Instruction Manual for

OCM Pro CF Measurement Device

(Original Instruction manual – German)

valid as of Software Revision No. 5.08

Firmware Radar: v1.00

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Translation

If the device is sold to a country in the European currency area, 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.

Names

The use of general descriptive names, trade names, trademarks and the like in this handbook does not entitle the reader to assume they may be used freely by everyone. They are often protected registered trademarks even if not marked as such.

1 General

Important

READ CAREFULLY BEFORE USE

KEEP IN A SAFE PLACE FOR LATER REFERENCE

This Instruction manual for the flow measurement unit OCM Pro CF is intended for the initial start-up of the unit depicted on the title page. This manual is oriented exclusively to qualified expert personnel.

Read this instruction manual carefully and completely prior to installation and connection since it contains relevant information on this product. Observe the notes and particularly follow the warning notes and safety instructions.
Keep this manual in a safe place and make sure it is available for the users of this product at any time.

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

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

Detailed information on how to operate the complete system can be found in the accompanying instruction manual oft NIVUS, Sensors etc.

Personnel requirements

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

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

Qualified personnel

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

- *Training, instruction or authorisation to activate/deactivate, isolate, ground, and mark electric circuits and devices/systems according to the safety engineering standards.*
- *Education and instruction according to the standards of safety engineering regarding the maintenance and use of adequate safety equipment.*
- *First aid training*

Applicable documentation

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

- Technical Instructions for correlation sensors and Electronic box
- Technical and Installation Instruction for Radar sensors OFR

These manuals are provided with the auxiliary units or sensors.

2 Safety Instructions and Hazard Warnings

2.1 Used Hazard Warnings

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

DANGER

Hazard warnings

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

WARNING

Danger of electrical shock

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

WARNING

Warning notice

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

CAUTION

Notes for caution

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

Important Note

Indicates a situation that could cause damage on this instrument if it is not avoided.

Contains information that should be highlighted.

Note

Indicates a situation that will not result personal injury.

2.2 Safeguards and Precautions

WARNING

Germ contamination

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

Wear protective clothing.

WARNING

Observe regulations for health and safety at work

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

Failure to do so may cause personal injury..

WARNING

Do not disable safety devices!

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

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

WARNING

Disconnect from power supply

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

Disregarding may lead to electrical shocks.

Important Note

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

2.3 Liability Disclaimer

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

For connection, initial start-up and operation of the OCM Pro CF the following information and higher legal regulations (e.g. in Germany VDE), such as Ex-regulations as well as safety requirements and regulations in order to avoid accidents, must be kept.
All operations on the device which go beyond installation or connection measures in principle shall be carried out by NIVUS staff or personnel authorised by NIVUS due to reasons of safety and guarantee. The manufacturer is not liable for failures resulting from improper or inappropriate use.

2.4 User's Responsibilities

Important Note

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

The customer shall 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

Connections:

As an operator make sure prior to activating the OCM Pro CF that during installation and initial start-up, if executed by the operator himself, the local regulations (such as regulations for electrical connection, operation in channels) are observed.

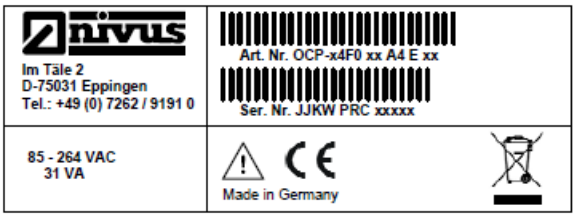
2.5 Device Identification

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:

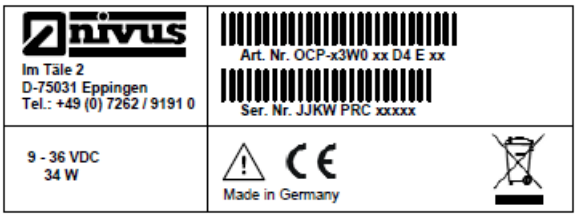
- Name and address of manufacturer
- CE label
- Type and serial number
- Year of manufacture
- Ex-label (on Ex-version devices only) as mentioned in chapter Specifications.

It is important for queries and replacement part orders to specify type, year of manufacture and serial number (Article no. if necessary). This ensures correct and quick processing.

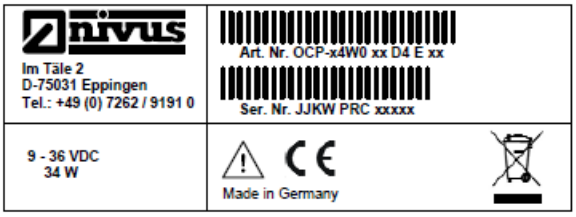
OCM Pro CF iin front panel enclosure with S4/M4 backplane:



OCM Pro CF in wall mount enclosure with S3/M3 backplane:



OCM Pro CF in wall mount enclosure with S4/M4 backplane:



Ex nameplate:

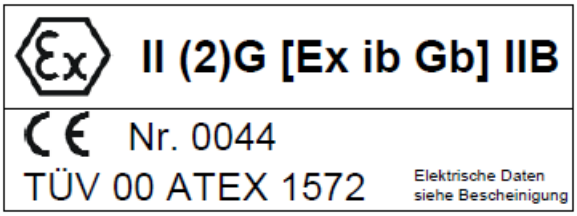


Fig. 2-1 OCM Pro CF nameplates

2.6 Installation of Spare Parts and Parts subject to wear and tear

We herewith particularly emphasize that replacement parts or accessories, which are not supplied by us, are not certified by us, too. Hence, the installation and/or the use of such products may possibly be detrimental to the device's ability to work or even lead to instrument failure.
Damages or measurement errors caused by the use of non-original parts and non-original accessories are left at user's risk. You can find spare parts or accessories in chapter 14.

2.7 Device Versions

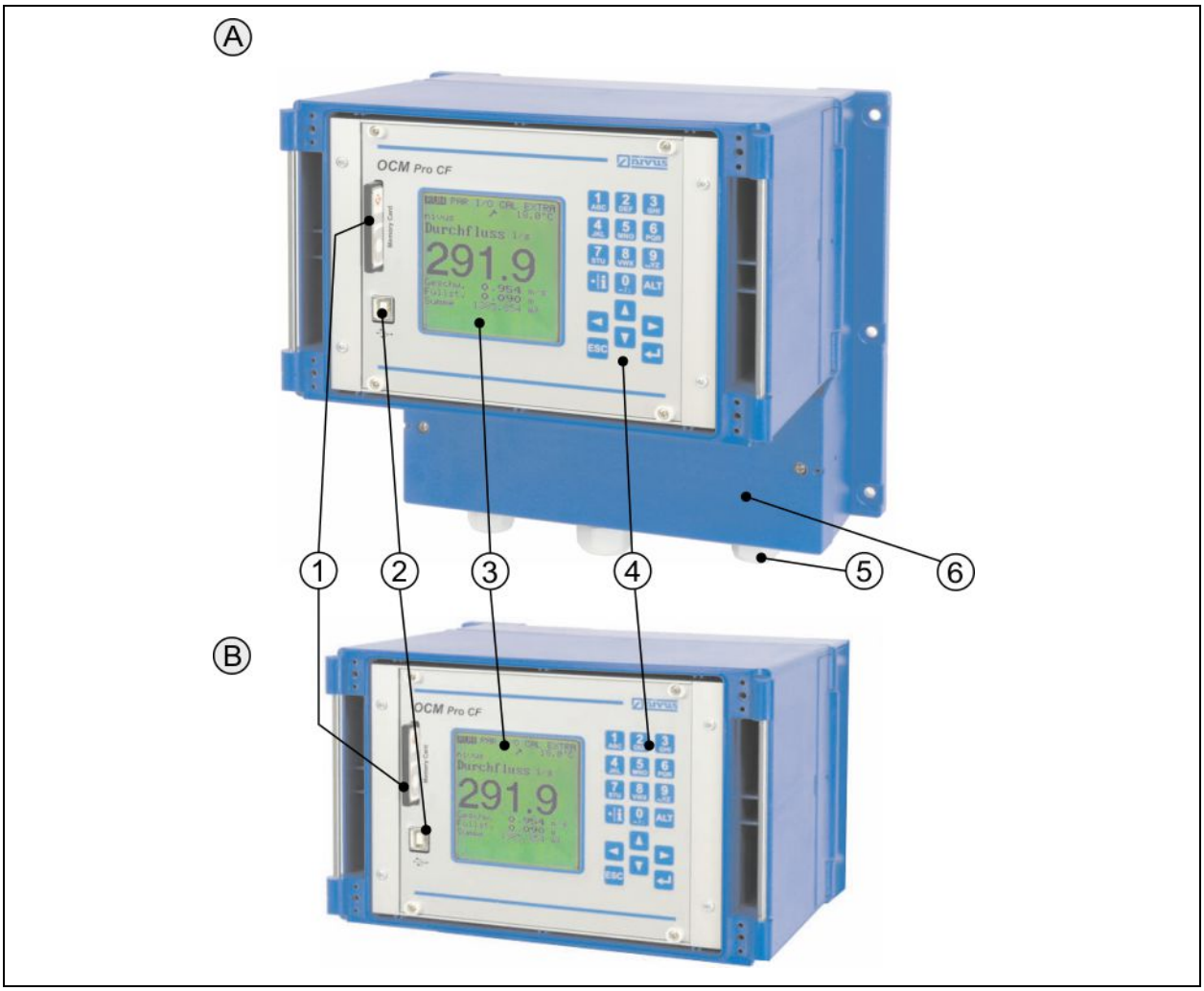
The OCM Pro CF measurement transmitter is available in different versions. The type key below gives a brief overview on the various possibilities.
The transmitters vary in terms of the number of inputs and outputs, enclosure construction, data transmission options, power supply and Ex protection. The 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 the type key below the type of device can be specified precisely.

OCP-	Type					
	S4	Standard version with 2 relays, 2 mA output (galv. isolated), 1 mA input (galv. isolated with 2-wire sensor supply) or for external level measurement				
	M4	Multifunctional version with 5 relays, 4 mA outputs (galv. isolated), 4 digital inputs, 5 analog inputs (1 of them galv. isolated with 2-wire sensor supply), integrated 3-point step controller with flush function, connecting options for up to 3 sensors				
	R4	Multifunctional version with 5 relays, 4 mA outputs (galv. isolated), 4 digital inputs, 5 analog inputs (1 of them galv. isolated with 2-wire sensor supply), integrated 3-point step controller with flush function, connecting options for one Radar sensors, type OFR				
		Construction				
		F0	Panel mounting IP54 / IP20, no data transmission available			
		W0	Wall-mounting IP65			
			Data Transmission			
			00	without Internet communication (for F0 enclosure)		
			IN	Internet communication via Intranet (for W0 enclosure)		
			MA	Internet communication via internal analog modem (for W0 enclosure)		
			MI	Internet communication via internal ISDN modem (for W0 enclosure)		
			MG	Internet communication via GPRS (GSM antenna required) (for W0		
				Power Supply		
				A4	100-240 V AC / 47-63 Hz	
				D4	9-36 V DC	
					ATEX Approvals	
					0	none
					E	Intrinsically safe sensor supply in Ex zone 1
OCP-						

Fig. 2-2 Type key for OCM Pro CF measurement transmitters

3 Overview and Intended Use

3.1 Overview



A Wall mount enclosure

B Panel mount enclosure

1 Slot with plugged Memory Card

2 USB interface (for service purposes only)

3 Keypad

4 Graphic display

5 Cable glands (only wall mount enclosure)

6 Terminal clamp housing with cover (only wall mount enclosure)

Fig. 3-1 Overview enclosure

1 Flow velocity wedge sensor, type POA-V2H1/V2U1
2 Flow velocity wedge sensor, type POA-V200/V2D0
3 Flow velocity wedge sensor, type CS2
4 Flow velocity pipe sensor, type CS2, with sensor screw joint and retaining element
5 Flow velocity pipe sensor, type POA, with sensor screw joint and retaining element
6 Air-ultrasonic level sensor, type OCL-L1
7 Flow velocity wedge sensor, type CSM-V100
8 Flow velocity wedge sensor, type CSM-V1D0
9 Air-ultrasonic level sensor, type DSM
10 Electronic Box, type EBM
11 Flow velocity radar sensor, type OFR

Fig. 3-2 Overview sensors and electronic box

3.2 Intended Use

Important Note

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

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 must be carried out.

The measurement device type OCM Pro CF including the respective sensor technology supplied by NIVUS is intended to be used for continuous flow measurement of slight to heavy polluted media in part filled and full channels, pipes or similar. Here the allowed maximum values, as specified in chapter 0, must be strictly kept. All cases which vary from these conditions and are not approved by NIVUS GmbH in written form are left at owner's risk.

Important Note

Install the device outside of Ex zones!

The Ex approval of the sensors is part of the „Technical Description for Correlation Sensors".

Ex-Identification

Transmitter: ⟨Ex⟩ II (2)G [Ex ib Gb] IIB

CAUTION

Damages invalidate the Ex protection

Damage might invalidate the Ex protection.

The OCM Pro CF then is not allowed to be used in Ex area any longer.

Protect the OCM Pro CF from shocks, drops or other damage.

Note

The approval is only valid in connection with the respective indication on the device nameplate.

The Ex-version of OCM Pro CF is matched to the NIVUS sensors regarding the assessment of intrinsically safe electrical systems according to EN 60079-25.

In case of using sensors from third party manufacturers the operator must carry out a system review according to EN 60079-25!

The required specifications of the OCM Pro CF Ex version can be taken from the EC-type examination certificate TÜV 00 ATEX 1572.

4 Specifications

Supply power	100 – 240 V AC, +10% /-15%, 47 to 63Hz or 9- 36 V DC
Max. consumption	AC: 31 VA / DC: 34 W
Typ. consumption	1x POA-V1U1 + 1x NMC0 + 1 relay energised, 230 V AC: (rounded) 14 W 1x POA-V1U1 + 1 relay energised, 230 V AC = (rounded) 14 W
Wall mount enclosure	- Material: Polycarbonate - Weight: approx. 3400g - Protection: IP 65
Panel mount enclosure	- Material: Polycarbonate - Weight: approx. 2800 g - Protection: IP 54 (front side), IP 20 (reverse side)
Ex-Approval (optional)	II (2)G [Ex ib Gb] II B
Operating temperature	-20°C to +50°C [Ex: -20°C to +40°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, Czech, Italian, Spanish, Polish, Danish, Swedish
Inputs	- 1 x 4-20 mA for external level measurement (2-wire sensor) - 1 x RxTx-Bus for NIVUS air-ultrasonic sensor type OCL/DSM - 1 x (type S4) or 4 x (type M4) 0/4-20 mA 12 bit resolution for external level measurement, external control set points and external units data storage, accuracy +/- 0.4 % of final value (20 mA) - 4 digital inputs (type M4 only) - 1 (type S4) or 2/3 (type M4) velocity sensors (POA, CS2 or electronic box EBM + CSM) connectable
Outputs	- 2 x (type S4) or 4 x (type M4) 0/4-20 mA, load 500 Ohm, 12 bit resolution, accuracy better than 0.1 % - 2 x (type S4) or 5x (type M4) switchable relays, loadable up to 230 V AC / 2 A (cos. φ 0.9), minimum switching load 10 mA
Data memory	- 1 MB internal data memory for programming and saving of readings - optional plug-in Compact Flash Card up to 128 MB
Storage cycle	1 to 60 minutes
Data transmission (for panel mount enclosure only)	- Modbus TCP using integrated web server coupling via networks - (LAN /WAN, Internet) - Internet via Ethernet - internal ISDN-, GPRS- or analog modem (optional)

Sensors (optional)

For the specifications on the according sensors please see the appropriate instruction manuals or technical descriptions.

5 Storing, Delivery and Transport

5.1 Receipt

Check your delivery according to the delivery note for completeness and intactness immediately after receipt. Report any damage in transit to the carrier immediately. Send a written report to NIVUS GmbH Eppingen as well.
Report any delivery incompleteness in writing to your representative or directly to NIVUS Eppingen within two weeks

Mistakes cannot be rectified later!

5.2 Delivery

The standard delivery of the OCM Pro CF measurement system contains:

- the instruction manual with the certificate of conformity. Here, all necessary steps to correctly install and to operate the transmitter are listed.
- one OCM Pro CF transmitter, type S4, M4 or R4
- one pc. of evaluation software type NivuSoft 2.0 for Windows® Vista, 7 or 8

Check any additional accessories by using the delivery note.

5.3 Storing

Maintain the storage conditions:

max. Temperature:	+ 70°C
min. Temperature:	- 30°C
max. humidity:	80 %, non-condensing

During the storage always protect the device from corrosive or organic solvent vapours, radioactive radiation and strong electromagnetic radiation.

5.4 Transport

Protect the measurement system from shock and impact loads and vibrations.
The 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 free of charge.
Returns with insufficient postage will not be accepted!

6 Functional Description

6.1 General

The OCM Pro CF is a stationary measurement system for flow measurement and storage of the detected measurement data. Type M4 additionally allows to use a 3-step controller to drive a slide valve or similar flow control actuator. Furthermore up to 4 external measurement values can be stored. Wall mount enclosure units can be accessed remotely using the TCPIP protocol via Internet. The device is designed to be used for measurements primarily in slight to heavy polluted media with various compositions. It can be operated in part filled and full channels and pipes with various shapes and dimensions.

Important Note

The method of flow velocity investigation is based on the ultrasound reflection principle. Hence, it is indispensable for the system to work that there are particles in the water, which are able to reflect the ultrasonic signal sent by the sensor (dirt particles, gas bubbles or similar). Alternative the surface velocity can be measured by using an OFR radar sensor. This sensor must not get in contact with the medium.

The OCM Pro CF type S4 either uses a POA or a CS2 sensor which simultaneously determines flow velocity and flow level. Alternatively, a CSM sensor in con-junction with the electronic box EBM may be connected, which however merely is a flow velocity sensor.
Type M4 allows to connect up to 3 POA or CS2 sensors or type EBM electronic boxes with type CSM sensors at the same time to accurately detect the flow velocity at one common measurement point.
In order to connect a type OFR surface radar the first sensor input can be used. Use a transmitter type R4 for this kind of connection.

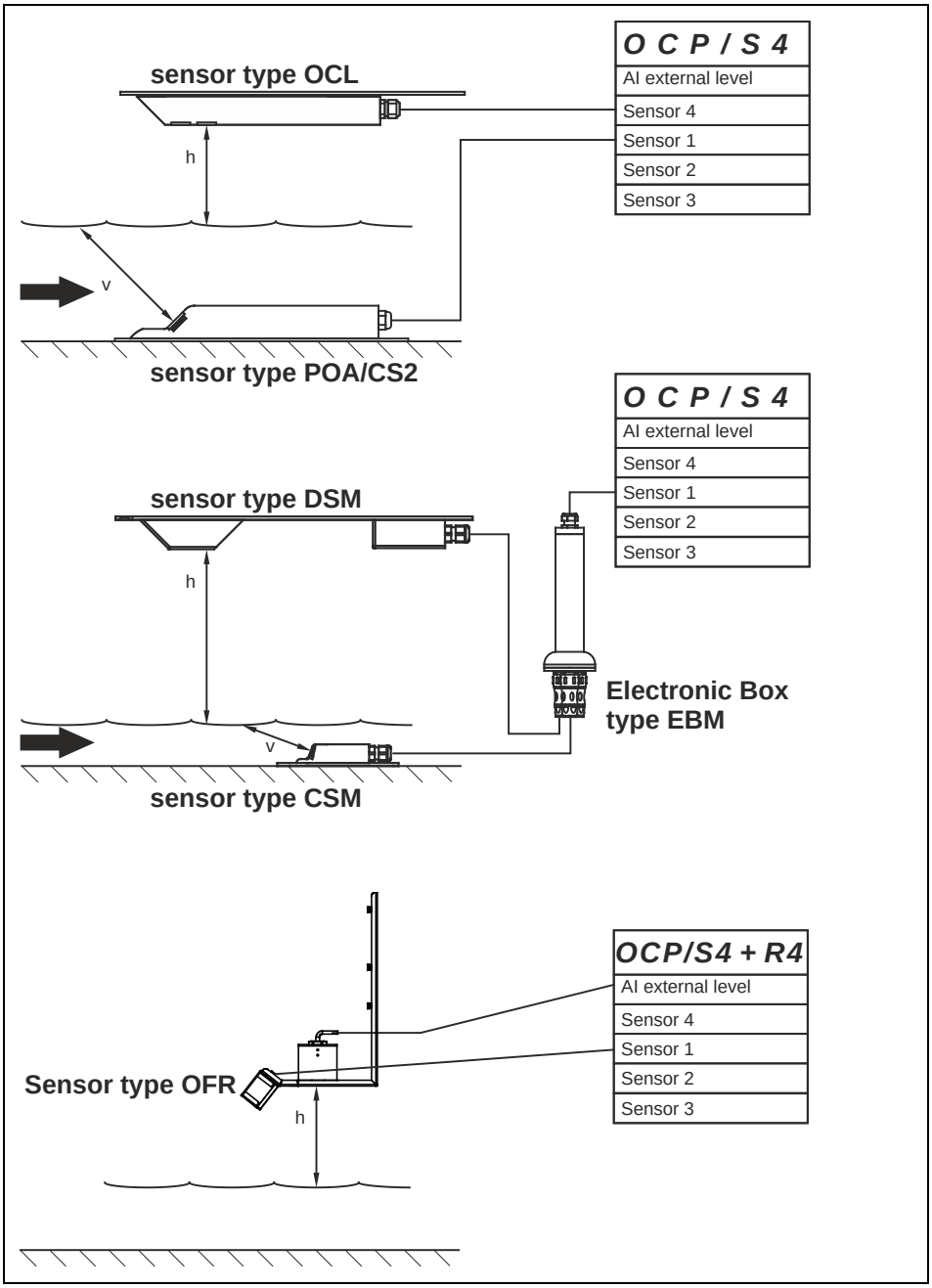


Fig. 6-1 Possible combinations OCP type S4 / R4

Note

A maximum of one OFR surface radar can be connected.

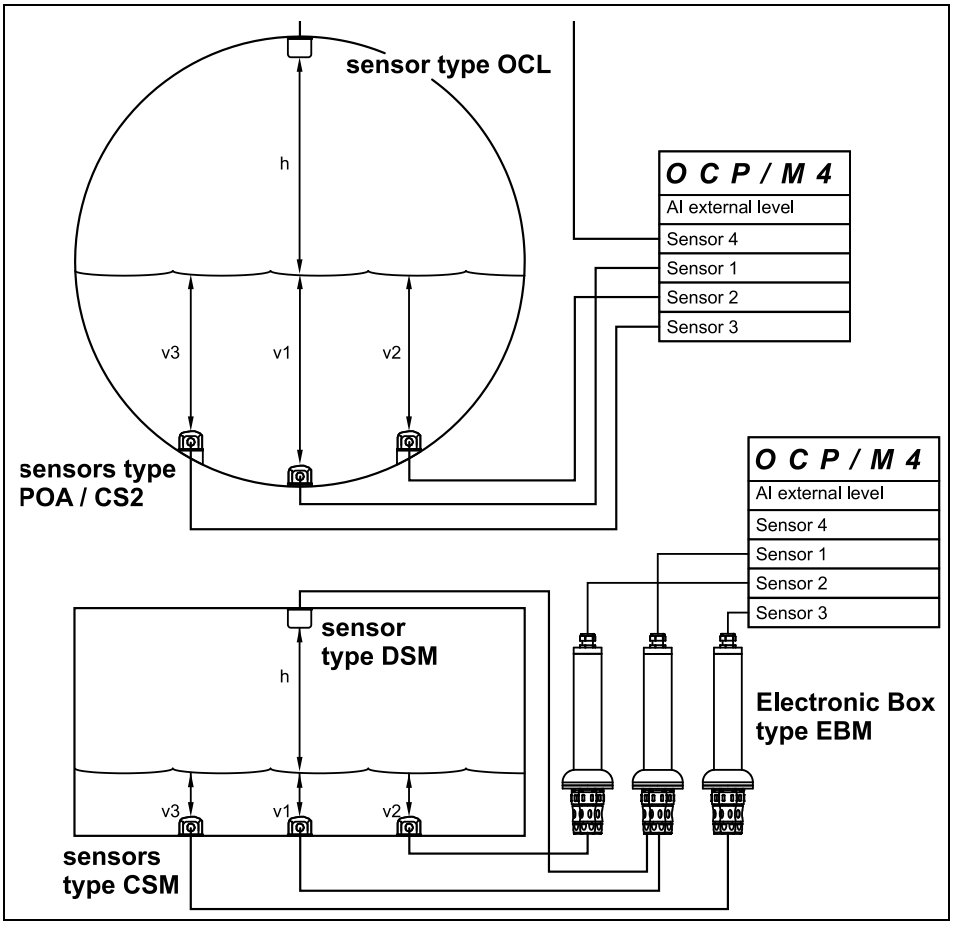
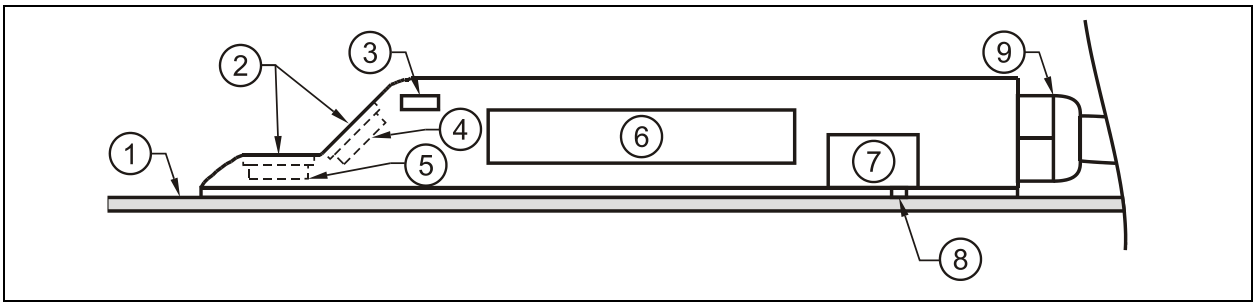


Fig. 6-2 Possible combinations OCP type M4

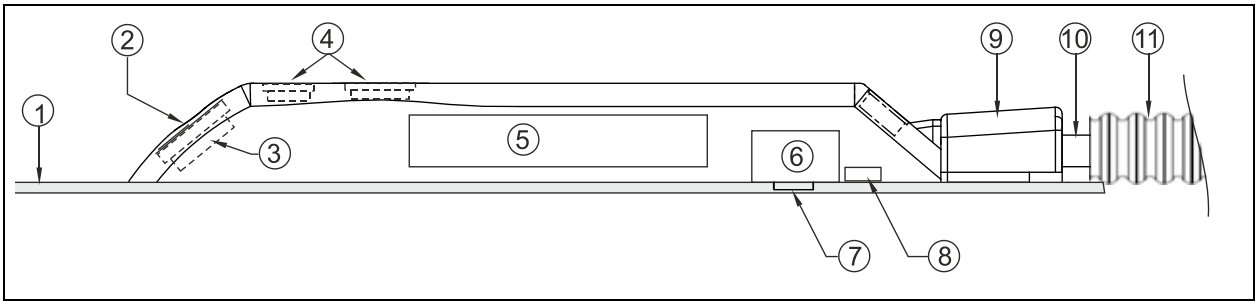
Note

A maximum of one air-ultrasonic sensor type OCL or DSM (with EBM) may be connected to a measurement system.



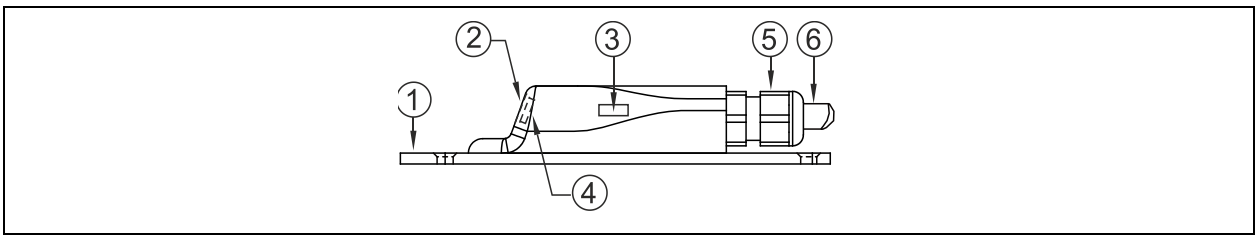
1 Mounting plate
2 Acoustic coupling layer
3 Temperature sensor
4 Flow velocity sensor
5 Level sensor (optional)
6 Elektronics
7 Pressure sensor (optional)
8 Duct for pressure measurement (optional)
9 Cable gland

Fig. 6-3 Basic design POA wedge sensor



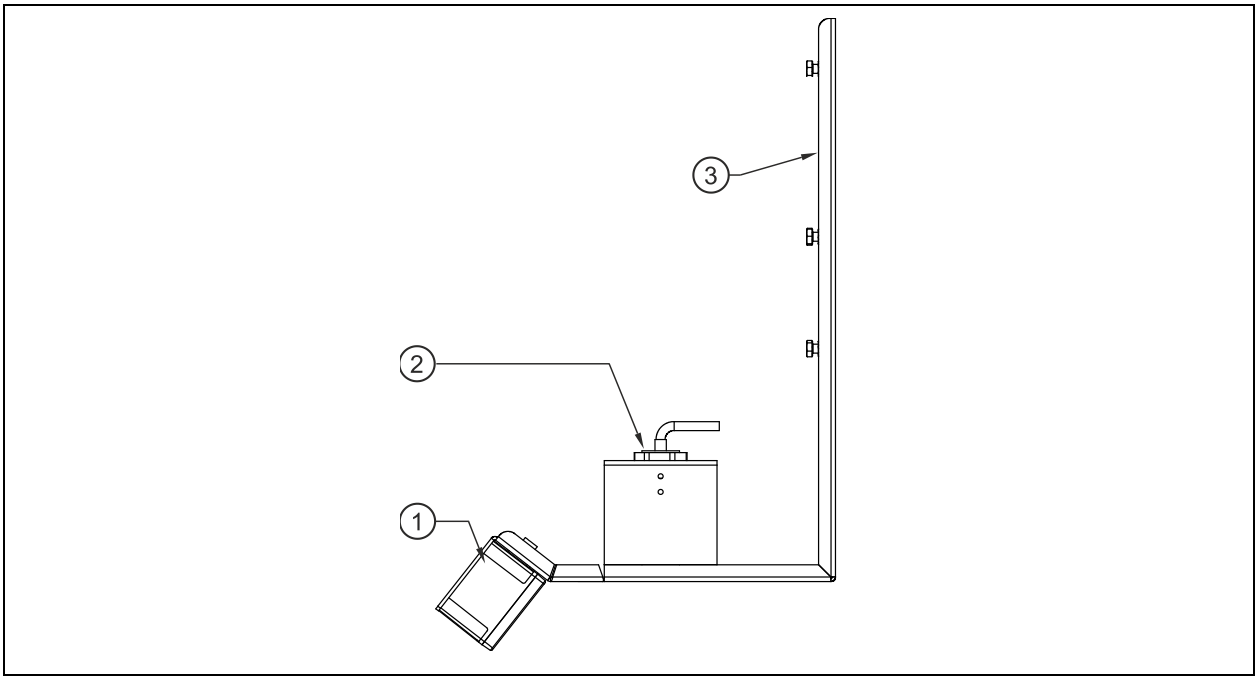
1 Mounting plate
2 Acoustic coupling layer
3 Flow velocity sensor for positive flow direction
4 Water-ultrasonic level sensors (optional)
5 Electronics
6 Pressure sensor (optional)
7 Duct for pressure measurement (optional)
8 Temperature sensors (sensors without pressure cell only)
9 Protective cover for sensor cable and protective hose fastening
10 Sensor cable
11 Protective hose (optional)

Fig. 6-4 Basic design CS2 wedge sensor



1 Mounting plate
2 Acoustic coupling layer
3 Temperature sensor
4 Flow velocity sensor
5 Cable gland
6 Sensor cable

Fig. 6-5 Basic design CSM wedge sensor V100



1 Sensor OFR
2 Sensor for level measurement (P-Series or i-series sensors)
3 Combi holder made of stainless steel (ZUB0OFRHAL)

Fig. 6-6 Overview radar, level sensor and holder

6.2 Level measurement using water ultrasound

Depending on the selected sensor type, the water-ultrasonic combi sensor may contain up to 2 different built-in level measurements: water-ultrasonic and hydrostatic level measurement. In this case type POA contains one sensor crystal; type CS2 uses 2 sensor crystals with different dimensions.
The sensor type CSM does not have an optional level measurement available; it is a pure flow velocity sensor.

The water-ultrasonic level measurement uses one or more horizontal sensor crystal(s) utilising the ultrasonic transit time method. Here the period between transmission and reception of a signal reflected from the water surface is measured.

