal grid line (see point 6 in Fig. 6-28). Set the start point for the trend graph to be indicated under point 1. The resolution (scale of the time axis) can be set under point 2. Select here between 10 minutes, 1 hour, 6 hours or 24 hours/grid line.

A click on the >Update< button (point 3 in Fig. 6-28) will refresh the screen by the new measurement data which have been collected whilst watching.



---

*If the selected start date/time of the trend is the current date/time or if the time axis range allows to view a greater range than selected by start date/time and resolution this will cause the screen to indicate older values than selected additionally.*

---

Log out the on-site unit by using the >Logout< button located on the left-hand side of the screen as well. This will take you back to the NIVUS homepage.



---

*If no data transmission has been executed for 5 minutes, the NivuChannel will automatically interrupt the connection in order to avoid unnecessary expenses.*

---

## 7 Initial start-up

### 7.1 General

#### Notes to the user

Before you connect and operate the NivuChannel you should strictly follow the notes below!

This instruction manual contains all necessary information to program and to operate the device, addressing qualified technical staff who have appropriate knowledge about measurement technology, automation technology, information technology and waste water hydraulics.

To ensure a correct function of the NivuChannel this instruction manual must be read thoroughly! The NivuChannel must be wired in accordance with the wiring diagram, see chapter 6.2.3! If any problems regarding installation, connection or programming should occur please contact our technical division or our service centre.

#### General Principles

The initial start-up is not allowed until the installation has been finished and checked. To exclude faulty programming this instruction manual must be read before the initial start-up. Please get familiar with the NivuChannel programming via display and keyboard by reading the instruction manual before you begin to program the device. After transmitter and sensors are connected (see chapters 6.2.3 and 6.3.3) the parameters must be set.

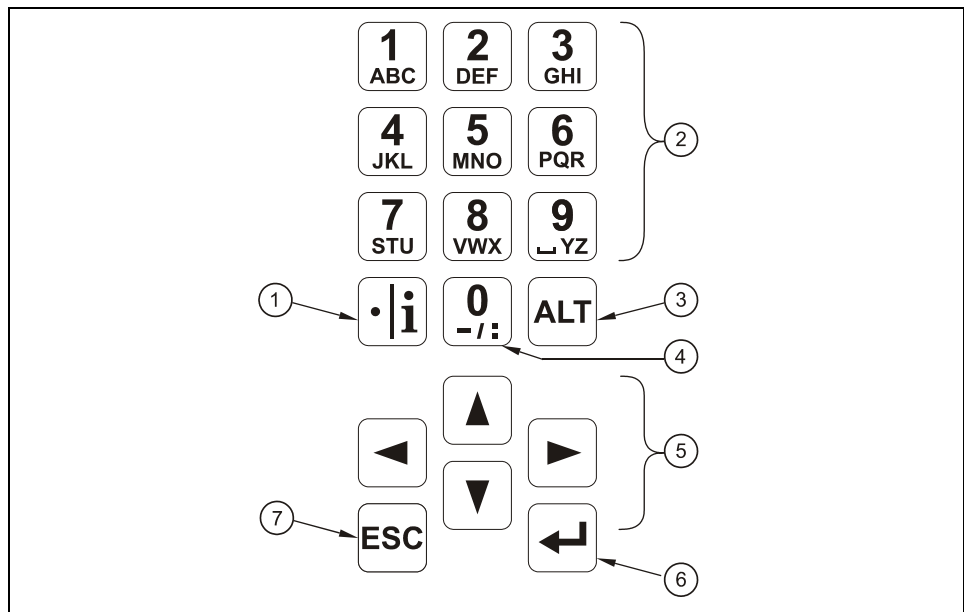
In the most cases all you need is:

- geometry of the measurement place (Type) and dimensions
- used sensors and positioning
- display units
- span and function of analog and digital outputs

The NivuChannel user surface was designed in a way that even unfamiliar users are able to easily set up basic settings in graphic dialog mode which ensure reliable device operation. For extensive programming, difficult hydraulic conditions, special channel shapes, in case of absence of expert staff or if a setup and error protocol is required, the programming should be carried out by the manufacturer or an expert company which is authorised by the manufacturer.

## 7.2 Operator Panel

There is a comfortable 18-button keypad available to input required data.



- 1 Comma / info
- 2 Figure – letter block
- 3 Shift key
- 4 0 / - navigation button
- 5 Control
- 6 Enter
- 7 Escape

Fig. 7-1 Operator panel

## 7.3 Display

NivuChannel has a large back-lit graphic display with a resolution of 128 x 128 pixel. This ensures a comfortable communication mode for the user.

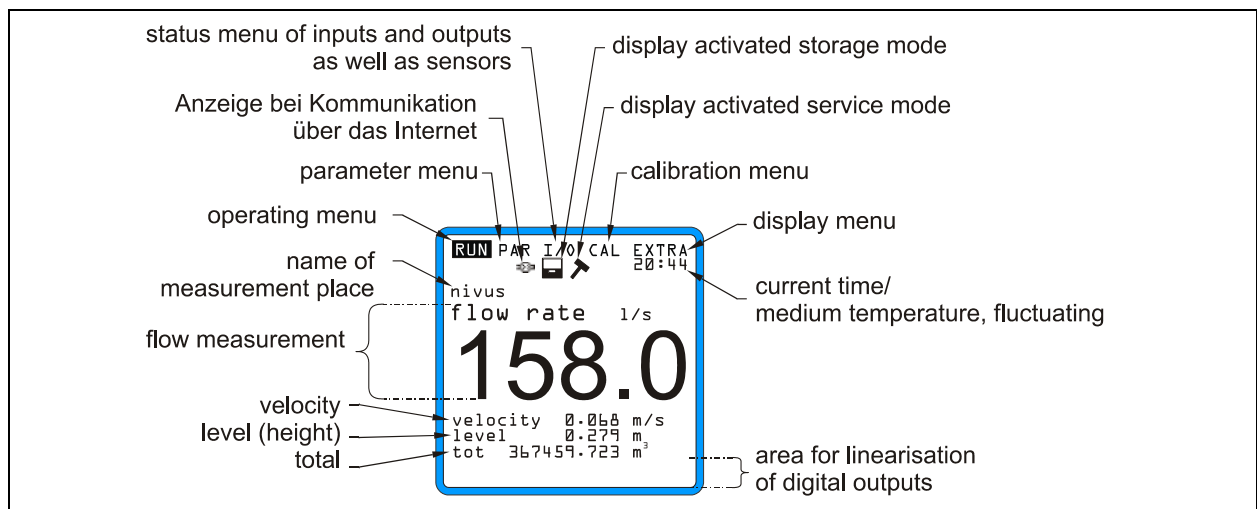


Fig. 7-2 Display

Five basic menus can be selected, visible in the headline of the display. They can be selected individually. The menus are:

- RUN** Standard operation mode. Apart from indicating the names of measurement places it allows to display time, flow volume, flow level, average flow velocity as well as to optionally show flow velocity, day totals error messages including a function enabling to record flow volume, flow level and average flow velocity.
- PAR** This menu is the most extensive of the NivuChannel. It is for the complete parameter setting of dimensions of the measurement place, sensors, analog and digital inputs and outputs, storage, data transmission and regulator function.
- I/O** This menu includes information about internal operation of the NivuChannel. All current values can be displayed, as well as the values of analog and digital outputs and relays. Additionally, single velocities are displayed. It further allows to determine the remaining capacity as well as the remaining memory time on an optionally plugged memory card resulting from the cycle time.
- CAL** Here it is possible to adjust height (depth) and flow velocity of analog outputs and to simulate analog as well as digital outputs.
- EXTRA** This sub-menu includes basic display settings: contrast, lighting, language, units, system times and totaliser presets.

## 7.4 Operation Basics

The entire operation is menu driven and supported by explanatory graphics. To navigate within the menu structure use the 4 control keys (see chapter 7.2).



Use these buttons to select main menus.



Buttons for scrolling within menus.



Selected submenus can be entered, inputs can be opened. The "Enter" key further serves to confirm data entries.



Escape submenu step by step. Cancels entered data.



These buttons are used for parameter setting and to enter digits. In some sub menus the buttons are to input letters (e.g. name of measuring point). Function compares with mobile phone or cell phone buttons: multiple quick pressing switches over to the next letter. The cursor will jump to the next digit if no key will be pressed for approx. 2 seconds.



The key "dot/i" serves for entering digits. In RUN-Mode it also recalls internal information on device, software version, MEG address, serial no. of transmitter and connected active NIVUS sensors. Furthermore it restarts communication between transmitter - flow velocity sensor.



This button is to switch between uppercase and lowercase letters in text entry mode. Further it is used to delete and to insert data. In the rest of the parameter setting mode it enables/disables various functions, as well as SHIFT-key between various programming options.

## 8 Parameter Setting

### 8.1 Quick Guide Parameter Setting (Quick Start)

In case of standard applications – part filled standard channel; level and flow velocity measurement by one pair of sensors; 1x mA output for flow rate; 1x impulse output - normally just a few basic settings, such as the ones mentioned below are required:

1. Install and connect transmitter and sensor as described in chapter 6
2. Connect power supply
3. Menu: EXTRA – Units: select units for flow (l/s), velocity (m/s), level/height (m) and total (m<sup>3</sup>). (units in brackets = default settings)
4. Menu: PAR – Measurement place – Channel profile: select profile
5. Menu: PAR – Measurement place – Channel dimensions: enter channel dimensions
6. Menu: PAR – LDV Parameter – path arrangement: number of paths (enter number of sensor pairs)
7. Menu: PAR – LDV Parameter – mounting position: enter position of sensors (parallel distance, angle to one another and height).

#### Additional Settings

8. Menu: EXTRA – Display: adjust brightness and contrast if necessary
9. Menu: EXTRA – System time: adjust time if necessary
10. Menu: PAR – Measurement place – Name of measurement place: enter the name of the measurement place
11. Menu: PAR – analog outputs – Function: enable analog output 1 (flow)
12. Menu: PAR – analog outputs – output span: select output span
13. Menu: PAR – analog outputs – measurement span: select measurement span
14. Menu: PAR – analog outputs – error mode: define what level the analog output should take in case of error
15. Menu: PAR – Relay outputs – Function: enable relay 1 (select pos-total impulse)
16. Menu: PAR – Relay outputs – Pulse parameter: set impulse value and duration
17. Exit parameter setting. Save values by entering code number 2718



## 8.2 Parameter Setting Basics

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

If “yes”, it requires to enter the code number.

**2718** Type in 2718 if prompted.



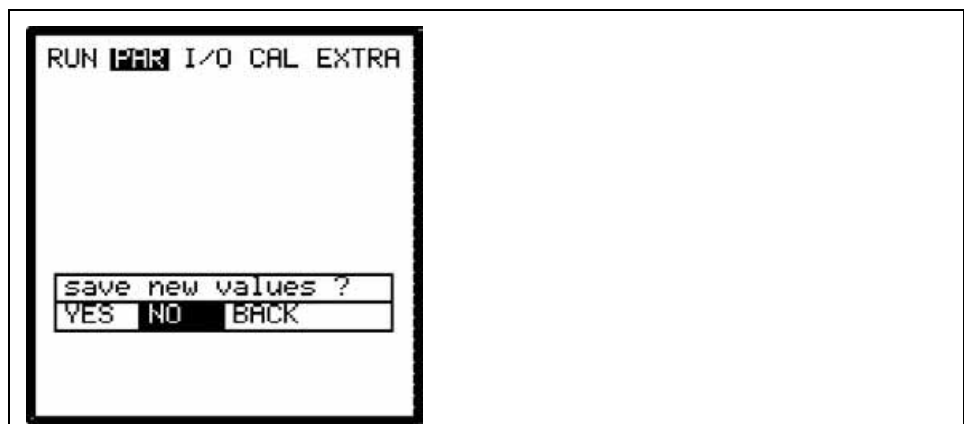
---

*Never give the code number to any unauthorised persons. Even do not leave the code next to the equipment or write it down on it. The code number protects against unauthorized access.*

---

If a faulty code has been entered three times the parameter mode will be aborted. The unit will proceed to operate using the values set earlier. If the correct code has been entered the modified parameters are accepted and the system resets. This reset will take approx. 20-30 seconds.

Besides having the option to save modified parameters or to reject any modification by pressing >No< at the end of the parameter setting procedure, it is possible to jump back to the previous level using the >Back< function. This enables the user to modify settings which might have been forgotten without the need to buffer previously modified settings.



**Fig. 8-1** Screen on end of parameter setting

If parameter settings are not going to be modified but just verified by selecting each parameter, there will be no request at the end of the dialog.

Modifications concerning language, units, contrast and display brightness do not require the code to be entered as these settings influence just the way of representation and not measurement or output.



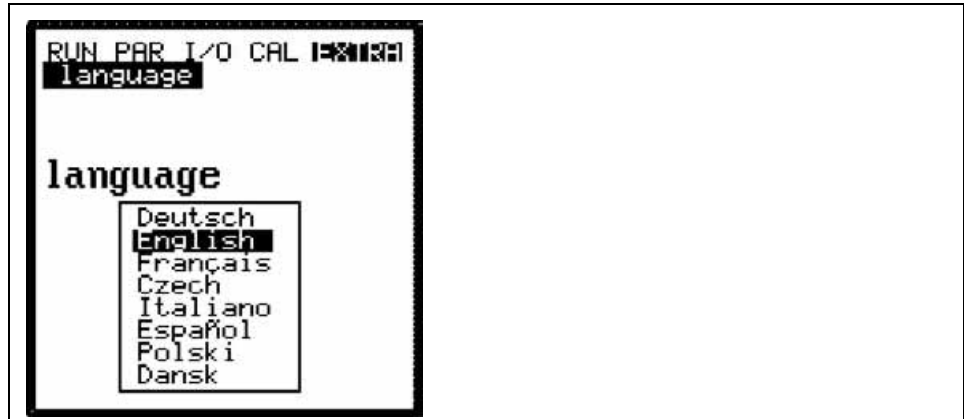
---

*This instruction manual describes all programming options of the NivuChannel. Depending on the device type various inputs and outputs may not be available. They may be programmable, but may not be available to be used as outputs or to be connected (see also Chapter 2.3.1).*

---

After mounting and installing sensor and transmitter (see previous chapters) activate the power supply.

The initial start-up dialog is the language selection:



**Fig. 8-2 Language Selection**

Select the desired language by using the arrow keys and press >Enter< to confirm.



Please press key once.

The transmitter begins communication evaluating the flow velocity and coordinates both processor programs. At the same time, you see the software version number on the display. This is required if problems should arise during programming.



---

*This procedure is required after each sensor change.*

---

Due to safety reasons please reset the system afterwards (menu PAR / sub-menu "setup parameter")

Now you are ready to begin setting your parameters.



---

*The system reset is allowed to be carried out only for a new unit. Custom parameters will get lost performing a reset and the unit will reset to factory defaults.*

---

### 8.3 Operation Mode (RUN)

This menu is a display menu for standard operation mode. Containing the following sub menus, it is not required for parameter setting:



Fig. 8-3 Operation mode selection

#### Normal

Display (basic screen) with information about the name of measurement place, time, medium temperature, flow quantity, level, average velocity and total volume.

#### Day Totals

Please select submenu INFO (see Fig. 8-4). This menu contains the total flow values of the past 7 days. (see Fig. 8-5, presumed the transmitter was operated without any interruption in the past seven days. Otherwise it shows the total for the uninterrupted days of operation).

The 24-hour flow totals will be indicated. Totalisation normally is carried out at 00:00 h (midnight). If desired, this value can be modified under RUN – Day Totals - Interval (see Fig. 8-6)

Additionally, you can get information about partial total value since the last reset (comparable with rout mileage counters in cars). Reset to >0< by pressing the >ALT< key. This reset does not influence the totaliser!

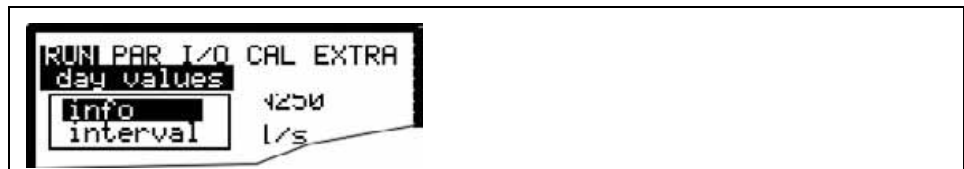
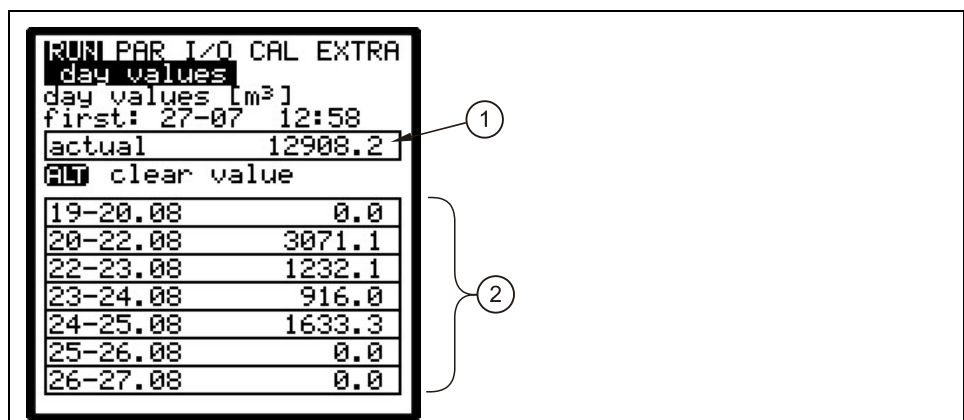


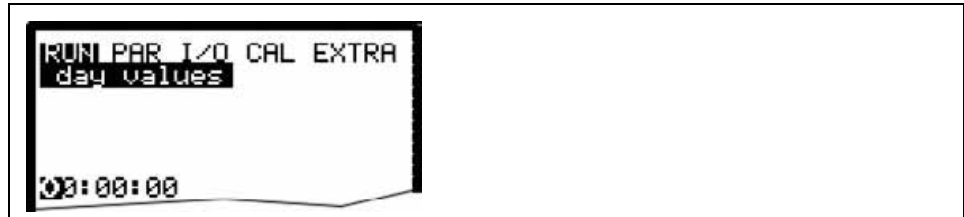
Fig. 8-4 Info menu



1 Day values range (current)

2 Day values (previous days)

Fig. 8-5 Day values



**Fig. 8-6 Time of day totalising**



*If the transmitter is disconnected from mains at the time of totalising set, it is not possible to create or to save a total for the respective day.*

*If the unit has been shut down temporarily between two totalising points, the flow rate missed during the inoperative period is not going to be considered for totalising. There will be no averaging interpolated replacing the lost flow rate!*

### Error Messages

This menu is to monitor any interruptions in the unit function. Errors are going to be saved and ordered by type of error, date and time.

Selecting the menu will always indicate the latest error message. Browse

through error messages using the keys ▲ and ▼.

Pressing the >ALT< key will delete all error messages one by one (from the latest one back to the oldest one). It is possible to select and to erase a single error message too.

The maximum number of stored error messages is limited to 16.

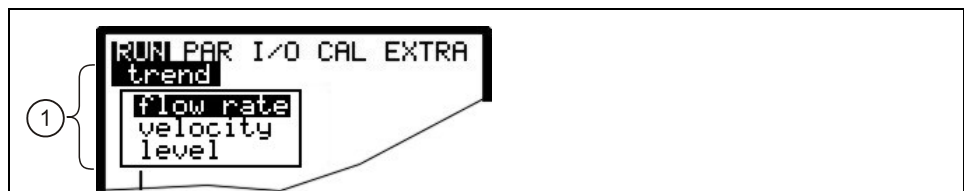
New error messages will not be saved before old ones are not going to be erased as soon as a number of 16 messages has been reached.



*When deleting an error message at a time when the error still is due to be dealt with, this error will NOT be written into the error memory again. The error will be saved in the memory not before it has disappeared and arisen again (or if the power supply has been interrupted briefly).*

### Trend

Operates like an electronic writer. Average cycle values of level, average flow velocity and height (level) will be recorded for the past days. Values can be individually selected and viewed in a submenu.



1 selection possibility of different displays

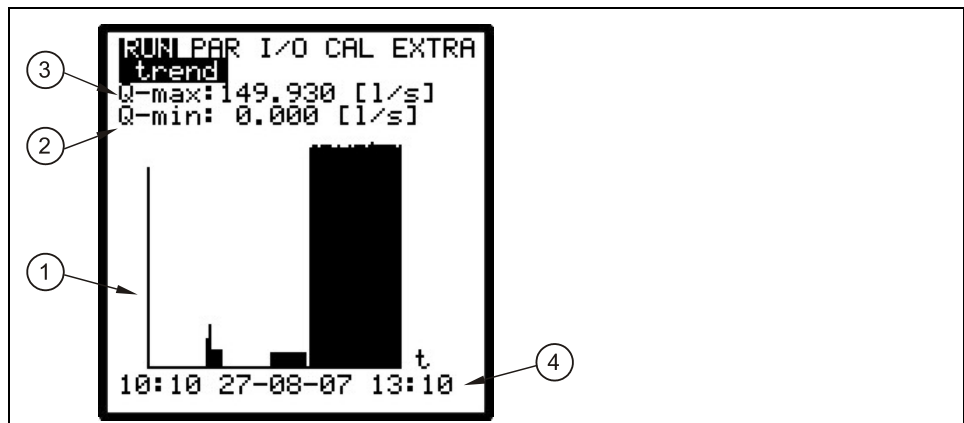
**Fig. 8-7 Trend value selection**

The period within which values have been averaged is indicated on the bottom line of the graphic display. New values will be added as vertical lines on the right-hand side each time after the programmed storage interval has expired (see Fig. 8-8). This is why the oldest value moves to the left-hand side of the display and from there into the internal memory area.