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

h = filling level
c = sound transit time
t_1 = time between transmit and receive signal

The sound travel time in water is 1480 m/s (4.85 fps) at 20 °C (68 °F).
The divergence depending on the temperature is 0.23 % per Kelvin.
To ensure a level measurement which is accurate to the millimetre, the medium temperature is constantly investigated and the sound transit time is corrected respectively for calculation purposes. The fixed level, which is determined by the sensor crystal position, is added to the determined value h1. This results in the total level h.

6.3 Level Measurement using Pressure

Depending on the type of sensor used, the sensor may have an additional integrated hydrostatic level measurement available.
The piezoresistive pressure sensor used operates according to the relative pressure principle, where the pressure of the standing water column above the sensor is directly proportional to the fill level. Fluctuations of the atmospheric pressure are compensated by using a small pipe integrated within the sensor cable. This small pipe is exposed to the atmosphere.
This sensor enables to measure fill levels even if the combi sensor is installed out of the channel bottom centre.
During initial start-up procedure the sensor is going to be calibrated by using a manually investigated reference value. An additional height due to the sensor installation position will be added as well.

6.4 Level Measurement using external Level Sensor

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

Note

The i-Series sensors feature pre-programmed measurement ranges. Please refer to detailed information in the instruction manual for i-Series sensors.

i-Series sensors can be also operated without a HART modem.

In parameter „Value at 20 mA“ enter the measurement span of the sensor. Depending on the sensor installation height it may be necessary to additionally enter a negative offset.

	i-3	**i-6**	**i-10**	**i-15**
4 mA (empty) 0% span distance to sensor face in m	3.0	6.0	10.0	15.0
20 mA (full) 100% span distance to sensor face in m	0.125	0.300	0.300	0.500
Span (value at 20 mA)	2.875	5.7	9.7	14.5

Fig. 6-7 Measurement range of i-Series sensors

6.5 Flow Velocity Detection

The piezo crystal which has a slope towards the flow direction operates as a flow velocity sensor. Here an ultrasonic burst with a defined angle is sent into the medium. All the particles in the measurement path (air, dirt, suspended solids) reflect a small amount of the ultrasonic signal. Depending on shape and size of the particle a particular signal results. Hence, the multitude of the reflected signals results in a reflection pattern (see Fig. 6-8). This pattern is going to be received by the piezo crystal again, converted to electric signals and loaded into a digital signal processor (DSP) which is built in the active sensor.

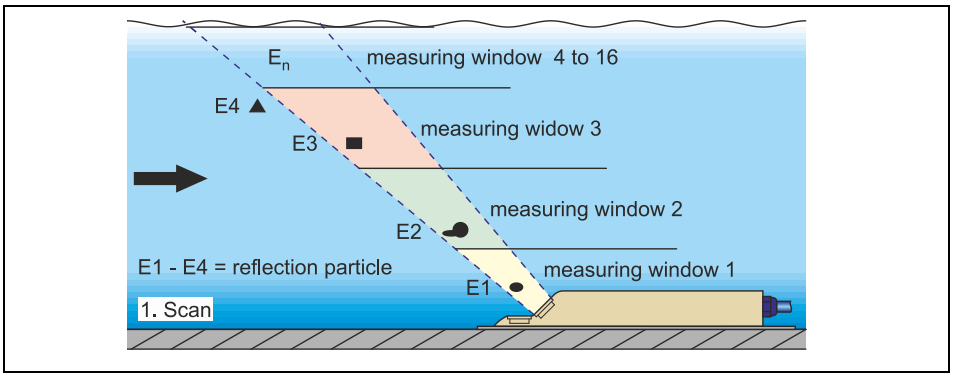


Fig. 6-8 Situation at first signal reception

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

In various flow levels there are different flow velocities (flow velocity profile). Depending on the level, the reflecting particles' movement away from the first measurement point therefore varies. Hence, a distorted reflection pattern results (see Fig. 6-9). At the same time slightly different reflections occur: some particles have been turning around and thus have another shape of reflection; some particles are no longer within the measurement range and others have now moved into the measurement range.

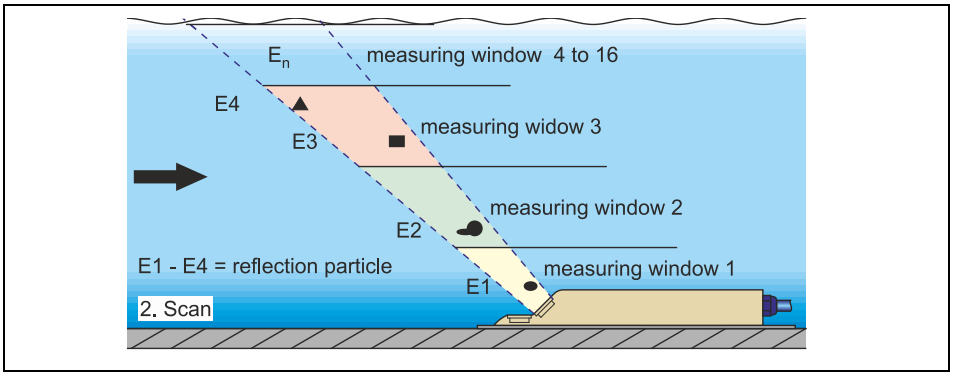


Fig. 6-9 Situation at second signal detection

The DSP checks both the received reflection patterns for similarities using the cross correlation method. All existing signal differences are rejected so that two similar but temporarily offset signal patterns are left for velocity evaluation. Depending on the flow levels both patterns are subdivided into up to 16 measurement windows. Then, in each measurement window the lag Dt of the signal pattern is investigated (see Fig. 6-10).

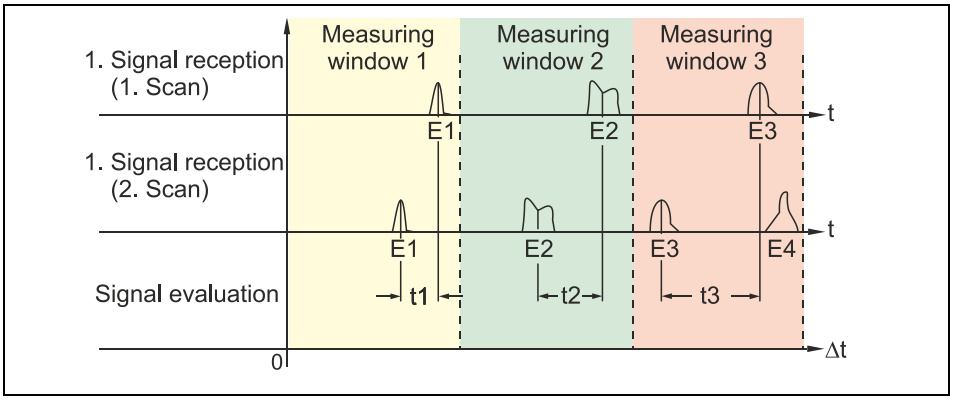


Fig. 6-10 Echo signal images and evaluation

Based on the beam angle, the interval between both transmitted signals and the lag of the signal pattern therefore in each single measurement window the flow velocity can be determined.
Stringing the single flow velocities together mathematically results in the flow profile of the acoustic path which then is indicated on the OCM Pro display and can be read there for inspection and control purposes.

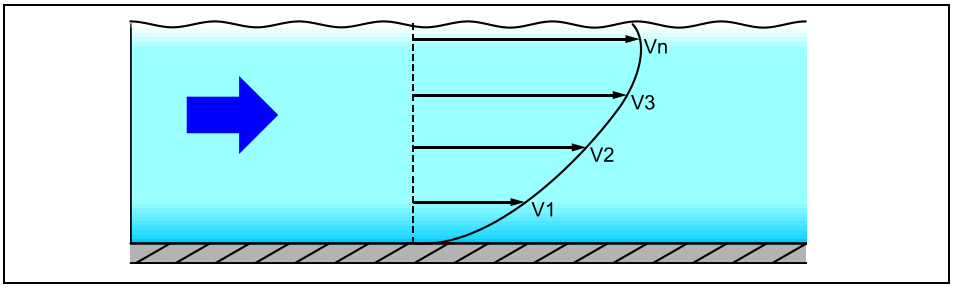


Fig. 6-11 Investigated flow profile

If there are appropriate banking distances on the measurement place available, based on the known channel geometry and the velocity distribution a 3-dimensional flow distribution can be rendered (see Fig. 6-12) (> finite element< principle.

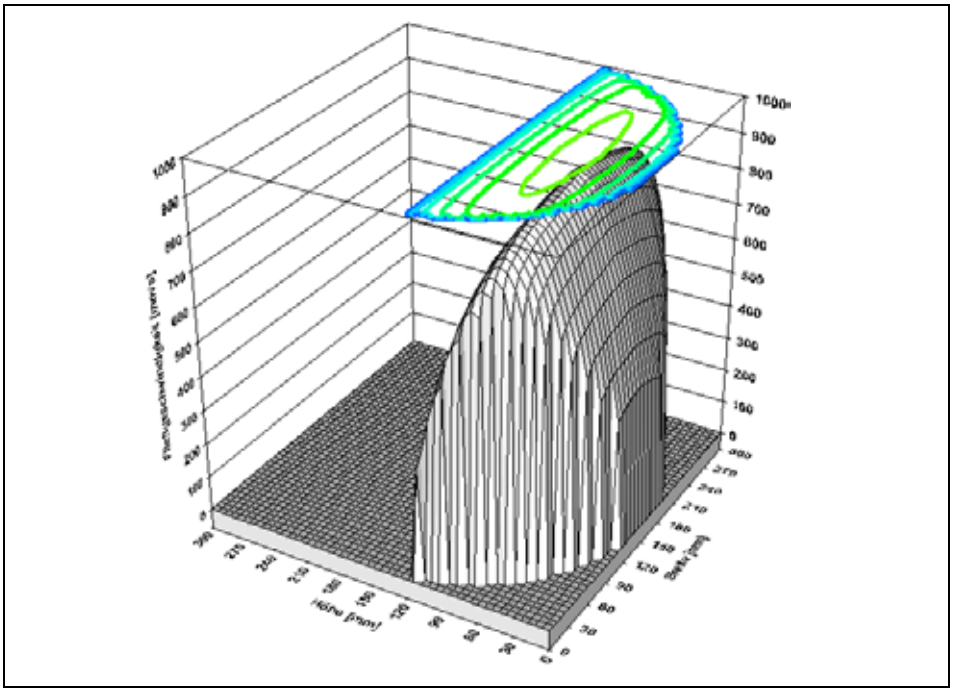


Fig. 6-12 Computed 3-dimensional flow profile

From this flow velocity distribution and the channel shape, the channel dimensions and the filling level the flow volume is calculated and displayed. This volume can either be a free programmable analog signal or an impulse signal as well.

6.6 Flow velocity via Surface Radar OFR

The OFR surface radar OFR is aligned as to face towards the flow direction. Initially emitting radar waves, the instrument then receives the waves reflected from the water surface. From the difference between transmitted and received frequencies it is possible to compute the velocity of the movement (Radar-Doppler-Effect).
By using complex integrated algorithms the transmitter now calculates the following values from the determined velocity of the water surface:

- The flow profile
- The average velocity of the wetted geometry

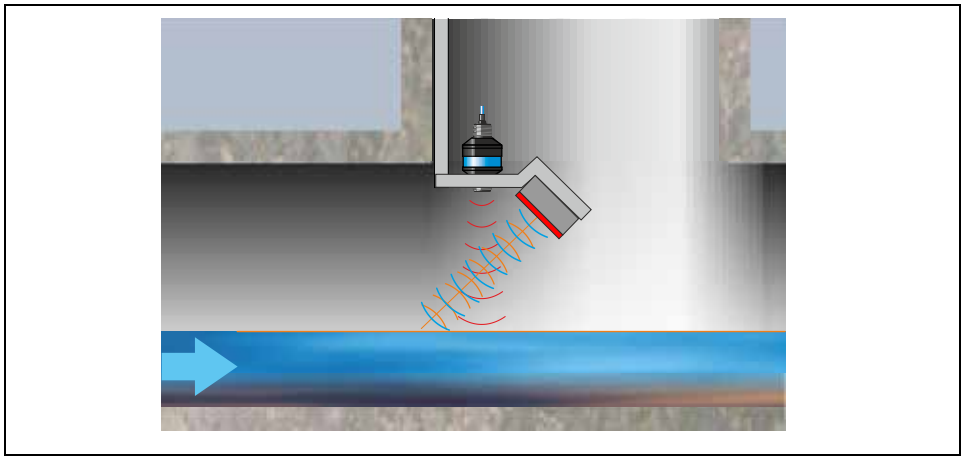


Fig. 6-13 Measurement using the surface radar

7 Installation and Connection

7.1 Installation Instructions

- Observe appropriate installation!
- Follow applicable legal or operational guidelines!
- Inappropriate use may result in injuries and/or damage on instruments!

The unit's mounting place must be selected according to certain criteria. Strictly avoid:

- direct sunlight (use weatherproof cover if necessary, e.g. NIVUS Art. No. ZMS01800)
- objects radiating strong heat
- permissible ambient temperature: -20° C to +40° C
- objects with strong electromagnetic fields (frequency converters, high voltage power lines or similar)
- corrosive chemicals or gases
- mechanic shocks
- vibrations
- radioactive radiation
- direct installation close to footpaths or travel ways

7.1.1 Fastening Wall Mount Enclosure

For fastening the wall mount enclosure, depending on place of mounting, use 4 machine screws size M5 with suitable length as well as the necessary nuts and shims. Or use 4 wood screws, min. diameter 4.5 mm (0.1772 in). These screws must penetrate min. 40 mm (1.575 in) into the wall or min. 50 mm (1.97 in) into appropriate dowels.

The clear view door as well as the display of the measurement transmitter are covered with a protection foil for protection during transport and from scratches during assembly. This protection foil must be removed immediately after the assembly!

Note

If the view door and display protection foil have been exposed to direct solar radiation for a long period, they cannot be removed easily.

This problem may be solved by using methylated spirit or car polish if required to clean the clear view door or the display. If these measures should not be successful, clear view door as well as display can be replaced by NIVUS (subject to costs).

7.1.2 Wall Mount Enclosure Dimensions

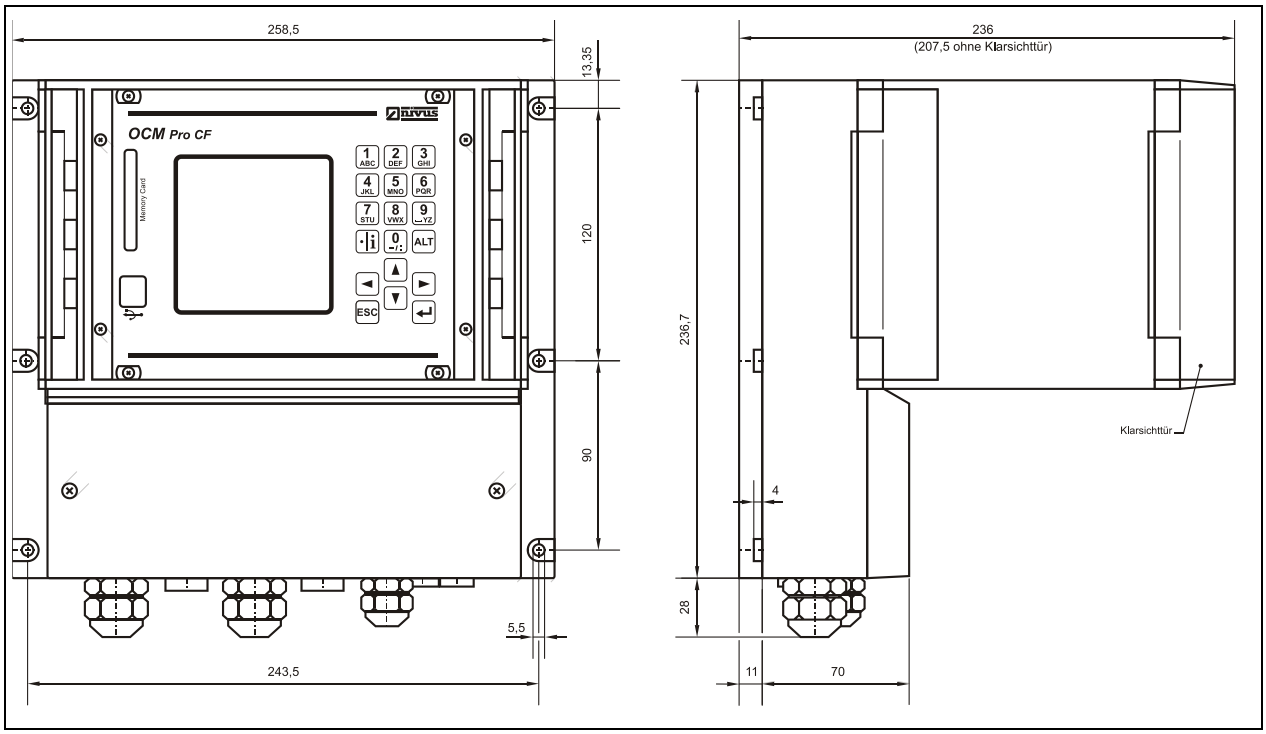


Fig. 7-1 Wall mount enclosure

Hints to avoid electrostatic discharge (ESD)

CAUTION

ESD Risks:

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

Disconnect the iXT from mains power!

The sensitive electronic components inside the unit may get damaged by static electricity. This may impair the instrument's performance or even lead to instrument failure.

The manufacturer recommends the following steps to prevent the device from getting damaged due to electrostatic discharge:

- Discharge static electricity from your body before touching the instrument's electronic components.
- Avoid unnecessary movements to reduce the risk of building up static electricity
- Wear a properly grounded antistatic wrist strap to discharge your body and to keep away static electricity.

Touch components which are sensitive to electrostatic build-up only in antistatic working areas. Use antistatic floor coverings and working surfaces always if possible

7.2 Electrical Installation

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

Before feeding the rated voltage the transmitter and sensor installation must be correctly completed. The installation shall be carried out by qualified personnel only. Legal standards, provisions and technical regulations need to be observed.

CAUTION

Secure your plant sections

The OCM Pro CF 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. Check the installation for correctness.
Observe that installation shall be carried out exclusively by expert personnel.
Take further statutory standards, regulations and technical rulings 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. will be required.
The cross-sectional dimension of the power supply wires must be 0.75 mm2 (0.03 in2) and must be in accordance to IEC 227 or IEC 245. The maximum allowed switching voltage on the relay contacts must not exceed 250 V and not undershoot 10 mA.
According to Ex protection it must be checked if the devices power supplies must be integrated into the facility's emergency shutdown conception.

7.2.1 Connection of Transmitter in Wall Mount Enclosure

General

- The OCM Pro transmitter is available in 3 different versions:
- standard version type >S4<
- Type >M4< with extended connections for up to 3 flow velocity sensors, digital inputs as well as additional analog inputs / outputs plus controller function.
- Type >R4< featuring extended options to connect a Type OFR radar sensor.

All three models have the same clamp terminal marking. The transmitters M4 and R4 merely have additional connecting options which have not been equipped in type S4.

Important Note

The terminal clamp wiring of wall mount and panel mount enclosure significantly vary from each other. The wiring diagram of the wall mount enclosure cannot be used for the wiring of a panel mount enclosure! The same applies in reverse.

The wall mount enclosure has cable glands and dummy plugs. Some of them are screwed in or are enclosed as spare parts or additional parts. Number and size of cable glands and dummy plugs depend on the type of transmitter.

Transmitter type S4:

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

Transmitter type M4:

2 glands M20 x 1.5
3 glands M16 x 1.5
2 dummy plugs M20 x 1.5
2 dummy plugs M16 x 1.5

Transmitter type R4:

2 glands M20 x 1,5
3 glands M16 x 1,5
2 dummy plugs M20 x 1,5
2 dummy plugs M16 x 1,5

With the supplied glands the following outer cable cross-sections can be connected reliably:

M16 x 1.5: 3.5 mm – 10.5 mm (0.138 – 0.413 in)
M20 x 1.5: 6.0 mm – 14.0 mm (0.236 – 0.591 in)

To be able to use cable diameters outside of the tolerance, glands must be used which ensure IP65 minimum protection.
Unused lead-ins have to be locked tightly with an appropriate dummy plug before the initial start-up.

The transmitter is equipped with terminal clamps which ensure reliable connection of single and multi-wired cables with cross-sectional areas of 0.18-2.5 mm² (0.007 – 0.098 in) in order to connect power supply as well as digital / analog outputs and inputs.
The sensors (flow velocity, combi, air-ultrasonic or 2-wire level sensors) are equipped with connection plugs due to better handling of the wall mount enclosure. The pre-configured cable tips of the NIVUS sensors or single and multi-wired cables with cross-sectional areas of 0.18-2.5 mm² (0.007-0.098 in) can be connected to these plugs.
The 7-pole plug-and-socket connections of the 3 flow velocity sensors can be switched with each other. Switching between 7-pole and 9-pole plug rail (9 poles = level sensors) is impossible due to mechanical configuration.

For terminal clamp connection it is necessary to use a slotted screwdriver with a 3.0 mm or 3.5 mm (0.118-0.138 in) blade. In order to connect the sensors to the terminal strips of the wall mount enclosure use a slotted screwdriver with a 2.0 mm or 2.5 mm (0.079-0.098 in) blade.

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

Note

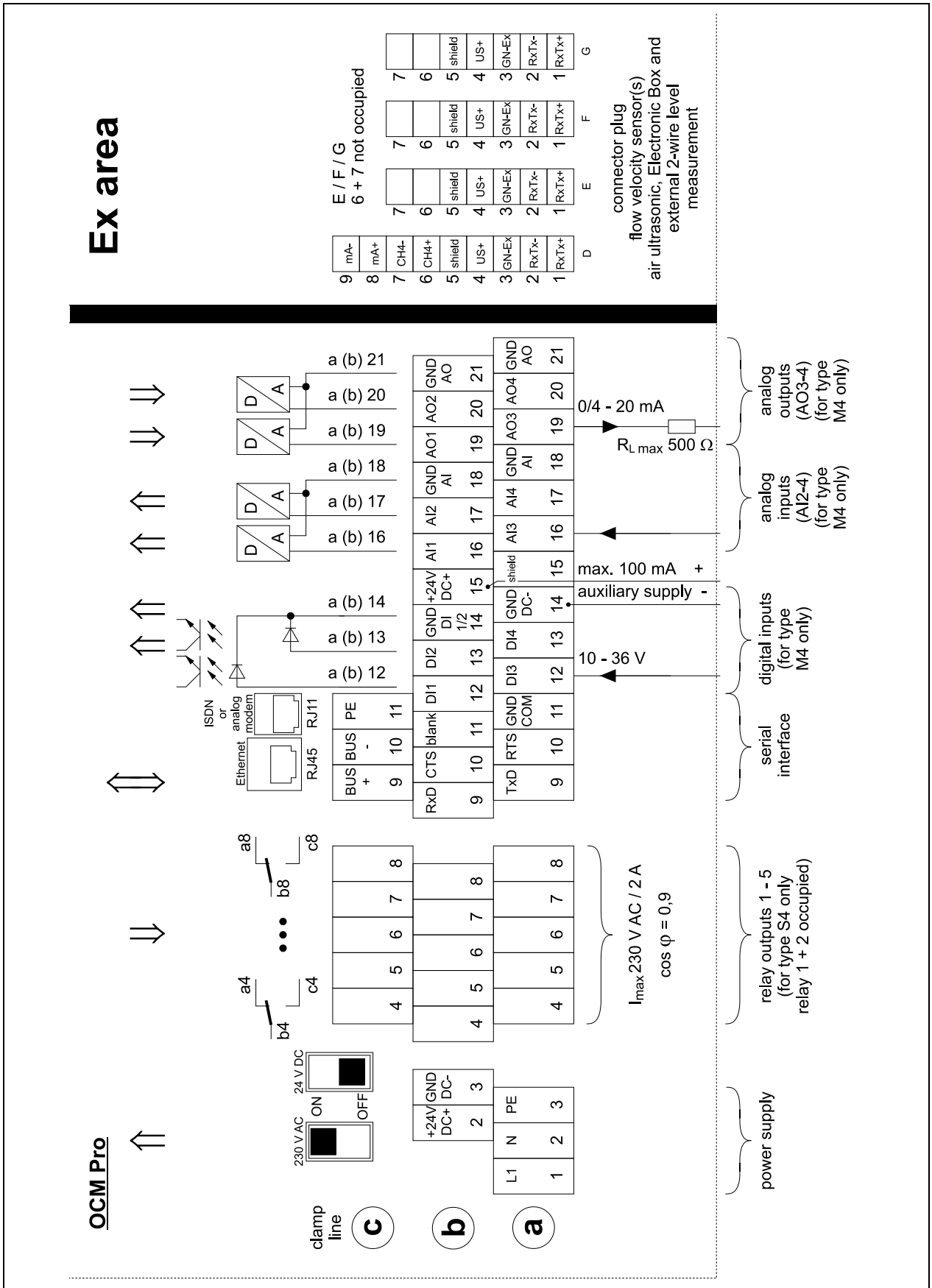
While connecting, it is helpful to exert slight pressure on the terminal clamp screw.

This ensures safe cable connection by opening the clamp.

Important Note

Close the terminal clamp compartment of the wall mount enclosure by using the accompanying cover and both screws. Closing prevents water or dirt from leaking in.

Observe to not reverse the cover during installation (steeply bevelled side up). The specified protection degree cannot be guaranteed if the cover is not installed correctly.



GND potentials insulated from each other:
DI1, DI2, DC-, AI1, AI2, AI3, AI4, AO1, AO2, AO3, AO4
Internal wiring: b2 + b15; b3 + a14

Fig. 7-2 Wiring diagram wall mount enclosure OCM Pro CF

7.2.2 Sensor connection - Wall mount enclosure

The sensor cable has to be connected to the transmitter at the terminal block. The diagram below applies in case of connecting a flow velocity or water-ultrasonic combi sensor:

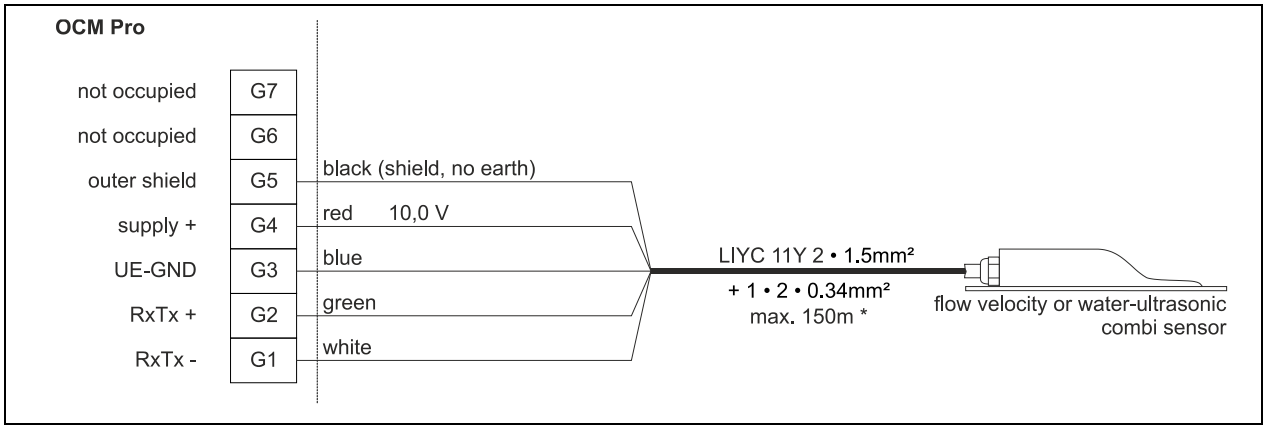


Fig. 7-3 Connecting a flow velocity or water-ultrasonic combi sensor on the OCM Pro type S4W0 / M4W0

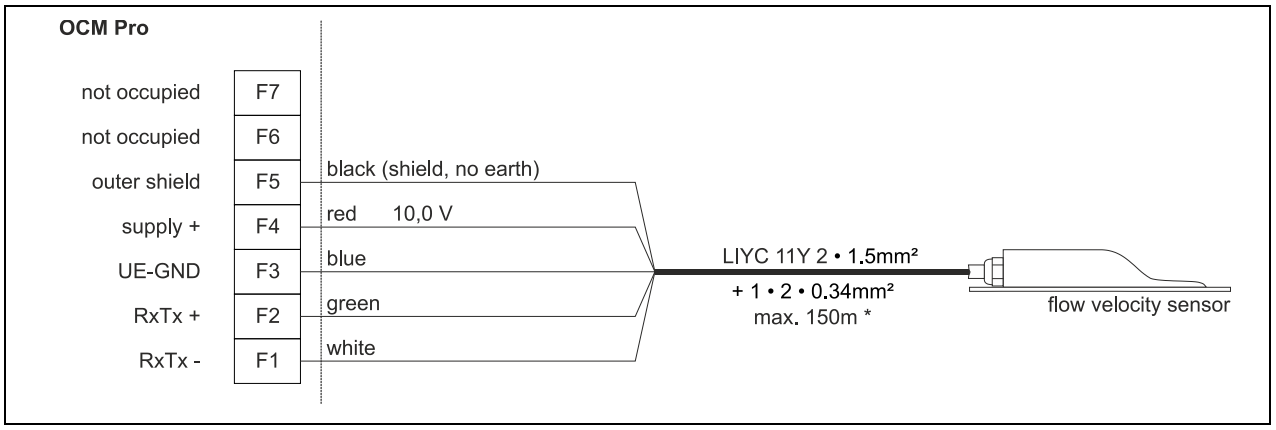


Fig. 7-4 Connecting a second velocity sensor to the OCM Pro type M4W0

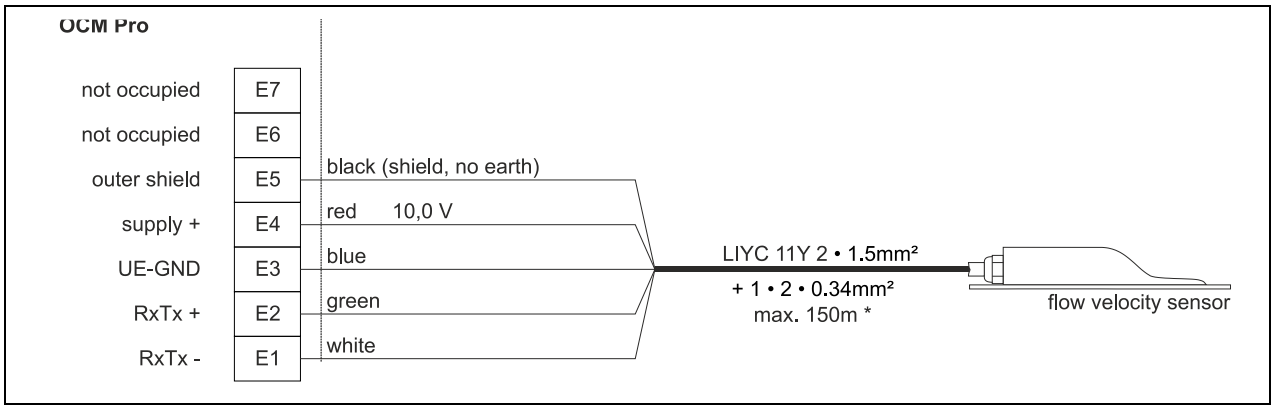


Fig. 7-5 Connecting a third velocity sensor to the OCM Pro type M4W0

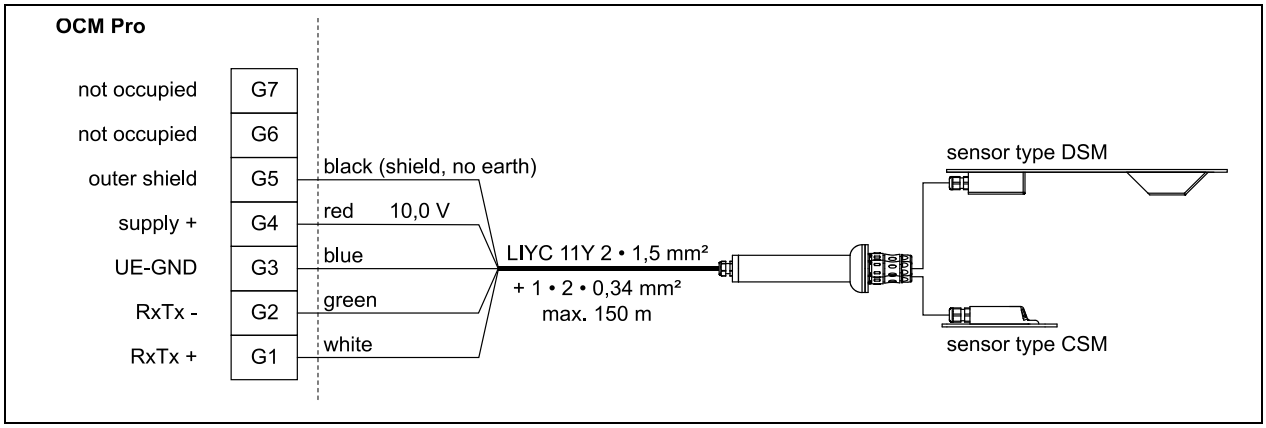


Fig. 7-6 Connection electronic box Type EBM with water-ultrasonic sensor Type CSM and air-ultrasonic sensor Type DSM to Type S4W0 / M4W0

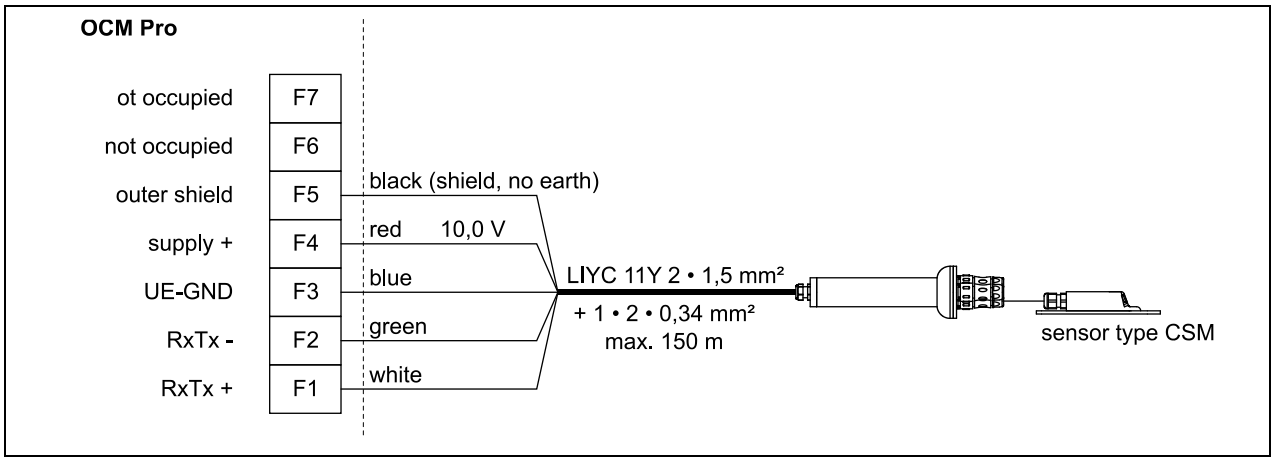


Fig. 7-7 Connection 2, electronic box Type EBM with water-ultrasonic sensor Type CSM to Type M4W0

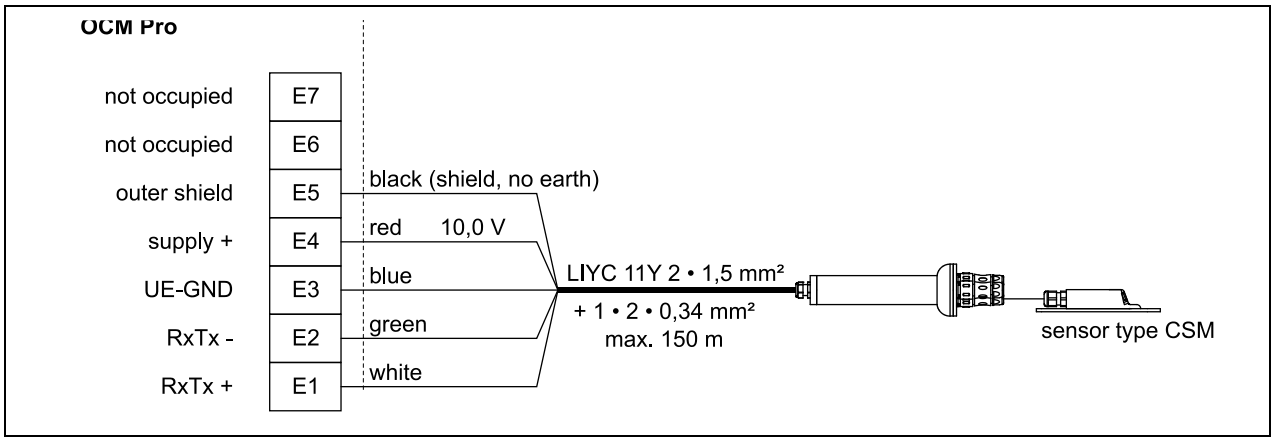


Fig. 7-8 Connection 3, electronic box Type EBM with water-ultrasonic sensor Type CSM to Type M4W0

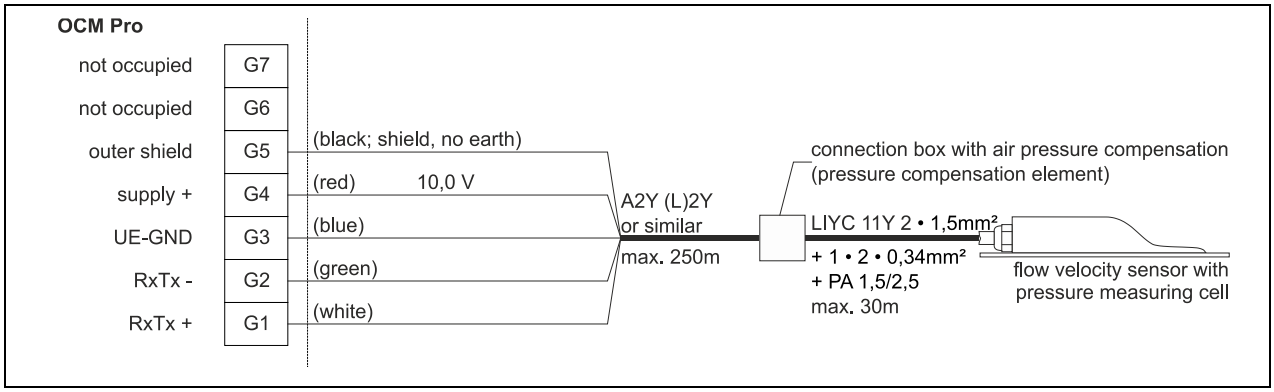


Fig. 7-9 Connecting a flow velocity sensor with integrated pressure measurement cell to type W0

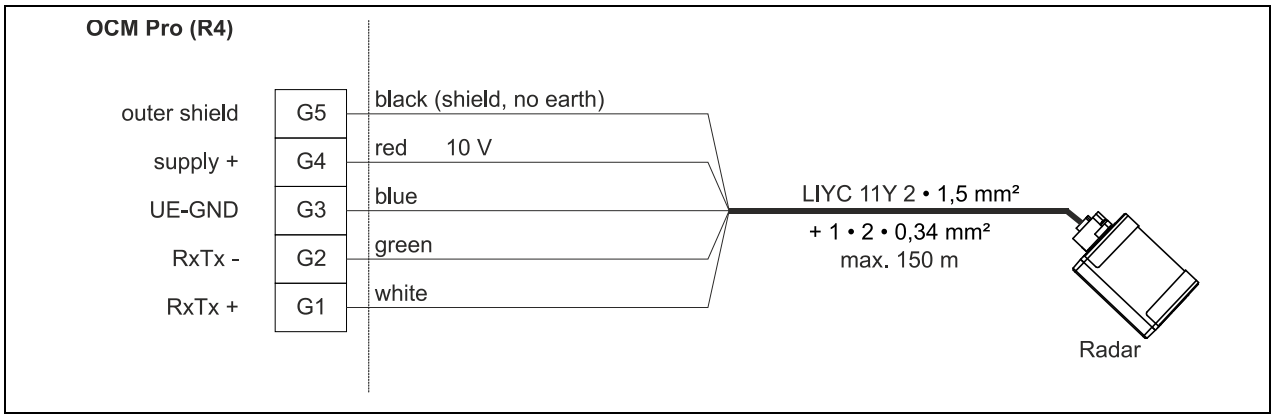


Fig. 7-10 Connecting an OFR flow velocity sensor to Type R4W0

Note

The pressure compensation element serves as connection socket for cable extension at the same time. Please observe not to exceed the maximum cable length of 135 m (443 ft.) in Ex areas and 250 m (750 ft.) in Non-Ex areas between sensor and transmitter by taking the maximum permissible resistance into account.

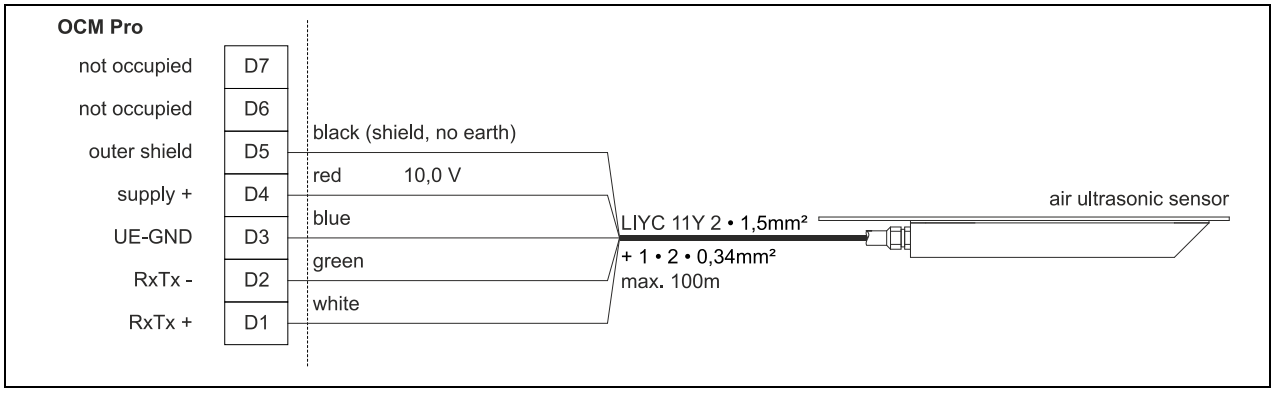


Fig. 7-11 Connecting the air-ultrasonic sensor type LUS to type M4W0 / S4W0

If the level measurement is carried out by a 2-wire probe (NivuBar, NivuCompact 2-wire echo sounder or similar) which is supplied by the OCM Pro, please follow the wiring diagram below:

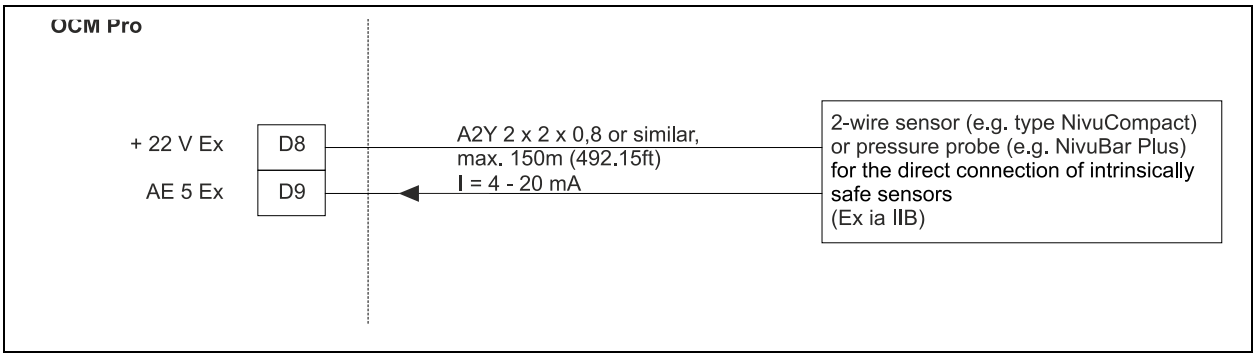


Fig. 7-12 Connecting a 2-wire sensor (EX for level measurement)

CAUTION

Do not connect cables without shields

If using sensors in Ex areas DO NOT lay the sensor cable past the mechanical shield between the terminal blocks.

Otherwise Ex protection is not guaranteed anymore.

Note

Use only the 3 cable connections located directly below the sockets! If using an i-Series (Ex) sensor do not connect the sensor to the Ex clamps. i-Sensors shall be connected to non-Ex clamps.

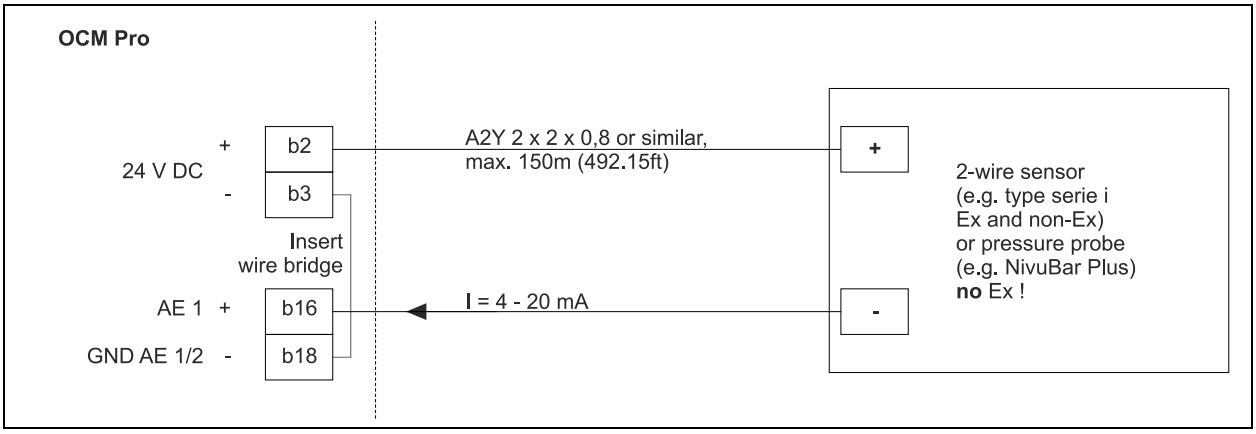


Fig. 7-13 Connecting a 2-wire sensor for level measurement to type W0

If the mA signal for level measurement is provided from an external transmitter (such as NivuMaster) connect to clamps as follows:

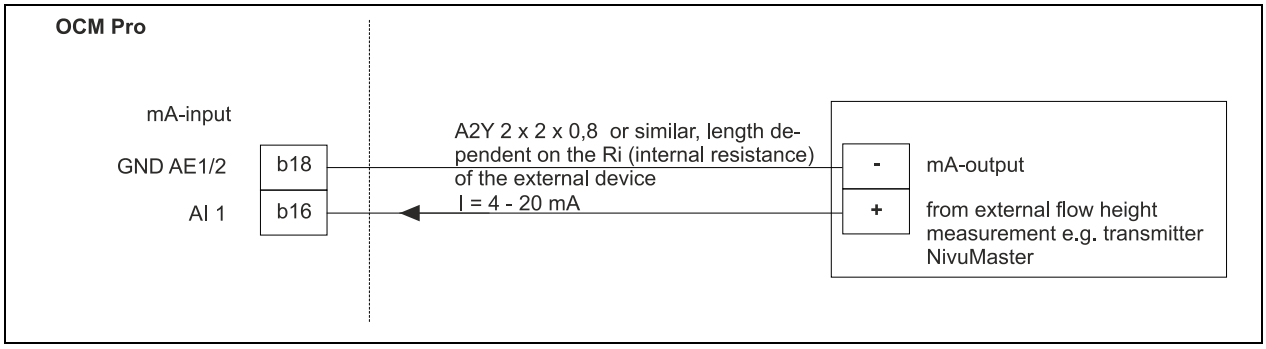


Fig. 7-14 Connecting external level measurement from NivuMaster to type W0

7.2.3 Wall Mount Enclosure Overvoltage Protection

For effective protection of the OCM Pro transmitter it is necessary to protect power supply as well as mA-output using overvoltage protection devices. NIVUS recommends surge arrestors types EnerPro 220Tr, EnerPro 24Tr (for 24 V DC) for the mains supply, as well type DataPro 2x1 24/24Tr for mA-outputs.
The flow velocity sensor as well as the air-ultrasonic sensor type OCL are internally protected against overvoltage. If higher voltages are expected to occur they can be protected by combining the types DataPro 2x1 12/12-11µH-Tr (N) as well as SonicPro 3x1 24 V/24 V

Important Note

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

The maximum permissible NIVUS cable lengths in Ex areas are:

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

Note

The use of overvoltage protection elements for sensors in Non-Ex areas will reduce the maximum possible cable length.
The line resistance is 0.3 Ohm/wire. This resistance must be taken into account considering the allowed total resistance (see "Technical Instructions for Correlation Sensors" for details)

Note

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

The overvoltage protection devices are ineffective if wired incorrectly!

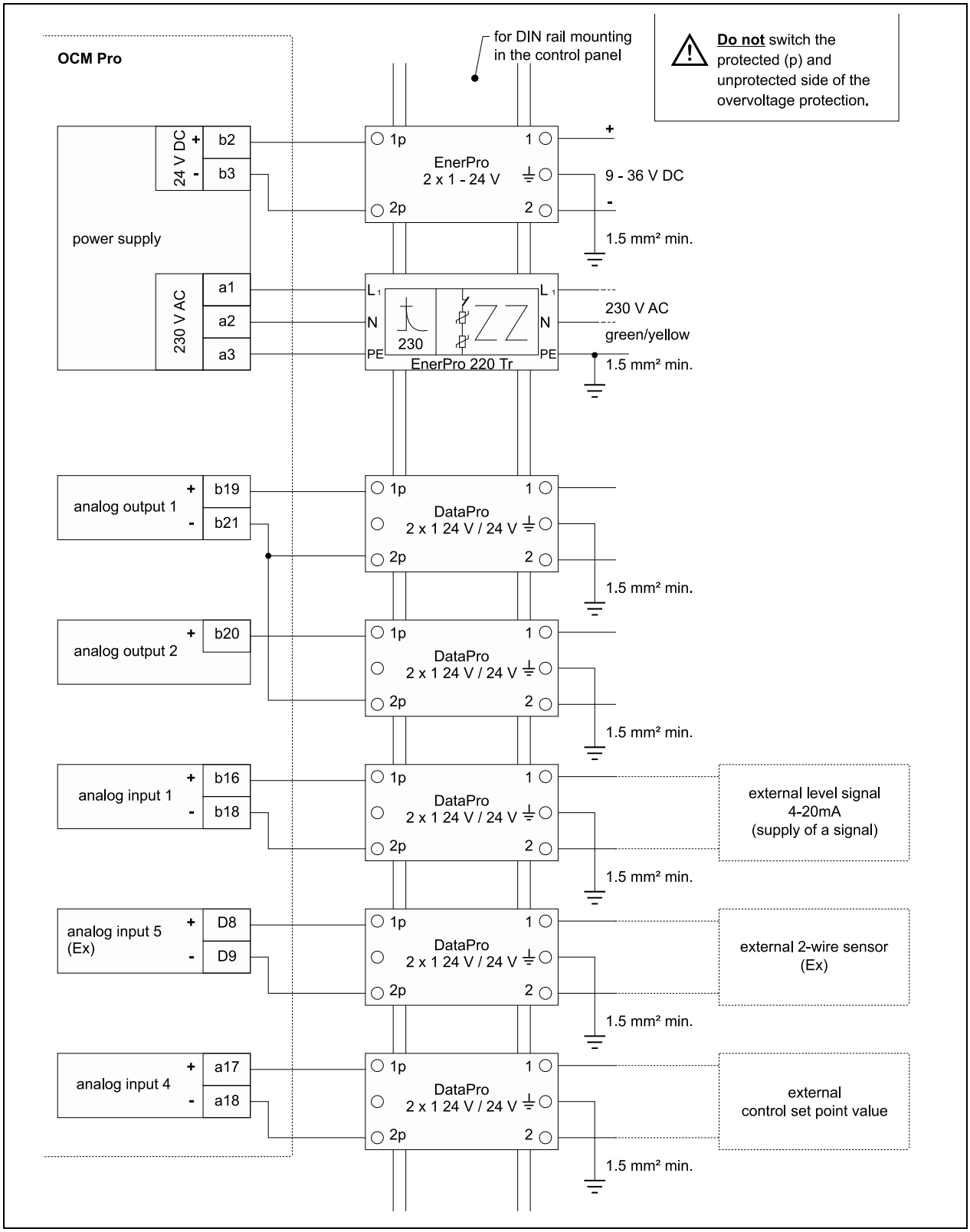


Fig. 7-15 Wall mount enclosure - connecting the overvoltage protection for power supply and analog inputs and outputs

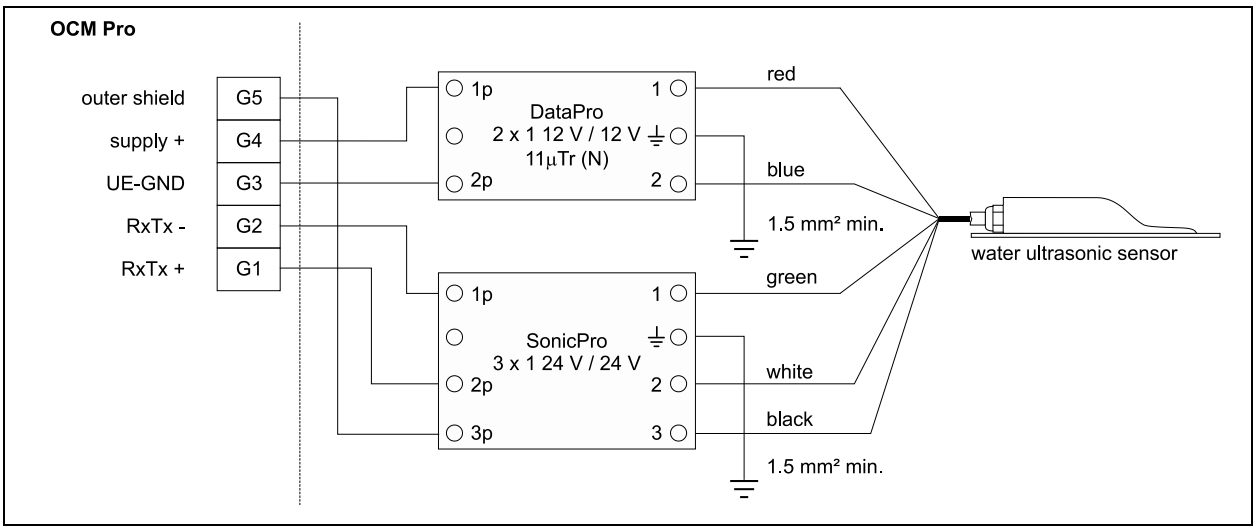


Fig. 7-16 Overvoltage protection water-ultrasonic sensor or electronic box, wall mount enclosure

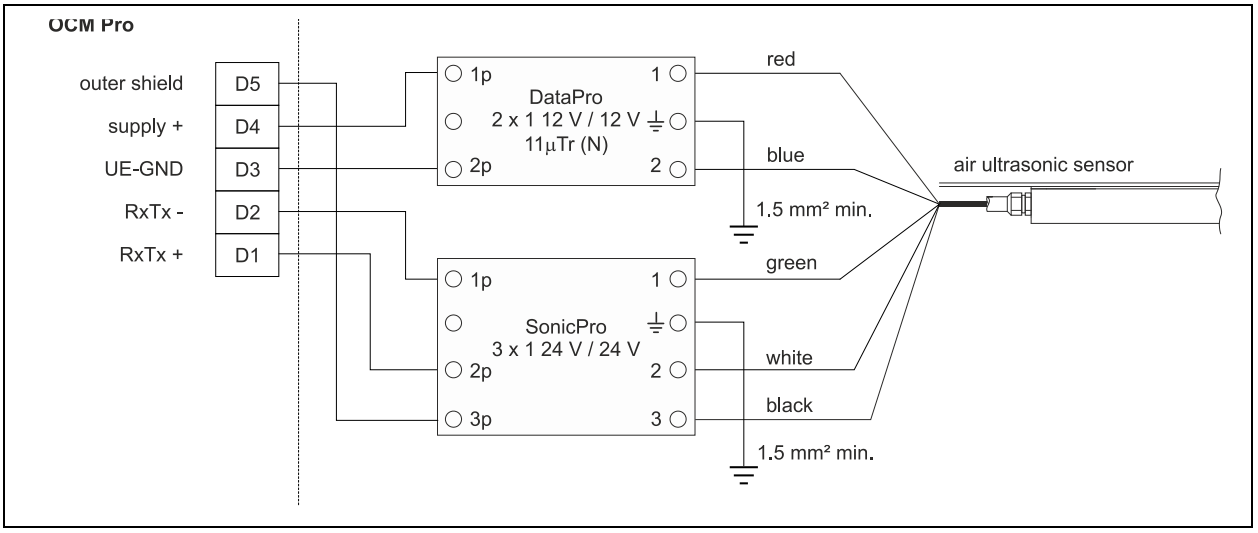


Fig. 7-17 Overvoltage protection air-ultrasonic sensor, type OCL, wall mount enclosure

7.3 Connection of the panel mount enclosure

7.3.1 Fastening the panel mount enclosure

First the panel must be cut out accordingly (see Fig. 7-18). Then, after the enclosure has been inserted, tighten the 4 clamps integrated in the sides of the enclosure for fastening.
The panel mount enclosure can be fastened by using the 4 built-in clamps

7.3.2 Panel Mount Enclosure Dimensions

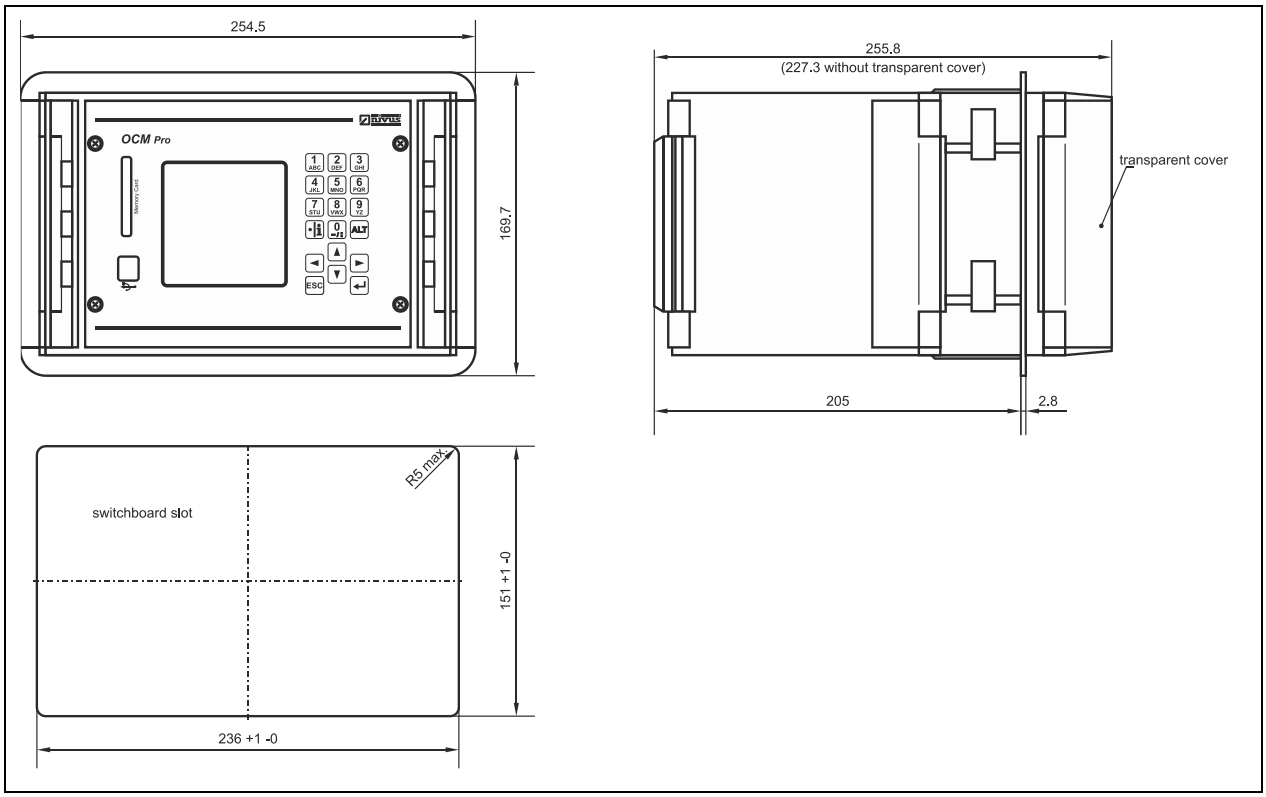


Fig. 7-18 Panel mount enclosure

7.3.3 Panel Mount Enclosure Transmitter Connection

General

Prior to connection please see the instructions in Chap. 7.3.

The transmitter is equipped with terminal clamps which ensure reliable connection of single-wired and multi-wired cables featuring cross-sectional areas of 0.18–2.5 mm² in order to connect power supply as well as digital / analog outputs and inputs.
For terminal clamp connection it is necessary to use a slotted screwdriver with a 3.0 mm or 3.5 mm blade.

Note

While connecting, it is helpful to exert slight pressure on the terminal clamp screw.

This ensures safe cable connection by opening the clamp.