By using the arrow keys >left< and >right< you can scroll within the time axis in order to view older data sets. Browse through day values (steps of 24 hours) using the arrow keys >up< and >down<. This enables to determine and to evaluate previous measurements, trends, dry weather periods as well as possible measurement problems which have been occurred some days before. The internal memory has a capacity of 90 days. Subsequently, saved data will be overwritten erasing the oldest data sets first.

Indicated measurement values will be scaled automatically during scrolling and therefore might change in order to ensure the best reading available.

The memory time interval can be set in the PAR - Memory Mode - Interval menu. The factory default setting is set to an interval of 2 minutes.



- 1 Graphic
- 2 Minimum value
- 3 Maximum value
- 4 Storage interval

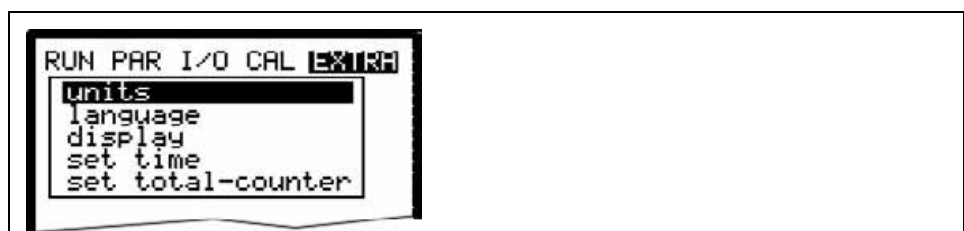
**Fig. 8-8 Trend graphic example**



*All trend graphic values saved previously will get lost if the memory interval or another parameter is going to be modified.*

## 8.4 Display Menu (EXTRA)

This menu allows to modify settings such as basic screen, units, language as well as the display itself. The following submenus are available:



**Fig. 8-9 Extra submenus**

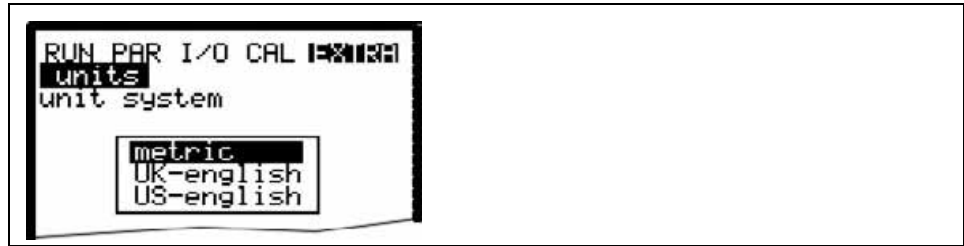


Fig. 8-10 Unit system selection

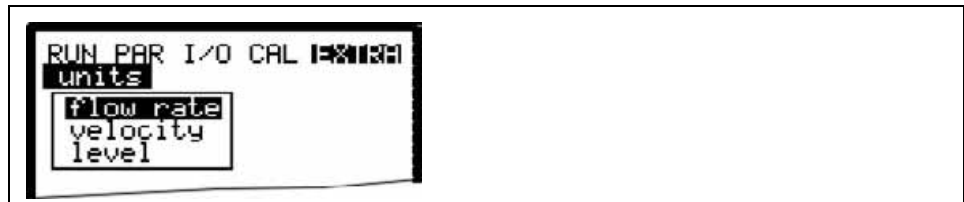


Fig. 8-11 Selection of individual units

**Units**

This menu contains the following sub menus:

- Flow
- Velocity
- Level
- Total

For each of these 4 measured values you can select a unit which appears on the display. Depending on the unit system selected, there are various units available.









**Unit System**

Here you can select between metric system (litre, cubic meters, cm/s etc.), English system (ft, in, gal/s, etc.) and American system (fps, mgd etc.).

**Language**

select from German, English, French, Czech, Italian, Spanish, Polish and Danish.

**Display**

allows to adjust display settings regarding contrast and brightness. Use  and  to decrease;  and  to increase values.  and  modify values in 5 % steps,  and  in steps of 1 %

**System Time**

In order to perform various control and memory functions, the unit includes an internal system clock saving dates of year, weekdays and week numbers. The clock settings can be modified if required (different time zones, summer time / winter time etc.).

First select the menu point "Info":

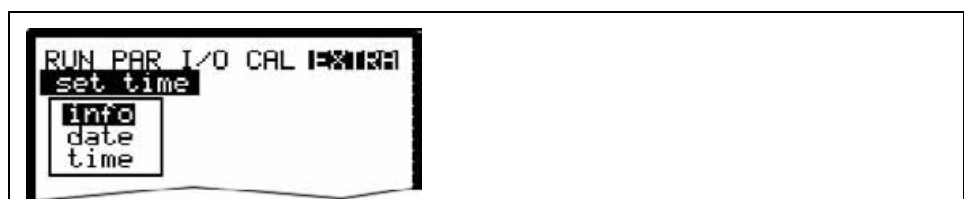
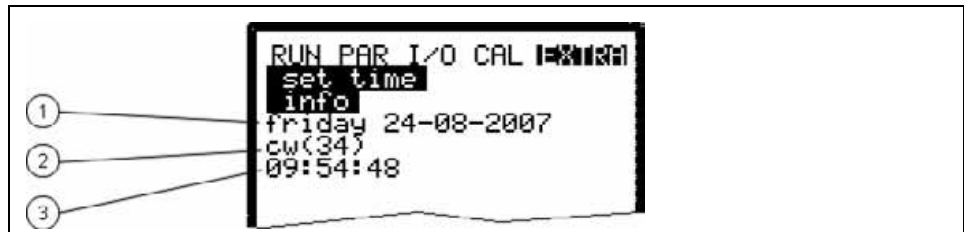


Fig. 8-12 System time submenu

The complete system time is indicated after the settings have been confirmed:



- 1 Date
- 2 Week number
- 3 Time

**Fig. 8-13 Complete system time**

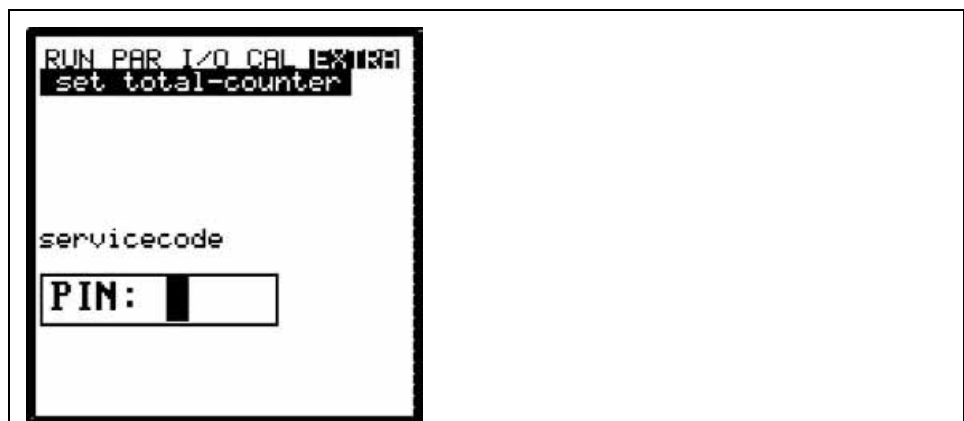
This menu point is for indicating purposes only. Hence the system time cannot be adjusted here. Modifications can be carried out in the individual menus "Date" and "Time". The according week number will be set automatically as soon as the date has been set.

### Totaliser

This menu allows to newly set the totaliser indicated on the main screen. This feature is normally going to be performed in case of replacing a transmitter which has to indicate the same value as before replacement. After the new value has been set confirm twice using the "Enter" key and type in the code number "2718" (up to 2 faulty entries possible). Otherwise the new value will not be accepted.

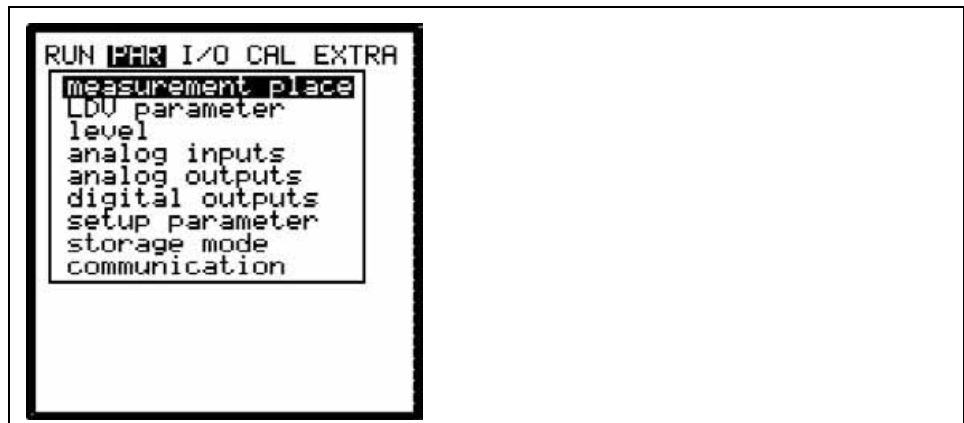


**Fig. 8-14 Totaliser modification**



**Fig. 8-15 Service code request**

## 8.5 Parameter Menu (PAR)



**Fig. 8-16** Selecting the measurement place

This menu is the most extensive and most important regarding the OCM Pro settings. It nevertheless is sufficient in most cases to set only some essential parameters, which usually are:

- name of measurement place
- channel profile
- channel dimensions
- sensor arrangement
- analog output (function, measurement range and measurement span)
- relay output (function and values)

All other functions are additions which are required in special cases only (special channels, storage mode or for special hydraulic applications). These settings are normally made with the help of our service personnel or by an authorised expert company.



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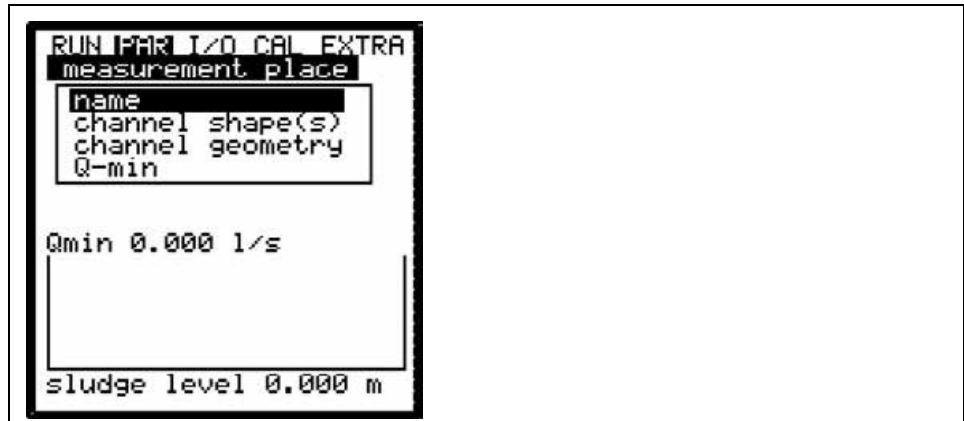
*This instruction manual describes all programming options of the NivuChannel. Depending on the device type various inputs and outputs may not be available. They may be programmable, but may not be available to be used as outputs or to be connected.*

---

The parameter menu >PAR< includes eleven partially very extensive submenus which are described individually on the following pages.



### 8.5.1 Parameter Menu „ Measurement Place “



**Fig. 8-17 Submenu measurement place**

This menu is one of the most important basic menus for parameter setting as the measurement place is going to be defined here. The menu cannot be indicated completely due to restricted display space. Similar to many well-known PC applications, this is readily identifiable from the black bars on the right-hand side of the screen.



Use "Up" and "Down" keys to scroll the menu.

#### **Name of measurement place**

NIVUS recommends to coordinate and to define names according to names stated in the respective documents. Names may contain up to 21 letters. Setting the name is quite similar to operating a mobile phone:

After the submenu >Name of Measurement Place< has been selected the basic setting "nivus" will come up. Toggle between uppercase and lowercase letters by using the >up< or >down< keys.

Pressing the "Alt" key will either turn on or off a selection of special characters. The special characters can be selected individually with the >left< or >right< arrow keys, confirm your selection with "Enter".












- 1 Name of measurement place
- 2 Selection menu

**Fig. 8-18 Setting the name of the measurement place**

Enter the desired name with the keypad, where each key has assigned three letters and a number (see Chapter 7.2). Select between these four characters by briefly pressing a key several times. The cursor will jump to the next character if a key has not been pressed for two seconds.

**Description of Keys:**

		Moves the cursor to the left-hand or the right-hand side.
		Moving the cursor to the left-hand side will delete the character left of the cursor.
		Moving the cursor to the right-hand side creates a space character.
		Toggle between uppercase and lowercase letters.
		Shift to uppercase letters.
		Shift to lowercase letters.
		Confirm the entered name with "Enter" and exit the menu.

**Subdivide profile**

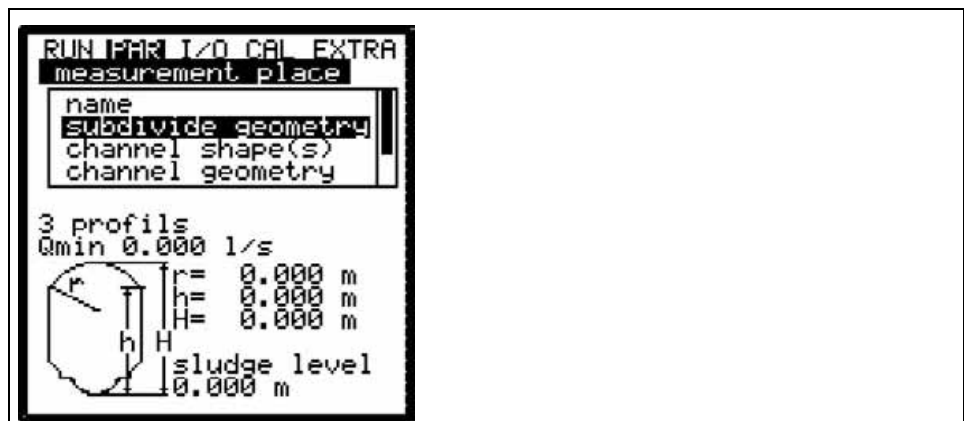
This is a special parameter which enables to easily set parameters for large special profiles with convex tops. This parameter will not be required for the very most applications! Mainly, authorised NIVUS personnel is going to use this function; which nevertheless will be described here briefly.

Basically, it is possible to subdivide special profiles in 2 or 3 level / height zones allowing to set dimensions in a faster way.

Pressing the >ALT< key will switch between the 3 options described below:

- NO (no profile subdivision, standard setting)
- 2 (subdivide in 2 level / height zones)
- 3 (subdivide in 3 level / height zones)

Please note that it is not possible to subdivide the river bed (channel) profile. Zones can be set under Parameter/Measurement Place/Channel Profile(s). The bottom zone of the profile can be set to >Pipe<, >Egg<, >Rectangle<, >U-Profile<, >Trapezoid<, >2r Egg< and Q=f(h). Set a height-width or a height-area characteristic in the centre zone and enter a segment of circle in the top profile zone.

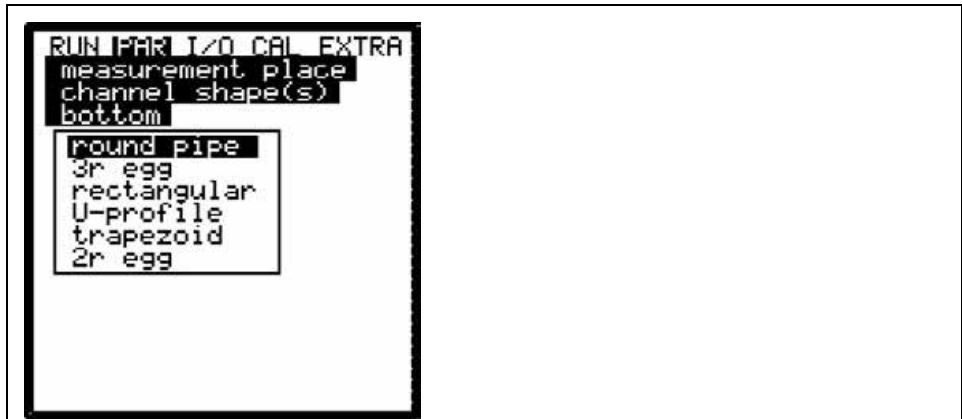


**Fig. 8-19 Profile divided into 3 zones**




**Channel profile(e)**

If the profile has not been subdivided first select the zone (bottom, centre, top) with the >ALT< key and set the desired profile subsequently. You can select between following standard profiles according to ATV A110:

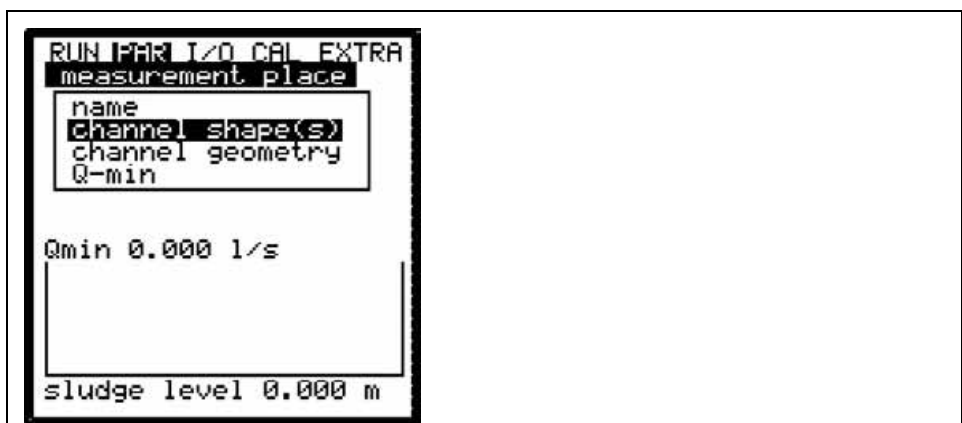
- Pipe
- Egg (standard; h:w = 1.5:1)
- Rectangle
- U-Profile
- Trapezoid and
- 2r Egg (h:w = 1:1)



**Fig. 8-20 Channel shape selection**

-   Select channel shape with "Up" and "Down" keys.
-  Confirm selection with "Enter".

The selected profile will be indicated in the programming mode screen.



**Fig. 8-21 Selected profile**

If the existing profile does not comply with the options to select from, choose >Custom shape< in this case.

-  Confirm with "Enter".

A request will come up subsequently asking for known relations.

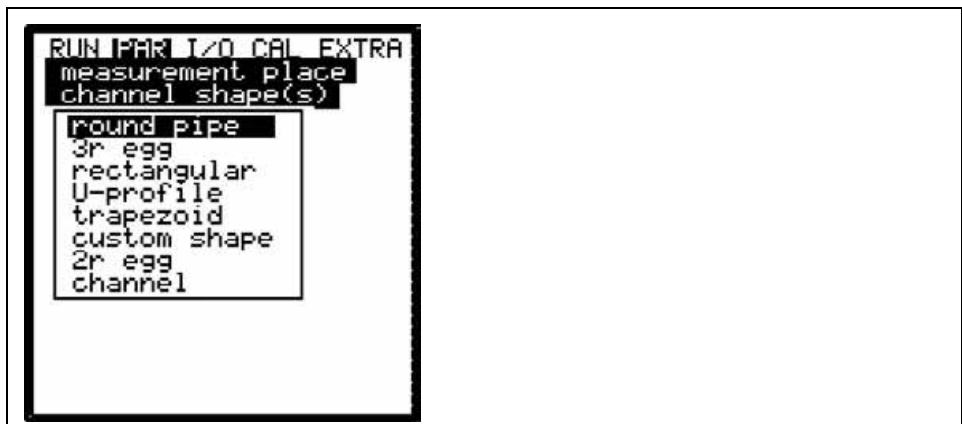


**Fig. 8-22 Custom shape menu**

### Profile

If the profile has not been subdivided simply select the according channel shape of the measurement place.

Choose from:



**Fig. 8-23 Not subdivided profile**

This selection not only covers commonly used channel shapes, it allows to set up and to detect free profiles and a river bed (channel) as well.

### Channel dimensions

Type in the respective channel dimensions depending on the profile chosen before.

#### Pipe:



**Fig. 8-24 Channel dimensions for Pipe**

Enter the pipe radius here.