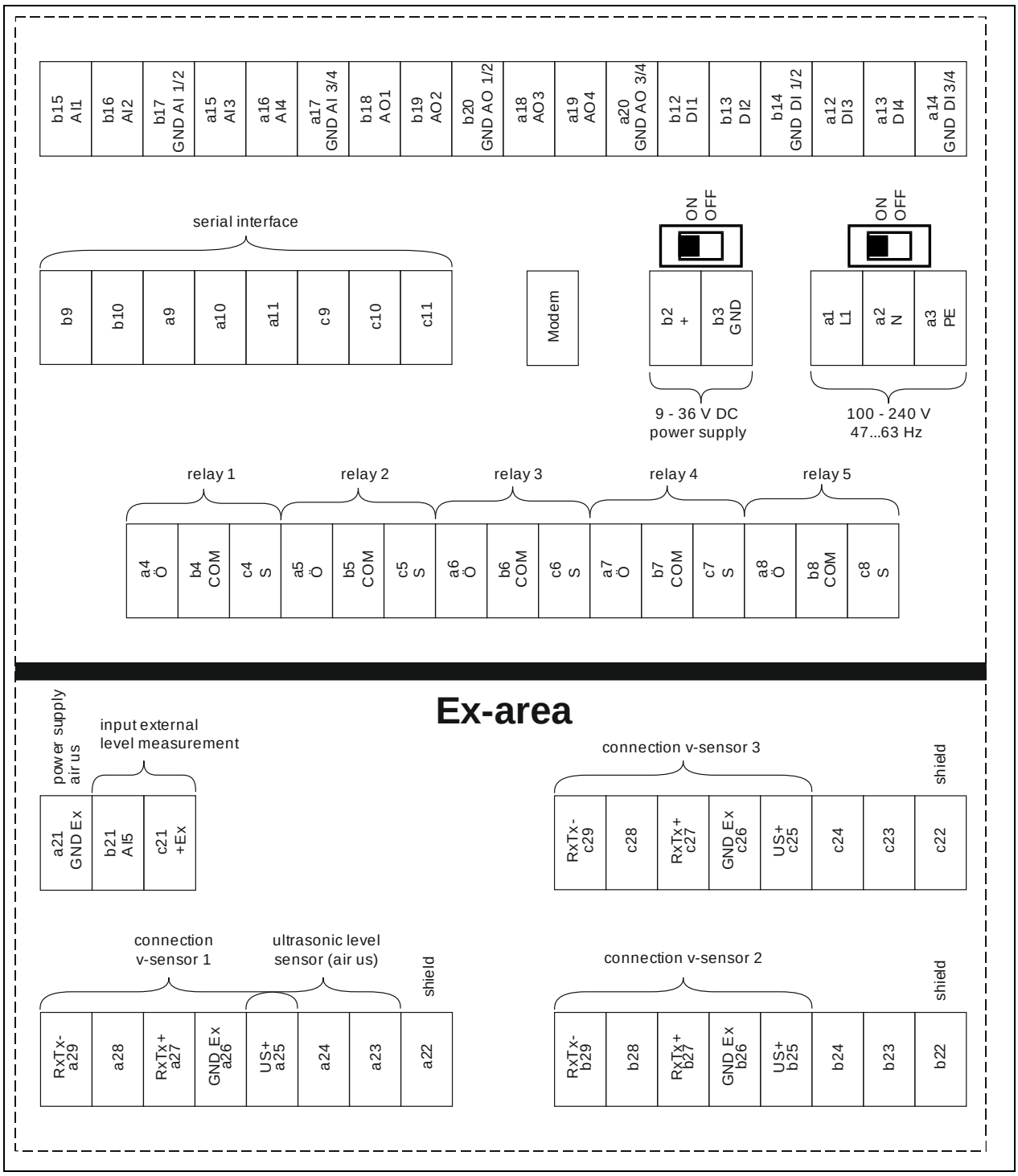


Fig. 7-19 Wiring diagram OCM Pro CF panel mount enclosure

7.3.4 Panel mount enclosure sensor connection

Sensor cables are connected to panel mount enclosures on the reverse side of the transmitter. Follow the wiring diagram below to connect a flow velocity or water-ultrasonic combi sensor:

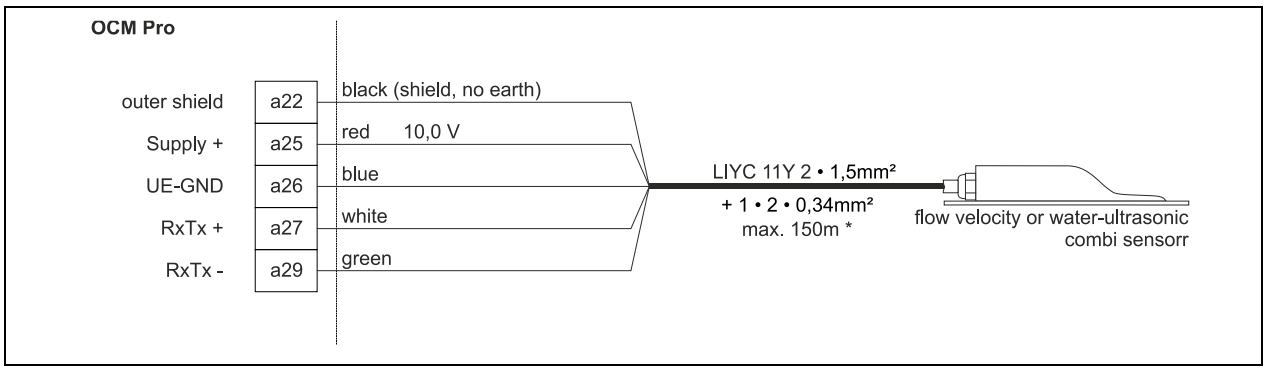


Fig. 7-20 Connecting a flow velocity or water-ultrasonic combi sensor to the OCM Pro CF, type S4F0 / M4F0

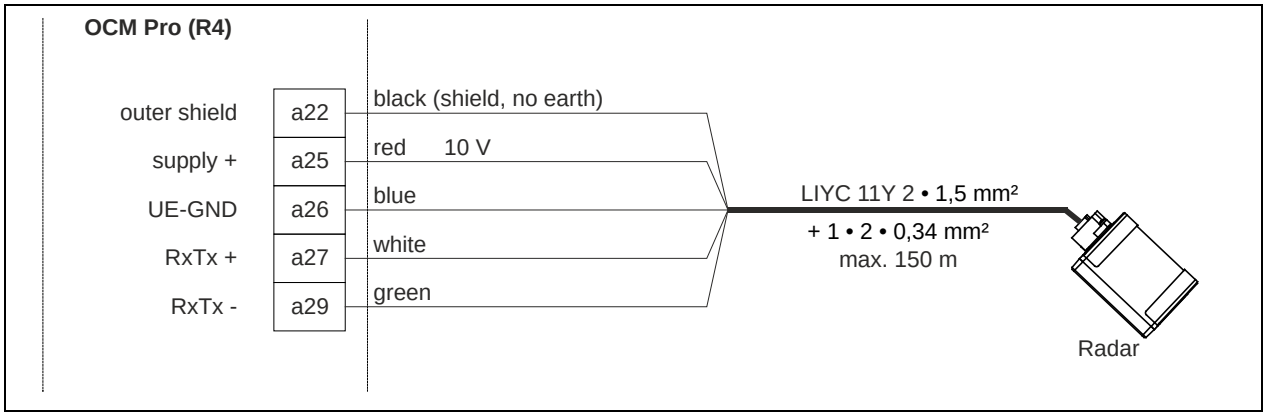


Fig. 7-21 Connecting an OFR flow velocity sensor to Type R4F0

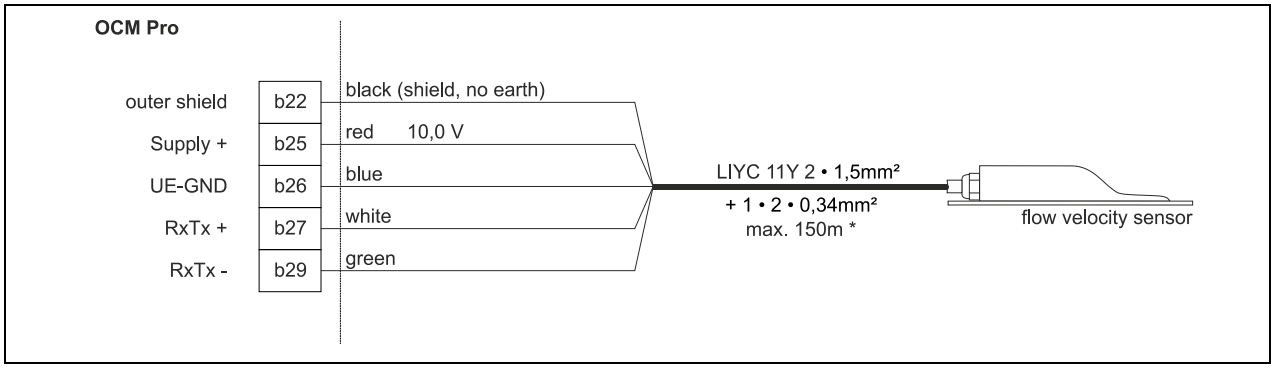


Fig. 7-22 Connecting a second flow velocity sensor to type M4F0

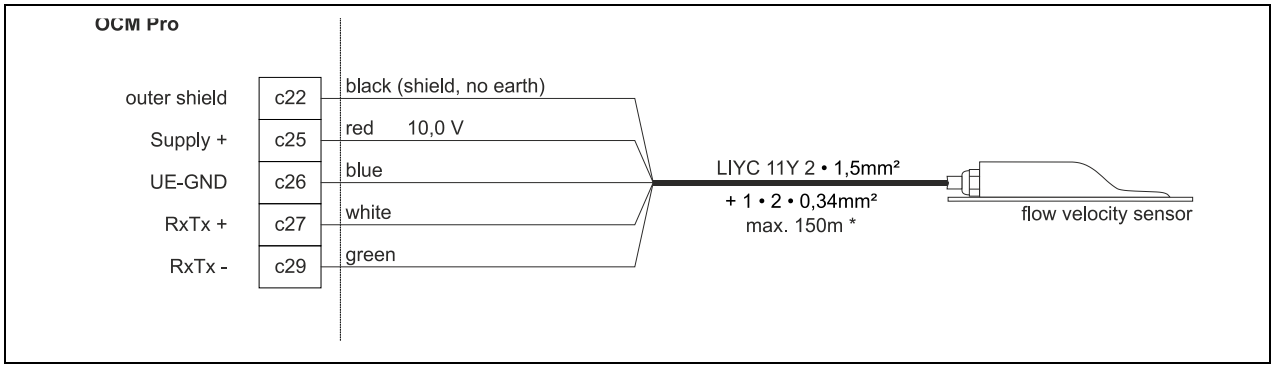


Fig. 7-23 Connecting a third flow velocity sensor to type M4F0

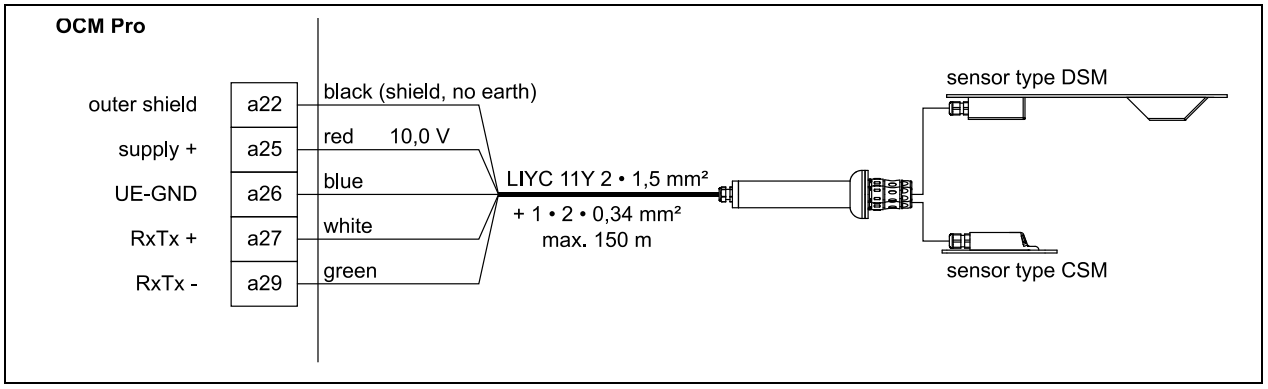


Fig. 7-24 Connection electronic box Type EBM with water-ultrasonic sensor Type CSM and air-ultrasonic sensor Type DSM to Type S4F0 / M4F0

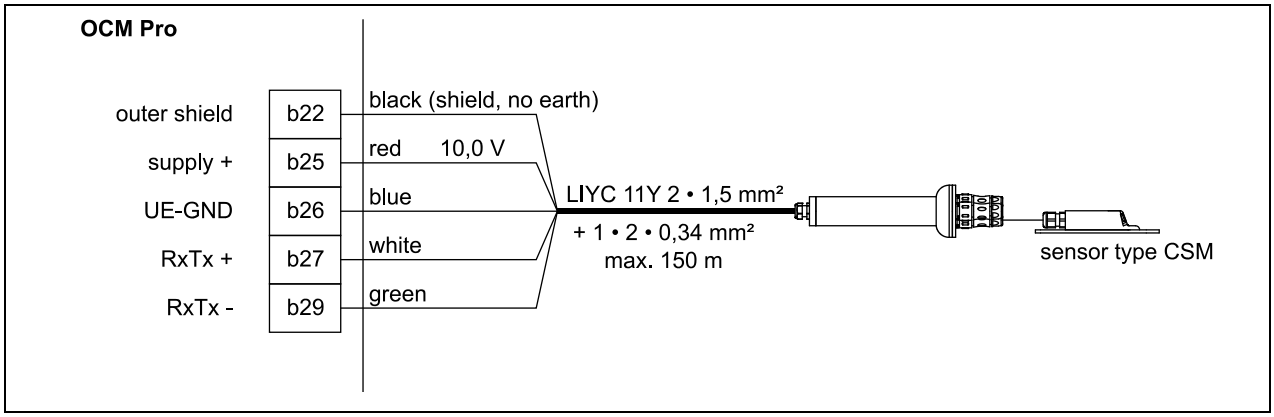


Fig. 7-25 Connection 2, electronic box Type EBM with water-ultrasonic sensor Type CSM to Type M4F0

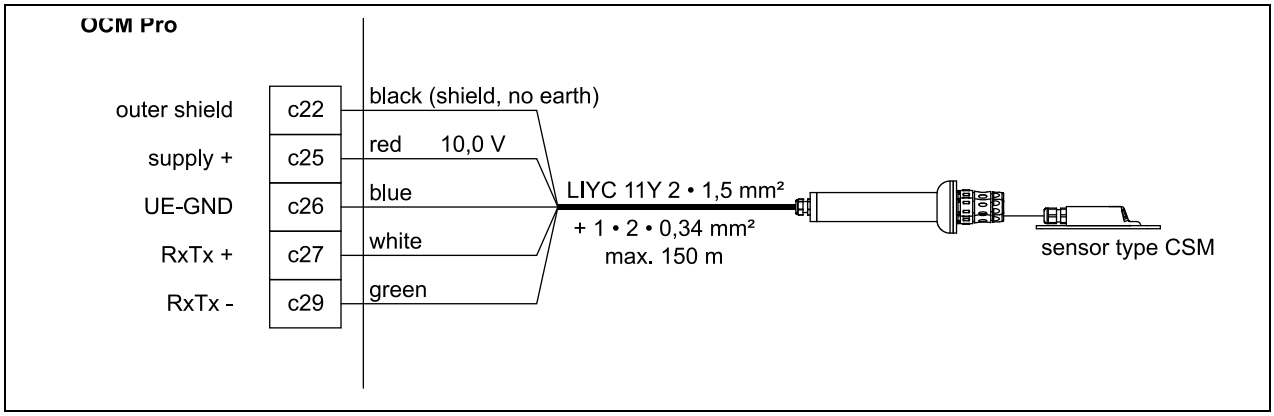


Fig. 7-26 Connection 3, electronic box Type EBM with water-ultrasonic sensor Type CSM to Type M4F0

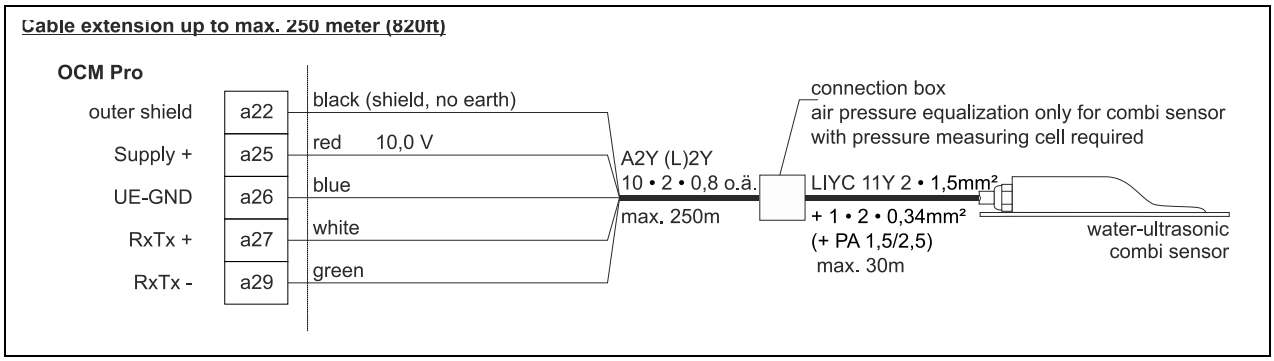


Fig. 7-27 Connecting a flow velocity sensor with integrated pressure measurement cell to type F0

Note

The pressure compensation element serves as connection socket for cable extension at the same time.
Please note that the maximum cable length between sensor and transmitter (considering the maximum permissible line resistance) shall not exceed 135 m in Ex areas. The maximum cable length in non-Ex areas is 250 m.

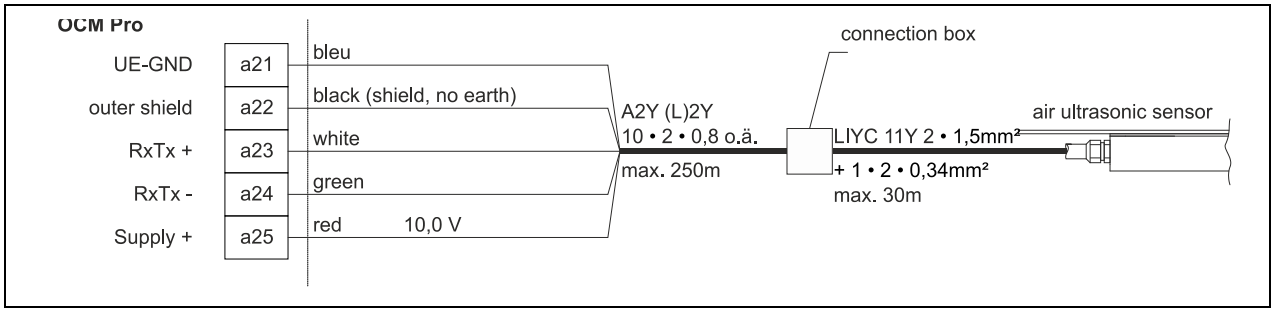


Fig. 7-28 Connecting an air-ultrasonic sensor type OCL to type F0

If the level measurement is carried out by a 2-wire probe (NivuBar, NivuCompact 2-wire echo sounder or similar) which is supplied by the OCM Pro, please follow the wiring diagram below:

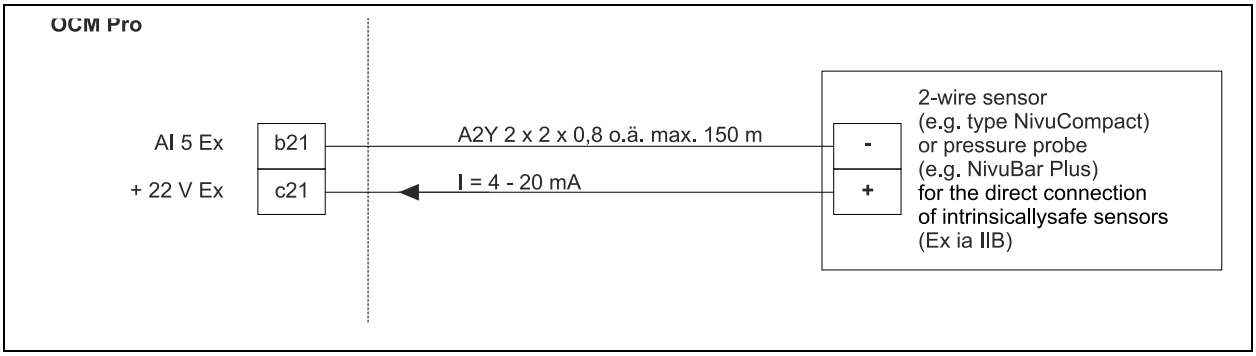


Fig. 7-29 Connecting a 2-wire sensor EX for level measurement to type F0

CAUTION

Do not connect cables without shields

If using sensors in Ex areas DO NOT lay the sensor cable past the mechanical shield between the terminal blocks.

Otherwise Ex protection is not guaranteed anymore.

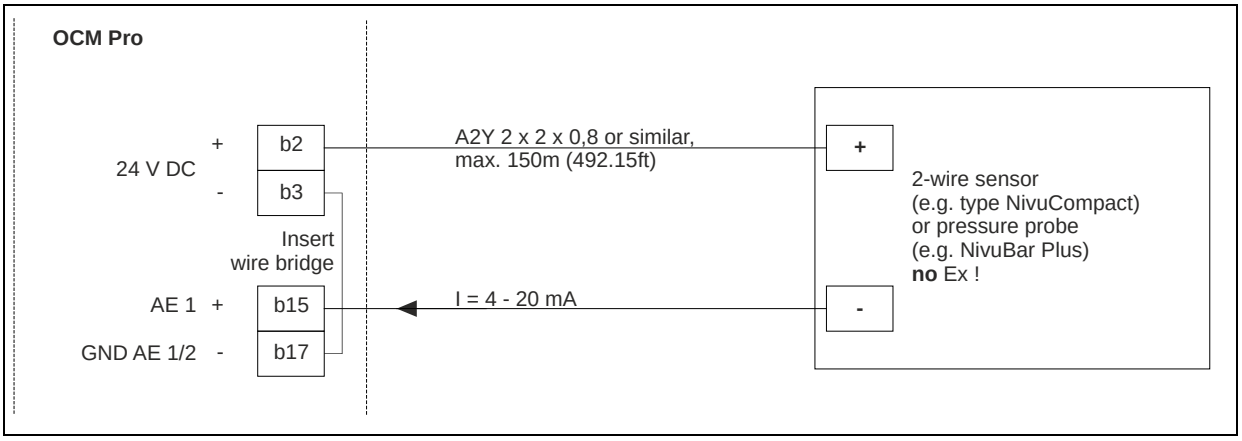


Fig. 7-30 Connecting a 2-wire sensor for level measurement to type F0

If the mA signal for level measurement is provided from an external transmitter (such as NivuMaster), connect to clamps as follows:

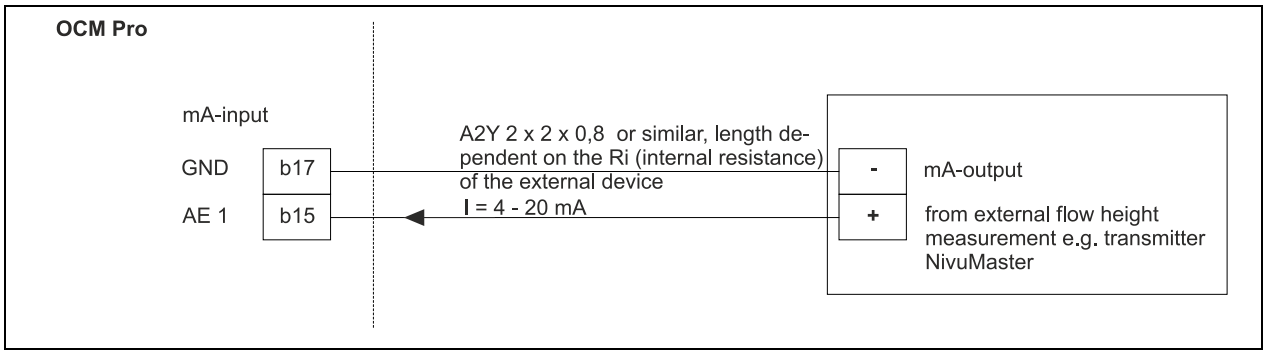


Fig. 7-31 Connecting external level measurement to type F0

7.3.5 Panel Mount Enclosure Overvoltage Protection

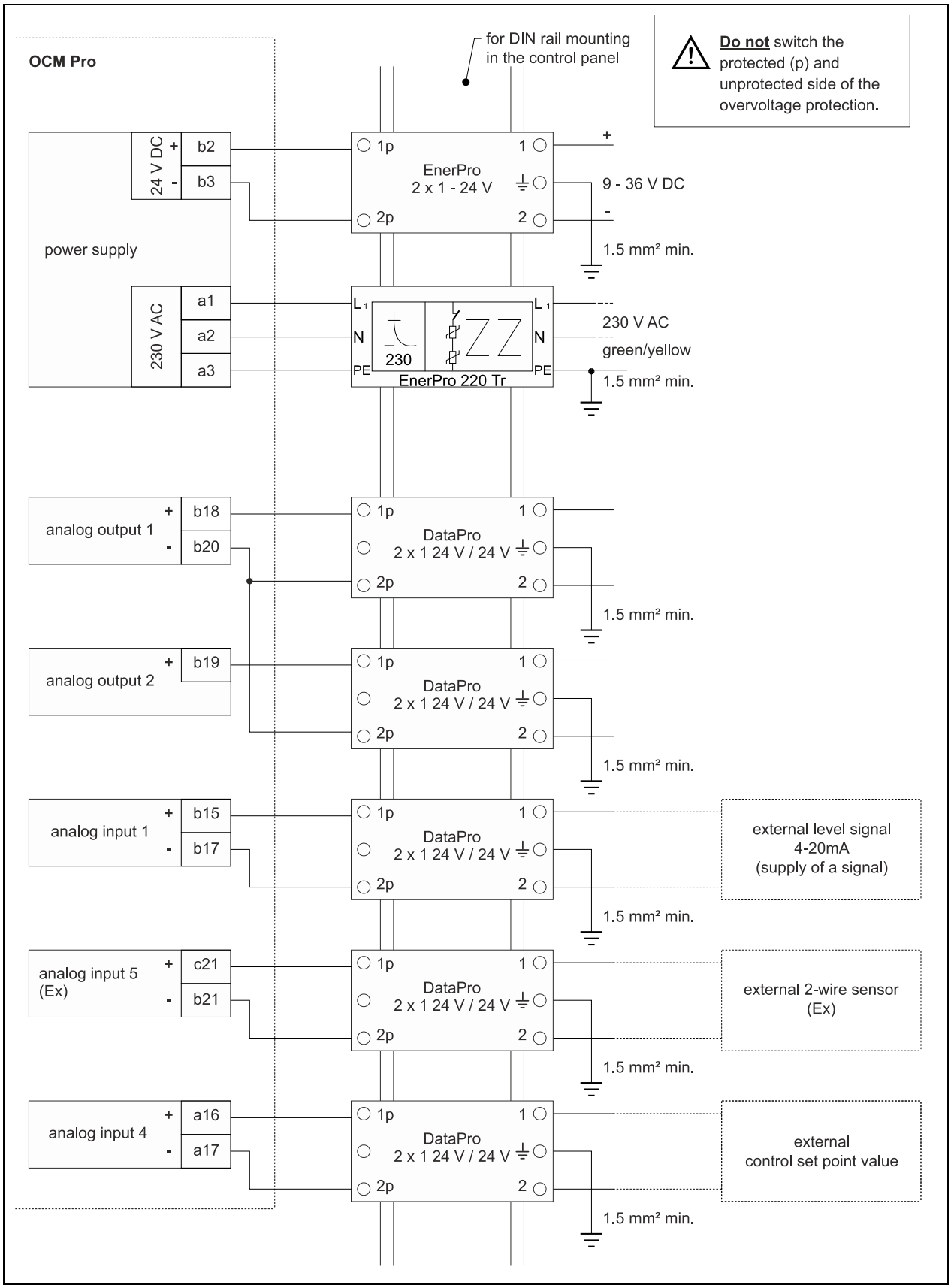


Fig. 7-32 Panel mount enclosure - connecting the overvoltage protection for power supply and analog inputs and outputs (panel mount enclosure)

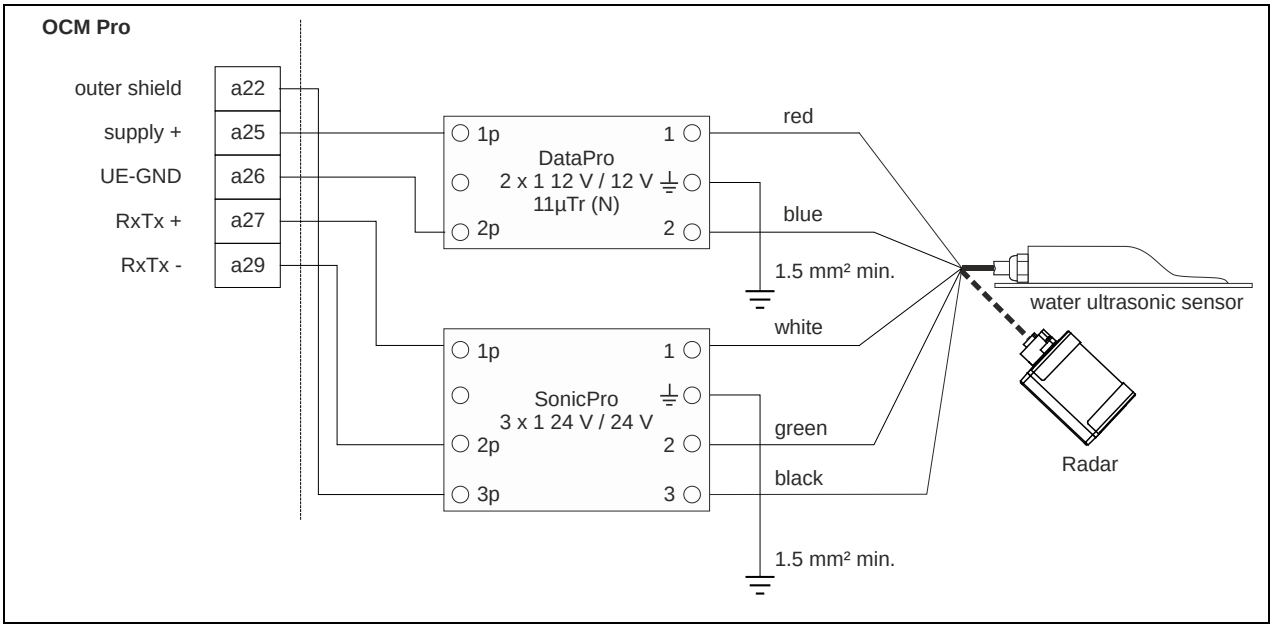


Fig. 7-33 Overvoltage protection water-ultrasonic sensor or electronic box or OFR radar, panel mount enclosure

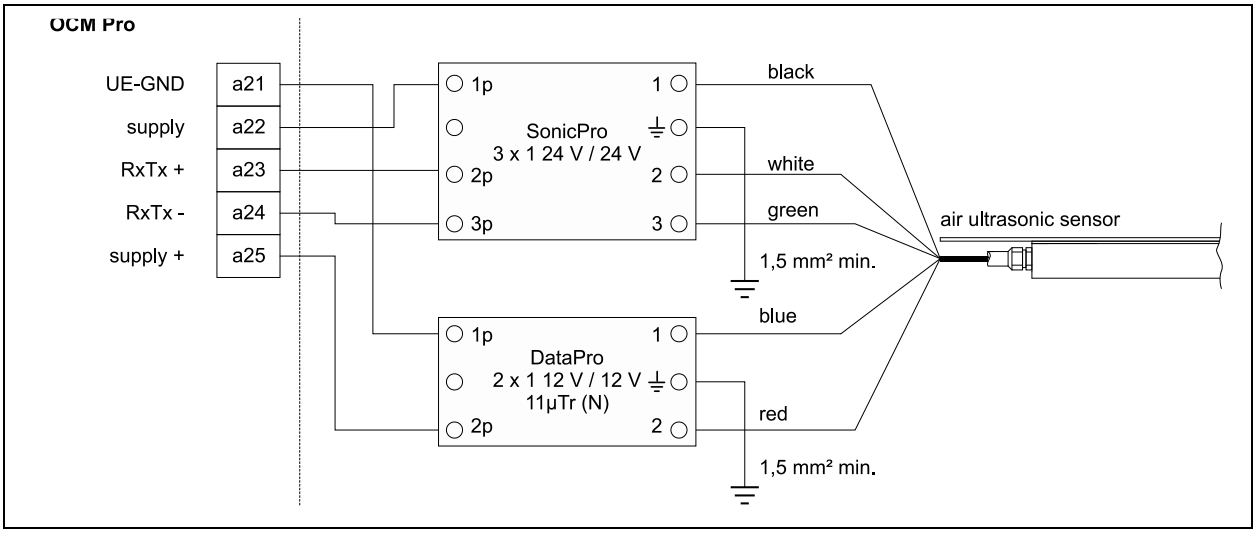


Fig. 7-34 Overvoltage protection air-ultrasonic sensor type OCL, panel mount enclosure

7.4 Power Supply Wall and Panel Mount Enclosure

Depending on the type of OCM Pro used the unit can be powered with 85-260 V AC (type: A4) or 8- 36 V DC (type: D4).
The two slide switches located above the terminals serve as additional ON or OFF switches.

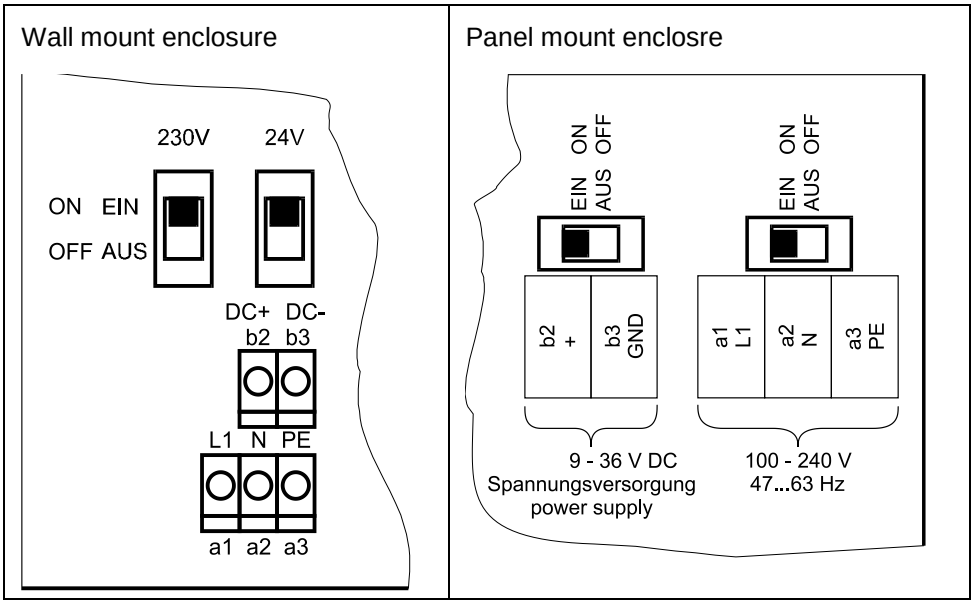


Fig. 7-35 Position of slide switch on the bus board

Important Note

A transmitter with 9-36 V DC cannot be operated with alternating current, just as it is impossible to operate a 230 V AC transmitter with 9-36 V direct current.

When operated with alternating current, the direct current supply clamps b2 and b3 both provide a voltage of 24 V and a maximum capacity of 100 mA (turn on 24 V switch!).

Please note, when using this supply voltage (e.g. for digital inputs with control signals), it must not be shielded through the complete switchgear in order to maintain disturbing interferences on a low level.