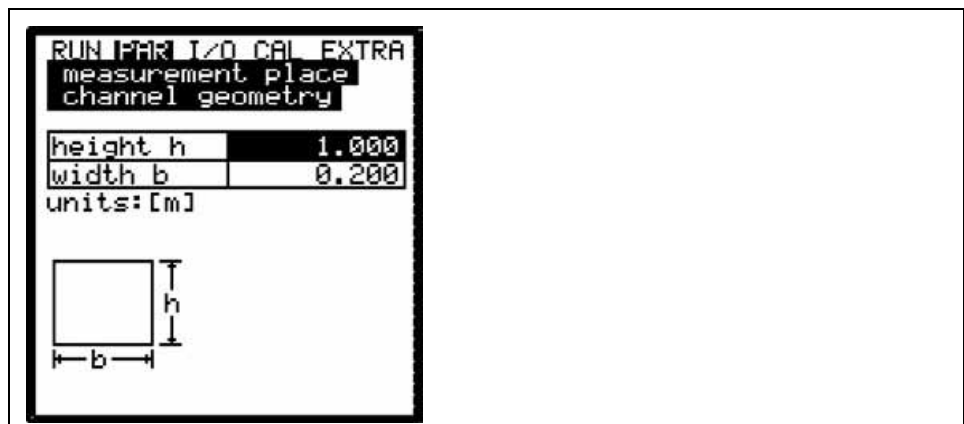
**Egg (standard; h:w = 1.5:1):**



**Fig. 8-25 Channel dimensions for Egg**

This screen is to enter the radius of a standard egg.

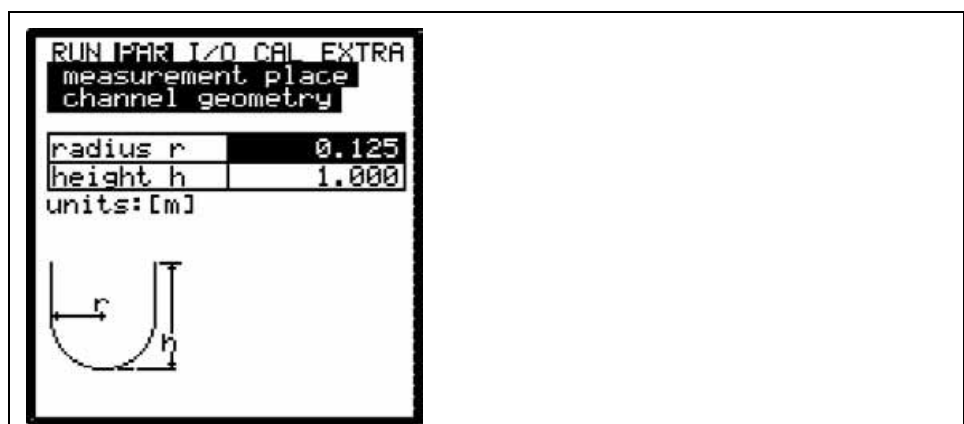
**Rectangle:**



**Fig. 8-26 Channel dimensions for Rectangle**

Enter the dimensions of rectangular channels here.

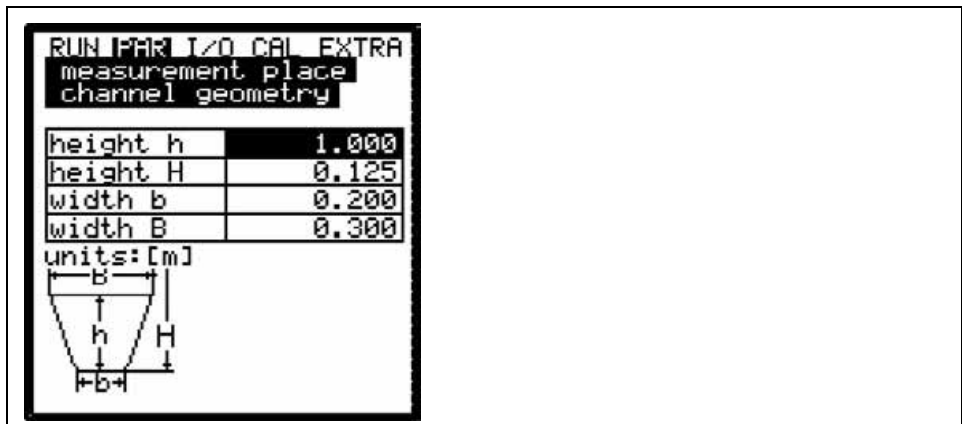
**U-Profile:**



**Fig. 8-27 Channel dimensions for U-Profile**

Here you can input the dimensions (radius and height) of an U-profile.

**Trapezoid:**



**Fig. 8-28 Channel dimensions for Trapezoid**

This menu accepts a total of 4 values defining the dimensions of a trapezoid channel.

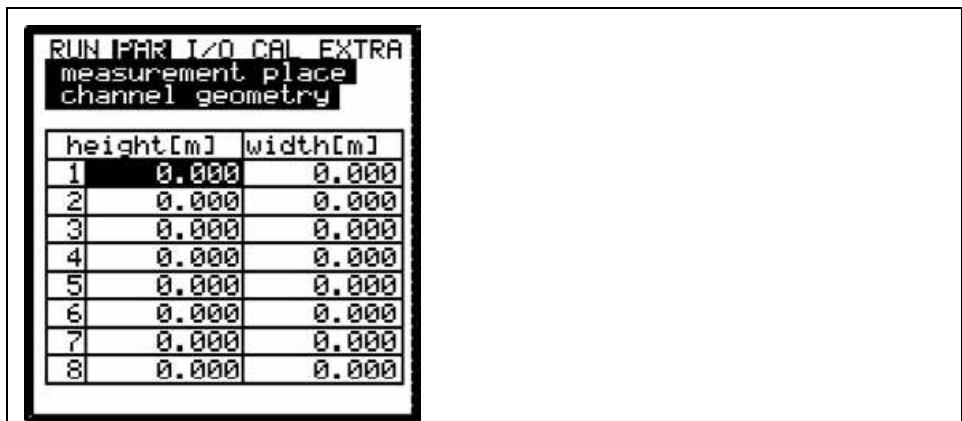
**Custom Shape:**



**Fig. 8-29 Selection of channel dimension for Custom Shape**

Once having chosen custom shape select the calculation reference first. Define whether there is a profile width or directly an area to be assigned to the fill level.

**Height - width**



**Fig. 8-30 Height – width entry**

Height - area

RUN PART 1/20 CAL EXTRA		
measurement place		
channel geometry		
height[m]	area[m <sup>2</sup> ]	
1	0.000	0.000
2	0.000	0.000
3	0.000	0.000
4	0.000	0.000
5	0.000	0.000
6	0.000	0.000
7	0.000	0.000
8	0.000	0.000

Fig. 8-31 Height – area entry

Choosing >Custom shape< will indicate a table of 32 possible breakpoints on the display. As described above, enter the relations between height-width or height-area and enter the according value pairs. In order to define the zero point of the channel start by entering 0 – 0 in breakpoint 1. All further breakpoint can be set freely regarding height as well as width/area.

There may be different distances between individual level points. Furthermore it is not required to use all of the 32 breakpoints possible. The NivuChannel however is going to use a linearisation function between the breakpoints. Decrease the distance between breakpoints in case of heavy and irregular fluctuation within the area.

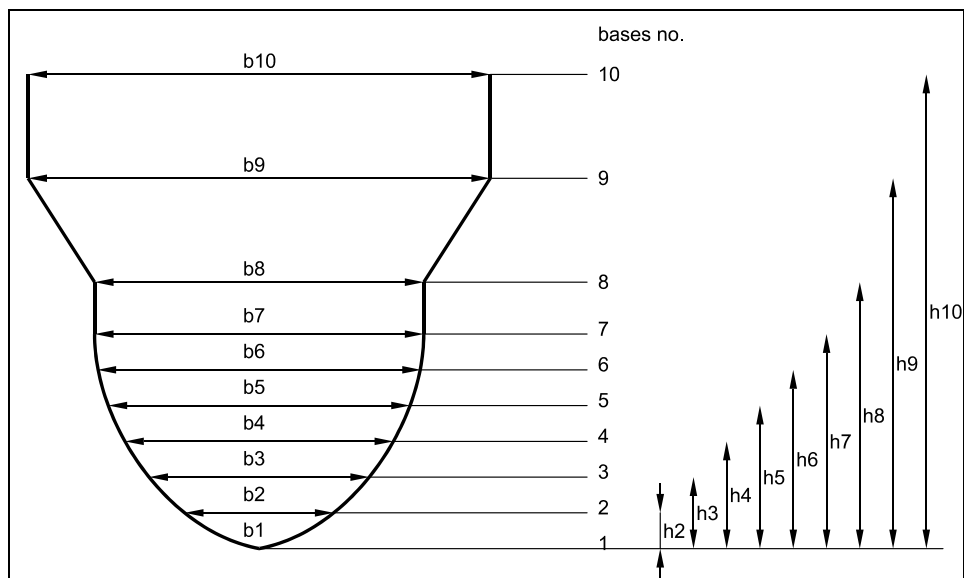


Fig. 8-32 Custom profile breakpoints

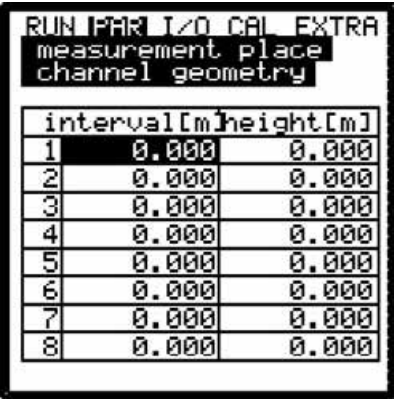
If the channel profile has been divided in two zones, the channel profiles below are available to be set:

- Bottom area:**
- Pipe
  - Egg
  - Rectangle
  - U-Profile
  - Trapezoid
  - 2r Egg
- Top area:**
- Custom shape

Dividing in three zones will reveal the following setting options:

- Bottom area:**
- Pipe
  - Egg
  - Rectangle
  - U-Profile
  - Trapezoid
  - 2r Egg
- Centre area:**
- Custom shape
- Top are**
- Pipe

**Channel:**



interval[m]	height[m]
1	0.000
2	0.000
3	0.000
4	0.000
5	0.000
6	0.000
7	0.000
8	0.000

**Fig. 8-33 Parameters for river bed (channel)**

This menu is to enter the height as from the river bed depending on the distance from the bank (interval). The same principle as in case of the custom shape applies. This profile however cannot be subdivided and flow calculation is based on the German "Manual for water level gauging and discharge measurements" automatically.



*Programming subdivided profiles, custom profiles and river beds (channels) requires comprehensive knowledge and experience in operating the NivuChannel and regarding hydrologic conditions. To avoid faulty programming or if in doubt this procedure should be performed by NIVUS service personnel or expert companies authorised by NIVUS.*





Please observe indicated units! If using the river bed (channel) function it is necessarily required to hydrologically calibrate the measurement after initial start-up.

**Sludge level**

The sludge level set is going to be calculated as non-moving channel sub-area and will be subtracted from the wetted hydraulic total area prior to performing flow calculation.

**Low-flow volume  $Q_{min}$**

This parameter serves to suppress lowest movements or apparent volumes arising. Used mainly to measure overflow volumes in constructions which are permanently flooded by receiving water.

$Q_{min}$ : measurement values lower than this one will be set to  $>0<$ . Only positive values are allowed to be set. These values are going to be considered as absolute values and therefore have positive as well as negative effects.

$V_{min}$ : low-flow volumes in applications with large profiles and filling levels can be suppressed by means of this parameter. Lowest velocity fluctuations within longer periods of time may cause apparently large volume fluctuations which cannot be gated by using the value of  $Q_{min}$ .

Flow velocities below this value will be set to „0“ which will set the calculated volume to „0“ as well. Only positive values are allowed to be set. These values are going to be considered as absolute values and therefore affect positive as well as negative velocities!

Both setting options of low-flow suppression have an OR relation between each other.

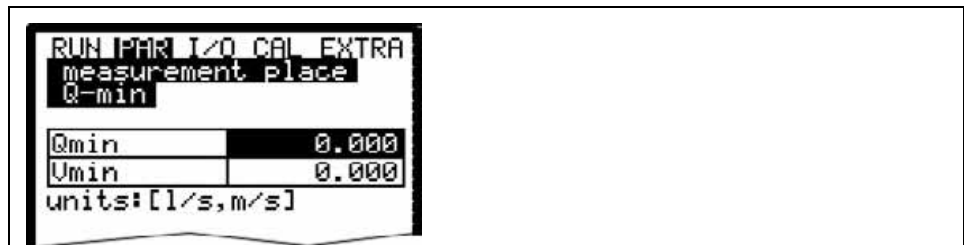


Fig. 8-34 Selection low-flow volumes



The suppression of low-flow volumes is **no** offset but a limit value.

### 8.5.2 Parameter Menu „LDV“

The parameter settings made here are extremely important regarding the geometry of the measurement paths. Number as well as positions of single paths (up to 8) can be set here. These settings determine the functionality of the entire measurement.

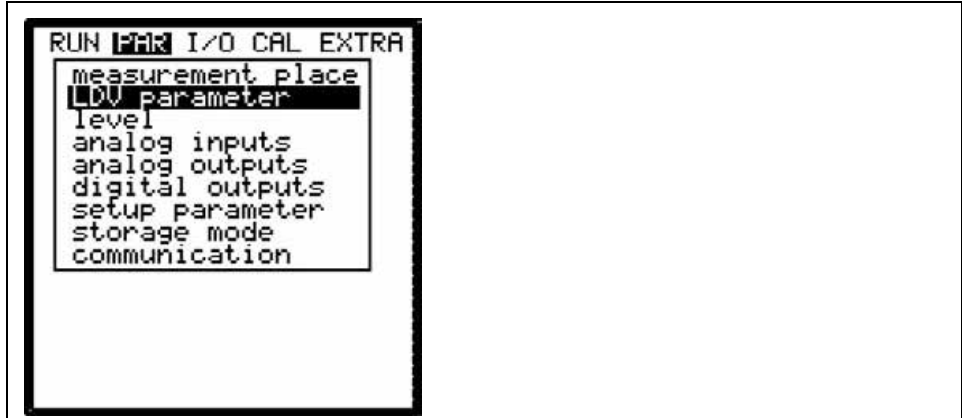


Fig. 8-35 Selection of LDV Parameters

#### Path number:

Firstly determine how many paths are required for measurement. Each path needs 2 sensors.

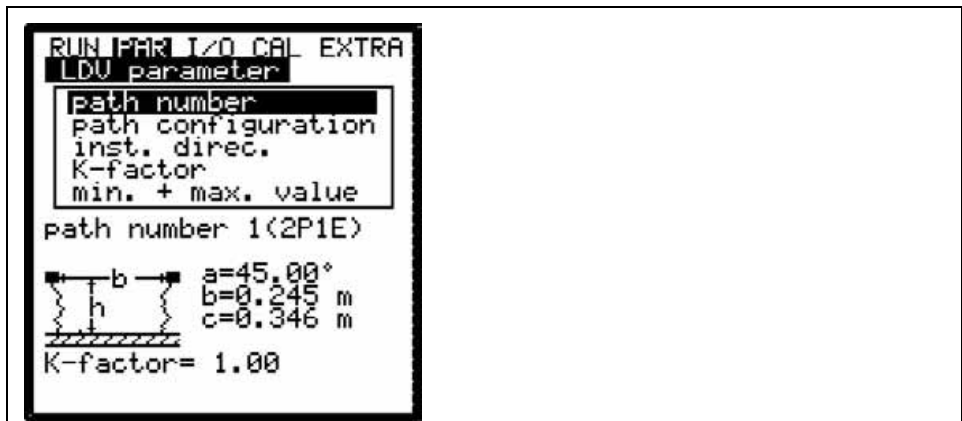
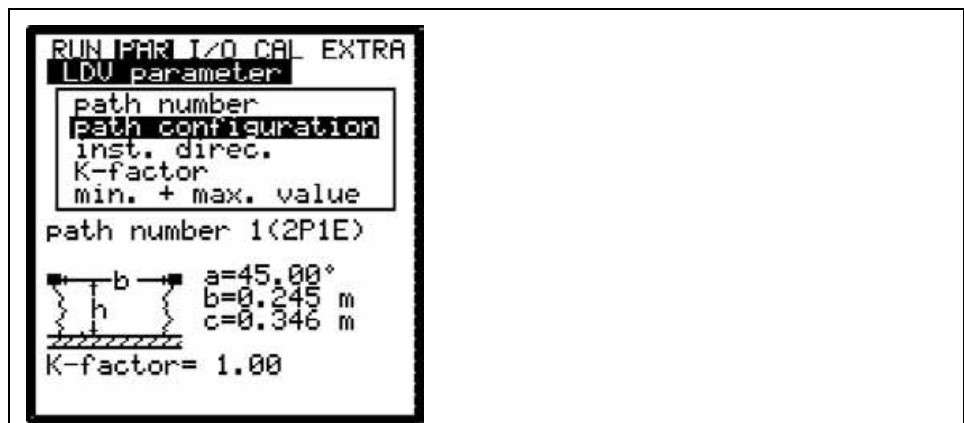


Fig. 8-36 Path number entry

Select the number of the path which is to be set here. The current path is indicated in "path number" (e.g. 1).

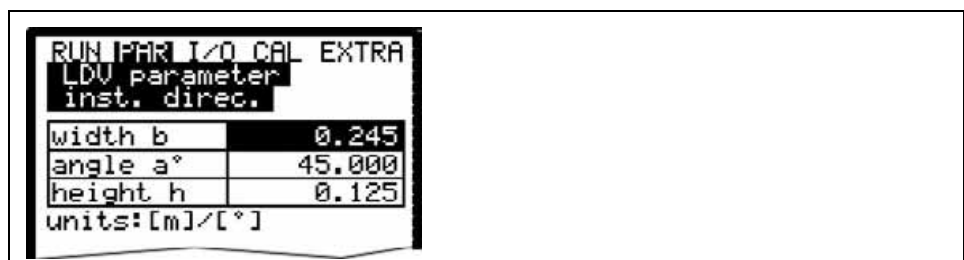
### Path configuration



**Fig. 8-37 Entering active measurement paths**

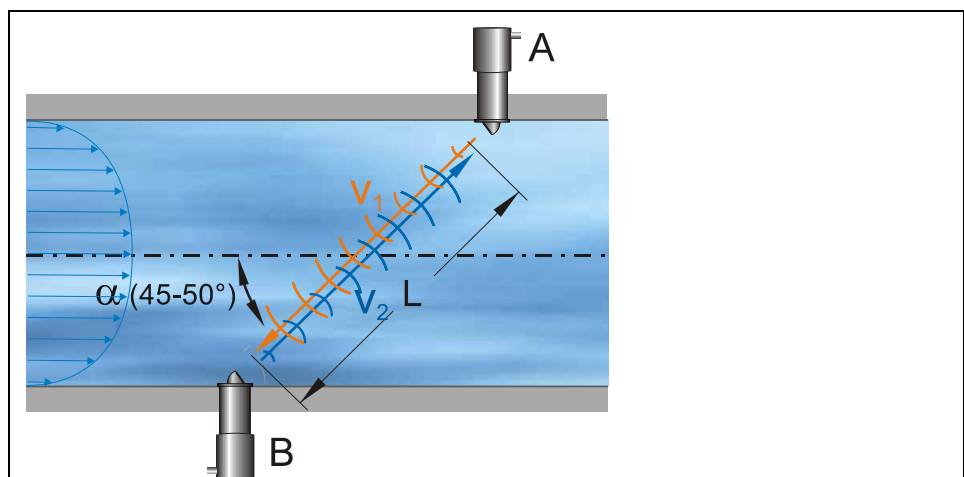
This menu is to enter the number of active measurement paths (up to 8 paths if using an adapter box).

### Installation direction



**Fig. 8-38 Installation direction settings**

The menu "Installation direction" serves to determine the sensor positions as well as their angles to one another.



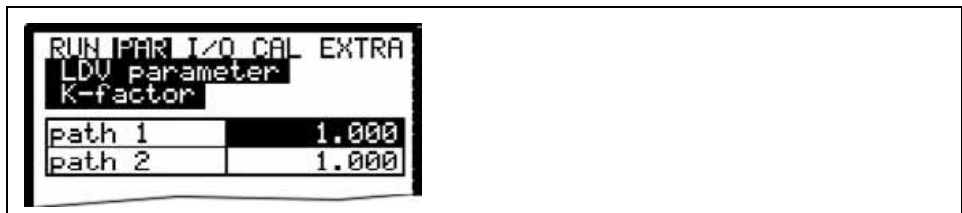
**Fig. 8-39 Installation direction diagram**

The width (b) defines the width of the channel or the parallel distance between the sensors.

Angle (a°) describes the angle between b and c as seen from sensor 1.

The height (h) is the installation height of the measurement path measured from the bottom of the profile used.

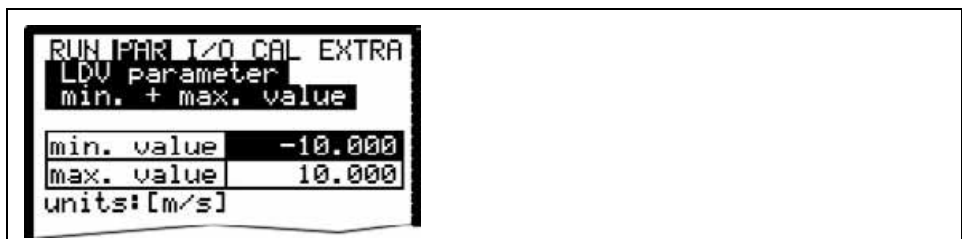
### K-factor



**Fig. 8-40 K-factor entry**

Thanks to the K-factor it is possible to adjust and to correct the average velocity within the measurement path by utilising an externally measured velocity. Normally the factor shall be set to 1 however.