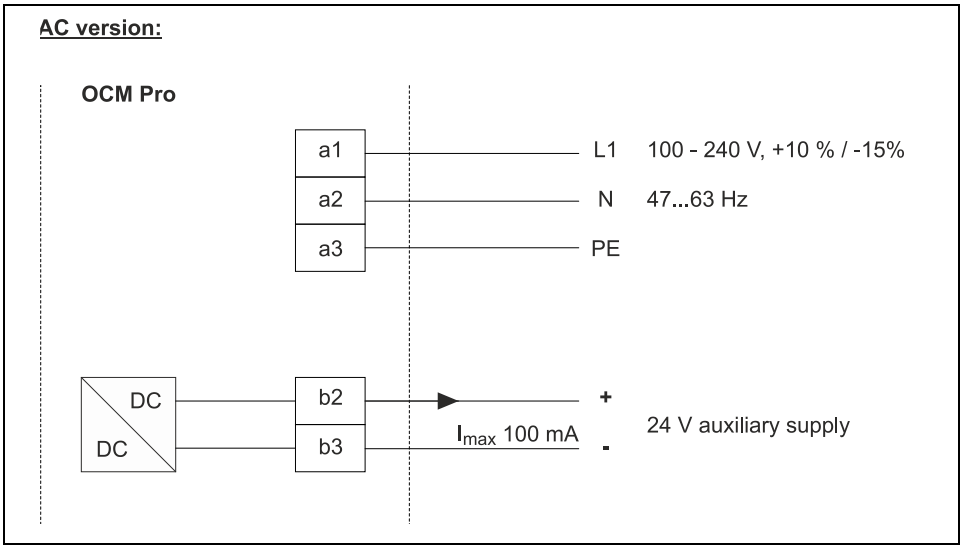


Fig. 7-36 AC model power supply

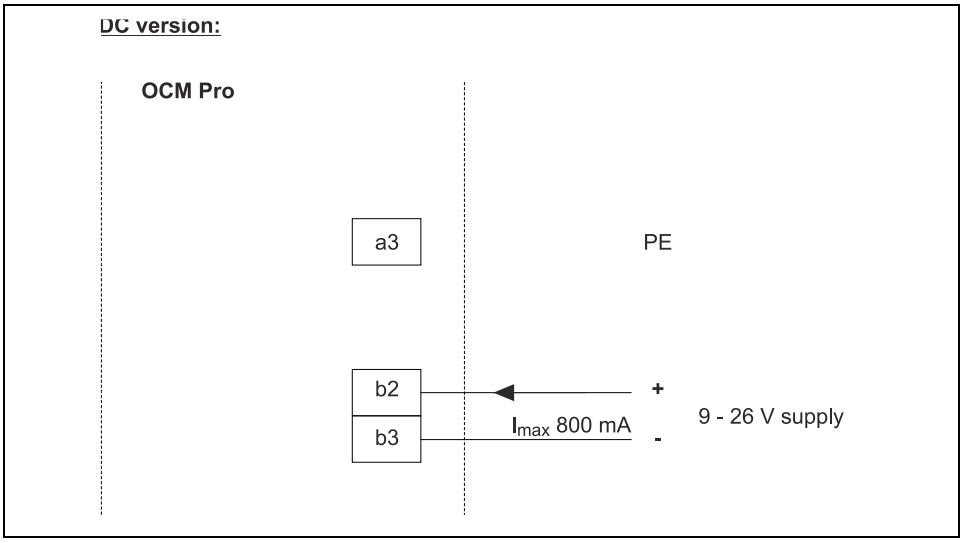


Fig. 7-37 DC model power supply

7.5 Regulator Mode

7.5.1 General

Note

Knowledge in control technology is necessarily required in order to correctly and reliably set the controller!

An OCM Pro Type >M4< is required as soon as the transmitter itself shall be used to control the flow rate.
Type >M4< has he following features:

- 1 external set point input
- 2 digital outputs to drive the regulator slide valve
- 2 digital inputs for the slide valve monitoring

If you operate an OCM Pro CF, type S4 for flow rate control please use a sufficient external controller and program it according to manufacturer specifications.

Use sluice gate valves, knife gate valves or iris gate valves with electric-drive three-step controller as control elements.
Analog-drive slide valves cannot be used.
We recommend the following regulating times (time elapsed between valve completely open and completely closed) for the selection of gate valves:
</= 300 mm (11.8 in) diameter: min. 60 seconds
</= 500 mm (19,7 in) diameter: min. 120 seconds
</= 800 mm (31.5 in) diameter: min. 240 seconds
</= 1000 mm (39.4 in) diameter: min. 300 seconds

For the correct driving as well as for error monitoring of the slide valve, the Way-End-Switches “OFF“ and “ON“ as well as the torque switches “ON“ are a mandatory requirement. These signals have to be connected to the digital inputs of the OCM Pro CF. Please note to select gold-plated contacts in order to ensure contact reliability. Connect a signal relay between switches and OCM Pro CF digital input to safely conduct the 10 mA input current.
Analog position feedback to OCM Pro CF is not planned.
The OCM Pro CF operates as a three-step controller with surge detection, quick close control, slide valve monitoring and automatic flush function.
To drive the regulating unit, the digital inputs 4 and 5 are assigned as default. Hence, digital output 4 as “slide valve closed“ and digital output 5 as “slide valve open“ are defined.
Analog input 4 is determined for input of external setpoint values (see chapter 7.3.5)

Note

- *The assignment of the digital outputs to the regulator cannot be modified.*
- *The input current on the digital inputs of the OCM Pro CF is 10 mA. Please ensure contact reliability by selecting sufficient contact materials on the end switch of the control slide valve.*

7.5.2 Construction of Measurement Section

For details on the construction measurement and control sections please refer to the "Installation Instruction for Correlation and Doppler sensors".

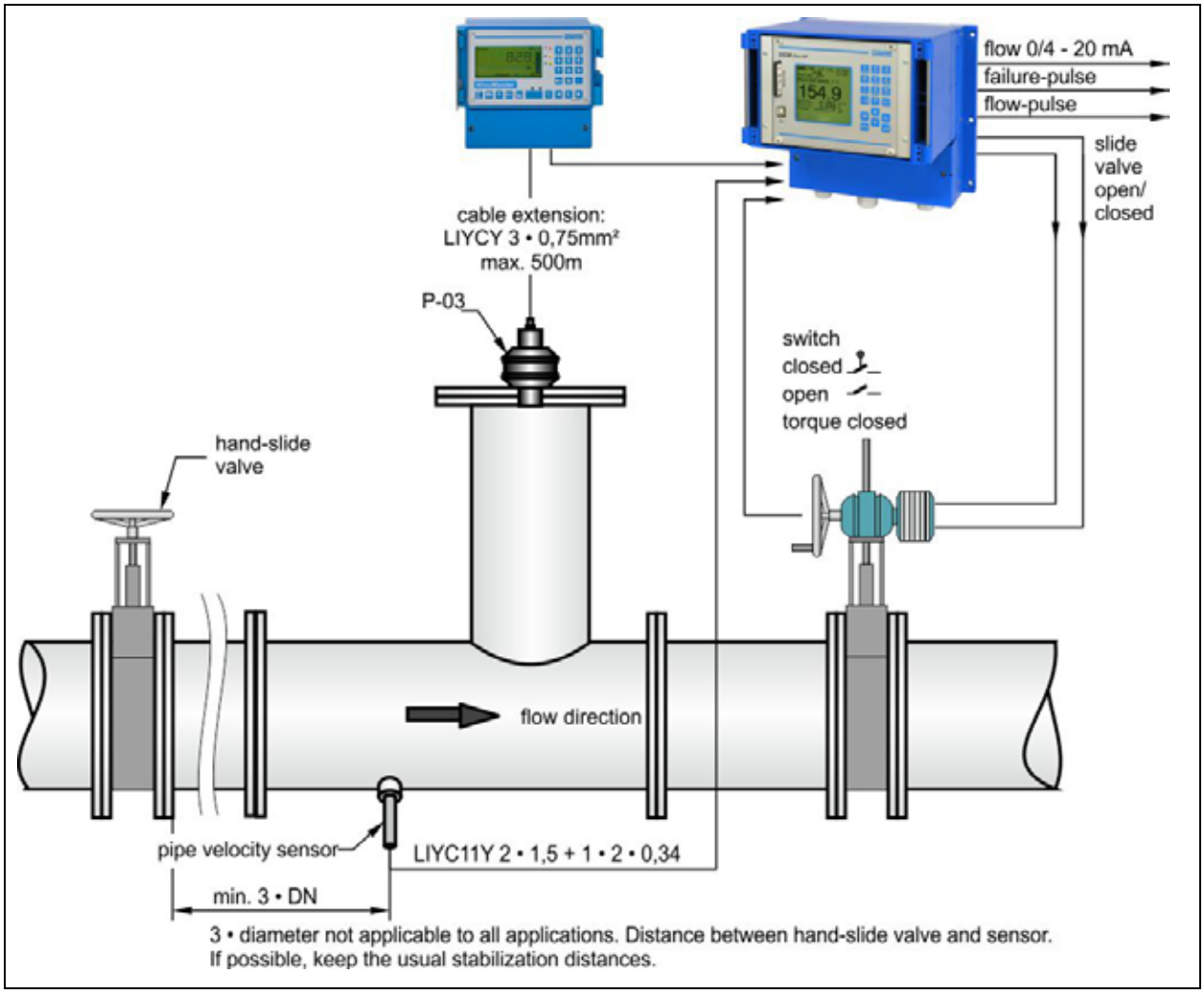


Fig. 7-38 Setup of a controlled system such as a discharge control

7.5.3 Regulator Mode Wiring Diagram

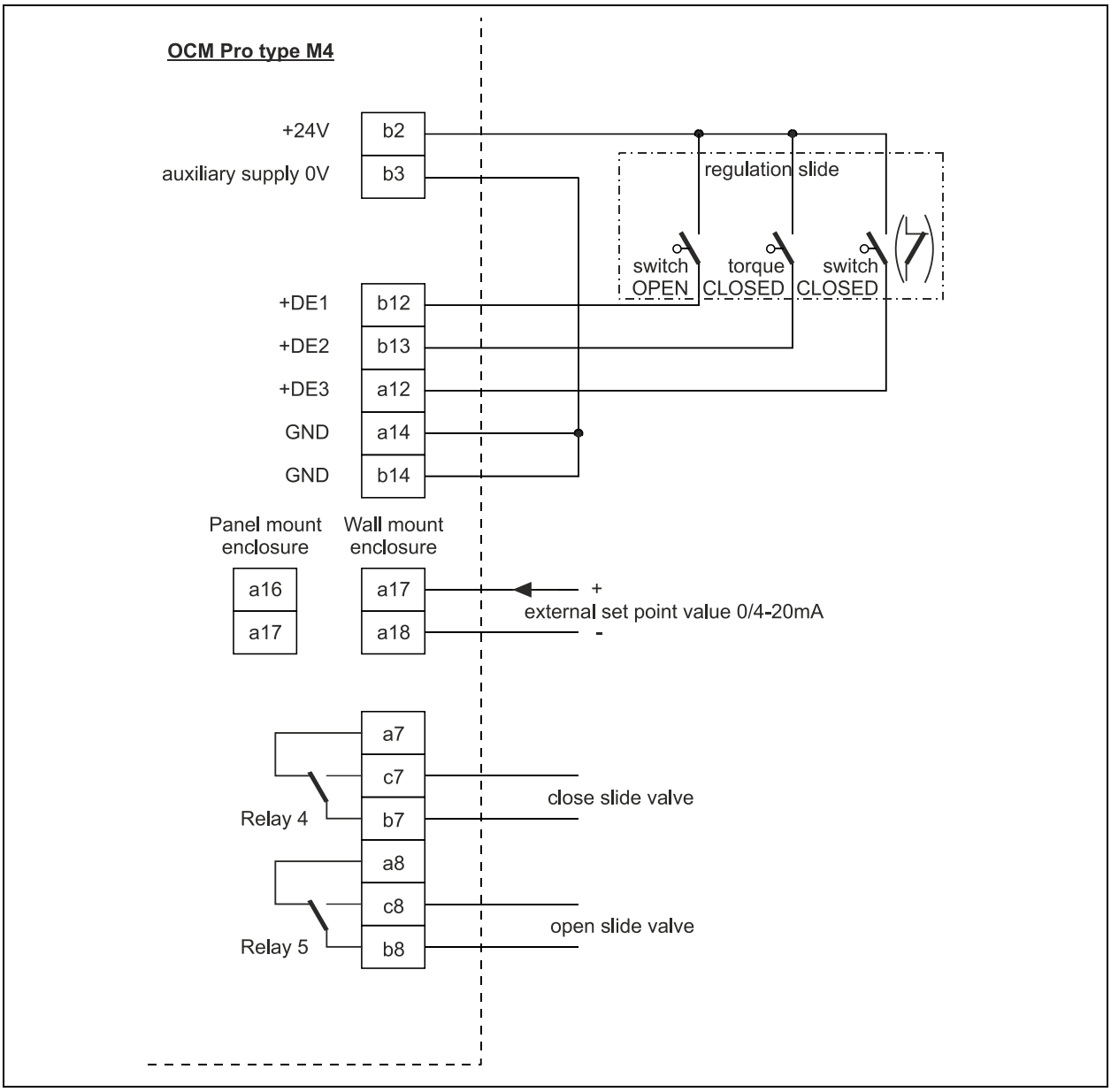


Fig. 7-39 Regulator mode wiring diagram

7.5.4 Control Algorithm

Note

***Always** use all 3 messages for slide valve control via digital inputs.*

Activating one message only may result in disturbed regulator operation.

If the regulator function is selected (see also chapter 9.5.8) relay 4 is going to self-activate for the function “SLIDE VALVE CLOSED“ and relay 5 for “SLIDE VALVE OPEN“. This assignment cannot be modified.
The digital inputs are free programmable for position feedback. To ensure correct and failsafe slide valve drive necessarily use the messages "PATH OFF“, "PATH ON“ and "TORQUE OFF“ of the slide valve drive.
The input current per digital input is 10 mA.

The regulator can alternatively be operated with external or internal set point. External setpoints to be used always have to be routed to analog input 4.
In case of using a 4-20 mA signal as external setpoint, this signal can be monitored for cable breaks and short circuits. If errors should occur the OCM Pro is going to access the internal setpoint (à in case of using external 4-20 mA setpoints and error monitoring always set the internal setpoint additionally!).

The following equation applies for the internal calculation of the slide valve control time:

$$\text{control time} = (\text{setpoint} - \text{flow}_{\text{actual value}}) \bullet \text{P\_factor} \bullet \frac{\text{max. slide valve runtime}}{\text{max. flow}}$$

7.6 Communication

7.6.1 General

Note

Communication can be used only in conjunction with the wall mount enclosure unit!

Programming can be executed with the panel mount enclosure unit as well; the transmitter however is not equipped with an Ethernet interface!

The OCM Pro CF wall mount enclosure unit allows remote access via Internet. This means that the unit can be operated via Internet connection and PC or Laptop keyboard as if being on-site.
Requirements:

- Intranet or TCP/IP network or:
- Internet access
- current Internet Explorer or Firefox (no Opera or similar)
- Java®

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 OCM Pro CF and setting up data transmission the unit can be accessed from any PC in the world!

Note

Do not confuse OCM Pro CF remote access and process conducting systems. The OCM Pro CF 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 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 2.5) there are various ways for data communication. Select from:

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

Important Note

Using remote access options is associated with connection costs on the part of the instrument as well as on the part of the operator/viewer. These costs depend on:

- *Providers choice*
- *Connection time*
- *Connection period*
- *Flat rate or similar arrangement*

They are not influenced by NIVUS.

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

7.6.2 Communication Options

There are several different options available for communication with the OCM Pro CF. These options are:

- direct Ethernet connection between PC/Laptop and OCM Pro CF using a cross-link cable
- Ethernet level connection via TCP/IP, network connection via Ethernet hub or switch (see Fig. 7-40) It is necessary to use patch cables.
- Connection via network server using DHCP (Dynamic Host Configuration Protocol) and/or DNS (Domain Name Server).
  This setup is depicted in Fig. 7-41.
- Internet connection via access portal (see Fig. 7-42)
  It is required to use an OCM Pro CF equipped with according hardware such as analog modem, ISDN modem or GPRS to set up such a connection.
  The setup is described in Chapter 7.6.3.
- connection to SCADA systems via Modbus TCP (Ethernet)
- data and alarm transmission via E-mail or FTP server

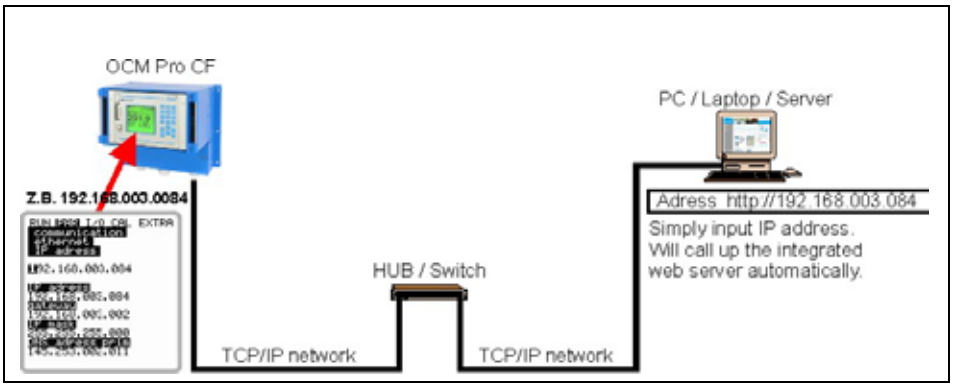


Fig. 7-40 Communication without server

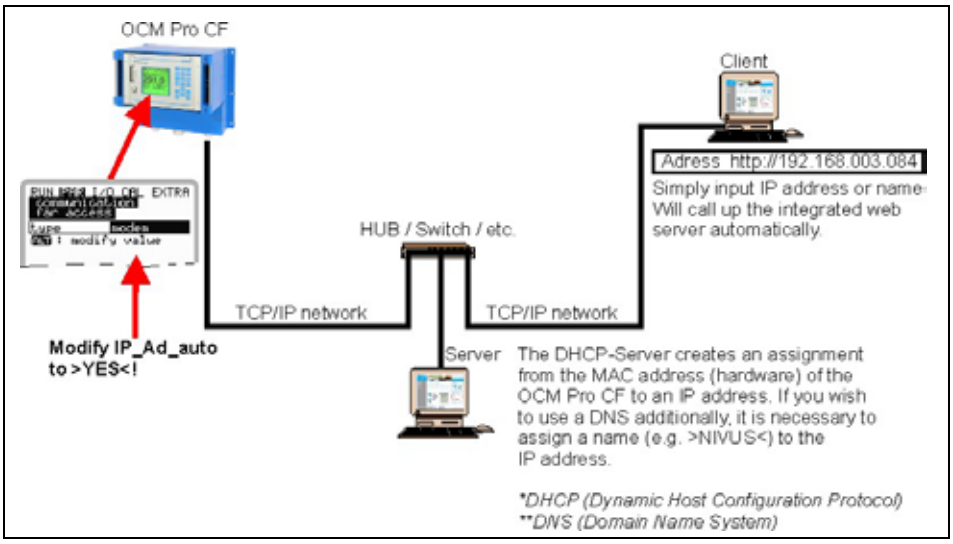
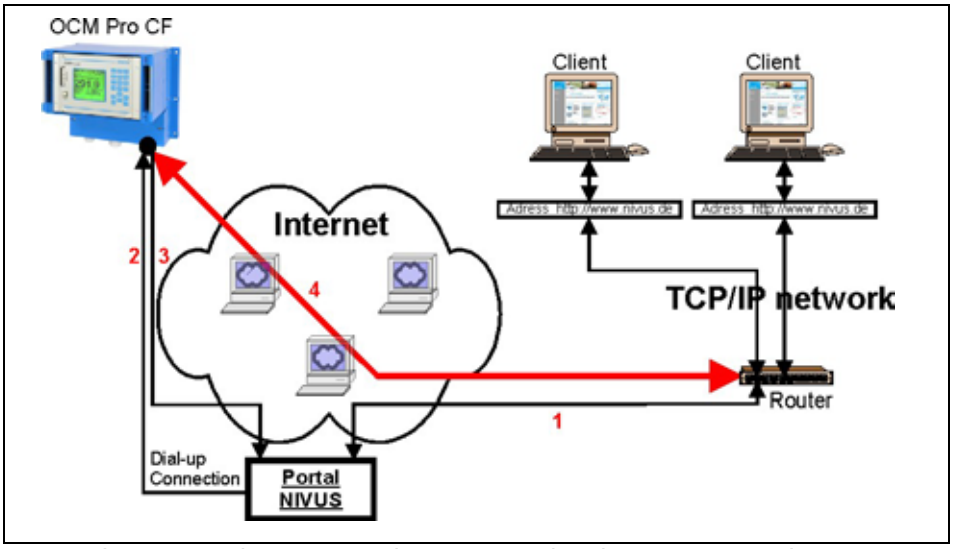


Fig. 7-41 Communication with server



1. Select your unit on >www.nivus.com< using the access portal.
2. The portal will “wake up” the unit sending a direct call.
3. The OCM Pro CF is setting up Internet access logging in to the portal subsequently.
4. The portal is going to establish a connection between unit and user using the internal OCM Pro CF web server

Fig. 7-42 Communication via Internet

7.6.3 Communication Setup via Access Portal

Important Note

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

Important Note

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.
A "Start portal" is required to start Internet connection.

This start portal is available under http://www.domoport.de/.
To start communication, enter the address mentioned before into your browser’s address line.
This will take you to the homepage of the provider (Domoport).
Enter your "Username" and "Password".
You are going to receive both codes after the initial setup has been carried out by NIVUS. You can modify the names and passwords yourself.

Fig. 7-43 Starting the communication

Important Note

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.

The data is transferred using SSL encryption, making it inaccessible to third parties. 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. 7-44 Measurement place selection

After selecting the desired measurement place and clicking the "Connect" button communication with the selected OCM Pro CF will be established. User name and password are going to be verified again and the homepage contained in the OCM Pro CF will be transmitted.
This may take between 15 and 120 seconds depending on modem type and quality of connection.

Fig. 7-45 Connecting

7.6.4 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.

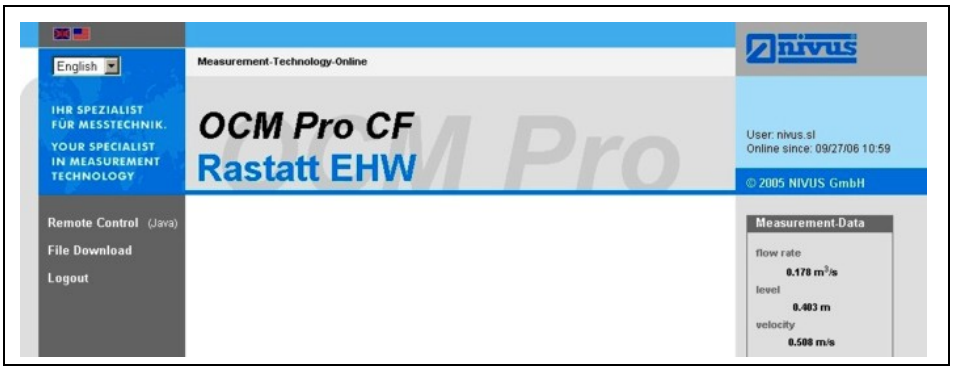


Fig. 7-46 Static communication page

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

Note

Remote control is not possible if the free Java™ runtime environment is not installed on the operator PC!

The Java© Applet is third party software and NIVUS therefore cannot accept any liability of the use of it.

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

Fig. 7-47 Java™-Applet starting

After starting Java™ successfully, the OCM Pro CF display now is indicated in the same manner as if being on-site.
The OCM Pro 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 (à no quick consecutive control entries, but always one movement at a time after the previous command has been executed visibly).

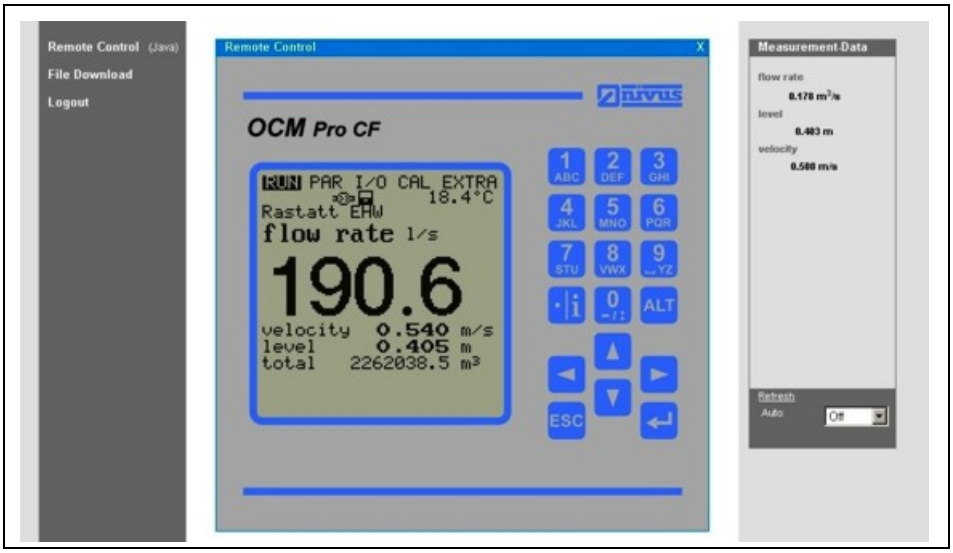


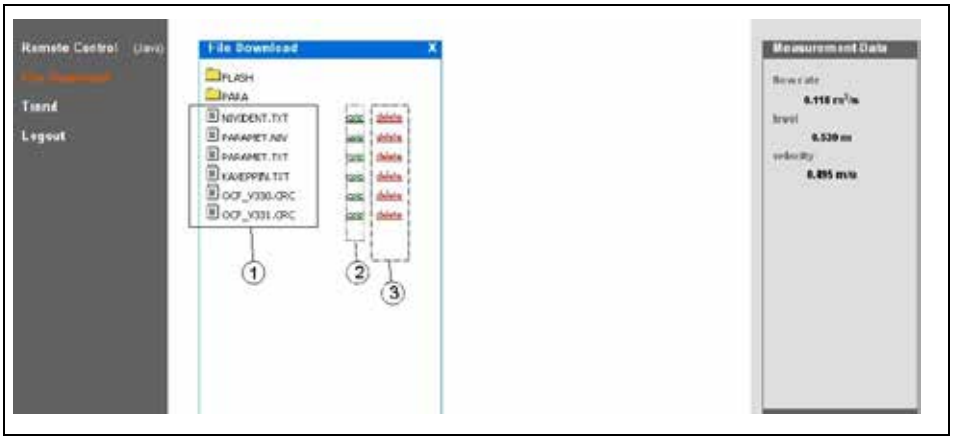
Fig. 7-48 Visualisation of online connection

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 (saves money and time).
You can find more information on the OCM Pro file structure and how to use the single files in chapter 9.5.11.

Note

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. 7-49 Selecting the file to transmit or to delete

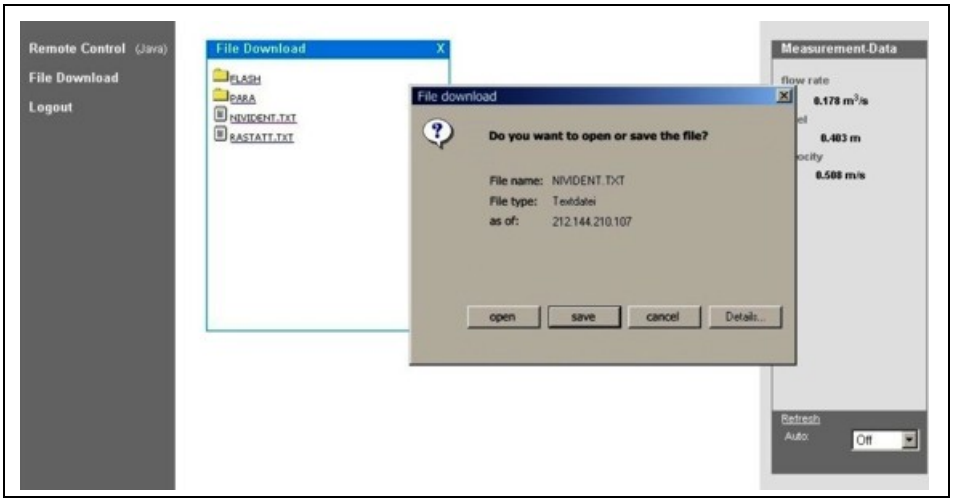


Fig. 7-50 Saving transmitted files on PC

The selected file can be deleted by double-clicking on it in area 3 (see Fig. 7-49). 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.

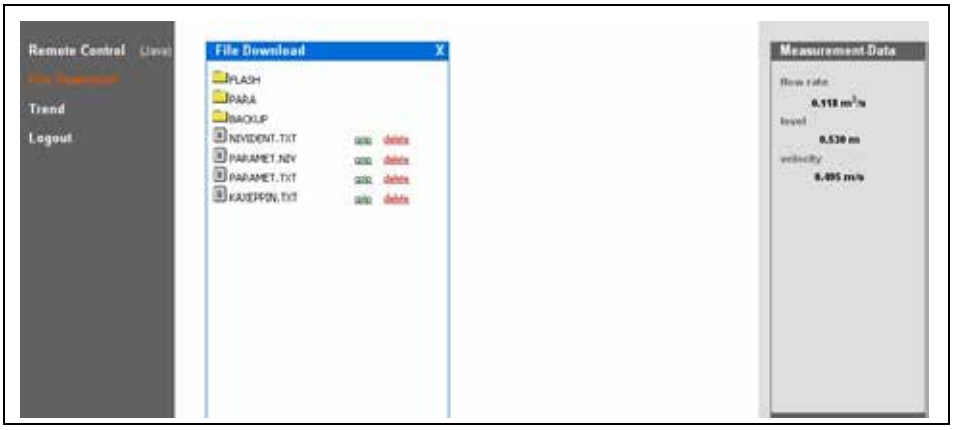


Fig. 7-51 Created backup folder

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

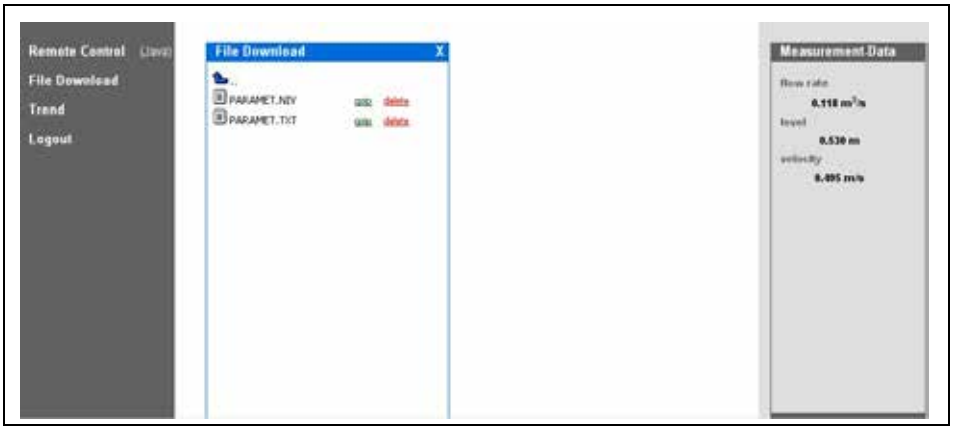


Fig. 7-52 Contents of created backup folder

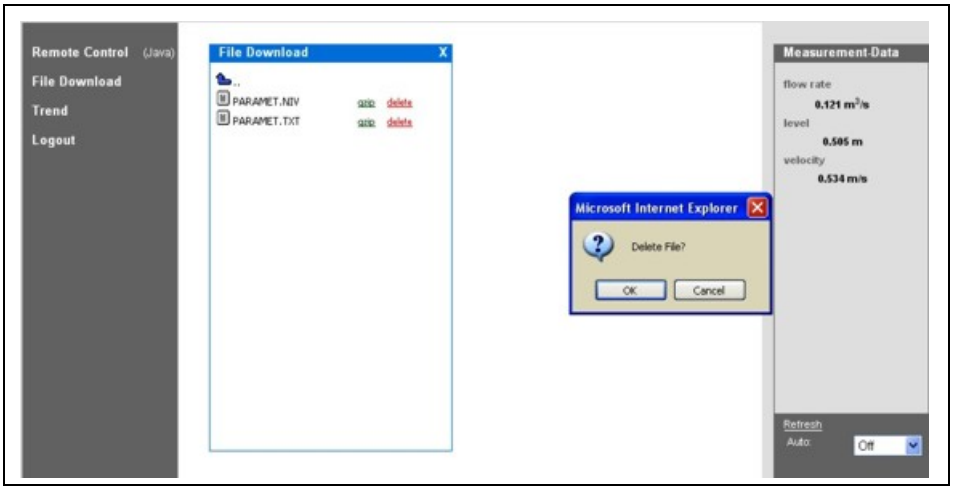


Fig. 7-53 Deleting a file permanently

Note

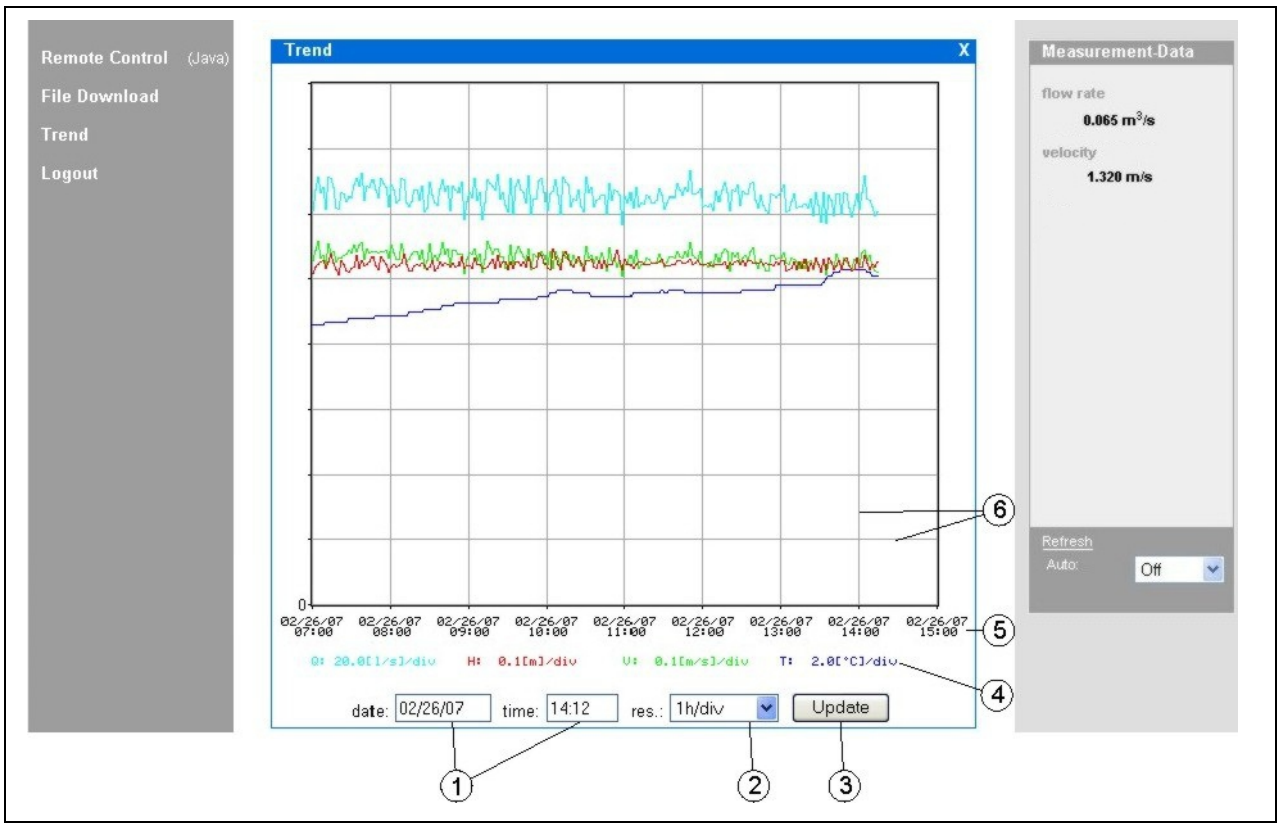
Transmitting the measurement place file without deleting it or moving it into the backup folder will cause to attach all future readings to the transmitted file. This is going to blow up the size of the file as "old" data which have been transmitted before are going to be transmitted again!