### Min. + max. value

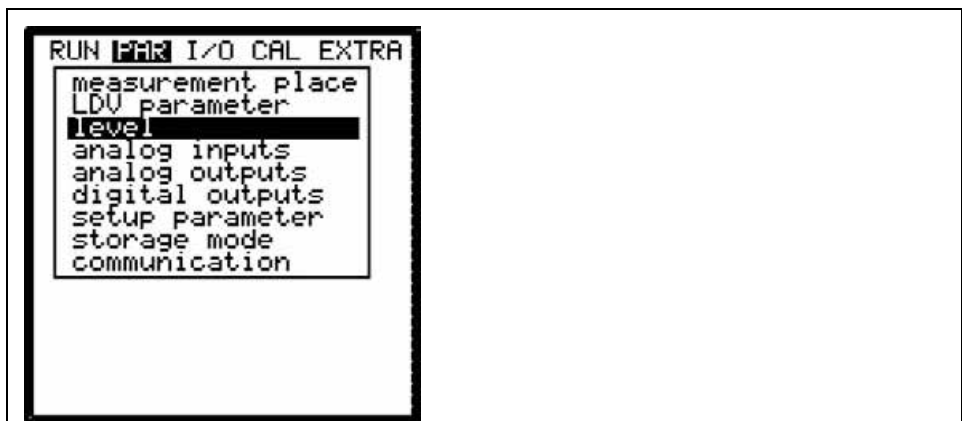


**Fig. 8-41 Entering min. + max. value**

Use min. and max. value to determine minimum and maximum velocity in the measurement path allowed for flow measurement.

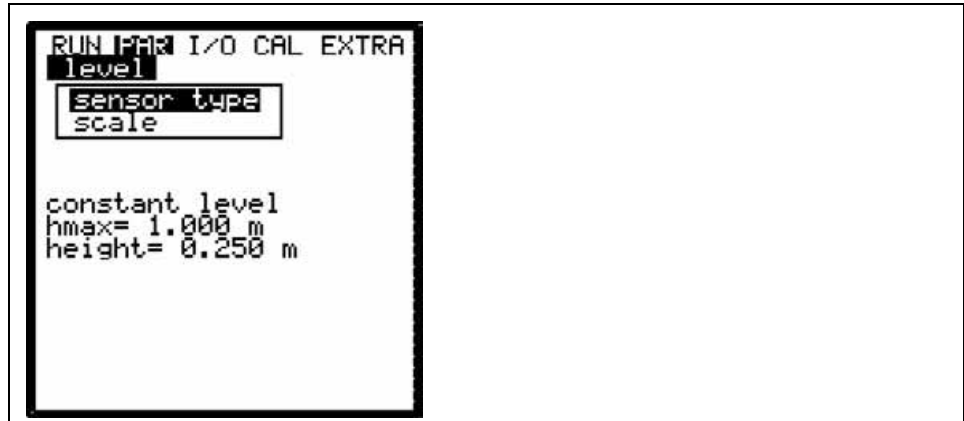
If you wish to not detect negative velocities (such as movements due to high / low tide) set the min. value to 0. This will cause unit to use only positive velocities for flow calculation.

## 8.5.3 Parameter Menu "Level"



**Fig. 8-42 Menu level measurement**

This menu defines any parameter regarding level measurement. The start screen depicted below as well as the parameters to be set may vary depending on the sensor type selected.



**Fig. 8-43 Example in case of selected level sensor**

The NivuChannel can be operated either by using an external level signal or by using a fixed height (full filled channel). Please observe to carry out the level measurement in the flow measurement area to avoid or to reduce the risk of faulty measurement.

With the memory mode enabled and a plugged memory card, all possible set and measured levels will be saved. Hence, it is possible to verify and to recalculate values at any time.

It is necessary to choose the appropriate level measurement method during the preliminary stages of project planning.



---

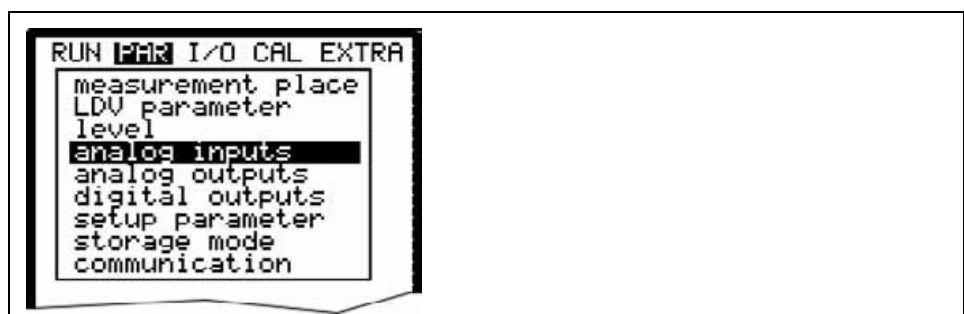
*When choosing the measurement method please observe to connect a sufficient sensor which is equipped with appropriate measurement elements!*

---

#### Scale

If programming as fixed value enter the constant water level (e.g. inner pipe diameter of permanently full filled pipes) here.  
In case of using external sensors enter offset (to be added to the measurement value) and measurement span (equivalent to 20mA of NivuChannel analog input).  
Scale must be adjusted according to measurement span or scale of the analog output of the external level meter used.

#### 8.5.4 Parameter Menu „Analog Inputs“




**Fig. 8-44 Analog inputs – submenu**

Transmitter:

- 1 analog input (galvanically isolated) for 2-wire sensors
- 3 additional analog inputs for external level sensor connection as well as for external setpoints or analog data storage..

Each individual analog input can be set individually regarding function, measurement range, measurement span and more. Furthermore it is possible to linearise each input stage individually.

<b>Channel Number</b>	Select from analog inputs 1–4 which one is to be set by using the following parameters.
<b>Name</b>	No entry required. Setting a name here is helpful only if the analog input is to be saved on memory card. This name will be saved on the storage medium exclusively. The procedure is the same as described in >PAR/Measurement Place/Name of Measurement Place<.
<b>Function</b>	Functions are going to be assigned to the analog input which has been chosen. by entering the >Channel Number< Select from various functions by pressing the >ALT< key: <ul style="list-style-type: none"> <li>- analog input disabled</li> <li>- archive value (analog input will be saved [data logging function of transmitter])</li> <li>- setpoint (analog input serves as external setpoint for regulator mode)</li> <li>- set+arch (setpoint + storage, analog input serves as external setpoint for regulator mode and will be saved additionally)</li> </ul>
<b>Measurement range</b>	Here it is possible to select from measurement ranges between 0-20 mA and 4-20 mA. The option to use voltage inputs with 0-5 V or 0-10 V requires hardware modifications and can be implemented by NIVUS service personnel only.
<b>Unit</b>	This parameter will be assigned to the name saved as well as to the breakpoint table mentioned below.



RUN PAR I/O CAL EXTRA				
analog inputs				
units				
m	cm	mm		
m/s	cm/s			
m <sup>3</sup>	l			
m <sup>3</sup> /s	l/s	m <sup>3</sup> /hm <sup>3</sup> /d <sup>h</sup>	°H <sub>2</sub> O	
sec	min	h	0.1s	
°C	K			
pH	mS	Proz		

Fig. 8-45 Table of measurement units

**Linearisation**

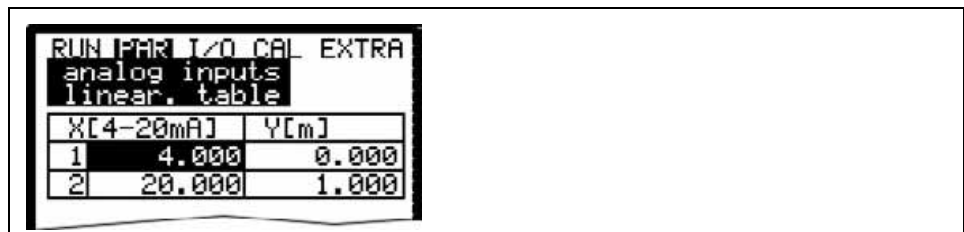
The analog input span can be defined here. Additionally it is possible to modify the weighting of the analog input by means of a 16-digit (max.) breakpoint table. If used properly, this point will open up some helpful special options regarding the setting of NivuChannel parameters. For example it is possible to convert a level/height signal into a volume-proportional signal which can be saved or route this signal to one of the analog outputs for further processing or display purposes.

Just enter the number of breakpoints.



Confirm entry!

A table with the respective units will come up subsequently.



	X[4-20mA]	Y[m]
1	4.000	0.000
2	20.000	1.000

**Fig. 8-46 Table of values for analog input span**

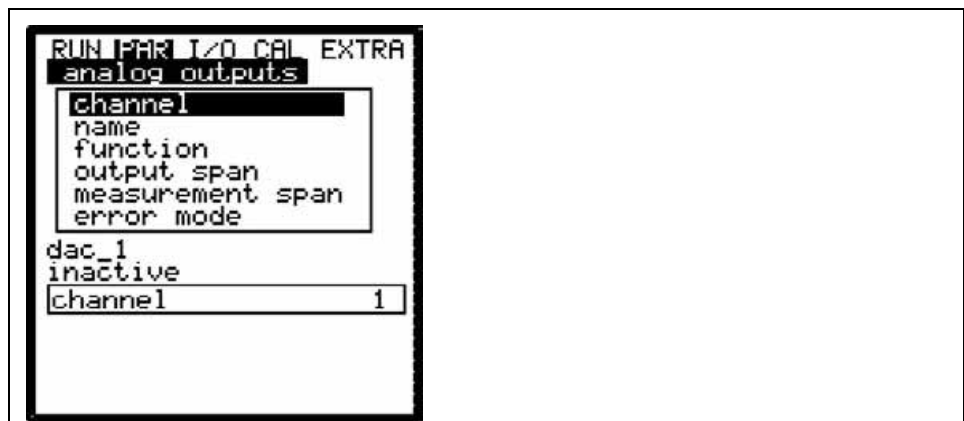
Enter the mA value in the X-column and the other value in the Y-column (appropriate unit has been selected before under "Units").

In case of classic applications such as setpoint input or in order to save a measurement value just enter "2" as breakpoint value. Subsequently define the analog input span, i.e. enter the respective values for 4 mA and 20 mA.

**Offset**

In addition to the input current, a fixed positive or negative offset using the unit chosen before can be added to the analog value.

**8.5.5 Parameter Menu „Analog Outputs“**



```

RUN | PAR | I/O | CAL | EXTRA
analog outputs
channel
name
function
output span
measurement span
error mode
dac_1
inactive
channel 1
    
```

**Fig. 8-47 Analog outputs – submenu**

Define functions and measurement ranges of the discrete analog outputs in this menu.

**Channel number**

Select from analog outputs 1–4 which one is to be set by using the following parameters.

**Name** No entry required. Setting a name here is helpful only if the analog output is to be saved on memory card. This name will be saved on the storage medium exclusively. The procedure is the same as described in >PAR/Measurement Place/Name of Measurement Place<.

**Function** Functions are going to be assigned to the analog output which has been chosen by entering the >Channel Number<. Select from various functions by pressing the >ALT< key:

- disabled (no analog signal output)
- output flow (output of analog signal which is proportional to calculated flow volume)
- output filling level (output of analog signal which is proportional to measured filling level)
- velocity (output of analog signal which is proportional to mean flow velocity averaged from measured individual velocities)
- water temperature (output of measured water temperature as analog signal)

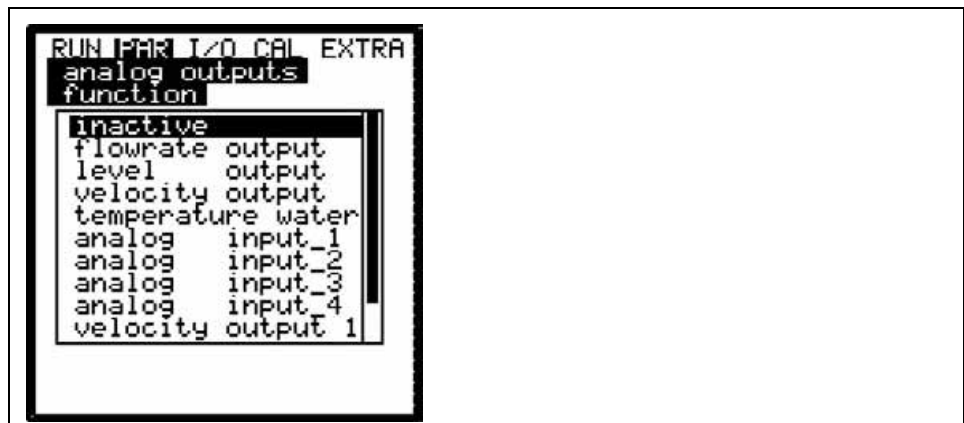


Fig. 8-48 Selection of analog output functions

**Output range** If desired toggle between measurement ranges of 0-20 mA or 4-20 mA here.

**Measurement span** Define the span of the enabled analog output here. **Negative values** can be entered as well!

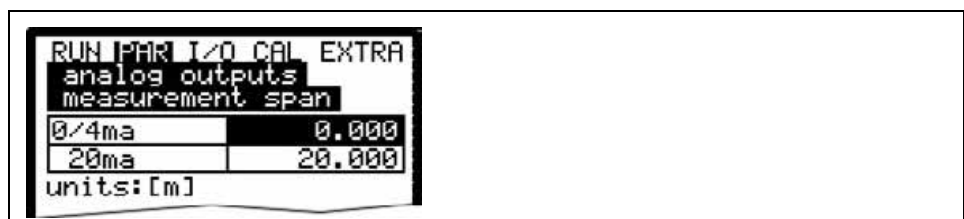


Fig. 8-49 Measurement span



**Example:**

A measurement place is partially tending to backwater formation. Negative values shall be recorded as well, the following recording or process conducting system however has only one analog input left available. In this case the analog output signal is set to have a "floating" behaviour.

This means that flow = 0 is going to output a mA signal in the middle of the measurement span.

Example:

4 mA = -100 l/s  
20 mA = 100 l/s

In this case the signal output is 12 mA if flow = 0. Backwater will cause the analog signal to decrease, positive flow will cause the signal to increase.

**Error mode**

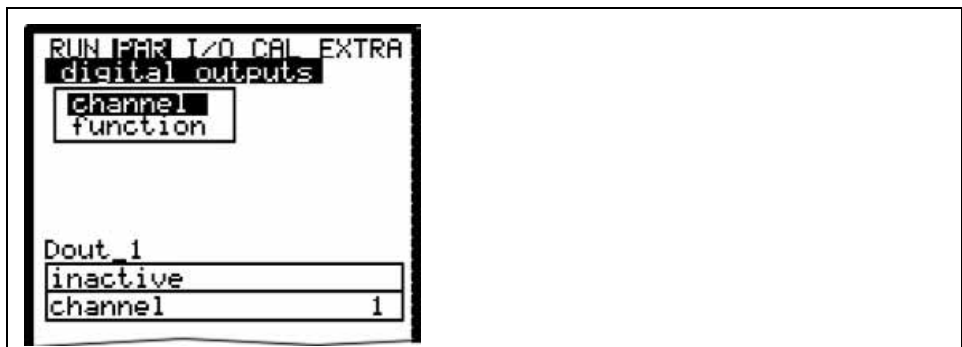
This parameter is to define the desired analog output condition if an error (such as cable break, CPU failure or similar) should occur.



Pressing this key will select between the following functions:

- 0 mA
- hold (will hold the latest valid signal value until the error has been removed or the error is no longer existent)
- 4 mA or
- 20.5 mA

**8.5.6 Parameter Menu „Relay Outputs“**



**Fig. 8-50 Relay outputs – submenu**

This menu allows to define both functions as well as accompanying parameters (such as limit values, duration of impulse and more) of individual relay outputs.

**Channel number**

Select from relays 1–5 which one is to be set by using the following parameters.

**Name**

This menu is visible only if a function has been enabled. The menu name refers to the name of the relay output selected before. It is not required to enter a name here as it currently is used for internal unit functions only.

The procedure is the same as described in >PAR/Measurement Place/Name of Measurement Place<.

**Function**

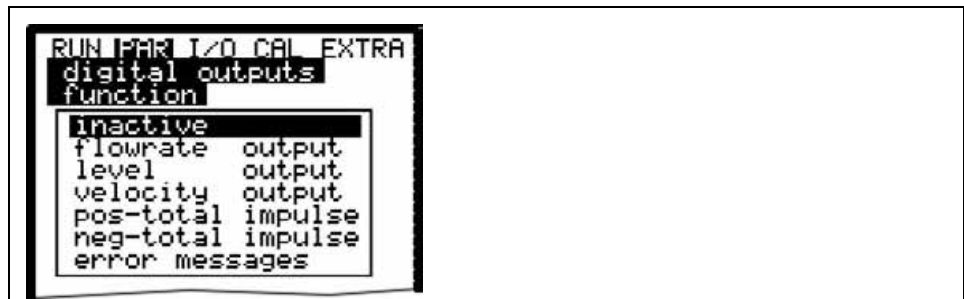
Functions are going to be assigned to the relay which has been chosen by entering the >Channel Number<. Select from following functions by pressing the >ALT< key:

- inactive
- flow limit contact (relay will energise if a flow limit value [to be set] has been exceeded and will de-energise if flow falls below a second limit value [to be set])
- velocity limit contact (relay will energise if a velocity limit value [to be set] has been exceeded and will de-energise if velocity falls below a second limit value [to be set])
- level limit contact (relay will energise if a level limit value [to be set] has been exceeded and will de-energise if level falls below a second limit value [to be set])



*The functions below can be set only once:*

- *Total positive impulses (relay will output volume-proportional impulses if the flow direction is positive. Weighting and impulse duration are free programmable)*
- *Total negative impulses (relay will output volume-proportional impulses if the flow direction is negative [= backwater]. Weighting and impulse duration are free programmable)*
- *Error messages (relay will energise in case of error messages such as sensor error, cable break, power failure, processor failure or similar)*



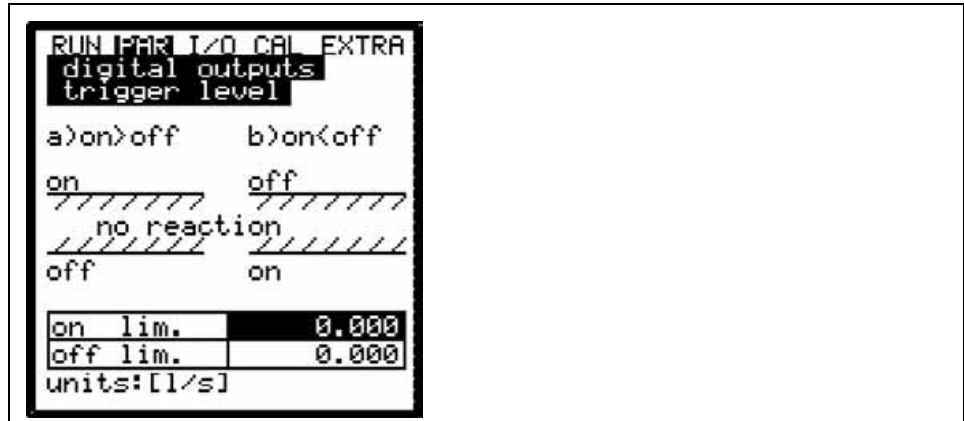
**Fig. 8-51 Defining the relay function**

**Logic**

Pressing the >ALT< key enables to select between >normally open< and >normally closed<. The relay is going to energise if >normally open< has been selected and the according value has been reached, if >normally close< has been selected the relay will energise immediately after the parameter has been set and will de-energise as soon as the according value has been reached.

**Trigger Levels**

This menu will be indicated only if the function >Limit contact< has been chosen.

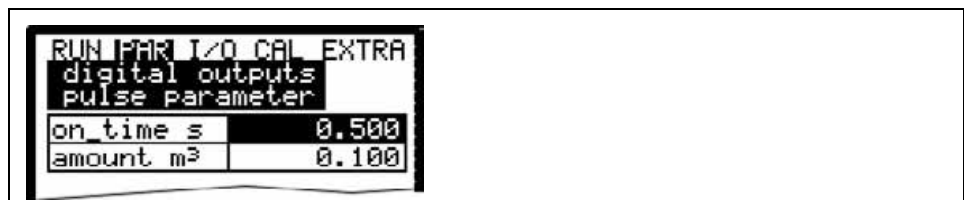


**Fig. 8-52 Setting the trigger levels**

Depending on the settings (start point higher than stop point or vice versa), the according switching behaviour can be considered as switching threshold (ON>OFF) or as in-bounds alarm (ON<OFF).

**Impulse parameters**

This menu will be indicated only if the function >Impulses< has been chosen.

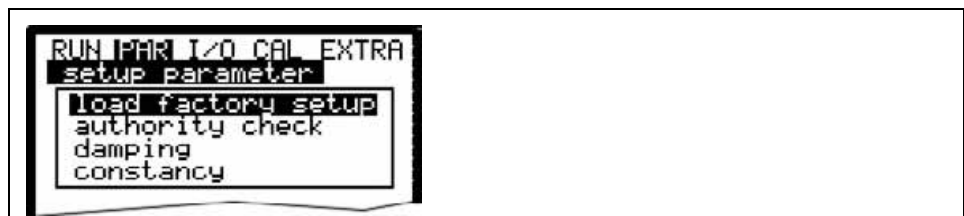


**Fig. 8-53 Impulse parameter setting**

Select from the options below:

- Duration (select an impulse duration between 0.01 and 2.0 seconds. The ratio between impulse and break is 1:1. It is useful to increase the impulse duration beyond the 0.5 sec. default setting if slow PLC inputs or mechanic counters are in use).
- Amount (defines the impulse weighting. The measured amount is going to be integrated internally until the selected value has been equalled. An impulse signal with the previously programmed duration will be emitted afterwards and the integrated internal value is going to be set to 0 again. This procedure will restart subsequently.)

**8.5.7 Parameter Menu „Settings“**

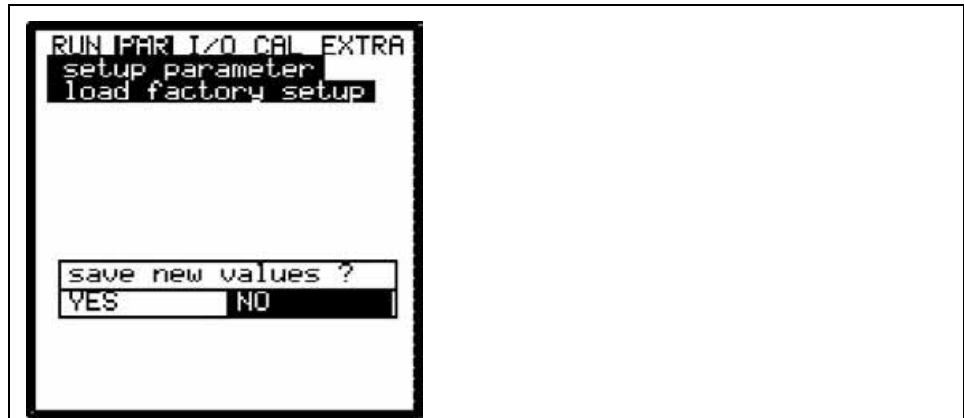


**Fig. 8-54 Settings – submenu**

This menu allows to either modify or to reset the following basic settings of the system.

**Load factory setup**

Enables a general reset of the measurement transmitter. Selecting this point will bring up the screen below:



**Fig. 8-55 Executing a general reset**



*Selecting "YES" is going to reset the system to the basic parameter settings. The default settings are going to be restored and all customer modifications will be set to default condition (system general reset)*

**Service code**

Additional system setting options are going to be revealed as soon as a special code has been entered. It is possible to modify e.g. beam angle or medium sound velocity, transmit voltages or special adjustments regarding the transmitter crystal drive. These settings are reserved to be used by the NIVUS initial start-up service as these modifications require comprehensive expert knowledge and do not need to be adjusted during standard use.

**Damping**

This menu enables to adjust the display and analog output damping between 20 and 600 seconds. This means that a 0 to 100 % jump of the calculated volume is going to require the time set to be indicated either on the display as well as on the output.

**Stability**

The period the NivuChannel will operate in without accepted level / height measurement value.

The NivuChannel will fall to measurement value >0< according to the damping set previously if the period expires without a correct level / height measurement value is being detected.

**Damping, example 1:**

Damping 30 seconds, jump from 0 l/s to 100 l/s (=100 %) – unit requires 30 seconds to run from 0 l/s to 100 l/s.

**Damping, example 2:**

Damping 30 seconds, jump from 80 l/s to 100 l/s (=20 %) – unit requires 6 seconds to run from 80 l/s to 100 l/s.

### 8.5.8 Parameter Menu „Storage Mode“



Fig. 8-56 Storage mode - submenu

Before enabling this menu plug in a NIVUS compact flash card with a capacity of 16 .... 128 MB. This card is available from your NIVUS representative if required.



*Use memory cards purchased from NIVUS only. Other manufacturer's cards may lead to irreversible loss of data or measurement failure (e.g. permanent transmitter reset).*

Please plug the card into the labelled slot (>MemoryCard<) on the unit faceplate in a way that the side identified by the numerous small holes is plugged in. Make sure that the card is fitting tightly.

The card can be inserted in one way only, incorrect plugging is going to be avoided due to mechanical construction. Please do not apply any force but rotate the card into the correct position.



Fig. 8-57 Memory card slot

After a new memory card has been plugged and the storage has been enabled in the programming menu, the NivuChannel will prompt a >Format card< request.

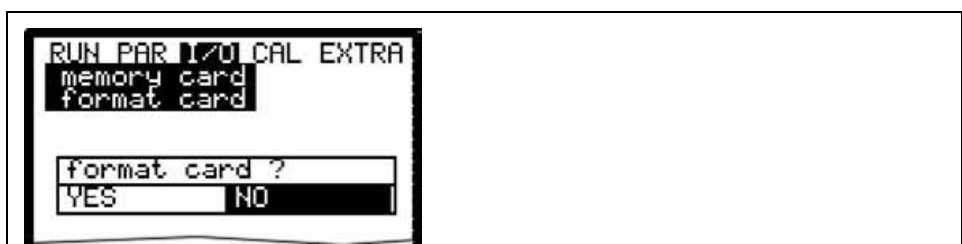


Fig. 8-58 Card formatting request

Card formatting is going to be executed in the menu I/O – Memory Card – Format card (see also Chapter 8.6.6). Due to the card's technically restricted number of storage cycles (approx. 100.000 writing events), the NivuChannel does not constantly save upcoming data on card but only each full hour. This interval is pre-set by the internal system time (exceptions: in case of very high data density and if a data volume of approximately 3000 – 4000 Byte has been cumulated data will be saved on card as well).

The data will be saved in a special NIVUS format. The name is „Name of measurement place set“.TXT<. This file can be read and processed either using Excel spreadsheet application or by using >NivuDat Pro< or >NivuDat 2.1< which is remarkably more convenient and comfortable. Both programs can be purchased from NIVUS (see also Chapter 8.5.9, Data Structure on Memory Card).



*Never format memory cards on PC but always on OCM Pro. The OCM Pro is not capable of using formats created by PC and therefore does not accept the cards formatted on PC.*



*Data will be saved as mean values averaged over the memory interval set, not as current values at the moment of saving.*

### Operation Mode



**Fig. 8-59 Activating operation mode**

### Mode

- ALT** Pressing this key toggles between:
- disabled = no data saving
  - cyclic = cyclic storage of fill level, flow velocity and volume

### Cycle interval

This parameter is to set the memory cycle. Select from settings between 1 minute and 1 hour. It is possible to set values between 1 minute and 1 hour. There are only exact fractional amounts of 1 hour allowed to be set (1 min.; 2 min.; 3 min.; 4 min.; 5 min.; 6 min.; 10 min.; 15 min.; 20 min.; 30 min. or 60 min.). Entering other values is going to cause the NivuChannel to set the next lower interval value.



**Fig. 8-60 Entering the storage cycle**

### Select data

This parameter point is to define which data sets are to be stored in addition to the automatic storage of filling level, average flow velocity, volume and medium temperature.

Choose from analog input 1-4 and system condition here.

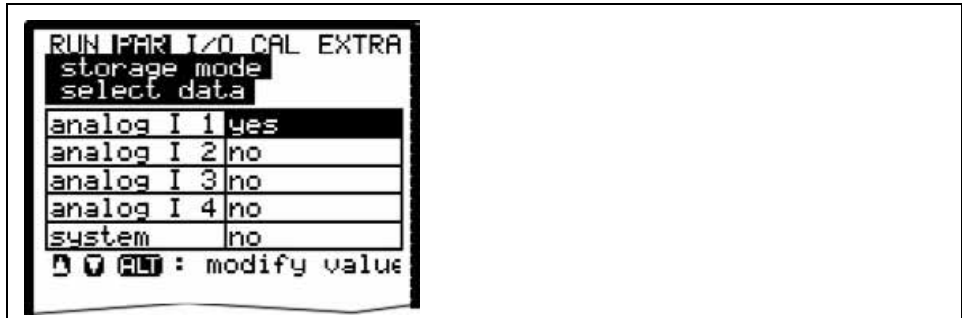


Fig. 8-61 Select data table

### System

- ALT Use "Alt" key to toggle between:
- NO = keine Speicherung der Systemparameter und
  - YES = system parameters will be saved (system errors, error messages, system ON and OFF events etc.)

### Unit system

Select between data storage in metric system (e.g. litres, cubic metres, cm/s etc.), English system (ft, in, gal/s, etc.) or American system (fps, mgd etc.).

The setting of this parameter does not influence the indication on the display.

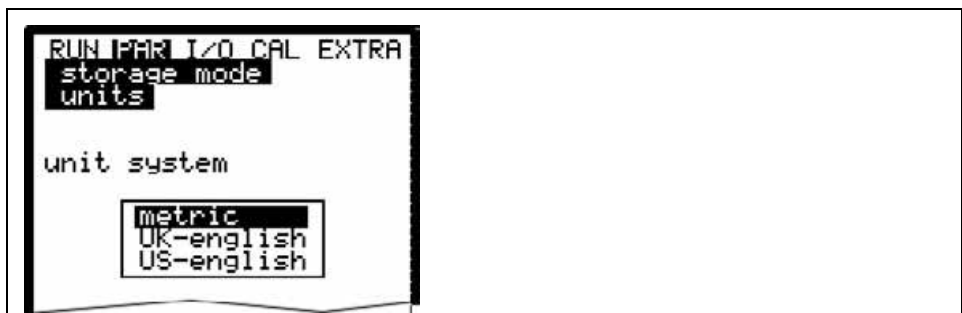


Fig. 8-62 Selecting the unit system to be saved

### Units

Set the desired storage units for the 3 main memory parameters "Flow", "Filling level" and "Velocity". Depending on the setting chosen previously various options are available (see also >Unit system<).

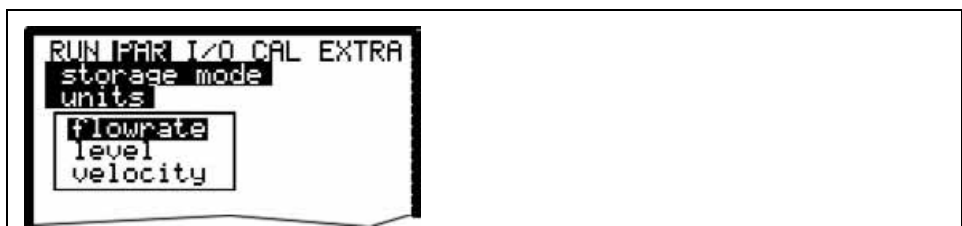


Fig. 8-63 Unit selection

### Format of numbers

Here you can choose if data are to be saved with commas or dots as decimal points (a comma is normally being used in Europe, dots are used in other regions).

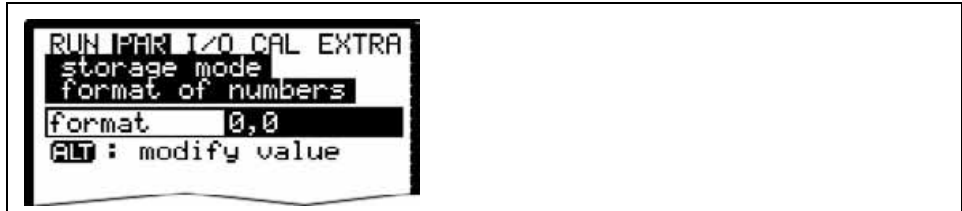


Fig. 8-64 Selecting the number format

### 8.5.9 Data Structure on Memory Card

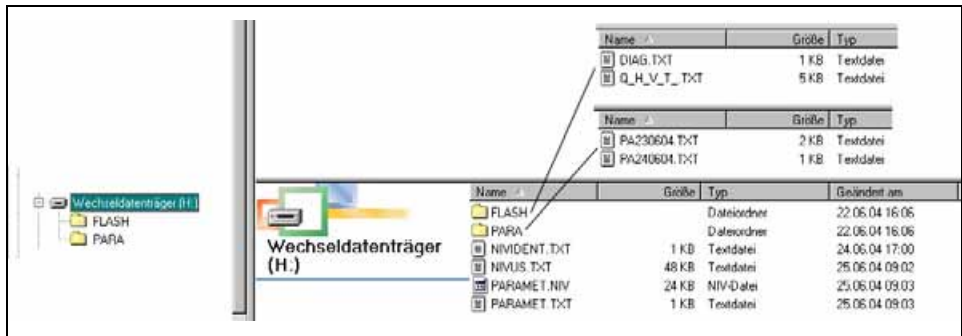


Fig. 8-65 Data structure on memory card

### Flash

This is the folder where the backup file is being saved (to execute select I/O – Memory Card – Save backup).

The name of the saved file is always >Q\_H\_V\_T.TXT<. It contains the internal memory values on level, velocity, flow and temperature.

The file >DIAG.TXT< contains all messages including error messages which might have been occurred during measurement operation. These might be start and end of Internet communication, modem restart, CPU restart after system reset or after reprogramming.

The respective message is labelled with date and time:

>: received error/message

<: reason of error/message cleared

The DIAG file is going to be saved only if you proceed as follows: I/O – Memory Card – save backup.

### PARA

This folder includes all parameter files with a date stamp.

The content of this folder allows to retrace transmitter settings regarding the measurement place as well as parameter settings which might have been modified.

The latest modification within the course of a day will be saved.

The file name is: PA TT MM JJ .TXT

(TT = day, MM = month; JJ = year)

### NIVIDENT

The name of the measurement place.

If the name of the measurement place saved on card does not comply with the name of the measurement place saved in the NivuChannel, the unit will prompt to format the card. The NivuChannel will create a new file for measurement values with the newly entered name as long as the card is not going to be formatted.



**Name of measurement place.TXT** This is the file where the measurement values are saved. It is going to be saved using the name of the measurement place set.

**PARAMET.NIV**  
**PARAMET.TXT** These files are created as soon as parameters are being saved on the memory card. The file PARAMET.NIV is required in order to upload data to OCM Pro. PARAMET.TXT is the print version of PARAMET.NIV as text file.



*Use memory cards purchased from NIVUS only. Other manufacturer's cards may lead to irreversible loss of data or measurement failure (e.g. permanent transmitter reset).*



*Never format memory cards on PC but always on NivuChannel. The NivuChannel is not capable of using formats created by PC and therefore does not accept the cards formatted on PC.*

### 8.5.10 Parameter Menu „Communication“

Modifications in this menu are required only as long as you wish to access the unit via Internet or a local network.

Depending on the type of transmitter (see Chapter 4.5) communication via local Intranet, analog modem, ISDN modem or GPRS modem is available.

If no other NIVUS device has been connected to Internet at the moment of initial start-up, it is indispensable to have the customer gate initialised by the NIVUS service. Due to this reason please complete the form which can be found in annex 11.3 and return it to NIVUS in order to prepare initialisation. Please fill out the form as complete as possible.

The form however does not have to be completed if you do not wish to access the unit via Internet or if required technical prerequisites are not established (no intranet; no telephone connection).



*Please fill out the fields marked with \* in Chapter 11.3 completely. The Internet connection cannot be set up by NIVUS without these details!*

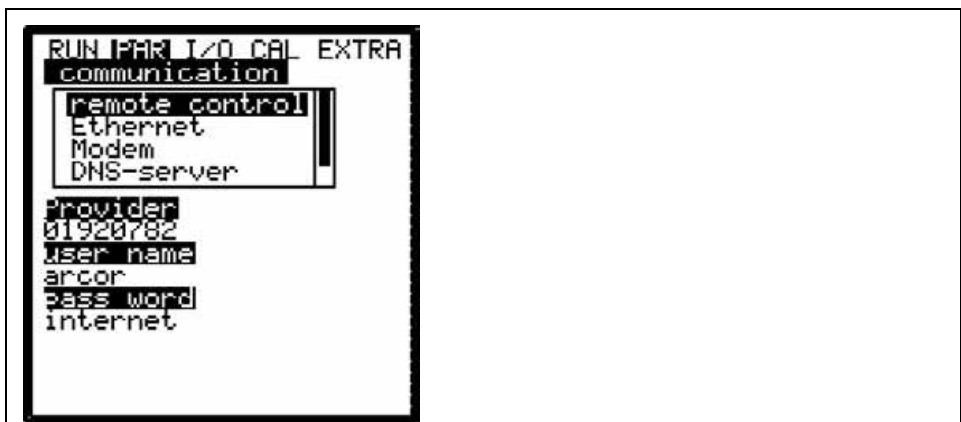


Fig. 8-66 Options of Internet connection

### Remote access

Select from the following options for remote access:

*disabled:* no remote access possible

*Modem:* connection via built-in modem  
(GPRS, analog or ISDN)

*Ethernet:* communication via local network (Ethernet)

Mod. → Eth. the unit is going to be called/enabled via the built-in modem. The following communication will be performed via local network such as WLAN and/or Ethernet

Any variation is possible to be chosen theoretically. In practical use however it is possible to use only options the unit has been equipped with. The respective configuration is indicated by the device ID which can be found on the unit (see also Chapter 4.5)

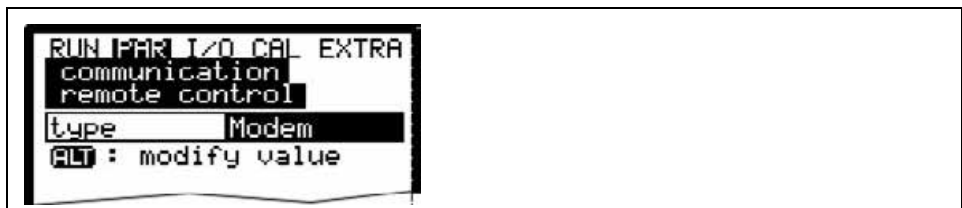


Fig. 8-67 Remote access

### Ethernet

By selecting this point it is possible to define if the IP address (required for unit access) is to be assigned automatically or manually.

If >YES< the assignment will be executed by DHCP routine (similar to Internet PC setting „Get IP address automatically“).

If >NO< enter the unit IP address manually. For this purpose use a free network address.

→ Observe current network configuration !!!!

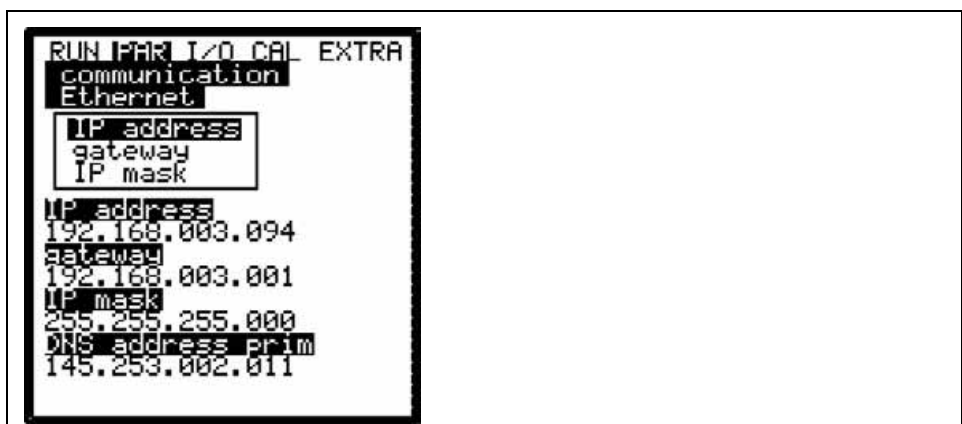
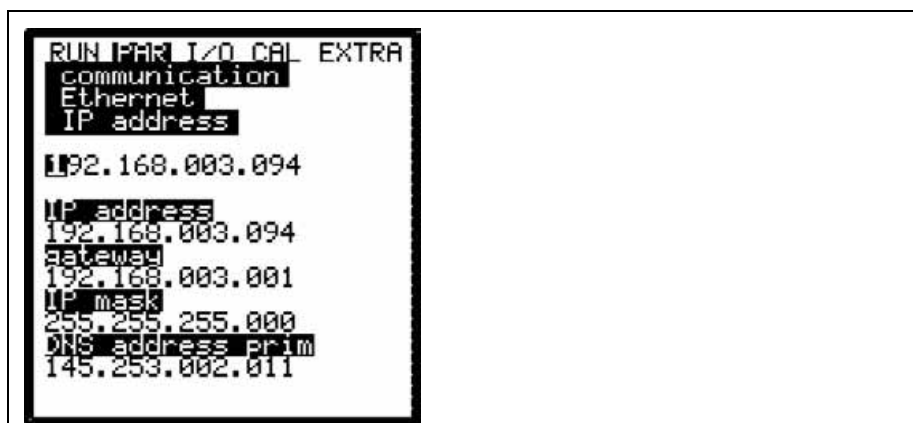


Fig. 8-68 IP address assignment

If manual IP address assignment has been selected enter IP address, gateway (optional, in case of interdigitate subnets) as well as IP mask.

The default setting (255.255.255.000) is normally suitable for most connections.