Note

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 OCM Pro CF 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. 7-54 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 OCM Pro display (see Chap. 9.3).
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 Fig. 7-54, point 6).

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. 7-54) will refresh the screen by the new measurement data which have been collected whilst watching.

Note

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.

Note

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

8 Initial Start-Up

8.1 General

Notes to the user

Before you connect and operate the OCM Pro CF 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 OCM Pro CF this instruction manual must be read thoroughly!
The OCM Pro CF must be wired in accordance with the wiring diagram, see chapter 7!
If any problems regarding installation, connection or programming should occur please contact our hotline
+49 (0)7262 9191-955.

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 OCM Pro CF 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 7.2.3 and 7.3.3) the parameters must be set. In the most cases all you need is:

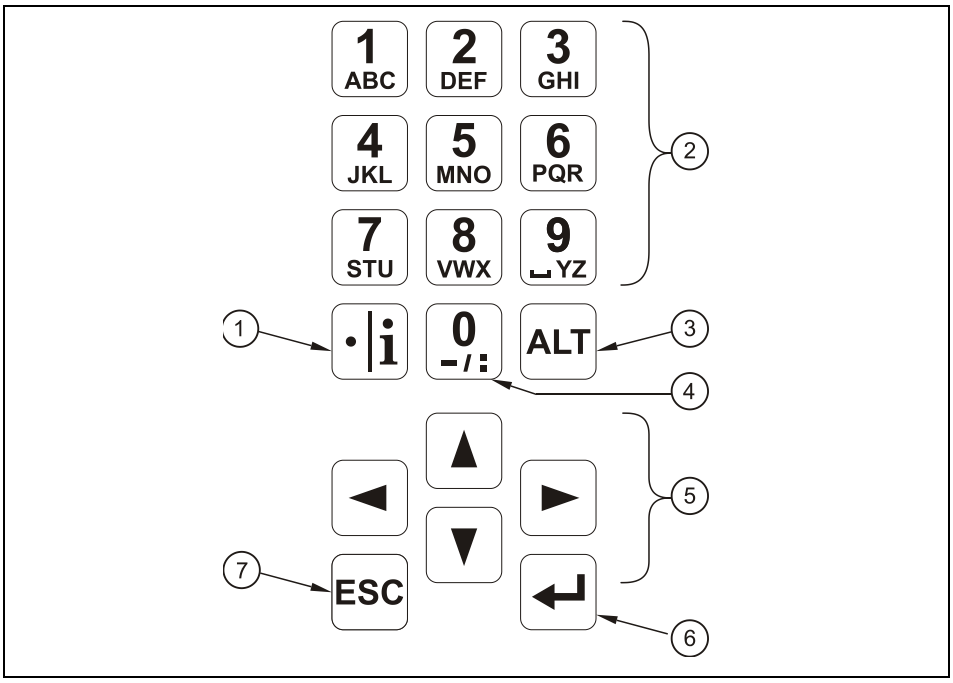
- geometry of the measurement place and dimensions
- used sensors and positioning
- display units
- span and function of analog and digital outputs

The OCM Pro CF user surface has been designed in a way which allows even unfamiliar users to easily set up basic settings in graphic dialog mode ensuring reliable device operation.
Either let the manufacturer or an expert company authorised by the manufacturer do programming works as soon as the following requirements are prevailing:

- extensive programming
- difficult hydraulic conditions
- special channel shapes
- lack of expert personnel
- if a setup and error protocol is required

8.2 Operator Panel

A comfortable 18-button keypad featuring partly multiple key assignment is available to input data.

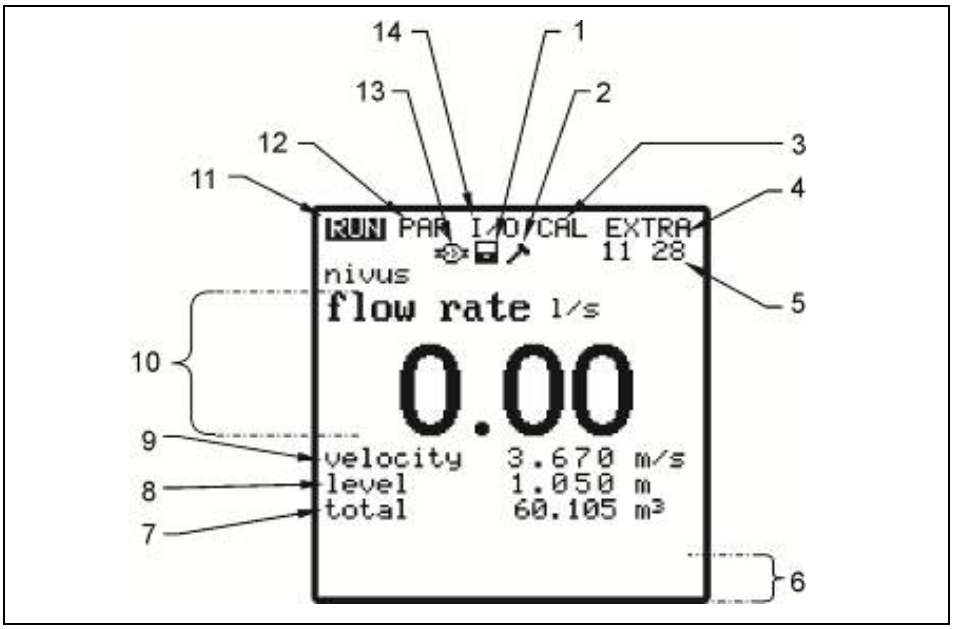


1 Decimal place / Info key
2 Numeric and alphabetic keys
3 Shift key
4 0 / - navigation key
5 Control key
6 Confirmation key (ENTER)
7 Escape key

Fig. 8-1 Operator panel

8.3 Display

OCM Pro CF has a large back-lit graphic display with a resolution of 128 x 128 pixel. This ensures to comfortably read current values.



1 Indicates activated data storage
2 Indicates activated service mode
3 Calibration menu
4 Display menu
5 Current system time (automatically alternates with medium temperature)
6 Fields indicating digital output conditions
7 Total
8 Filling level (height)
9 Flow velocity
10 Flow rate
11 Operation menu
12 Parameter menu
13 Symbol indicating active communication
14 Status menu of inputs, outputs and sensors

Fig. 8-2 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, time, flow rate, level and average flow velocity optionally allows to indicate the flow velocity distribution. Additionally it is possible to show day totals and error messages including time stamps or to graphically indicate the history of flow volumes, filling level and average flow velocity.

PAR This menu is the most extensive of the OCM Pro CF. It is for the complete parameter setting of dimensions of the measurement place, sensor selection, analog and digital inputs and outputs, storage, data transmission and regulator function.

I/O This menu includes information about internal operation of the OCM Pro CF. All current values can be displayed, as well as the values of analog and digital outputs and relays. Additionally, echoes of the sensors and 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. To detect very low volumes occurring at minimum levels which do not allow to reliably detecting the flow velocity, it is possible to set up an automatic flow calculation based on the manning formula here.

EXTRA This sub-menu includes basic display settings: contrast, background lighting, language, units, system times and totalizer presets.

8.4 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 8.3).

◄ ► 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.

ESC Escape submenus step by step. Cancels entered data.

1 ABC - 9 YZ 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 is pressed for approx. 2 seconds.

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

ALT 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.

9 Parameter Setting

9.1 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 accept the new values.
If “yes”, it is needed to enter the PIN code.

2718 If prompted enter this number into the OCM Pro.

Important Note

The PIN code protects against unauthorized access.

Never give the PIN code to any unauthorised persons. Even do not leave the code next to the equipment or write it down on it.

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.

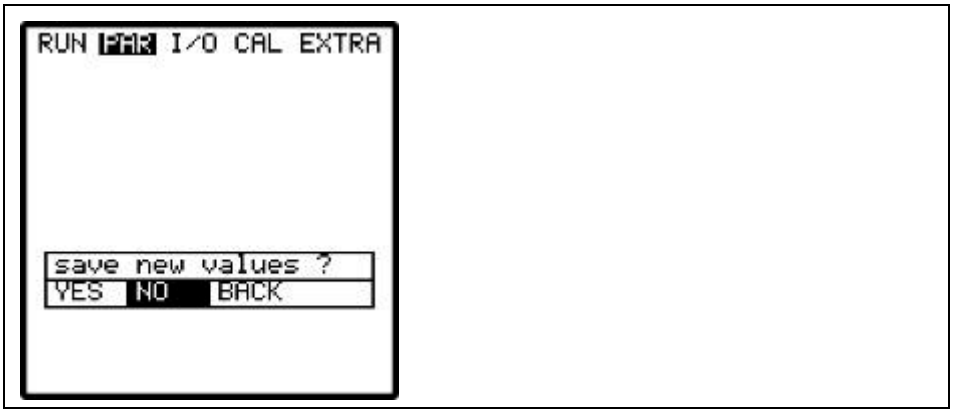


Fig. 9-1 Screen at end of parameter setting

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 PIN code as these settings influence just the way of representation and not measurement or the output of measurement values.

Note

This instruction manual describes all programming options of the OCM Pro CF. Depending on the device type various inputs and outputs as well as communication and data transmission features may not be available. They may be programmable, but may not be available to be used as outputs or to be connected (see also Specifications in Chapter 0).
This applies for the transmitter type S4, which has only 2 analog outputs, 2 relay outputs, 1 analog input and no digital input. This device cannot be operated as a controller. It can be operated with 2 analog outputs and 2 relay outputs only. Please use transmitter type M4 for the additional functions described above.

After mounting and installing sensor and transmitter (see previous chapters as well as "Installation Instructions for Pipe and Wedge Sensors") activate the power supply.
The initial start-up dialog is the language selection:

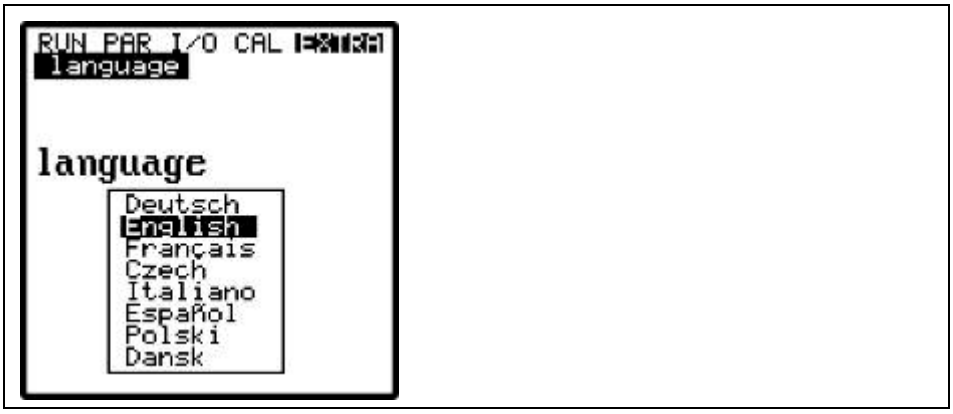
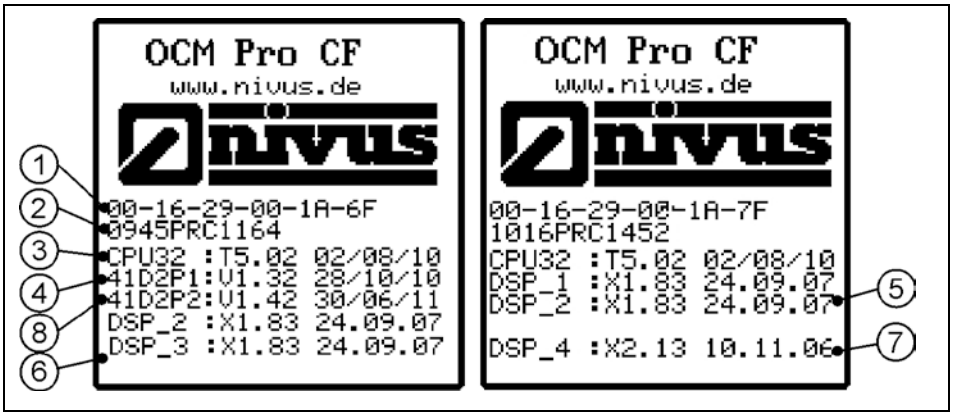


Fig. 9-2 Language selection

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

Please press key once

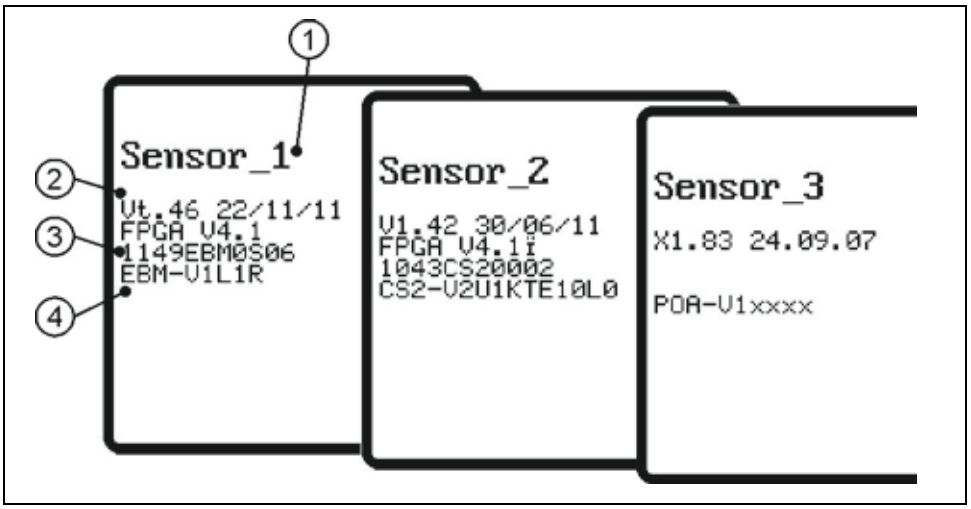
The transmitter begins communication with the sensor and coordinates both processor programs. At the same time, the firmware version numbers of CPU and sensor will be indicated, which is necessarily required if problems during programming should arise.
You will need to note this information. It is required as soon as questions on programming should arise.



1 MAC address OCM Pro CF
2 Serial number OCM Pro CF
3 Transmitter firmware version with date of creation
4 CS2 sensor firmware version with date of creation
5 POA sensor 2 firmware version with date of creation
6 POA sensor 3 firmware version with date of creation
7 OCL sensor firmware version with date of creation
8 EBM electronic box firmware with date of creation

Fig. 9-3 Info on firmware and version number

Pressing the "right" arrow key indicates additional information on the connected and activated sensors:



1 Sensor number
2 Firmware version with date of creation
3 Serial number
4 Sensor type

Fig. 9-4 Additional sensor information

If older sensors are in use it may not possible to indicate the sensor information completely.

Important Note

During the final inspection a system reset is performed and the OCM Pro CF is shipped subsequently. The unit hence is reset to factory defaults. Independent from this, we recommend to execute one more system reset (PAR/Settings/System reset) prior to programming parameters in order to ensure a defined basic state.

Then parameters can be set.

9.2 Operation Mode (RUN)

This menu is a display menu for standard operation mode.
The following sub menus are available:

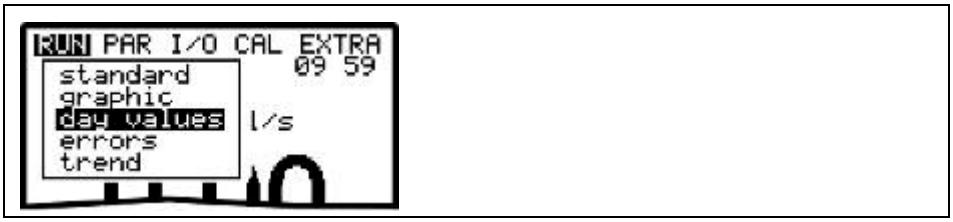


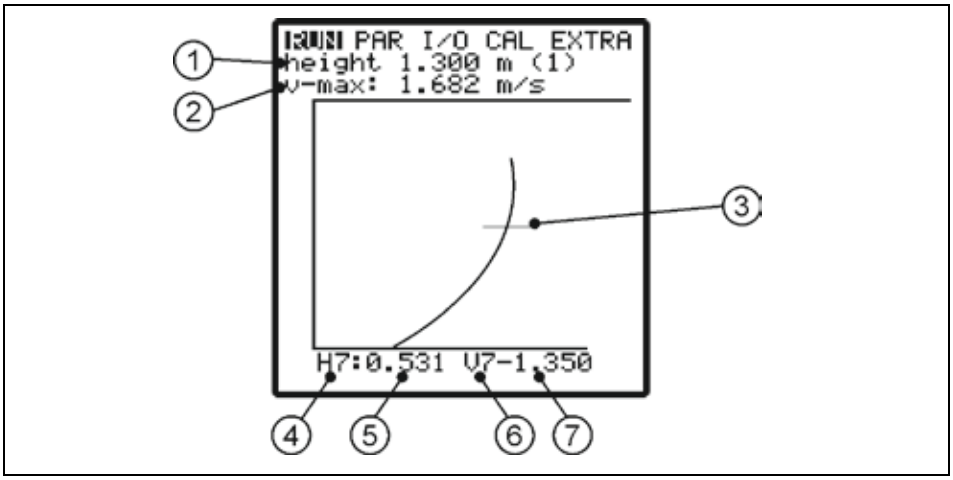
Fig. 9-5 Operation mode selection

Standard

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

Graphics

Indicates the velocity distribution in a vertical measurement path.
Pressing the "arrow up“ or "arrow down“ keys will move the indicator line accordingly. The selected height as well as the current velocity can be read from the bottom line of the display (see Fig. 9-6).
This graphic indication enables to understand the current flow conditions at the chosen measurement place. The velocity profile should be evenly distributed and should not have any errors (see Fig. 9-7).
In case of very unfavourable conditions change the position of the flow velocity sensor. For more details please refer to the "Installation Instruction for Correlation and Doppler sensors".
Graphics are not availbale if a surface radar sensor is used.



1 Maximum Height
2 Maximum Measured Velocity
3 Measurement Window Indication
4 Level Measurement Window no.
5 Level Value
6 Velocity Measurement Window no.
7 Velocity Value

Fig. 9-6 Flow velocity distribution

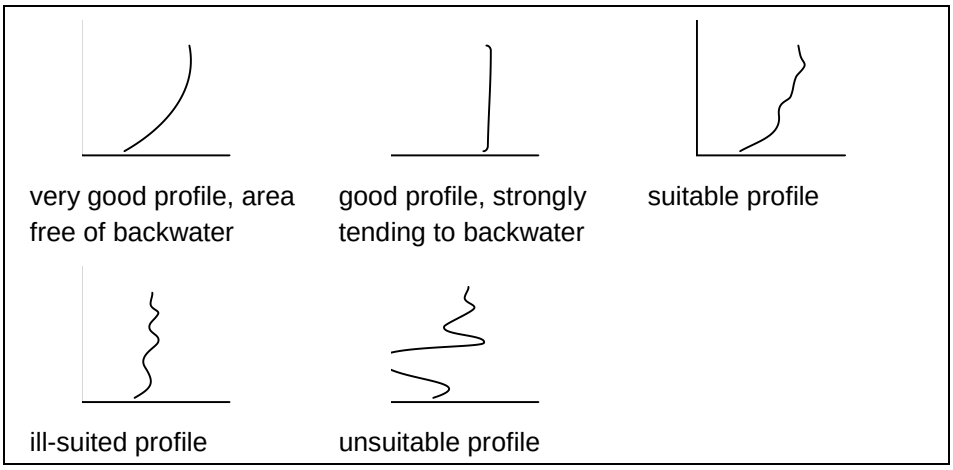


Fig. 9-7 Flow velocity profiles

Note

This function is not available as soon as an OFR radar sensor is connected.

Day totals

The submenu >INFO< (see Fig. 9-8) allows to view the flow totals of the past 7 days (see Fig. 9-9), presumed the transmitter has been operated without any interruption in the past seven days. Otherwise it shows the total for the uninterrupted days of operation).
Totalisation normally is carried out at 00:00 h (midnight). If desired, this value can be modified under RUN – Day Totals - Interval (see Fig. 9-10)
Additionally, you can get information about partial total value since the last reset (comparable with rout mileage counters in cars). This value can be reset to >0< at any time by pressing the >ALT<-key. This reset does not influence the totaliser.

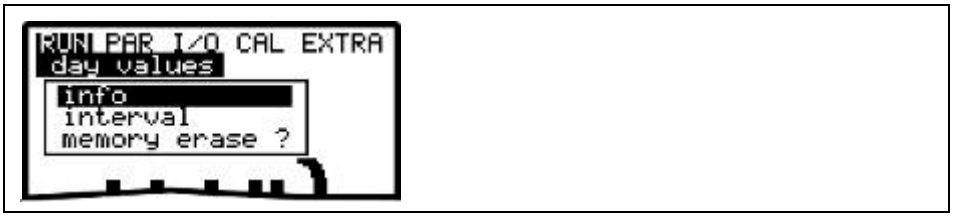
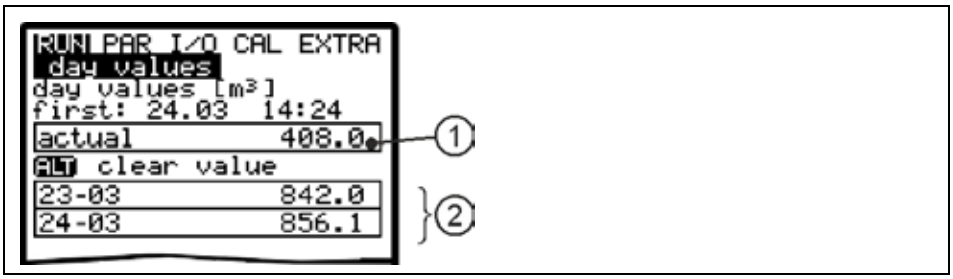


Fig. 9-8 Info menu



1 Sub total
2 Day total

Fig. 9-9 Day values

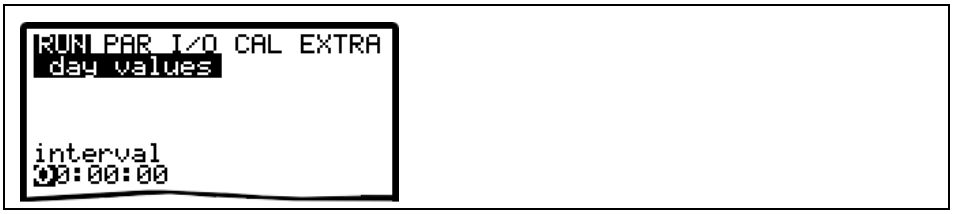


Fig. 9-10 Time of daily totalising

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. Pressing the >ALT< key will delete all error messages one by one (from the latest one back to the oldest one).

Note

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..

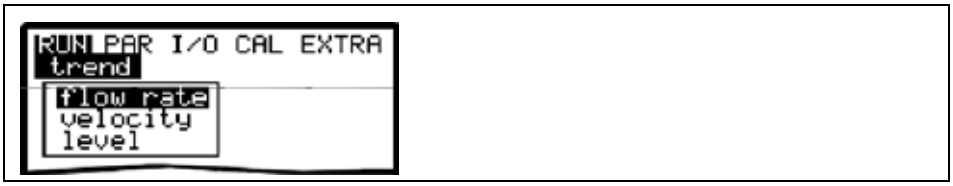
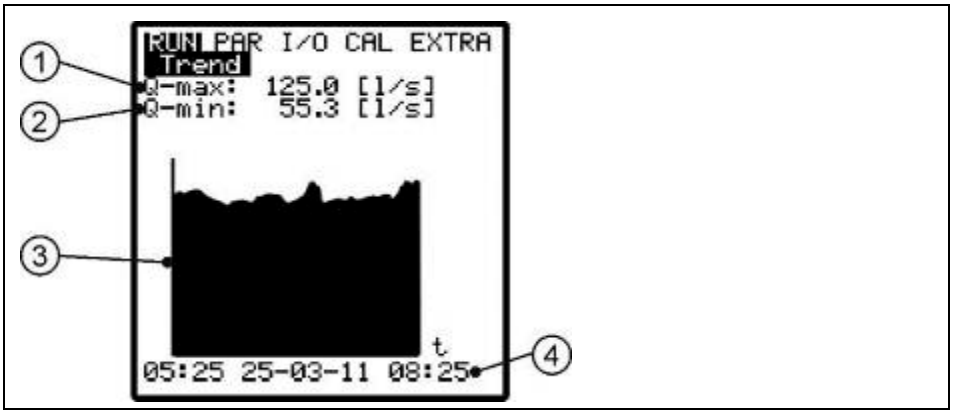


Fig. 9-11 Trend value selection (varying screens)

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 cycle has expired (see Fig. 9-21). 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 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.



1 Maximum value occurred
2 Minimum value occurred
3 Graph
4 Period indicated

Fig. 9-12 Trend graph example

Note

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

9.3 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:

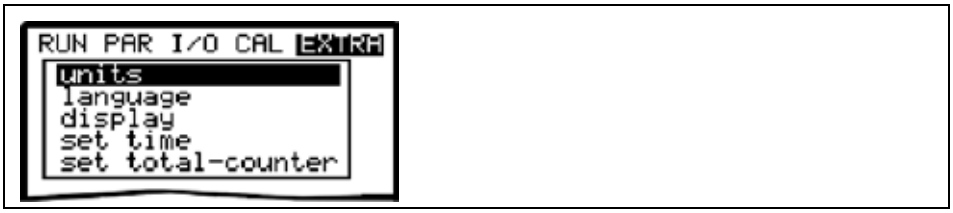


Fig. 9-13 Extra submenus

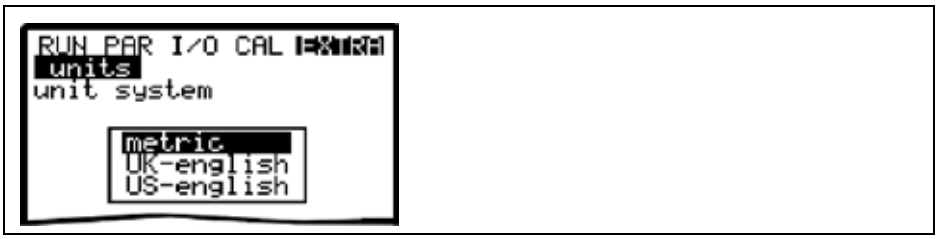


Fig. 9-14 Unit system selection

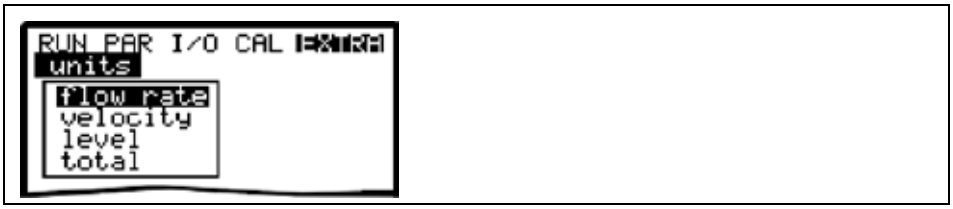


Fig. 9-15 Selection of individual units

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 the metric system (litre, cubic meters, cm/s etc.), English system (ft, in, gal/s, etc.) and American system (fps, mgd etc.).

Language

German, English, French, Czech, Italian, Spanish, Polish and Danish are available for communication and indication of messages on the Display.

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<:

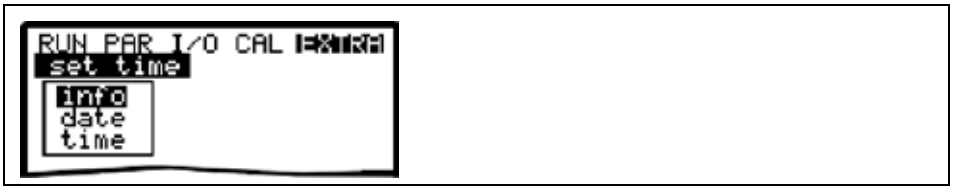
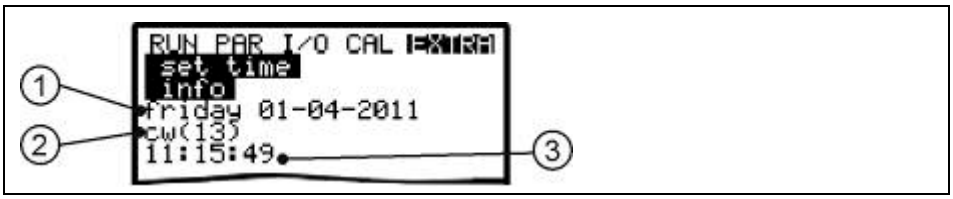


Fig. 9-16 System time submenu

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



1 Date
2 Week no.
3 Time

Fig. 9-17 System time screen

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 bet set automatically as soon as the date has been set.

Set Total-Counter

This menu allows to newly set the totalizer indicated on the main screen. This feature is normally going to 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 PIN “2718“ (up to 2 faulty entries possible). Otherwise the new value will not be accepted.

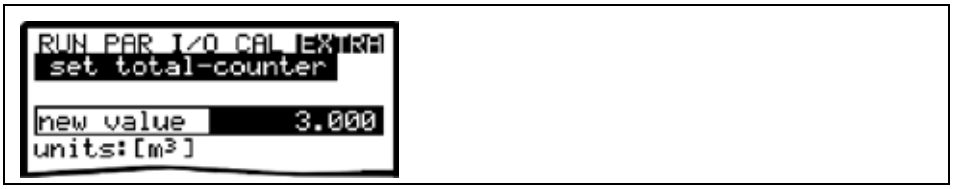


Fig. 9-18 Totalizer modification

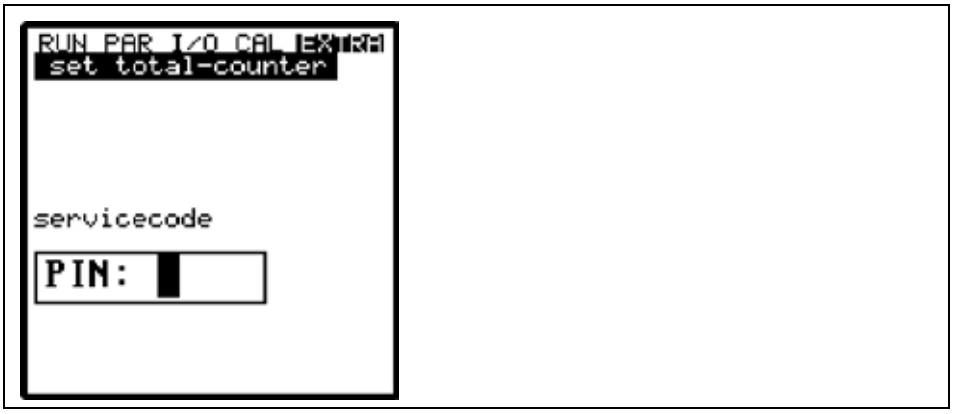


Fig. 9-19 PIN request

9.4 Parameter Menu (PAR)

9.5 Parameter Menu (PAR)

This menu is the most extensive and most important regarding the OCM Pro CF 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
- flow velocity measurement sensor type
- level measurement sensor type
- 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, regulator mode, 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.
The parameter menu >PAR< includes twelve partially very extensive submenus which are described individually on the following pages.