**Fig. 8-69 Manual setting of IP address**



*If in doubt please consult your responsible system administrator or use the NIVUS initial start-up service.*

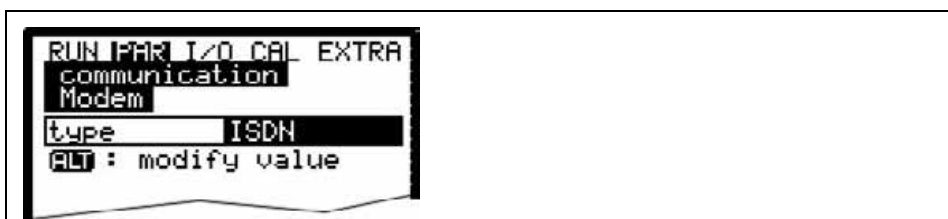
## Modem

If connection type >Modem< or >Mod → Eth.< has been selected enter the type of integrated modem here.

The built-in modem can be specified from the device ID which can be found on the unit (see also Chapter 4.5).

Choose between the following options:

<i>disabled</i>	no modem enabled
<i>analog</i> :	integrated analog modem
<i>ISDN</i> :	enables built-in ISDN modem
<i>GPRS</i> :	internal GPRS modem is going to be used
<i>GSM</i> :	function not yet available

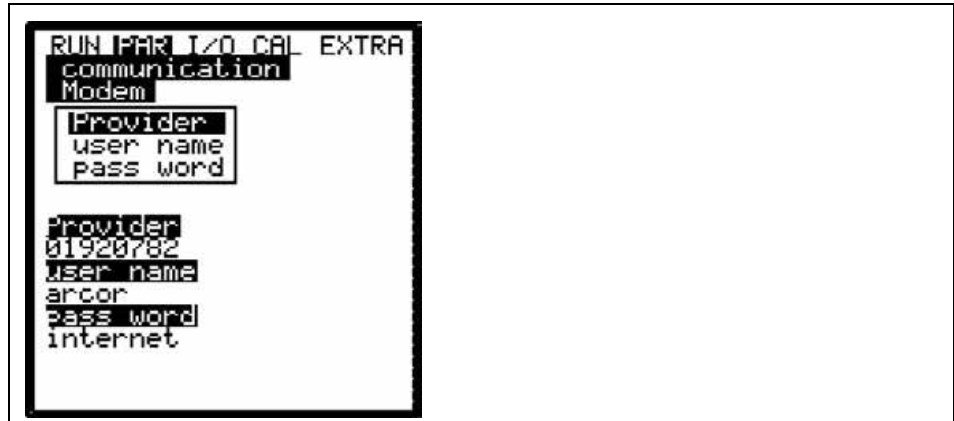


**Fig. 8-70 Selecting the modem type**

According to the type of modem selected adjust the settings below:

Analog modem:

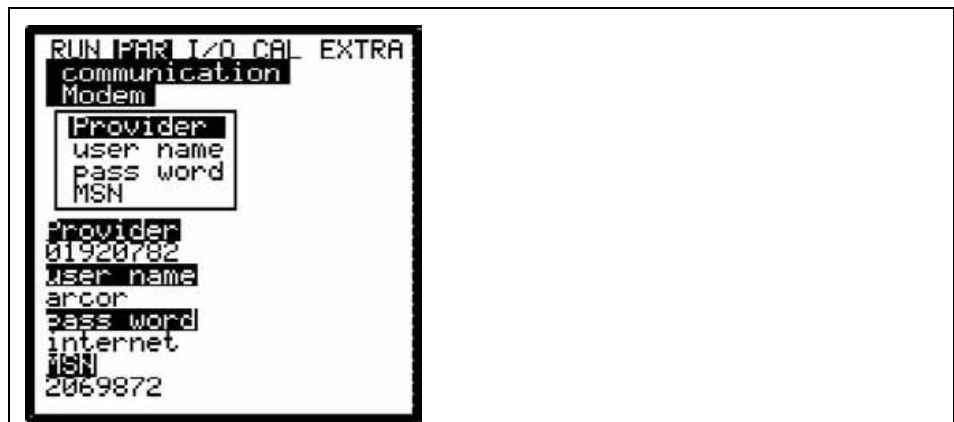
- Provider dial-up: you are free to select from any provider available.  
In case of using a Call-by-Call service we recommend to choose a provider offering a constant rate all over the day without additional dial-up fees (of course any other free available local provider can be chosen however).  
If there are agreements on flat rates or similar available it makes sense to use the according connections.
- User name: to be assigned by the provider and hence depends on provider dial-up selected. The provider will refuse service in case of faulty entry.
- Password: to be assigned by the user and hence depends on user name.  
The provider will refuse service in case of faulty entry.



**Fig. 8-71 Analog modem parameter settings**

ISDN-Modem:

- Provider dial-up: see analog modem
- User name: see analog modem
- Password: see analog modem
- MSN: **M**ultiple **S**ubscriber **N**umber – the ISDN number assigned to the user by the telecommunication provider (normally there are 3 numbers min. and 10 numbers max. available per subscriber).



**Fig. 8-72 ISDN modem parameter settings**

The parameter settings regarding GPRS modems are not going to be explained here as this type of communication is currently being prepared and will be available in the foreseeable future.

## DNS Server

This point will be indicated only if remote access has been enabled and >Ethernet: IP\_Ad aut = ON< has been set.

Normally it is useful to set >DNS auto< to >ON<. This setting allows the provider or the local network to assign the DNS automatically. If >NO< has been set it is required to enter primary and secondary DNS subsequently (available from provider or system administrator of the local network).

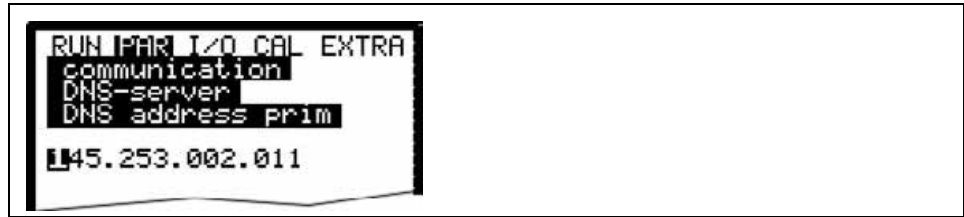


Fig. 8-73 Manually entering DNS

#### direct Access

Required only if a direct 1:1 connection to the NivuChannel is desired to be set up via Laptop/PC, network cable and the internal RJ45 interface. In this case determine both password as well as user name for this internal connection on PC/Laptop.

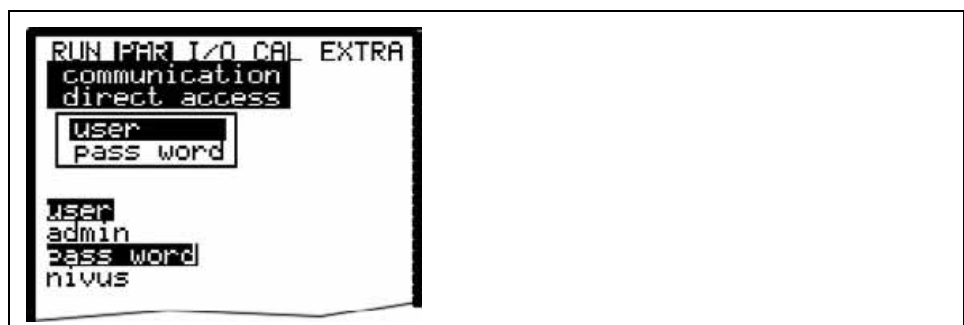


Fig. 8-74 Enabling direct unit access

## 8.6 Signal Input/Output Menu (I/O)

This menu includes several submenus which both serve to assess and to check sensors as well as to control signal inputs and outputs. It allows to indicate various values (current values of inputs and outputs, relay conditions, echo profiles, individual velocities etc.), however does not enable to influence signals or conditions (offset, adjustment, simulation or similar). The menu therefore primarily serves in order to assess the parameter settings and for error diagnosis.

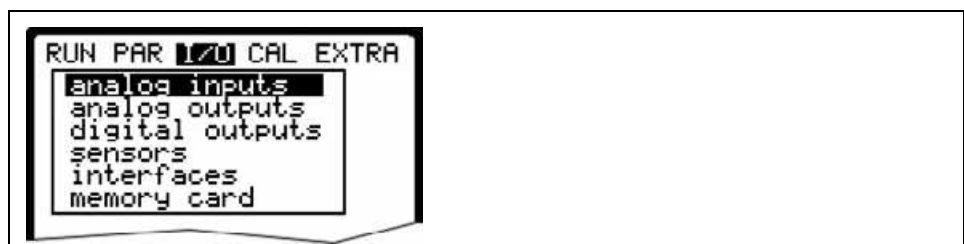


Fig. 8-75 I/O submenu



*The menu basically allows to indicate any input and output theoretically possible even if it might not be connected or available.*

### 8.6.1 I/O Menu „Analog Inputs”

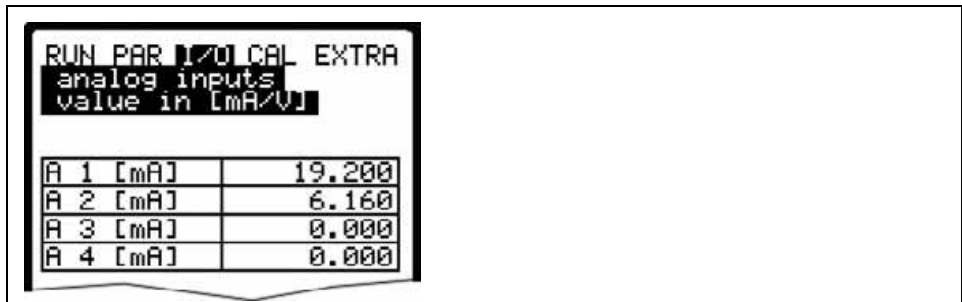
Analog input values routed to the transmitter input clamps can be controlled and checked from here. Values before (in [mA/V]) or after (calculated values) the analog input linearisation can be indicated.



**Fig. 8-76 Selecting indication of values**

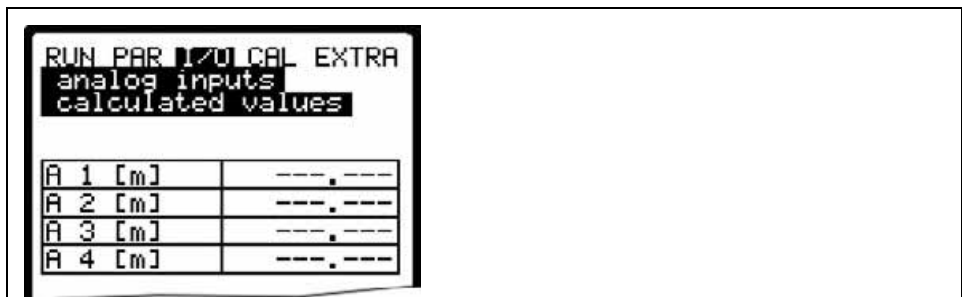
The function is mostly being used to control current signals from external level / height measurement units during initial start-up.

Normally >Values in [mA/V]< will be set. A screen similar to the one below will come up:



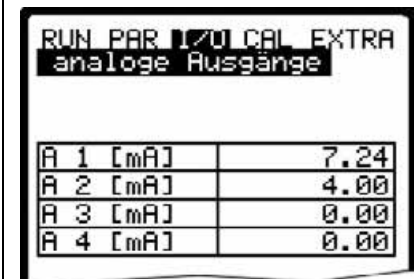
**Fig. 8-77 Analog value indication**

Setting >Calculated values< without having a signal available (>4 mA) will bring up the following screen:



**Fig. 8-78 Error screen**

### 8.6.2 I/O Menu „Analog outputs”



RUN PAR I/O CAL EXTRA	
analoge Ausgänge	
A 1 [mA]	7.24
A 2 [mA]	4.00
A 3 [mA]	0.00
A 4 [mA]	0.00

Fig. 8-79 Screen analog values

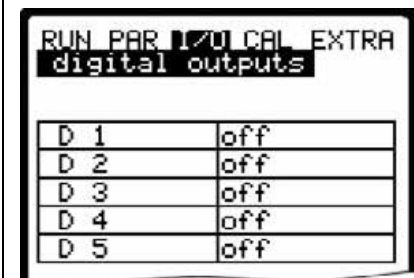
This menu indicates the calculated values which have to be sent to the analog converter as mA signals.



*The actual currents fed to the output clamps will not be indicated. The only signal visible is the signal the analog output converter receives for output.  
This menu cannot be used to detect or to indicate faulty wiring.*

### 8.6.3 I/O-Menu „Digital outputs”

This submenu indicates the calculated conditions to be output on the relay. We distinguish between logically "OFF" or "ON".



RUN PAR I/O CAL EXTRA	
digital outputs	
D 1	off
D 2	off
D 3	off
D 4	off
D 5	off

Fig. 8-80 Screen digital values



*The actual conditions of the relay contacts on the output clamps will not be displayed. The only signal visible is the signal the relay receives for output.  
External faulty wiring neither can be detected nor indicated in this menu.*

### 8.6.4 I/O Menu „Sensors”

This menu including the respective submenus allow to view and to asses the most important sensor conditions. It hence provides information on the quality of the measurement place, cable layout, echo signal quality and many more parameters.

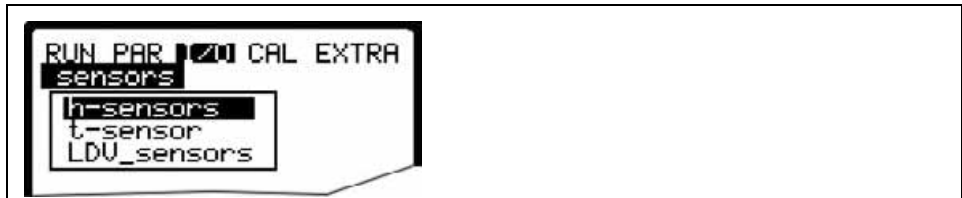


Fig. 8-81 Basic selection menu

The subsequent submenu >H-Sensor(s)< may vary depending on the type of level sensor set:

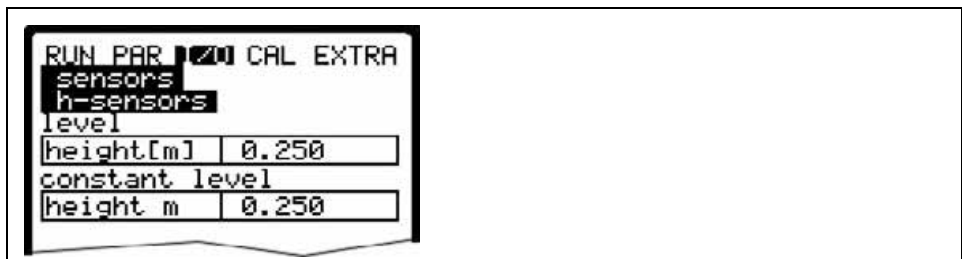


Fig. 8-82 Menu with fixed height

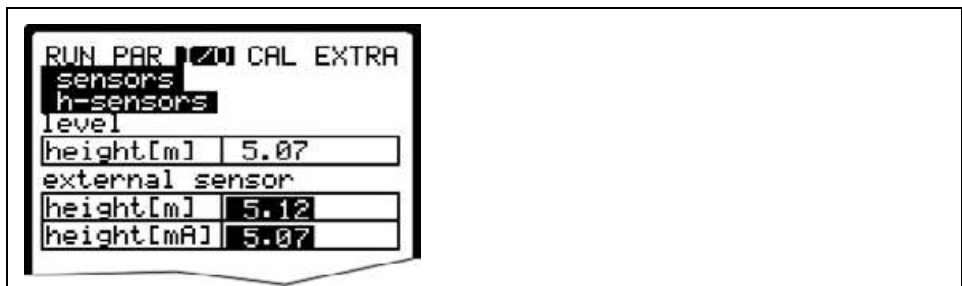


Fig. 8-83 Menu with external sensor

#### T-Sensor

This screen allows to view the water temperature based on the measured velocity of sound. Invalid values indicate faulty geometry settings (mounting position) or incorrectly clamped connections.

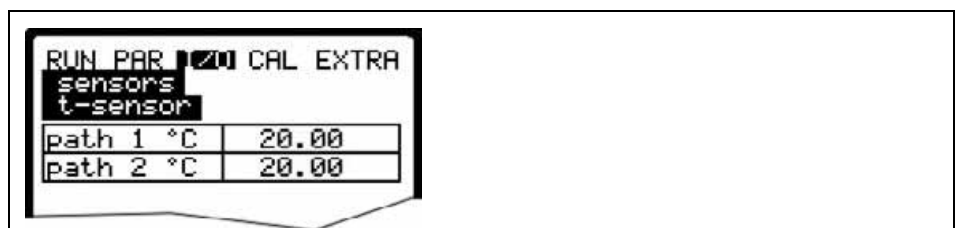
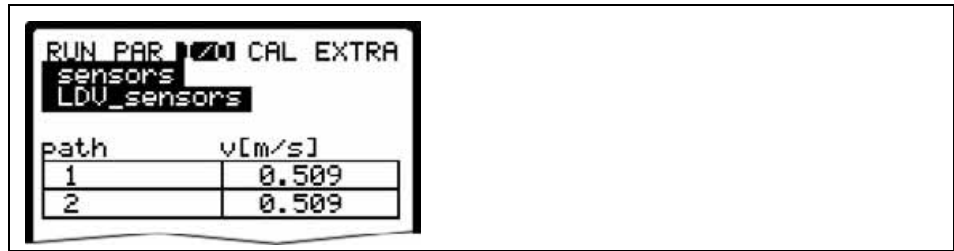


Fig. 8-84 Temperature screen



**LDV\_Sensors**

This submenu indicates the investigated flow velocities of the single paths. The overall velocity required for flow calculation will be derived from these single velocities.



**Fig. 8-85 Velocity screen**

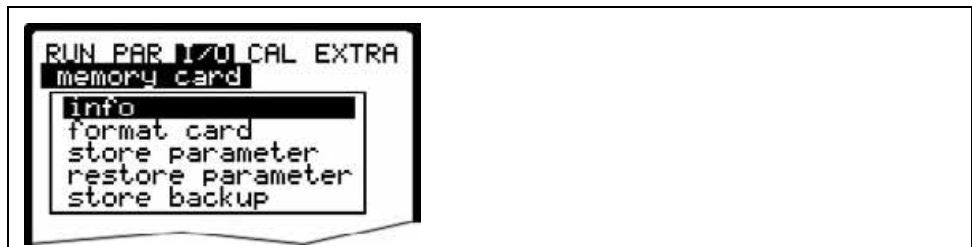
Missing velocities indicate that e.g. there is no more water in the measurement path which interrupts signal transmission between the sensors. Please also check additionally if the sensors have been connected correctly.

**8.6.5 I/O Menu „Interfaces”**

The menu includes the transmission speed of the internal interfaces. It has no meaning for users and is going to be used for service purposes only.

**8.6.6 I/O Menu „Memory Card”**

This menu enables to view various information regarding the memory card. Additionally it is possible to save data as well as to read out and to load the parameters set.



**Fig. 8-86 Memory card menu**

**Info**

Information on the remaining card capacity and the remaining storage time is available here.



**Fig. 8-87 Card information**

Information can be recalled only if the memory card is plugged. To be able to indicate the remaining capacity time the card has to be plugged one hour at least.

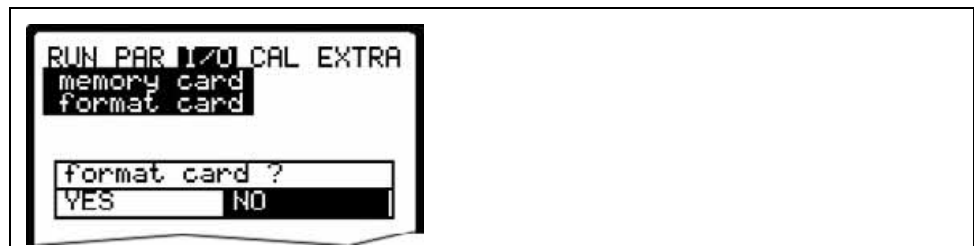


The card can be replaced at any time unless the display indicates >Memory Card active< (approx. 1 second each full hour).

The card can be formatted in the following menu. This procedure should be carried out after each data transfer as well as if the card is being used for the first time. Formatting process will take 10 – 60 seconds depending on card capacity and is finished if the main screen appears again.



Do not press any keys and do not turn the unit off as long as the card is being formatted. Otherwise the card might be irreversibly damaged.



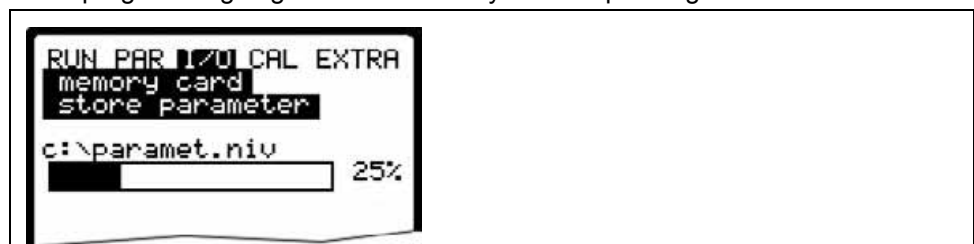
**Fig. 8-88 Card formatting request**



All data saved on the card will get irreversibly lost during the formatting process.

NivuChannel parameter settings can be saved for backup purposes or in order to transfer the settings to similar measurement places. Select „Save parameters“ to write the parameters on memory card. This procedure will take approx. 30 seconds.

The progress is going to be indicated by a corresponding bar:



**Fig. 8-89 Saving parameters on memory card**

The menu point „Load parameters“ first of all shows all programming files available on the card. The file is going to be transmitted to the NivuChannel after the point has been selected.

The name of the required file is „PARAMET.NIV“.

**save** = OCM Pro → card  
**load** = card → OCM Pro

Data which have been stored within the past 14 days in the NivuChannel can be saved in case of data loss due to faulty data readout, defect cards, unintentional formatting or similar. Use the menu >Save backup<.

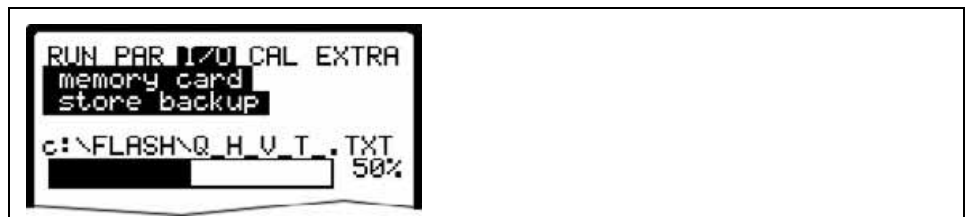


Fig. 8-90 Data backup

## 8.7 Calibration and Calculation Menu (CAL)

This menu allows to adjust level measurements, to adapt analog outputs to following systems and to emulate relay switching events and analog outputs. Furthermore it is possible to perform a temperature and flow velocity adjustment.

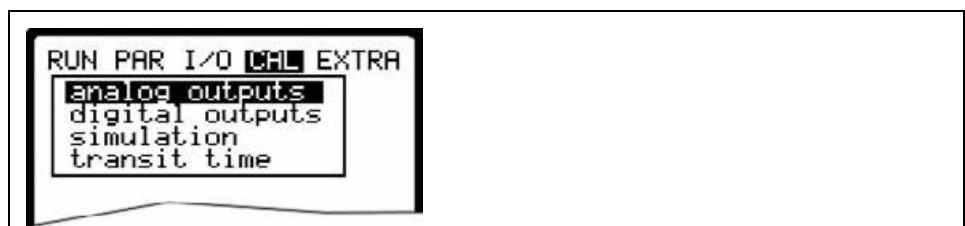


Fig. 8-91 Menu selection if fixed value is set to height

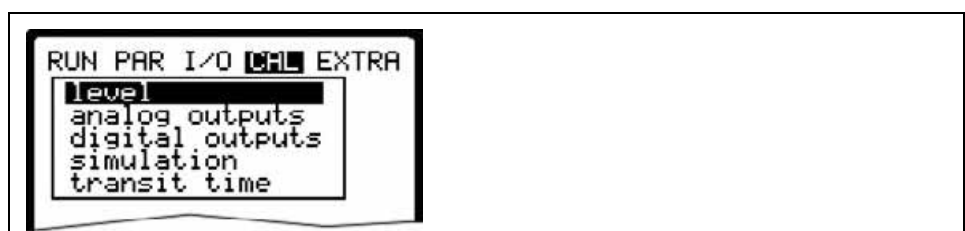


Fig. 8-92 Selection if using external sensor

Selection menu if an external signal has been set as level/height to analog input 1.

The correct filling level has to be investigated as accurate as possible before adjusting by using another suitable measurement method (value = 0 if the sensor has been removed from the medium).

Enter the investigated value as reference.

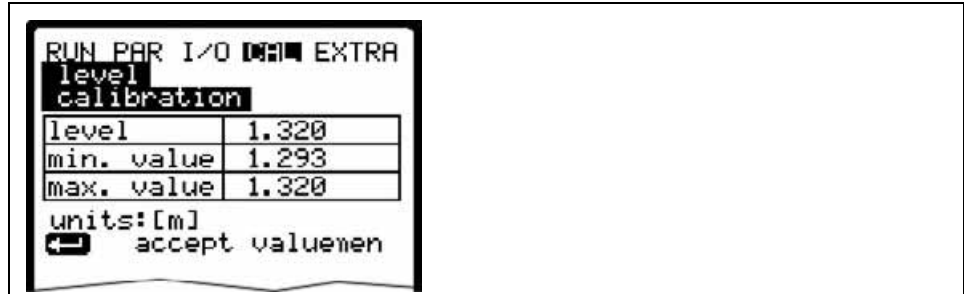


Fig. 8-93 Adjusting the level measurement

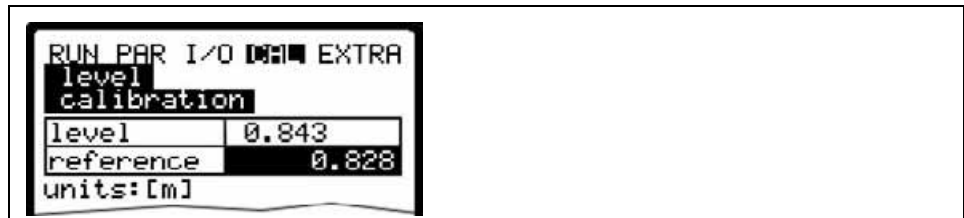


Fig. 8-94 Entering the correct filling level

**Basic Hints on Simulation:**



*The simulation of NivuChannel outputs will access any following facility areas **without any safety locking measures!***

*Simulations are allowed to be executed exclusively by NIVUS expert personnel or by expert companies trained by NIVUS in cooperation with experienced users.*



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



*The simulation of analog inputs and outputs is allowed to be carried out by specialist electricians only which have sound knowledge on the control system of the facility. This requires detailed preparation. **It is absolutely necessary to have a safety person available!***

*The following system must be set to manual operation mode. Actuators or similar have to be disabled if possible or have to be functionally restricted in a way not to cause any damage.*

*Operate only equipment within your visibility range.*

### analog Outputs

This parameter allows to simulate the NivuChannel output signals. After selecting >analog Outputs< the PIN must be entered once again. This ensures to keep unauthorised persons away from executing simulations during operation.

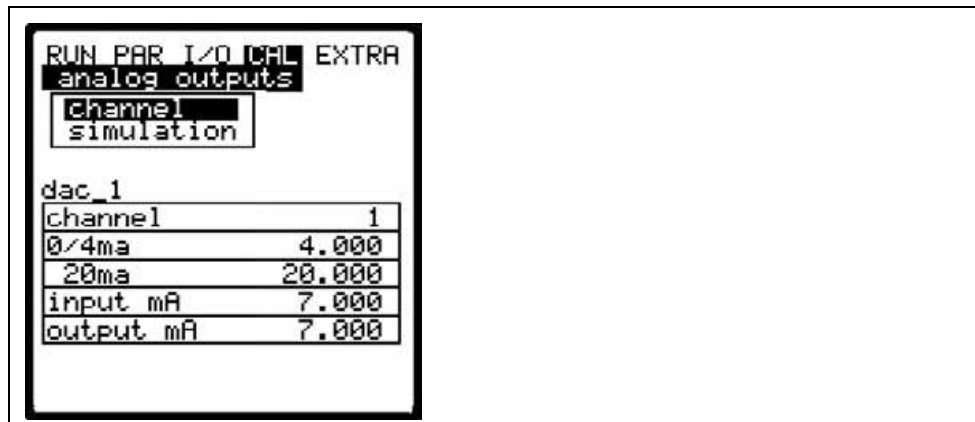


Fig. 8-95 Selecting the analog output simulation

### Channel number

Choose the analog output which is to be simulated by entering the respective number from 1 – 4 or by using the >left< or >right< arrow keys in the simulation main menu.

### Simulation

Enter the desired value in mA and confirm with Enter in order to directly output it on the according clamp.



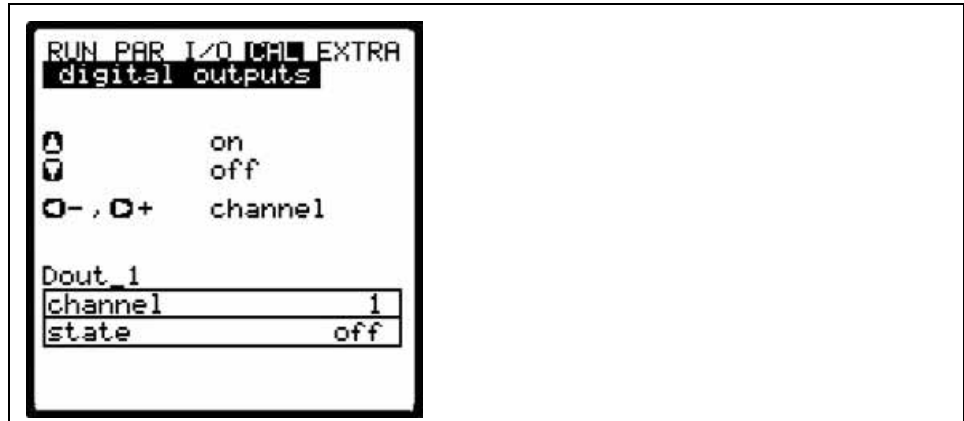
Fig. 8-96 Executing the simulation

### Relay outputs

Select the desired relays to be simulated by pressing the >left< or >right< arrow keys. The relay number chosen is going to be indicated in the first line of the output table.

The arrow keys >up< or >down< will either directly enable or disable the relay selected previously.

After selecting >Relay Outputs< the PIN must be entered once again. This ensures to keep unauthorised persons away from executing simulations during operation.



**Fig. 8-97 Relay simulation**

### Simulation

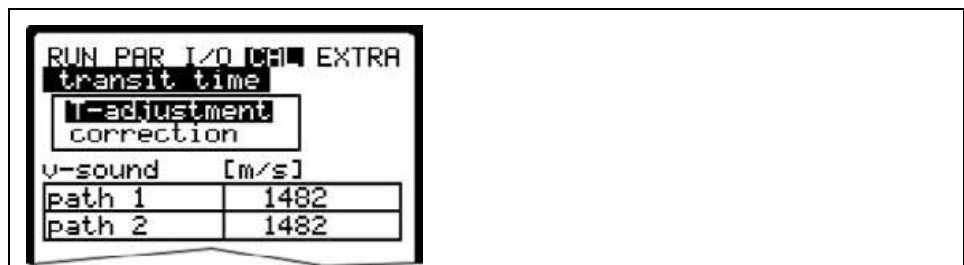
This function allows to simulate a theoretical flow by entering supposed level and velocity values without having these values actually available. The NivuChannel is going to calculate the current flow value by using the simulated values based on the channel dimensions set. The results are going to be sent to the respective outputs (analog + digital).

Simulate the desired flow velocity by pressing the >left< or >right< arrow keys. Using the >up< or >down< keys will simulate the desired flow level.

Both values simulated are going to be indicated in the table. The calculated flow value can be seen above the table.

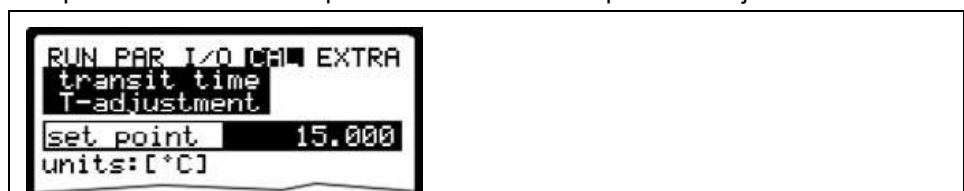
### Transit time

The transit time submenu allows to adjust temperature and velocity by utilising correction factors at various levels.



**Fig. 8-98 Screen velocity of sound in water**

The T-adjustment area indicates the currently investigated velocity of sound in m/s. This allows to draw conclusions on the medium temperature. If there should be a difference between investigated velocity of sound and externally measured temperature however it is possible to execute temperature adjustment.




**Fig. 8-99 Temperature adjustment**

If you wish to adjust the temperature use this submenu to enter the temperature you have been measuring.

External temperature measurement should be always executed in or close to the measurement path.

**Correction**

Here you can carry out velocity corrections depending on level by entering correction factors.



height[m]		
1	1.500	1.000
2	3.000	1.000
3	4.500	1.000
4	6.000	1.000
5	7.500	1.000
6	9.000	1.000
7	10.500	1.000
8	12.000	1.000

**Fig. 8-100 T-Adjustment**



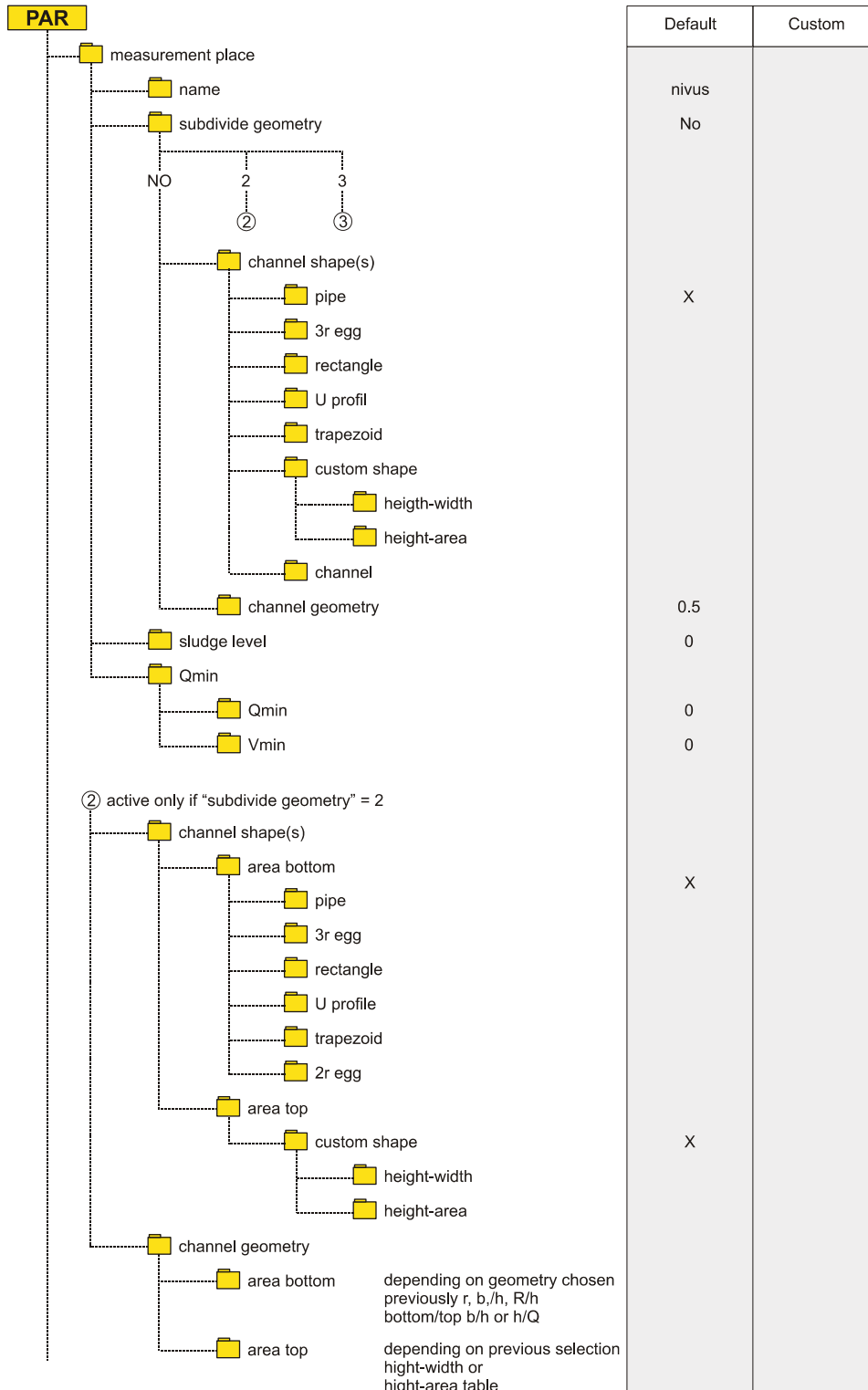
---

*Entering correction factors might leave the measurement corrupted. Settings in this menu are allowed to be modified only by expert personnel.*

---

## 9 Parameter Tree

### Parameter Menu (PAR) Part 1





Parameter Menu (PAR) Part 2

PAR		Default	Custom
③ active only if "subdivide geometry" = 3			
channel shape(s)			
area bottom			
pipe		x	
3r egg			
rectangle			
U profile			
trapezoid			
2r egg			
area middle			
custom shape		x	
height-width			
height-area			
area top			
pipe			
channel geometry			
area bottom	depending on geometry chosen previously r, b,/h, R/h bottom/top b/h or h/Q will be prompted		
area middle	depending on previous selection height-width or height-area-table		
area top	Enter r, total height and circle segment height		
LDV parameter			
path number	choice of active paths	1	
path configuration	number of paths	1	
inst. direct.	installation direction and geometry of the chosen path		
K-factor	correction factor of the chosen path		
min.+max. value	velocity limits of the chosen path	from -10 to +10	
level			
sensor type			
external sensor			
constant level			
scale			
offset			
span			
time delay			

Parameter Menu (PAR) Part 3

PAR	Default	Custom
analog inputs		
channel number	1	
name	Analogin_1	
function		
inactive	X	
archive		
set point		
set+arch		
measurement range		
0-20 mA		
4-20 mA	X	
0-10 V		
0-5 V		
unit	m	
linear table		
fix points	2	
fix point list	4.0: 0.0 20.0: 1.0 0.0	
offset		
analog outputs		
channel number	1	
name	dac_1	
function		
inactive	X	
flowrate output		
level output		
velocity output		
temperature water		
analog input_1		
analog input_2		
analog input_3		
analog input_4		
output span		
0-20 mA	X	
4-20 mA		
measurement span	0/4 mA: 0.0 20 mA: 20.0	
error mode		
0 mA	X	
hold		
4 mA		
20.5 mA		

Parameter Menu (PAR) Part 4

PAR	Default	Custom
digital outputs		
channel number	1	
function		
not active	1	
flowrate output		
level output		
velocity output		
pos-total impulse		
neg-total impulse		
error messages		
following par. only at active function		
logic	n.o.	
trigger level	ON: 0.0 OFF: 0.0	
or:		
pulse parameter	on time: 0.5 amount: 0.1	
setup parameter		
load factory setup		
service code		
PIN		
damping	30	
stability	60	
storage mode		
operation mode	inactive	
or:		
operation mode	level	
source	n.o.	
level		
periodic interval		
cycle	300	
event interval	60	
select data		
analog I1	NO	
analog I2	NO	
analog I3	NO	
analog E4	NO	
system	NO	

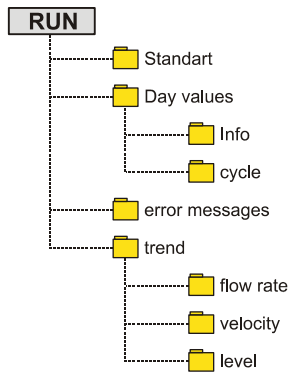
Parameter Menu (PAR) Part 5

PAR	Default	Custom
units		
unit system	metric	
flowrate		
m <sup>3</sup> /s (ft <sup>3</sup> /s, cfs)		
l/s (gal/s, mgd)	X	
m <sup>3</sup> /h (ft <sup>3</sup> /h, gpm)		
m <sup>3</sup> /d (ft <sup>3</sup> /d, cfh)		
m <sup>3</sup> /min (ft <sup>3</sup> /min, cf/min)		
level		
m (ft)	X	
cm (in)		
mm (in/10)		
velocity		
m/s (ft/s, fps)	X	
cm/s (in/s)		
wake-up limit (only at event "level")		
on limit	0.05	
format of numbers	0	
communication		
remote access	inactive	
Ethernet	NO	
Modem (only when remote access Modem is active)		
provider	01920782	
user name	arcor	
pass word	internet	
DNS-server		
DNS- address prim.	145.253.002.01	
DNS- address sec.	193.254.160.00	
direct access		
user	admin	
password	nivus	

Calibration Menu (CAL)

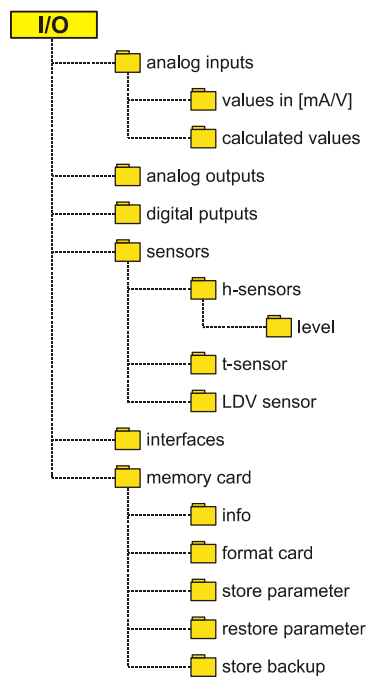
CAL	Default	Custom
level		
calibration		
analog outputs		
channel number	1	
simulation	0	
digital outputs		
simulation		
transit time		
T-adjustment		
correction		

**Operation Mode (RUN)**



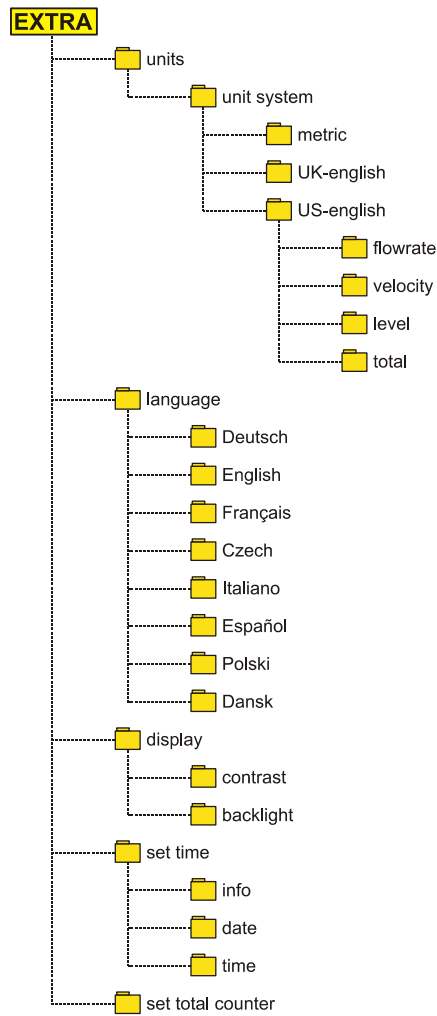
Default	Custom

**Signal Input/Output Menu (I/O)**



Default	Custom

Display Menu (EXTRA)



Default	Custom
l/s	
m/s	
m	
m <sup>3</sup>	
X	
50 %	
75 %	
0	

## 10 Troubleshooting

Error	Possible Reason	Correction
No indication of flow (>0< or >----<)	Connection	Check connection between sensor cable and terminal strip. Check connection boxes, connections for sensor cable extension for correct connection or moisture.
	Sensor	Check sensor installation.
		Check sensor for soiling, sedimentation, silting (→ to be removed) or mechanical damage or sensor body and cable (→ replace sensor).
	Flow level measurement	<p><b>Important:</b> no flow level → no flow velocity measurement possible!!</p> <p>In case of level measurement: check external transmitter for function and signal transmission (cables, clamped connections, short-circuits, contact resistance).</p>
		Flow level > 65 mm (2.56 in)? In this case the NivuChannel is in Q/H measurement mode at initial start-up. Enter the velocity at a level of 65 mm (2.56 in) manually in parameter CAL – Flow vel. – Velocity h_crit. This has to be done only once.
		Check level measurement parameter "Fixed value" in case measuring in full channel without using level measurement.
	Transmitter	<p>Call up error memory. Depending on error messages take the respective measures (check cables, plug and socket connections, sensor installation). If &gt;CPU Error&lt; is indicated consult NIVUS service personnel.</p> <p>Investigate the moment of failure in menu RUN – Trend.</p>
Negative flow direction	Sensors shifted during connection? → exchange sensor connections.	
Programming	Completely check the transmitter parameter settings.	