9.5.1 Parameter Menu "Measurement Place"

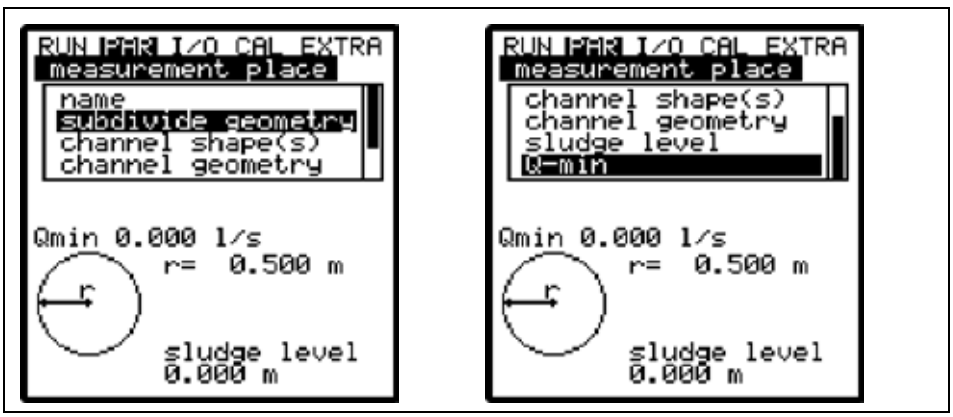


Fig. 9-20 Submenu measurement place

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 construction 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 menu

Fig. 9-21 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 **Fehler! Verweisquelle konnte nicht gefunden werden.**). 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 Geometry

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.
This parameter allows to subdivide special profiles with convex tops and possibly with a bottom featuring a dry weather channel into 2 or 3 level / height zones, which facilitates the programming of the total profile dimensions.
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)

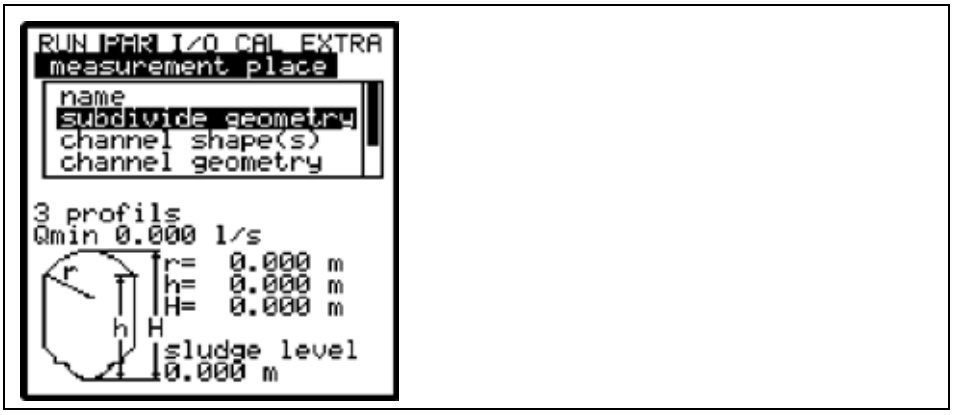
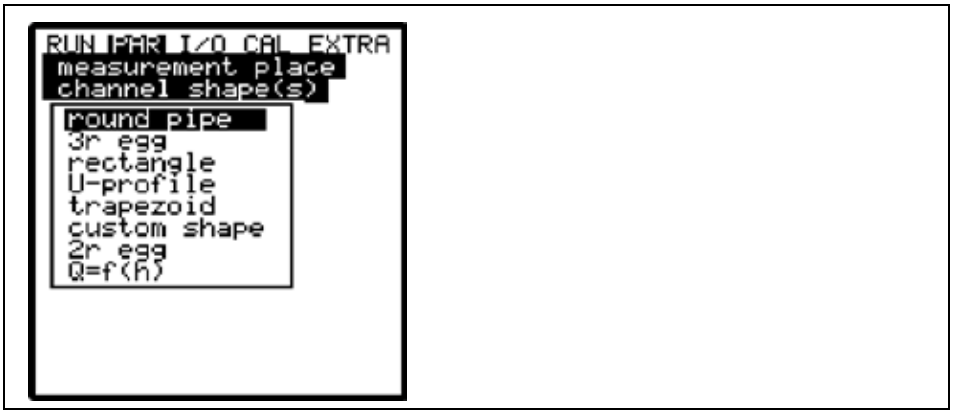


Fig. 9-22 Profile divided into 3 zones

Channel Profile(s)

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 German ATV A110:
(see dimensions to enter in brackets)



- Pipe (radius)
- Egg, h:w = 1,5:1 (radius)
- Rectangle (channel height and channel width)
- U-Profile (channel height and radius)
- Trapezoid (channel height, trapeze width bottom/top, height)
- custom profile (spot heights and according channel widths)
- 2r Egg, h:w = 1:1 (radius)
- Q= f(h)

Fig. 9-23 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

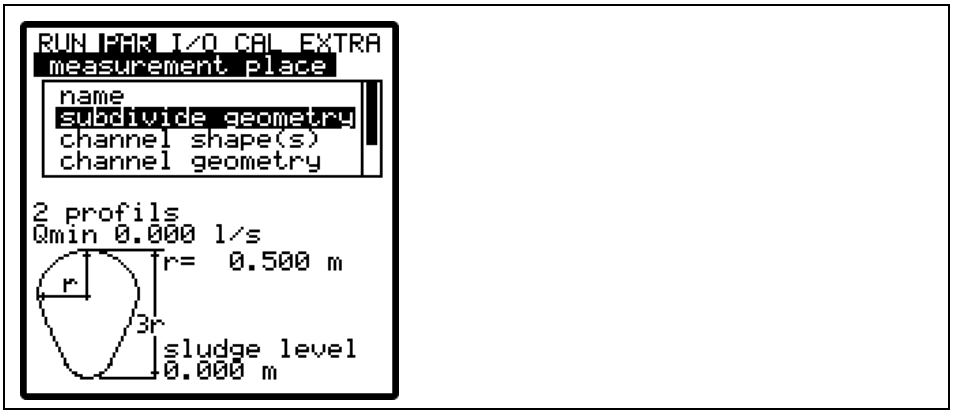


Fig. 9-24 Selected profile

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

↵ Confirm with“Enter“.

A request will come up subsequently asking for known relations.

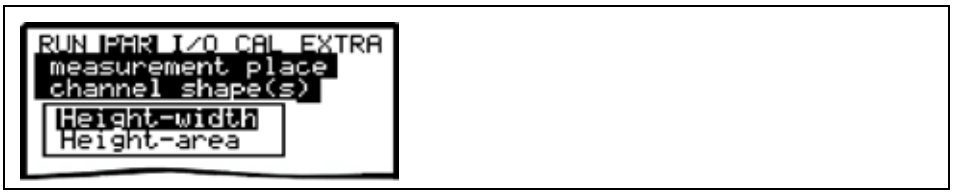


Fig. 9-25 Custom shape menu

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

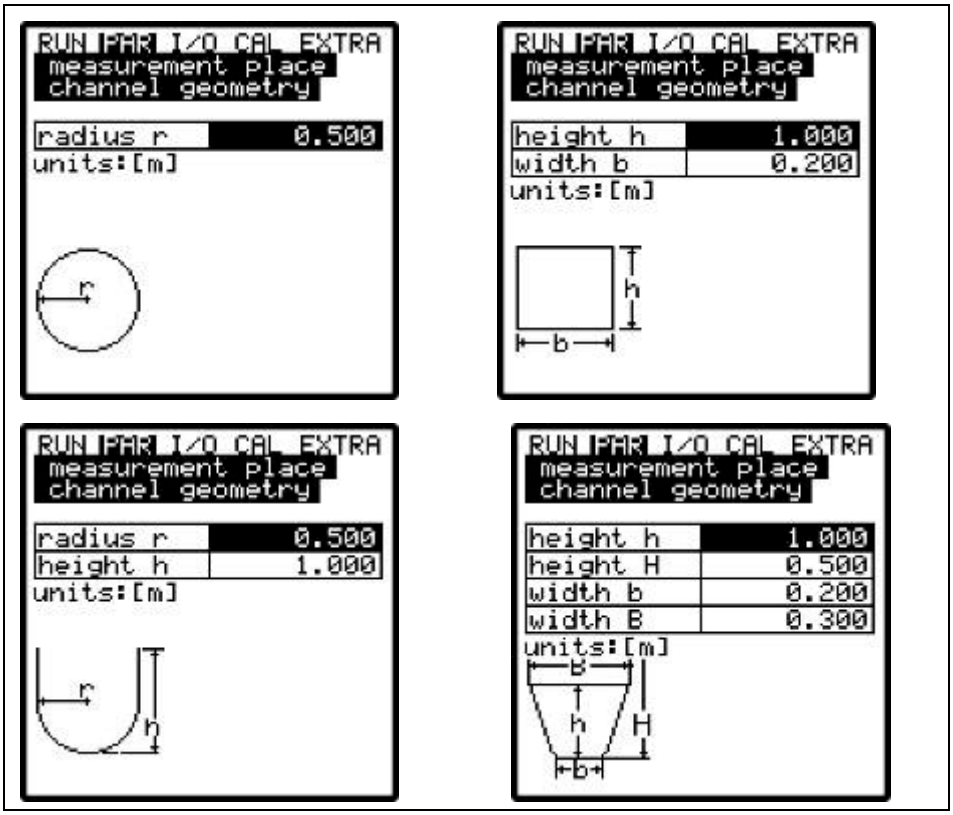


Fig. 9-26 Screens showing various channel dimensions

Note

Please observe indicated units when entering values!

Choosing >Custom shape< will indicate a table containing a maximum of 32 possible breakpoints on the display. As described above, enter the relations between >height-width< or >height-area< (Fig. 9-25) and enter the according value pairs.

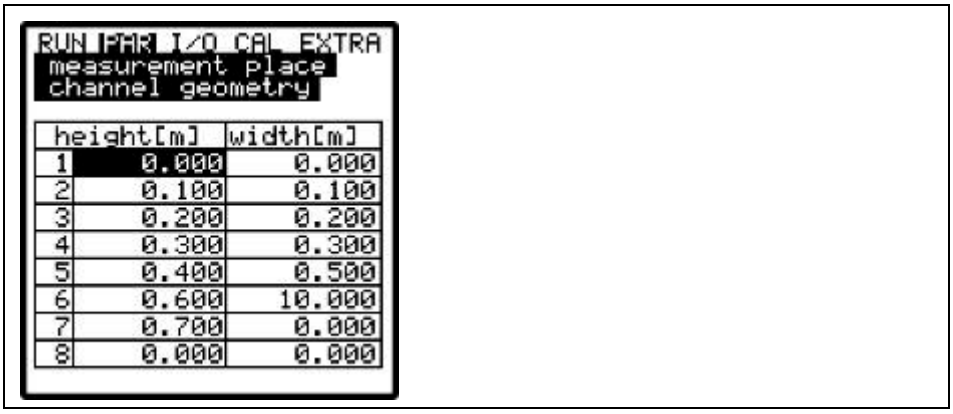


Fig. 9-27 List of custom shape breakpoints

To define the zero point of the channel, start by entering 0 – 0 in breakpoint 1. All further breakpoints can be set freely regarding height as well as width/area.

There may be different distances between individual level points. Furthermore it is not necessary to use all of the 32 breakpoints possible.
The OCM Pro however is going to use a linearization function between the single breakpoints. Decrease the distance between breakpoints in case of heavy and irregular changes in the channel dimensions.

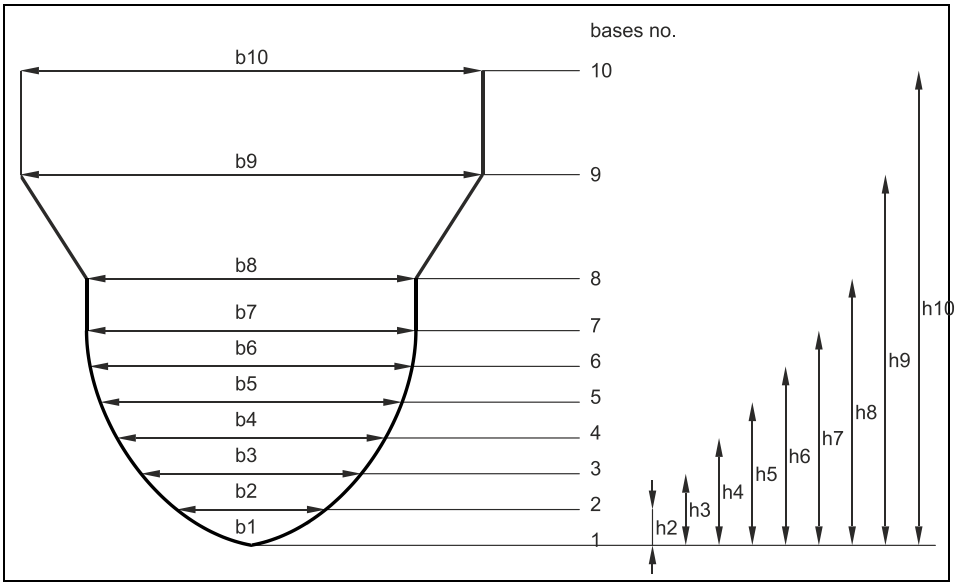


Fig. 9-28 Custom profile breakpoints

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
- Q=f(h)

Top area:
- Custom profile

Dividing in three zones will reveal the following setting options:

Bottom area:
- Pipe
- Egg
- Rectangle
- U-Profile
- Trapezoid
- 2r Egg
- Q=f(h)

Centre area:
- Custom profile

Top area:
- Pipe

Important Note

Programming subdivided profiles requires comprehensive knowledge and experience in operating the OCM Pro.

To avoid faulty programming or if in doubt this procedure should be performed by NIVUS service personnel or expert companies authorised by NIVUS.

Sludge level

The sludge level set is considered during calculation as non-moving sub-area on the channel bottom 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 can 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.

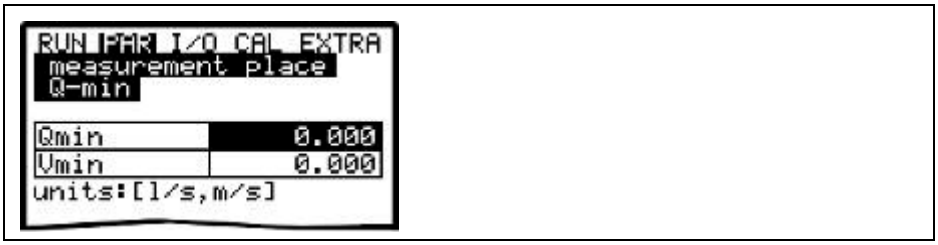


Fig. 9-29 Selection low-flow volumes

Note

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

9.5.2 Parameter Menu “Level “

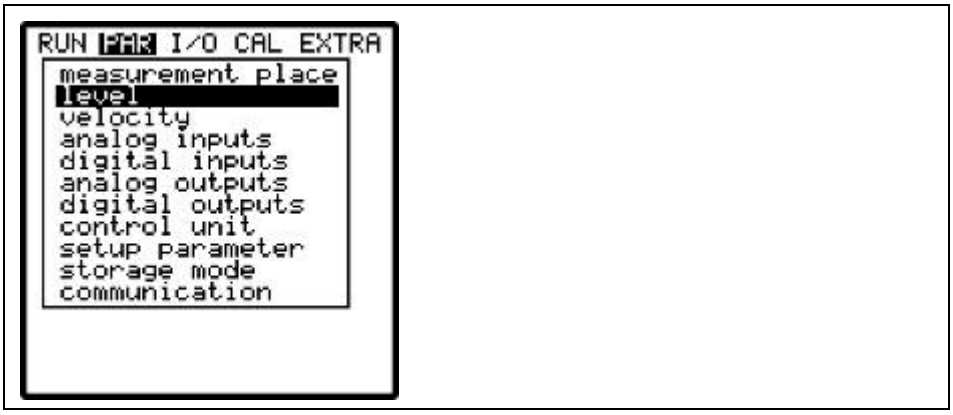


Fig. 9-30 Menu level measurement

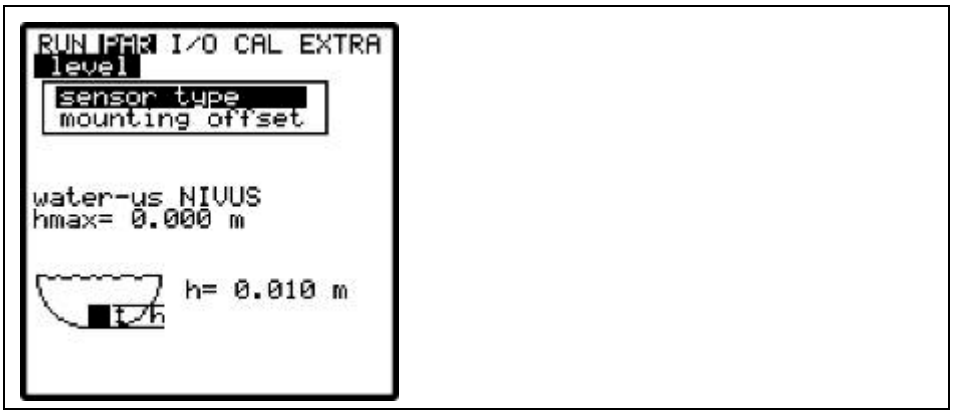


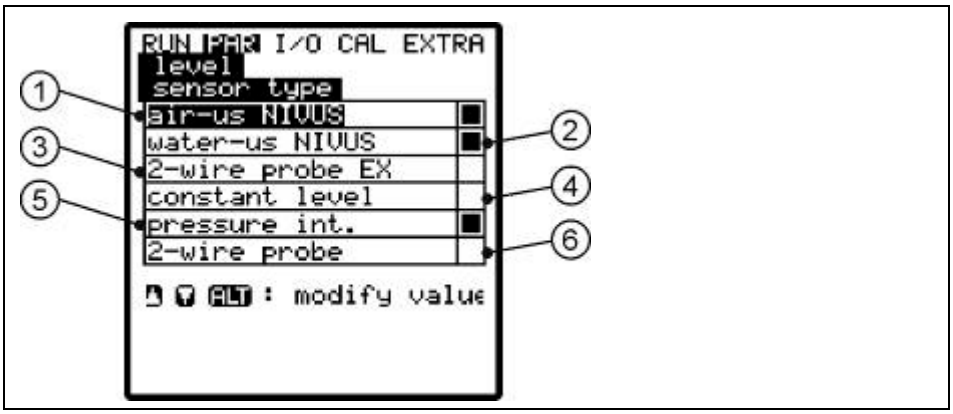
Fig. 9-31 Level measurement – submenu

Important Note

The sensor type selection is decisive for the following programming procedure. An incorrect selection may lead to faulty measurements or even measurement failure.

This menu defines all parameters responsible for level measurement. Depending on the sensor type selected the parameter start page as well as the parameters to enter may vary.
Basically determine sensor type or sensor combination first!
Move the cursor accordingly by using the >up< and >down< arrow keys. Select or de-select sensors with the >ALT< key. Confirm your selection by pressing >ENTER<.

It is distinguished between the following level sensors:



1 Air-ultrasonic type >OCL< or >DSM< by NIVUS
2 Water-ultrasonic integrated into flow velocity sensor, types: POA-V1H1 or CS2-V2H1
3 2-wire probe **EX**, e.g. types: NMC0 or HSB0NBP
4 Fixed value for permanently full filled applications or for testing purposes
5 Pressure measurement cell integrated into flow velocity sensor, types: POA-V1D0 or CS2-V2D0
6 2-wire probe, e.g. types NM5-3101 or HSB0HG, i-Serie Ex

Fig. 9-32 Determination of level sensor type

Note

When using combi sensors featuring multiple level measurements (water-ultrasound and pressure measurement cell, e.g. type POA-V1U1 or CS2-V2U1) it is necessary to select both level measurements in the selection menu.

Sensor type 1: **Air-ultrasonic (Air-US NIVUS)**

Level measurement by using active air-ultrasonic sensor from top down. May be combined with the flow velocity sensor
This sensor can be used to detect low flow levels, e.g. to measure nightly discharge.
The sensor must be installed exactly in the centre of the channel vertex, (± 2°) parallel to the water surface.
An air-ultrasonic sensor type OCL or DSM is required!

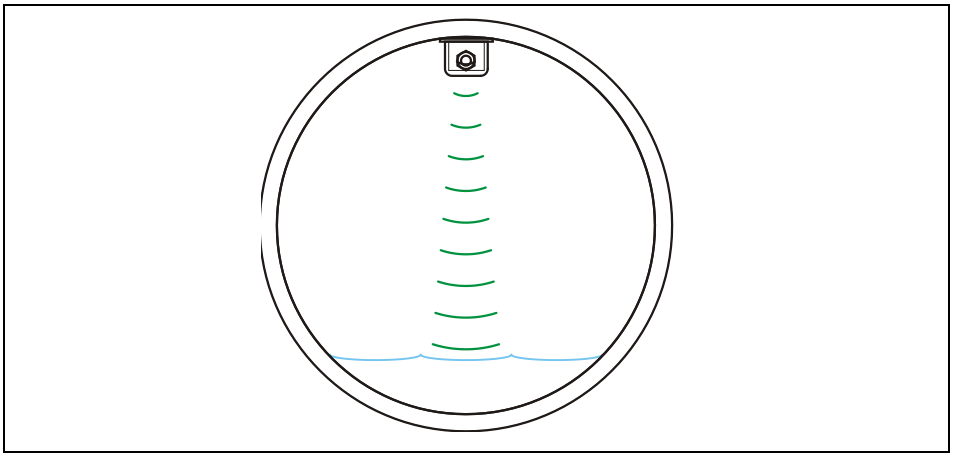


Fig. 9-33 Sensor type 1: air-ultrasonic

Sensor type 2: **Water-ultrasonic (Water-US internal)**

Level measurement using a combi sensor type V1H or V2H. Level measurement using water-ultrasound from bottom up.
This sensor type is for discharge detection in medium part filled areas.
The sensor must be installed exactly in the bottom centre observing a maximum permissible deviation of ±2°.

Important Note

Never use a water-ultrasonic sensor if the sensor is installed out of the centre, (e.g. sedimentation or risk of soiling)! This may result in echo loss and measurement failure.

In this case use a different level sensor (ultrasound from top down or pressure measurement cell).

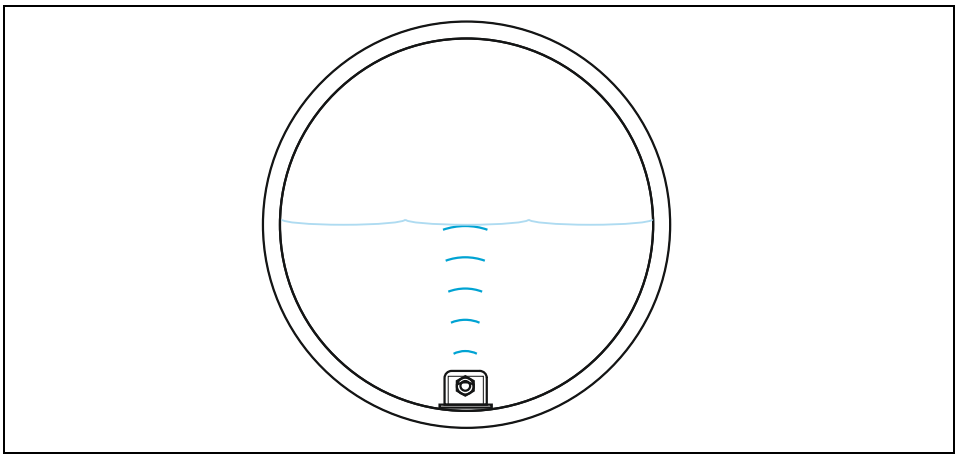


Fig. 9-34 Sensor type 2: water-ultrasonic

Sensor type 3: **2-Wire probe EX**

This selection is for level measurement by using external 2-wire Ex probes supplied by OCM Pro CF such as a pressure probe type NivuBar Plus or a type NivuCompact echo sounder. Can be combined with the flow velocity sensor.

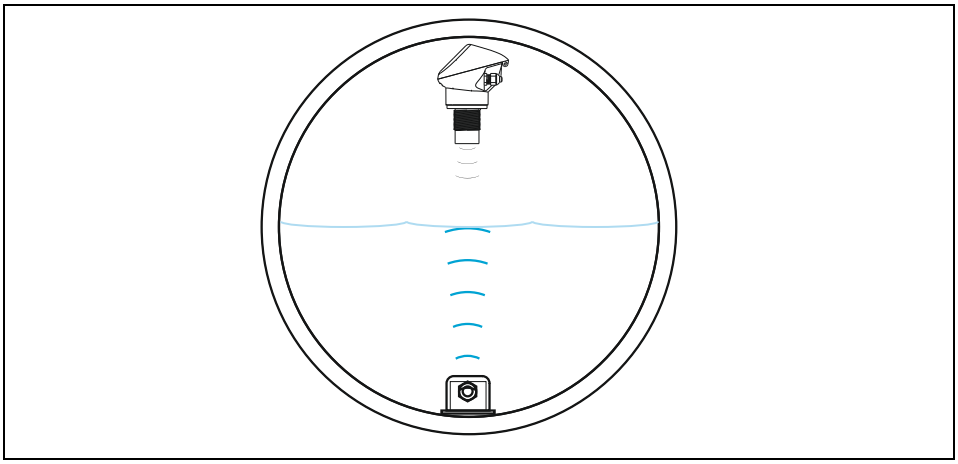


Fig. 9-35 Sensor type 3: 2-wire probe EX

Note

For connection see Fig. 7-12 or Fig. 7-29.

Sensor type 4: **Fixed value**

This programming is designed for permanently full filled pipes and channels. Level measurement is not required for such applications. The constant filling level is entered under "Fixed value / Scale / Level" and is used for flow calculation.
This parameter is very helpful during initial start-up procedures or while performing tests without having level readings available as well.

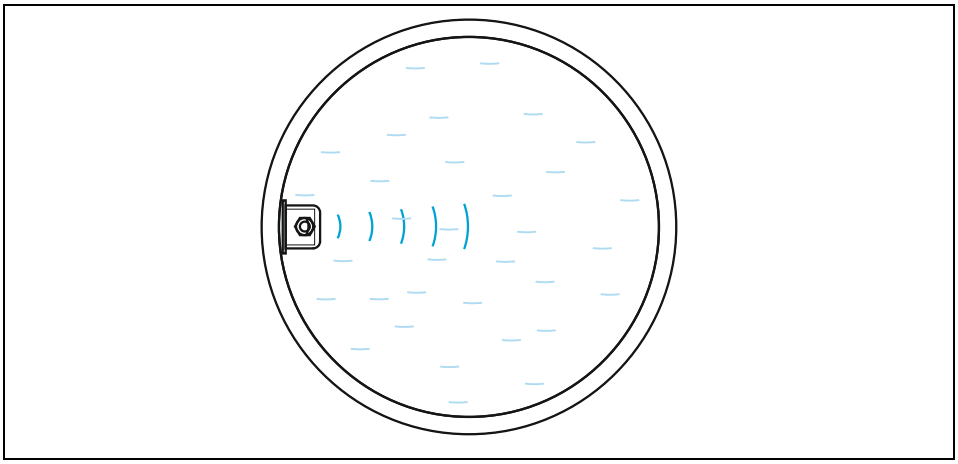
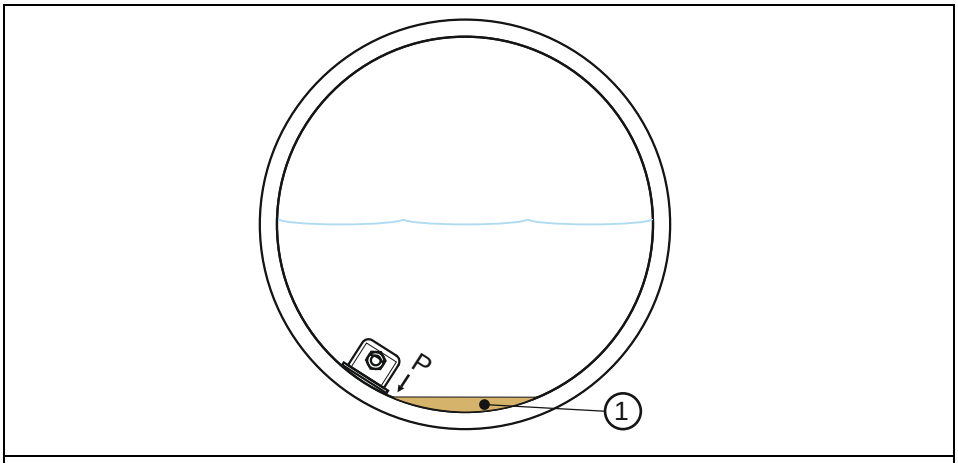


Fig. 9-36 Sensor type 4: fixed value

Sensor type 5: **Internal pressure**

Here the level is measured by using a combi sensor type V1D/V2D or V1U/V2U with integrated pressure measurement cell from bottom up. Installation on the sides, e.g. in case of sedimentation or high pollution loads is possible. Level measurement in flooded condition is possible as well.



1 Sedimentation or soiling

Fig. 9-37 Sensor type 5: internal pressure

Sensor type 6: **2-wire probe**

Here the level is measured by using an external 2-wire source such as the type NivuMaster echo sounder or a pressure probe type HydroBar. Both can be combined with the flow velocity sensor.

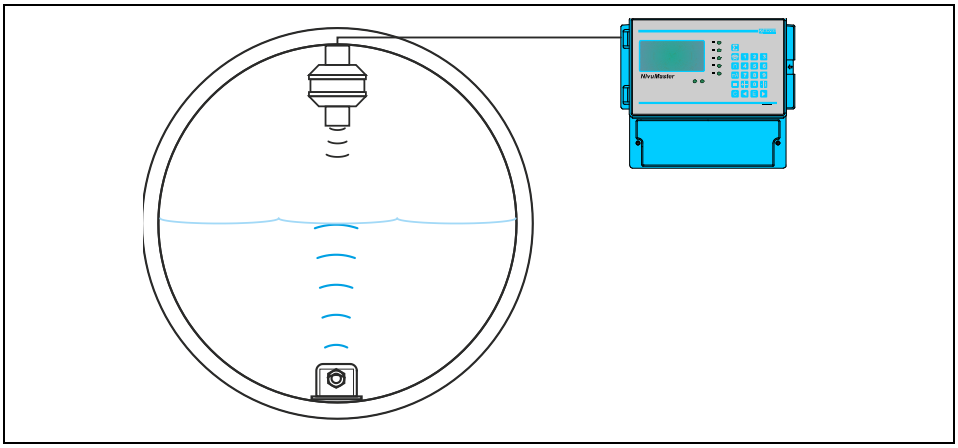


Fig. 9-38 Sensor type 3: 2-wire probe

Note

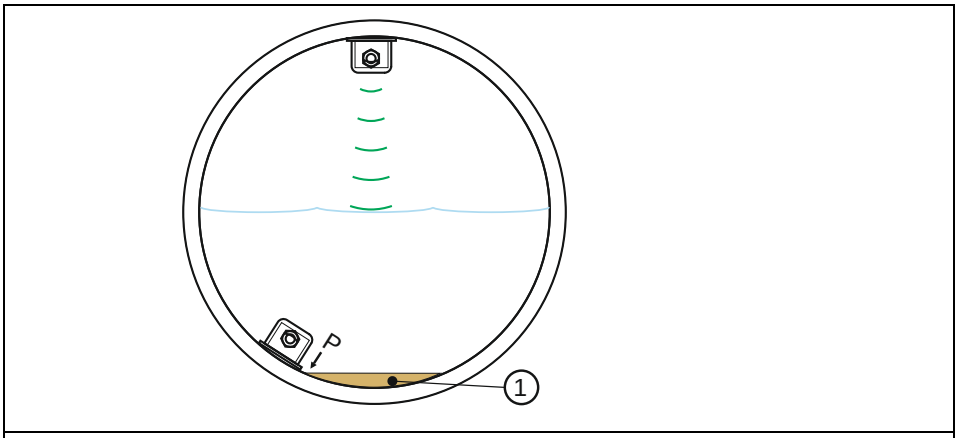
For connection see Fig. 7-12 or Fig. 7-29.