No screen (black / flickering)	Connection	Check power supply connection.
	Power supply	Check power supply voltage.
		Check switch position on connection board.
		Compare power supply (AC or DC) with transmitter type.
	Memory card	Unauthorised manufacturer → use NIVUS memory card.
		Improper memory size? → use card with permissible maximum capacity
Card formatted on PC? → send card to NIVUS.		
Display Error Sensor >X<	Connection	Check cable connection. Wiring on terminal strip switched? Cables firmly connected to plugs (re-tighten screws, pull at cable ends)? Insulation of single wires unintentionally clamped in? Plug and socket firmly put together?
	Communication	Communication to sensor disturbed. Can be checked by pressing the I key. Sensor should be indicated in the third line of the following screen. Check cables for interruption or loose connection. Check sensor for mechanical damage.
Unstable measurement values	Disadvantageous hydraulic conditions on measurement place	Verify the quality of the measurement place by utilising the graphic flow velocity profile indication. Relocate sensor to a place with better hydraulic conditions (extend calming section).
		Remove soiling, sedimentation or obstructive constructions upstream of sensor.
		Straighten the flow profile by installing appropriate baffle plates and calming elements, flow straighteners or similar upstream of measurement.
		Increase damping.
	Sensor	Check sensor installation (towards flow direction, horizontal installation). Check sensor for sedimentation or obstructions.



Unplausible measurement values	Hydraulically unsuitable measurement place	See "Unstable measurement values".
	External level signals	Check for correct connection.
		Check if cables are crushed, for short circuits and improper resistive loads or current consumers without galvanic isolation.
		Check measurement range and span.
		Check input signal in I/O menu.
	Sensor	Check for correct connection.
		Check if cables are crushed / for extensions/cable types, short circuits, surge arresters or improper resistive loads.
		Check level signal, echo profile, flow velocity signal, cable parameters and temperature in I/O menu.
	Programming	Check if the correct shape of measurement place has been set, check dimensions (observe units), sensor type, sensor installation height etc.
	Faulty relay output	Connection
Check power supply of external control relays.		
In I/O menu check signals to be output.		
Check output control function in calibration menu.		
Transmitter		Check relay outputs under "Simulation"!
Programming		Check if relay outputs are enabled..
		Check if outputs are correctly assigned to respective output channels.
	Check additional values such as impulse parameters, limit values, logic etc.	
Faulty mA output	Connection	Check connection clamps for correct wiring and polarity.
		In case of using several outputs: check following systems/indicators if they are potential-free. Two analog outputs at a time have a common ground.
	Programming	Check if functions have been assigned to correct output channel.
		Check output range (0 or 4-20 mA)
		Check output span
		Check offset
		Check Offset
		Check output signal in I/O menu
	Following systems	Check cables and connections as well as input and output clamps.
		Check input range (0 or 4-20 mA) of following system.
		Check input span of following system.
		Check offset of following system.

No / incomplete data on memory card	Memory Card	Memory card defect. To be checked in menu: I/O – MemoryCard – Info.
		Unauthorised manufacturer → use NIVUS memory card.
		Memory card with more than 128MB capacity cannot be used currently!
		Memory card formatted on PC. Send card to NIVUS.
	Transmitter	Memory card not firmly plugged (not deep enough).
		Memory card not plugged for a sufficient period of time (min. required: 60 minutes! Data will be saved every full hour).
	Programming	Storage not enabled in Memory Mode – Operation Mode – Mode.

## 11 Lists and Questionnaire

### 11.1 Table of Resistiveness

**The medium contacting parts of the NivuChannel sensor are made of the standard materials below:**

**Rod sensor:**

- Stainless steel V4A (pipe sensor jacket)
- Carbon CFK (sensor surface)
- PEEK (sensor crystal cover)
- Polyurethane (Cable sheath and glands)
- Viton (PA/PR) sealing

**Hemisphere:**

- V4A (Holder bracket)
- Carbon CFK (sensor surface)
- POM, PUR (sensor body)
- Neoprene for coupling

The sensors are resistant to normal domestic sewages, dirt and rain water as well as mixed water from municipalities and communities. In many industrial plants (such as Huels, BASF etc.) the resistance does not represent any problems. The sensors nevertheless are not resistant to all substances and substance mixtures.



---

*As a basic principle, damage might occur in case of using chloride media (pitting corrosion in stainless steel ground plate or sensor jacket), hydrogen sulphide ( $H_2S$  – risk of diffusion through cable sheath or sensor body resulting in destruction of copper wires and conductor paths) as well as various organic solvents (may dissolve cable sheath or sensor body)!*

---

Please observe that substance mixtures (several substances being present simultaneously) under certain circumstances may cause catalytic effects which might not occur if the individual substances are in use. Due to infinitely possible combinations these catalytic effects cannot be verified entirely.

If in doubt please contact your NIVUS representative and request a free material sample for long time testing purposes.

For special applications using high-aggressive or solvent-containing media there are sensors made of full PEEK with Hastelloy or titanium ground plates or according pipe sensors made of high-resistant special steel available. Sensor cables which have to be immersed into the medium are available with special FEP coating (resistant to organic solvents or hydrogen sulphide).

MEDIUM	FORMULA	CONCENTRATION	HDPE	PPO GF30	PUR	PEEK	FEP	V4A
Acetaldehyde	C <sub>2</sub> H <sub>4</sub> O	40 %	3/3	4	4	1	(1)	(1)
Acetic acid	C <sub>2</sub> H <sub>4</sub> O <sub>2</sub>	10 %	1/1	2	3	1	1/1	1/1
Acetic acid methylester	C <sub>3</sub> H <sub>6</sub> O <sub>2</sub>	tech. clean	1/0	3	0	1	1/0	1/1
Aceton	C <sub>3</sub> H <sub>6</sub> O	40 %	1/1	4	4	1	(1)	1/1
Allyl alcohol	C <sub>3</sub> H <sub>6</sub> O	96 %	1/3	2	0	1	1/1	1/1
Aluminium chloride	AlCl <sub>3</sub>	10 %	1/1	2	0	1	1/1	3/4
Aluminium chloride	(NH <sub>4</sub> )Cl	aqueous	1/1	1	0	1	1/1	1/2L
Ammonium hydroxide	NH <sub>3</sub> + H <sub>2</sub> O	5 %	1/1	2	4	1	1/1	1/1
Anilin	C <sub>6</sub> H <sub>7</sub> N	100 %	1/2	3	4	1	1/1	1/0
Benzene	C <sub>6</sub> H <sub>6</sub>	100 %	3/4	3/4	2	1	1/1	1/1
Benzyl alcohol	C <sub>7</sub> H <sub>8</sub> O	100 %	3/4	3	2	1	1/1	1/1
Boric acid	H <sub>3</sub> BO <sub>3</sub>	10 %	1/1	1	1	1	1/1	1/1
Bromic acid	HBrO <sub>3</sub>	konz.	0/0	0	3	1	0/0	(4)
Butanol	C <sub>4</sub> H <sub>10</sub> O	tech. clean	1/1	2	3	1	1/1	(1)
Calcium chloride	CaCl <sub>2</sub>	spirituous	1/0	1	1	1	1/1	1/2L
Chloric gas	Cl <sub>2</sub>		4/4	3	3	1	1/1	1/0
Chloric methane	CH <sub>3</sub> Cl	tech. clean	3/0	4	4	1	1/0	1/1L
Chlorine water	Cl <sub>2</sub> x H <sub>2</sub> O		3/0	2	0	1	(1)	2/0L
Chlorobenzene	C <sub>6</sub> H <sub>5</sub> Cl	100 %	3/4	3	4	1	1/1	1/1
Chloroform	CHCl <sub>3</sub>	100 %	3/4	4	4	1	1/1	1/1
Chromate	CrO <sub>3</sub>	10 %	1/1	1	0	1	1/1	1/2
Diesel oil	—	100 %	1/3	2	0	1	(1)	(1)
Ethanol	C <sub>2</sub> H <sub>6</sub> O	96 %	1/0	1	1	1	1/1	1/1
Ethyl acetate	C <sub>4</sub> H <sub>8</sub> O <sub>2</sub>	100 %	1/3	3	3	1	1/1	(1)
Ethylen chloride	C <sub>2</sub> H <sub>4</sub> Cl <sub>2</sub>		3/3	4	3	1	1/1	1/1L
Ferric-(III)-chloride	FeCl <sub>3</sub>	saturated	1/1	2	3	2	1/1	4/4
Formaldehyde solution	CH <sub>2</sub> O	10 %	1/1	1	2	1	1/1	1/1
Gasoline, unleaded	C <sub>5</sub> H <sub>12</sub> - C <sub>12</sub> H <sub>26</sub>		2/3	3	2	1	1/1	1/1
Glycerol	C <sub>3</sub> H <sub>8</sub> O <sub>3</sub>	90%	1/1	1	2	1	1/1	1/1
Heptane, n-	C <sub>7</sub> H <sub>16</sub>	90%	2/3	1	1	1	1/1	1/1
Hexane, n-	C <sub>6</sub> H <sub>14</sub>	100 %	2/3	1	2	1	1/1	1/1
Hydrofluoric acid	HF	50 %	1/1	2	3	1	1/1	4/4
Isopropanol	C <sub>3</sub> H <sub>8</sub> O	tech. clean	1/1	1	2	1	1/1	(1)
Magnesium chloride	MgCl <sub>2</sub>	aqueous	1/1	1	2	1	1/1	1/0L
Potassium hydroxide	KHO	10 %	1/1	1	3	1	1/1	1/1
Potassium nitrate	KNO <sub>3</sub>	aqueous	1/1	1	0	1	1/1	1/1
Methanol	CH <sub>4</sub> O		1/1	1	2	1	1/1	1/1
Methyl benzene (toluene)	C <sub>7</sub> H <sub>8</sub>	100 %	3/4	3	3	1	1/1	1/1
Lactic acid	C <sub>3</sub> H <sub>6</sub> O <sub>3</sub>	3 %	1/1	1	0	1	1/1	1/1
Mineral oil	—		1/1	1	1	1	1/1	1/1
Sodium bisulphite	NaHSO <sub>3</sub>	aqueous	1/1	1	0	1	(1)	1/1
Sodium carbonate	Na <sub>2</sub> CO <sub>3</sub>	aqueous	1/1	1	3	1	1/1	1/1
Sodium chloride	NaCl	aqueous	1/1	1	2	1	1/1	1/2
Sodium hydroxide	NaHO	50 %	1/1	1	3	1	1/1	1/3
Sodium sulphate	Na <sub>2</sub> SO <sub>4</sub>	aqueous	1/1	1	0	1	1/1	1/1
Nitrobenzene	C <sub>6</sub> H <sub>5</sub> NO <sub>2</sub>		3/4	3	4	1	1/1	1/1
Oleic acid	C <sub>18</sub> H <sub>34</sub> O <sub>2</sub>	tech. clean	1/3	1	1	1	(1)	1/1
Oxalic acid	C <sub>2</sub> H <sub>2</sub> O <sub>4</sub> x 2H <sub>2</sub> O	aqueous	1/1	2	0	1	1/1	1/3
Ozone	O <sub>3</sub>		3/4	2	2	1	1/1	0/0
Petroleum	—	tech. clean	1/3	3	1	1	(1)	1/1
Essential oils	—		0/0	1	1	1	(1)	1/1
Phenol	C <sub>6</sub> H <sub>6</sub> O	100 %	2/3	3	2	1	1/1	1/1
Phosphoric acid	H <sub>3</sub> PO <sub>4</sub>	85 %	1/1	1	0	1	1/1	1/3
Quicksilver-(II)-chloride	HgCl <sub>2</sub>	aqueous	1/1	1	0	1	1/1	(4)
Nitric acid	HNO <sub>3</sub>	1-10 %	1/1	1	3	1	1/1	1/1
Hydrochloric acid	HCl	1-5 %	1/1	1	3	1	1/1	4/4
Carbon disulphide	CS <sub>2</sub>	100 %	4/4	2	0	1	1/1	1/1
Sulphuric acid	H <sub>2</sub> SO <sub>4</sub>	40 %	1/1	1	3	1	1/1	2/3
Ethyl alcohol	C <sub>2</sub> H <sub>6</sub> O	100 %	1/0	1	1	1	1/1	1/1
Carbon tetrachloride (TETRA)	CCl <sub>4</sub>	100 %	4/4	3	4	1	1/1	1/1L
Trichloroethylene (TRI)	C <sub>2</sub> HCl <sub>3</sub>	100 %	3/4	4	4	1	1/1	1/1L
Citric acid	C <sub>6</sub> H <sub>8</sub> O <sub>7</sub>	10 %	1/1	1	1	1	1/1	1/1

## 11.2 Resistiveness Legend

### Resistiveness

There are two values per medium.

left number = value at +20° C / right number = value at +50° C.

- 0 no specifications available
- 1 very good resistance/suitable
- 2 good resistance/suitable
- 3 limited resistance
- 4 not resistant
- K no general specifications possible
- L risk of pitting corrosion or stress corrosion cracking
- ( ) estimated value

### Material Names

- HDPE Polyethylene, high density
- FEP Tetrafluorethylene-Perfluorpropylene
- V4A Stainless steel 1.4401 (AISI 316)
- PPO GF30 Polyphenyloxylyene with 30% glass fibres
- PU Polyurethane
- PEEK Polyetheretherketone



## 11.3 Internet Connection Questionnaire

There are several options to set up an Internet connection for the NivuChannel. Basically all units can be connected to a local area network (Intranet). Depending on the type of transmitter used (see Chapter 4.5) it is optionally possible to set up Internet connections via analog or ISDN modem as well as GPRS modem (currently being prepared). Prior to entitling NIVUS to set up the connection it is required to specify several technical details. If you wish to set up several units please fill out one questionnaire per unit.

Please copy the questionnaire below, fill out and return by fax or post to:

**NIVUS GmbH, Department "Data Technology"**

Im Taele 2 • 75031 Eppingen, Germany • Fax: +49 (0)7262/9191-999

<p>*Mandatory specifications. ① Request from user system administrator if required.</p>			
<p><b>Requesting Company:</b></p>			
*Contact Person:		*Phone:	
*Street:		Fax:	
*Postal Code, City:		E-mail:	
Transmitter Art. No.:		Transmitter Serial No.:	
<p><b>Location :</b> (if not as stated above)</p>			
Postal Code, City:		Country:	
Contact Person:		Phone:	
<p><b>* Set up Internet connection as described below:</b></p>			
<input type="checkbox"/> LAN/Ethernet	<input type="checkbox"/> Analog Line	<input type="checkbox"/> ISDN Line	<input type="checkbox"/> GPRS (TD1)
<p>Fill out respective column only if checked above</p>			
<p>- *IP to be assigned① ..... - *Gateway IP ① ..... - *Subnet Mask ① .....</p>	<p>- *Direct access <input type="checkbox"/> yes <input type="checkbox"/> no - *Terminal is part of a telephone system <input type="checkbox"/> yes, Type: ..... <input type="checkbox"/> no - *Additional units to be operated on same line (Telephone, Fax or similar) <input type="checkbox"/> yes <input type="checkbox"/> no - *Telephone number of terminal ..... - Telephone line socket available  <input type="checkbox"/> Type TAE  <input type="checkbox"/> Type Western  <input type="checkbox"/> none - Outward dialling <input type="checkbox"/> &gt;&gt;0&lt;&lt; <input type="checkbox"/> none, direct extension <input type="checkbox"/> other .....</p>	<p>- *Additional units to be operated on same line <input type="checkbox"/> yes <input type="checkbox"/> no - *Telephone number of terminal ..... - Telephone line socket available <input type="checkbox"/> Western RJ45 <input type="checkbox"/> Western RJ11 <input type="checkbox"/> none</p>	<p>- *Number of unlocked GPRS SIM ..... - *PIN ..... - *TD1 service available on desired location? <input type="checkbox"/> yes, service o.k. <input type="checkbox"/> yes, service weak <input type="checkbox"/> not checked <input type="checkbox"/> other .....</p>

LAN/Ethernet	Analog Line	ISDN Line	GPRS (TD1)
	<p><b>* Internet Provider</b></p> <p><input type="checkbox"/> Provider agreement available</p> <p>Provider: .....</p> <p>Dial-up: .....</p> <p>User Name: .....</p> <p>Password: .....</p> <p><input type="checkbox"/> Internet by Call (established or desired provider)</p> <p>Provider: .....</p> <p>Dial-up: .....</p> <p>User name: .....</p> <p>Password: .....</p> <p><input type="checkbox"/> Internet by call – to be set up by NIVUS upon request</p>		
<p><b>* Gate Access</b></p> <p><input type="checkbox"/> previously set up by NIVUS</p> <p><input type="checkbox"/> not yet set up</p> <p>desired main user name: (suggested: company.admin)</p> <p>.....</p> <p>Password desired:</p> <p>.....</p> <p>(may be customised later)</p>		<p><b>* Java Run Time Environment</b> ①</p> <p><input type="checkbox"/> available</p> <p><input type="checkbox"/> not available</p> <p><b>* Browser</b> ①</p> <p><input type="checkbox"/> Explorer, Version: .....</p> <p><input type="checkbox"/> FireFox</p> <p><input type="checkbox"/> Opera</p> <p><input type="checkbox"/> other: .....</p>	
<p>.....</p> <p>Date</p>		<p>.....</p> <p>Signature</p>	

## 12 Maintenance and Cleaning



---

*Due to using the measurement system mostly in the waste water field which may be contaminated with hazardous germs, please ensure to take respective precautions getting in contact with system, transmitter, cables and sensors.*

---

The device Type NivuChannel is designed to be virtually maintenance-free and free of material wear and does not need to be calibrated. The only exception is the flow velocity wedge sensor with integrated pressure measurement cell.

If required clean the transmitter enclosure if with a dry, lint-free cloth. For heavy pollution NIVUS recommends the use of surface-active agents. The use of abrasive cleansing agents is not allowed.



---

*If you wish to clean the enclosure surface with a damp cloth please disconnect the unit from mains before.*

---

In heavily polluted media tending to sedimentation it may be necessary to clean the sensor regularly. To do this, please use a brush with plastic bristles, a broom or similar.



---

*No hard objects such as wire brushes, rods, scrapers or similar shall be used to clean the sensor.*

*Never use scrubbing, scouring cleansing agents or other tools / media which might have abrasive effects or organic solvents to clean sensor cables and sensors.*

*Cleaning by using a water jet is allowed up to a max. pressure of 4 bar (see Water Ultrasonic Sensor / Hydro-Acoustic Converter) (e.g. use water hose).*

*Using a high pressure cleaner may lead to measurement failures and thus is not allowed.*

---



## 13 Emergency

In case of emergency

- press the emergency-off button of the main system or
- set the slide switch (see Fig. 6-10 ) a on the unit to OFF.

## 14 Dismantling/Disposal

The device shall be disposed according to the local regulations for electronic products.

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