Sensor combination examples:

On the following pages you can find the combinations possible between the different sensor types.
Such combinations are required as soon as one single level sensor is not sufficient for level detection covering the desired measurement range due to constructional reasons (see also Fig. 7-47)

Air-US NIVUS + Internal pressure

Combination between sensor types 1 and 5.
This combination is recommended for measurement ranges from 0 cm level up to flood. In this case the air-ultrasonic sensor type OCL or DSM detects low levels; the pressure sensor detects the flood range. The pressure sensor may be installed out of the centre if the risk of sedimentation or soiling should occur (Fig. 7-39).



1 Sedimentation, soiling

Fig. 9-39 Combination: Air-ultrasound and internal pressure

2-Wire probe (Ex) + internal pressure

Combination between sensor types 3 or 6 and sensor type 5.
Same area of use as described under version >air-US + internal pressure<.
However the air-ultrasonic sensor type OCL/DSM will be replaced by a 2-wire probe.

Internal Water-US + Internal pressure

Combination from sensor types 2 and 5.
This combination is recommended for level measurement ranges as from approx. 0.5 cm up to flood. The pressure sensor is responsible for upper and lower measurement range. The water-ultrasonic sensor detects the medium part filled area.
The water-ultrasonic sensor must be installed in the centre of the channel bottom. Otherwise there is the risk of echo loss and hence measurement failure.

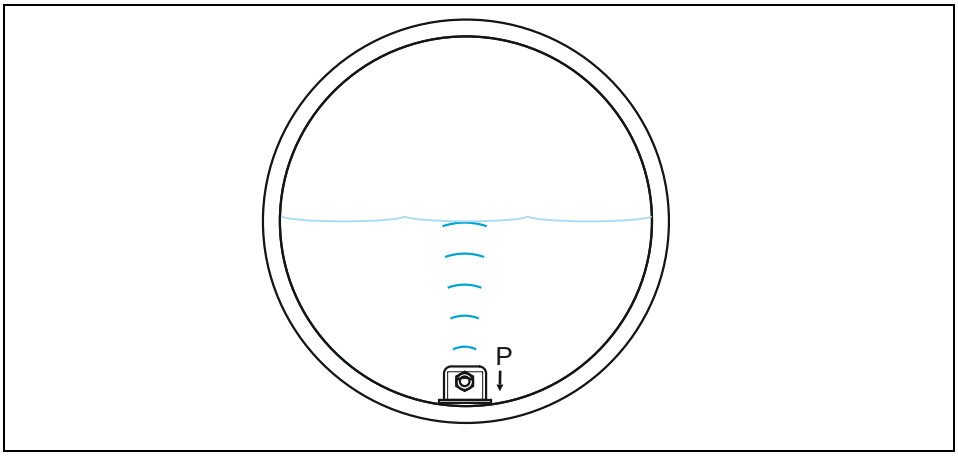


Fig. 9-40 Water-ultrasound and internal pressure

Air-US NIVUS + internal water-US

Combination from sensor 1 and 2.
The following combination covers level measurement ranges as from 0 cm up to approx. 80 % full filling. The water-ultrasonic sensor detects levels as from approx. 7 cm; the air-ultrasonic sensor detects the levels below.
The water-ultrasonic sensor must be installed in the centre of the channel bottom.

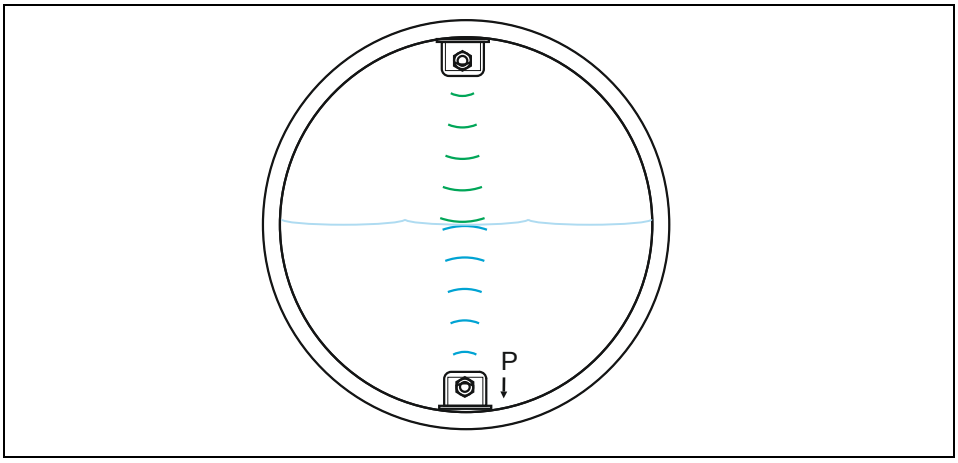


Fig. 9-41 Air- and water-ultrasound

Internal Water-US + 2-Wire probe

Combination from sensor 2 and 6 or 3.
To be used in applications as described in water-US int. + air-US. An external 2-wire sensor instead of an air-ultrasonic sensor is going to be used to detect low flow levels (expediently an echo sounder).

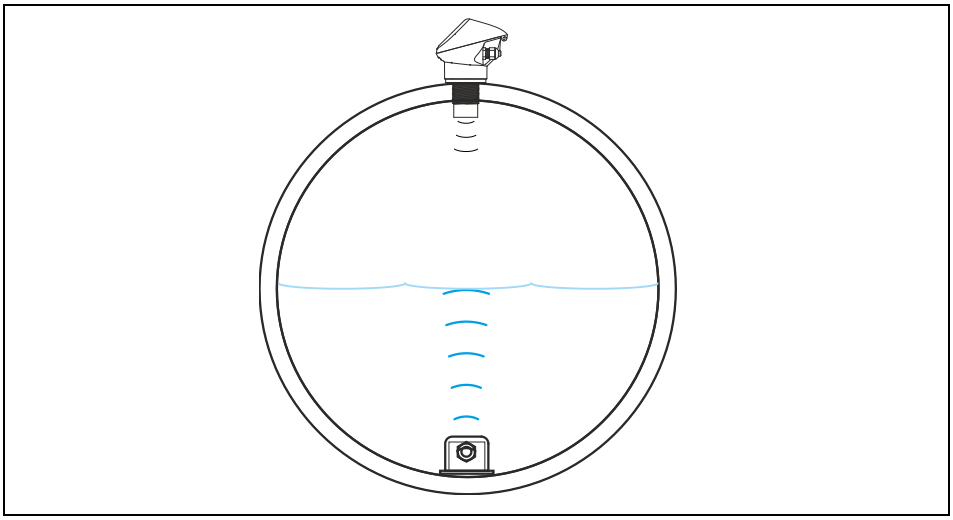


Fig. 9-42 Water-ultrasound + 2-wire probe

Air-US NIVUS + Water-US internal + Pressure int.

Combination of options 1, 2 and 5.
This combination is recommended from 0 cm filling level up to overflow if the best possible measuring accuracy is required.
In this case the pressure sensor detects the upper measurement range. The water-ultrasound sensor detects the medium range and the air-ultrasound sensor detects the low range.
Please observe to install the water ultrasonic sensor in the centre of the bottom

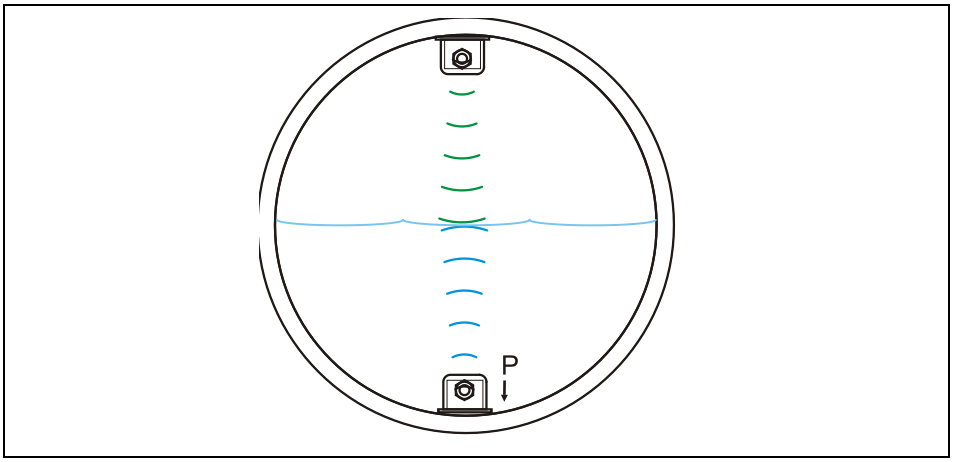


Fig. 9-43 Sensortyp Luft-Ultraschall, Wasser-Ultraschall und Druck

Water-US internal + 2-Wire probe (Ex) + Pressure int.

Combination of options 2, 3 or 6 and 5.
Application as the combination >Air US + Water US + Pressure<.
An external 2-wire probe (expediently an echo sounder) is used to detect low filling levels instead of the air-ultrasound sensor.
Please observe to install the water ultrasonic sensor in the centre of the bottom.

Mounting height

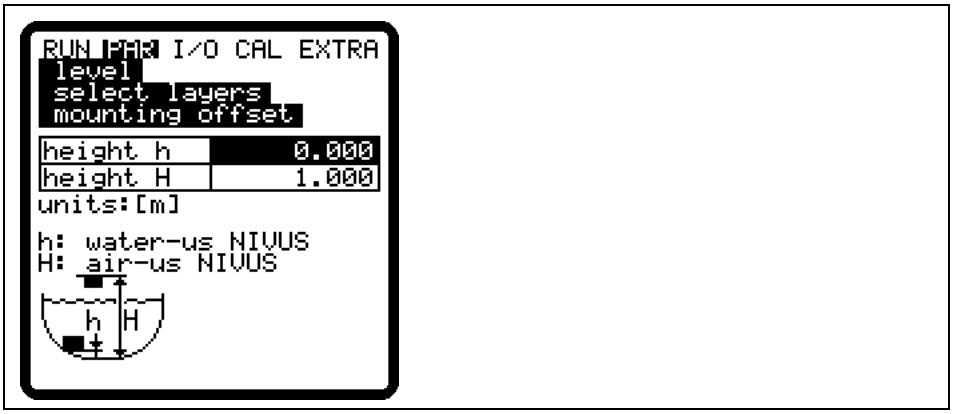
This parameter is required only for applications where the sensor is not installed directly on the channel bottom but is mounted in a pipe on a wedge support or out of the centre to avoid effects due to sedimentation.

Note

The value is set to 0.000 m per default as soon as the level sensors have been selected.

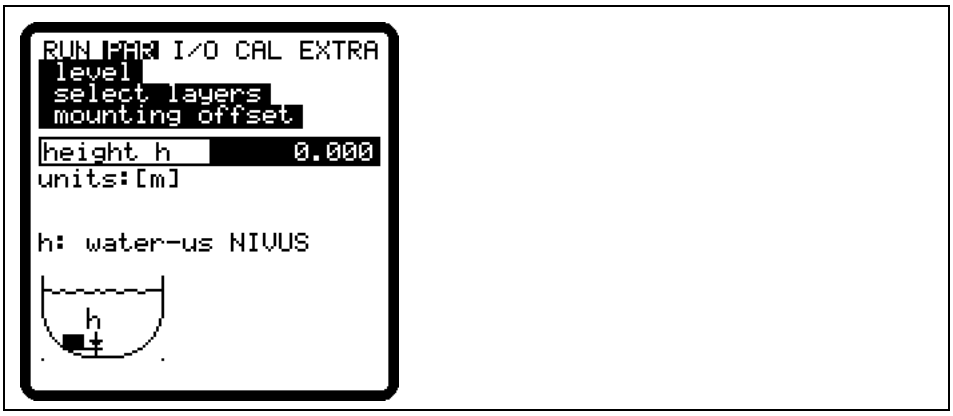
The reference point in front of each level sensor is the unknown variable of the ground plate or the channel bottom / channel crest.

The level adjustment in the CAL menu, which is required due to the higher installation, allows to adjust the respective installation height to the available conditions and the mounting situation.



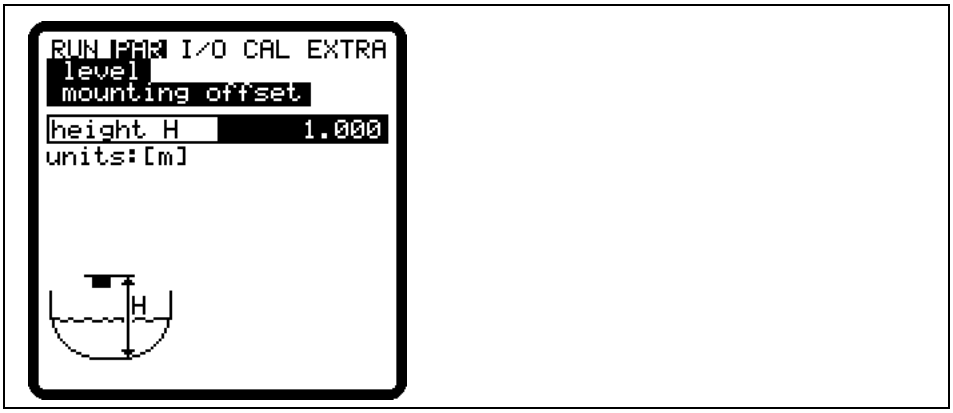
1 height h: mounting height of pressure and water-ultrasonic sensor
2 height H: mounting height air-ultrasonic sensor (OCL or DSM)

Fig. 9-44 Mounting height of level sensors in case of selection air-US NIVUS, pressure and water-US



1 height h: mounting height sensor type pressure internal

Fig. 9-45 Mounting height of level sensors in case of selection pressure internal or water-US internal



1 height h: mounting height sensor type air-US-NIVUS

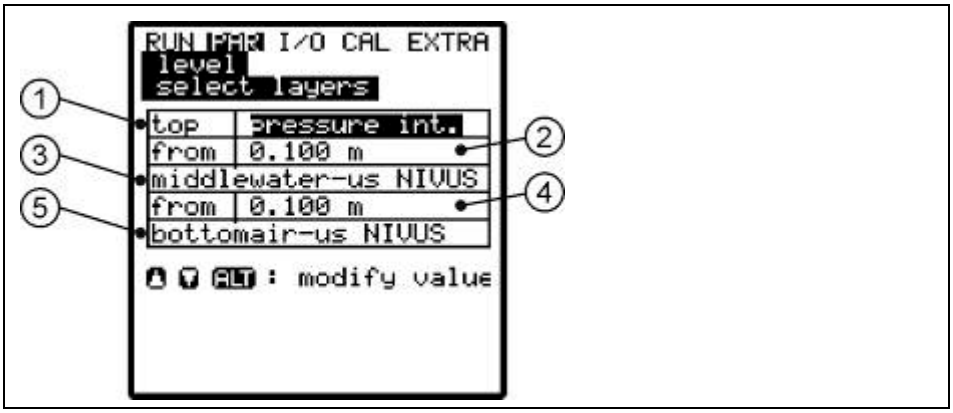
Fig. 9-46 Mounting height level sensor in case of selection air-US NIVUS

Note

As soon as the mounting height of pressure or water-US sensors is changed, the mounting height in the PAR/Flow velocity menu must be adjusted by the same amount!

Select layers

This parameter will be indicated only if a sensor combination has been selected. The OCM Pro CF automatically aligns the sensors to partial layers.
Layer borders however may be defined freely as well. Use the >ALT<-key to do this. Determine the threshold levels between the layers using the box in the >from< line.



1 Top layer sensor
2 Threshold level between middle and top layers
3 Middle layer sensor
4 Threshold level between middle and bottom layer.
5 Bottom layer sensor Sensor

Fig. 9-47 Select layers

After being selected the level sensors will be indicated on the screen.

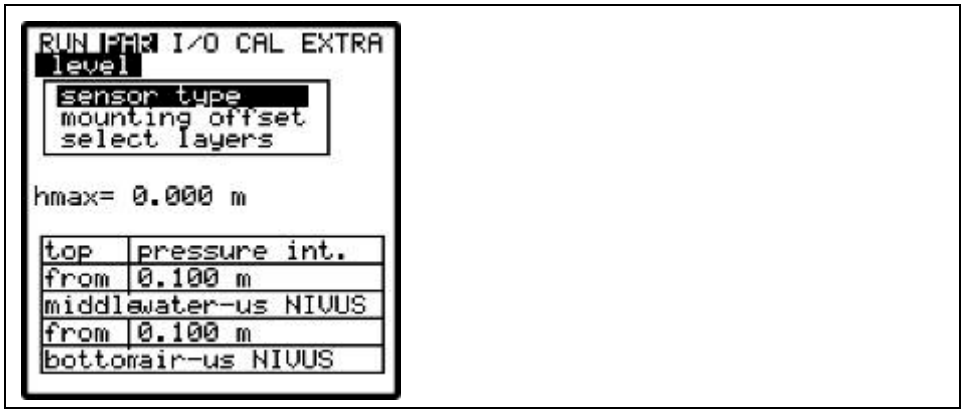


Fig. 9-48 Overview on level sensors

Scale

Depending on the sensor type selected, a fixed value or a measurement offset as well as the measurement span according to the input signal is entered here.

Offset: this value is added to the level measurement value. Negative entries are possible as well, which can be used to adjust values from the 2-wire probe.
Span: the measurement span (equal to 20 mA from the OCM Pro CF analog input) shall be adjusted to the span of the analog output of the 2-wire probe used.

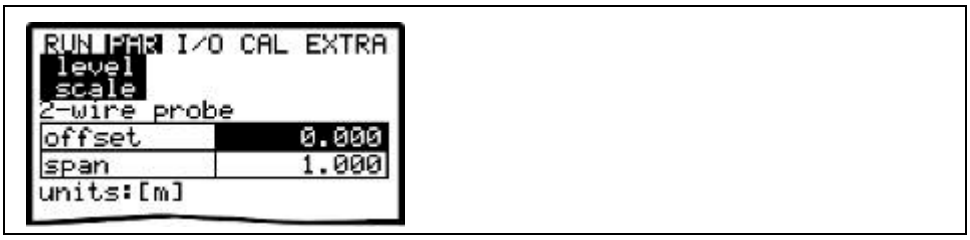


Fig. 9-49 2-wire sensor settings

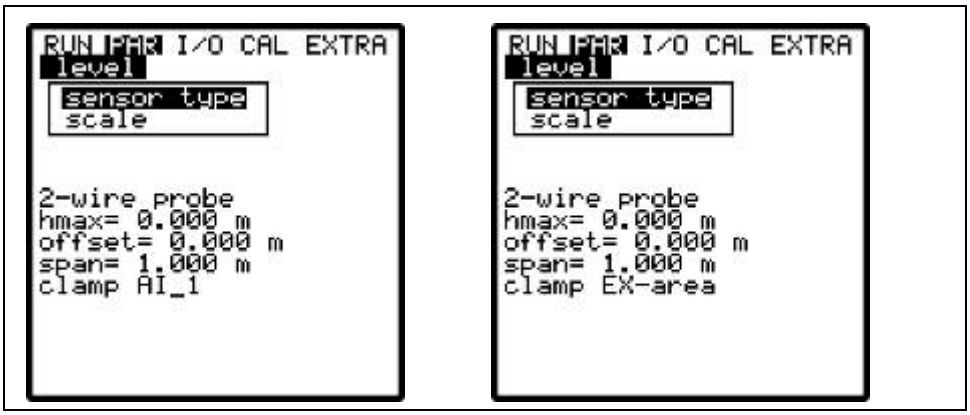


Fig. 9-50 Screen at 2-wire sensor Ex/non-Ex

Important Note

Connect the 2-wire probes, which are supplied by the transmitter, to the Ex terminal clamps:

- *wall mount enclosure: D8 + and D9*
- *panel mount enclosure: B 21 + and C 21 -*

Set the sensor type 2 to „2-wire_probe Ex“.

Failure to observe leads to loss of Ex protection.

Important Note

*Connect externally supplied level signals **always** to the clamps in the non-Ex area (e.g. NivuMaster or i-series Ex)*

- *wall mount enclosure: B16 +, B18 -*
- *panel mount enclosure : B15 +, B17 -*

Set the sensor type 2 to „2-wire_probe“

Failure to observe leads to loss of Ex protection.

Note

Note Fig. 7-12 to Fig. 7-14 and Fig. 7-29 to Fig. 7-31 for sensor connection.

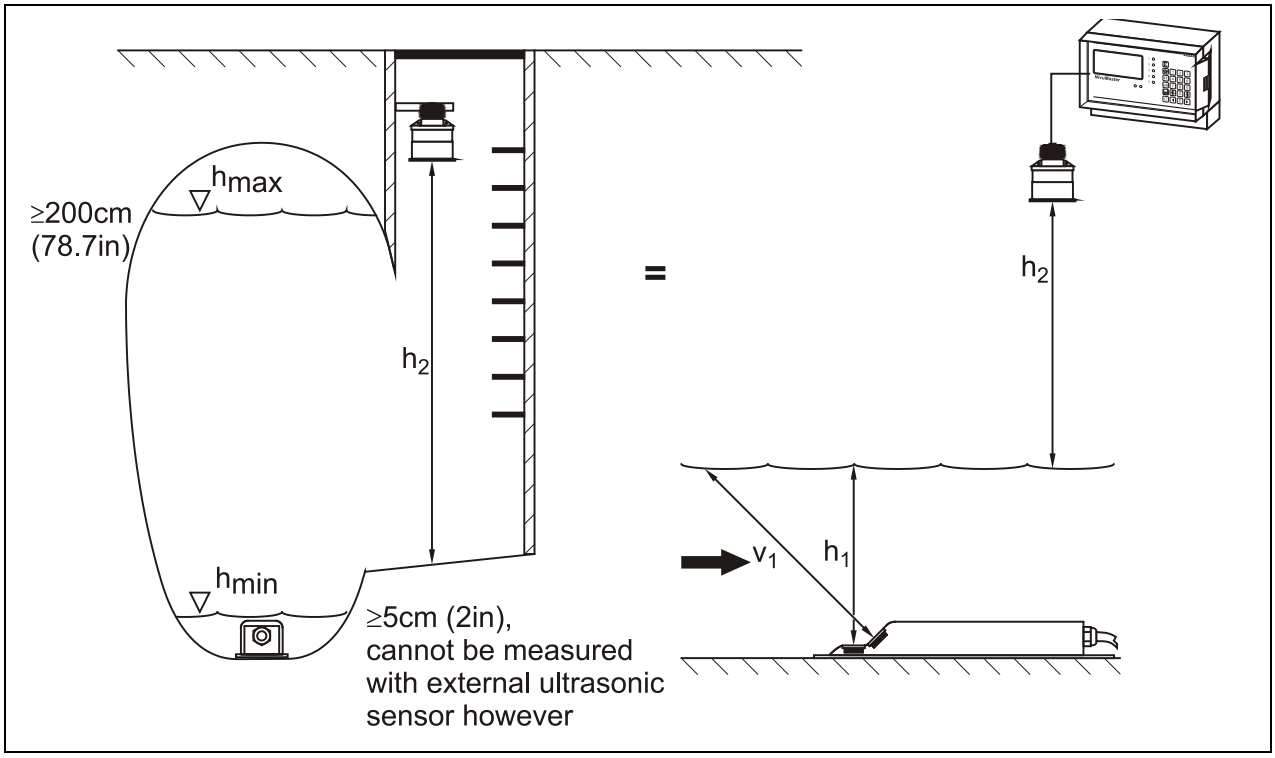


Fig. 9-51 Application example for water-US + 2 Wire probe

Please note when you use combined level detection via different sensors that only one measurement method is responsible for volume calculation. The applicable measurement method has to be selected depending on the level/height and must be determined during the programming procedure.

In order to ensure reliable level detection at any time, please observe the hydraulic and metrological basic conditions.
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.

Important Note

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

Preferably use NIVUS sensors.

Important Note

While setting combi sensors using different level measuring methods in varying areas, programming errors may arise very easily.

If in doubt please use the assistance provided by our commissioning service or an expert company authorised by NIVUS!!

9.5.3 Parameter Menu „velocity “

The number of sensors is set to >1< per default. This setting meets the requirements of most applications. In case of using multiple sensors (e.g. in subdivided cross-sections) the number of sensors can be modified by using the "up" or "down" arrow keys.

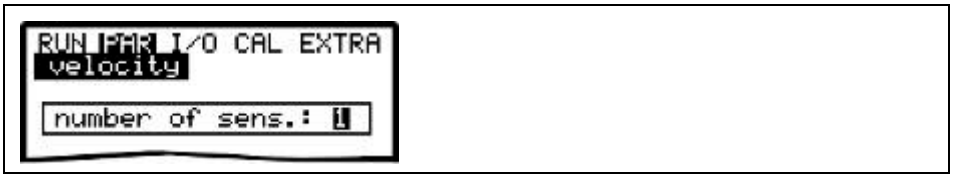


Fig. 9-52 Setting the number of sensors

Sensor type

In **v-Sensor** mode it is possible to change the sensor type using the >ALT< key. Select the type of sensor construction used.
Installation position of the sensor is set to “positive“ per default. This parameter should not be modified! It is going to be used only for special applications where the flow velocity sensor is heading upstream (unlike heading downstream towards the flow direction as in standard applications) but is to detect positive velocities however. This is the only case which requires to set “negative“ here.

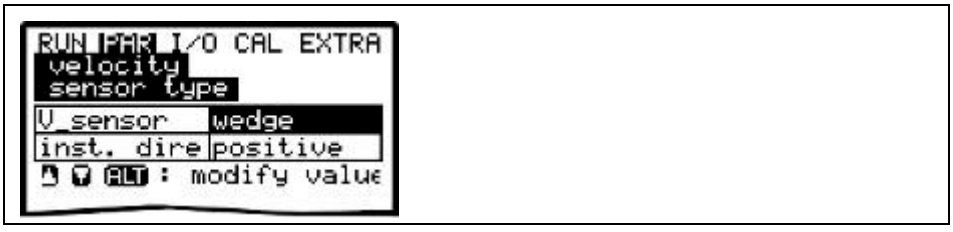


Fig. 9-53 Select sensor type and mounting position

V_sensor wedge:

Flow velocity measurement using a wedge sensor.

V_sensor tube:

Flow velocity measurement using a pipe / tube sensor.

V_sensor float:

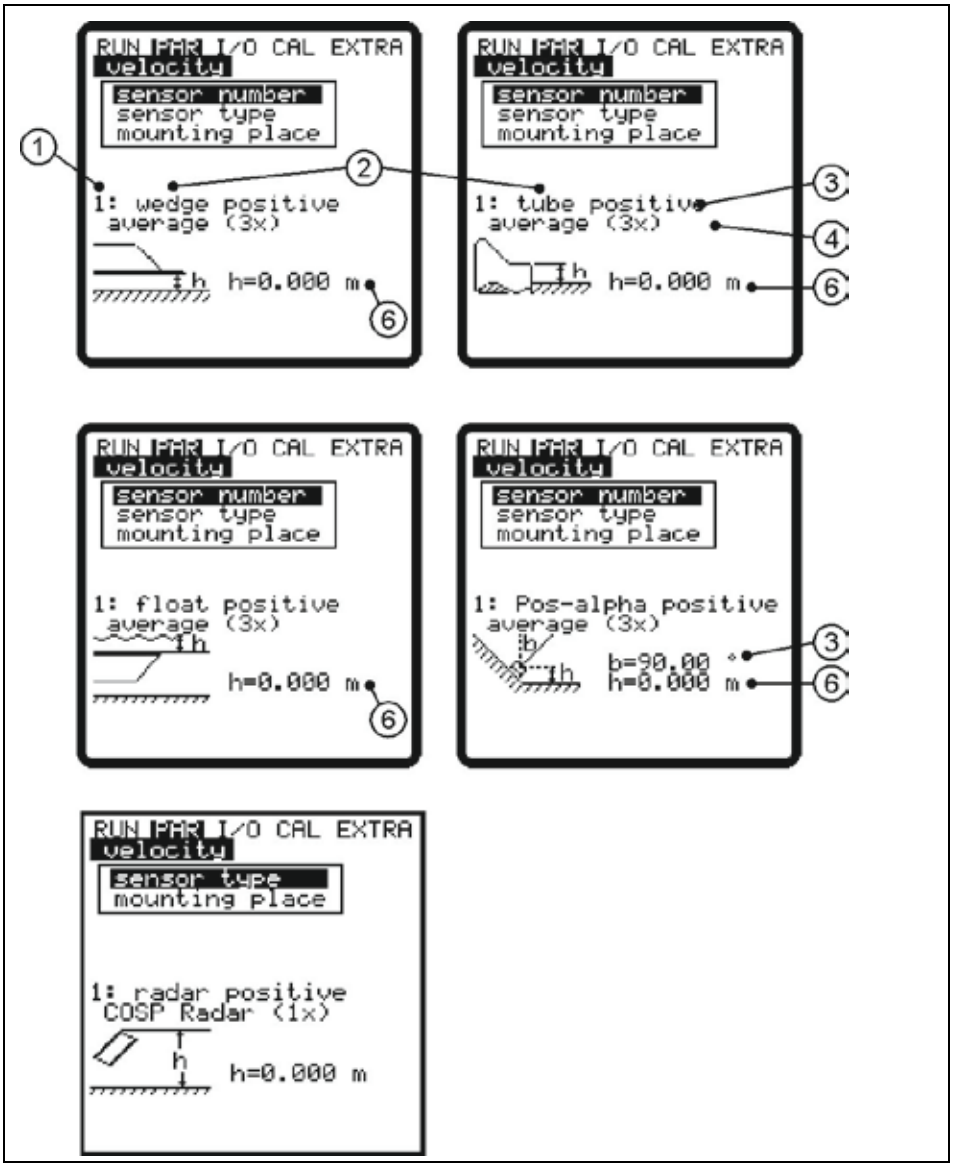
Flow velocity measurement using a sensor fastened on a float. In this case the measurment is executed from the top down.

V_sensor Pos-alpha:

Flow velocity measurement using a wedge or pipe / tube sensor installed in an angle varying from the perpendicular.

V-sensor radar:

Flow velocity measurement using a surface radar sensor installed in positive or negative direction above the water surface

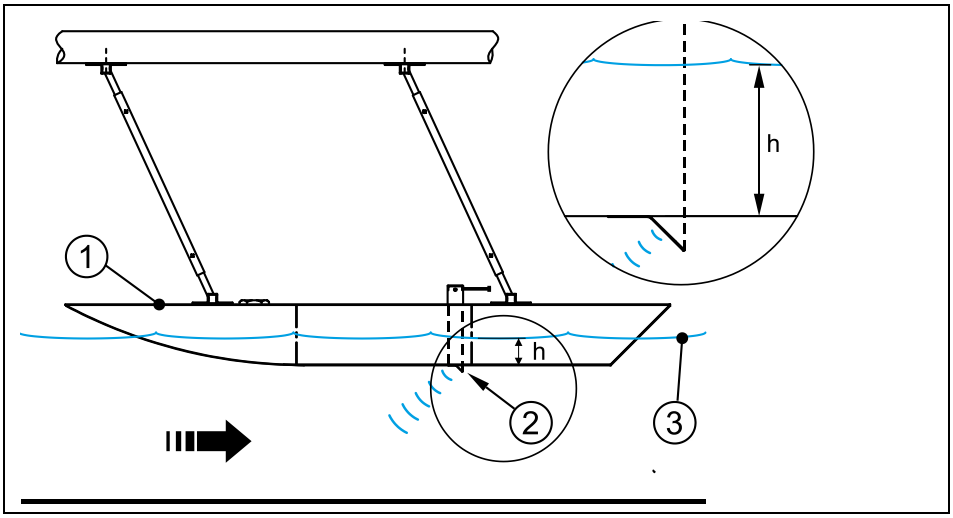


1 Sensor number (1, 2, 3)
2 Sensor type (wedge, tube, float, Pos-alpha)
3 Installation position (positive, negative)
4 Number of sensors (1x, 2x, 3x)
5 Angle >b< is the angle varying from perpendicular at Pos-Alpha
6 Mounting height of flow velocity sensor

Fig. 9-54 Indication of sensor types

Mounting place

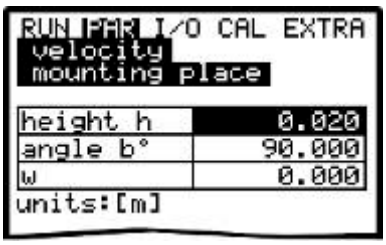
This menu point is to modify the installation height (h) of the flow velocity sensor. The standard setting is 0 mm. This setting does not need to be modified unless the wedge or tube sensor has been installed higher or lower. In case of elevated or depressed installation must be added to or subtracted from the 0 m. The reference point of the wedge sensor is the bottom edge of the ground plate, with the pipe sensor it is the horizontal area at the tip of the sensor.
Enter the distance between water surface and the centre of the immersed flow velocity sensor crystal as soon as the sensor type "Float" has been selected.
If sensor type "float" has been selected, enter the distance from the water surface to horizontal area at the tip of the pipe sensor here..



1 float
2 flow velocity sensor
3 surface

Fig. 9-55 Graphic >float <

If >Pos-alpha< has been selected, the following >mounting places< are available:

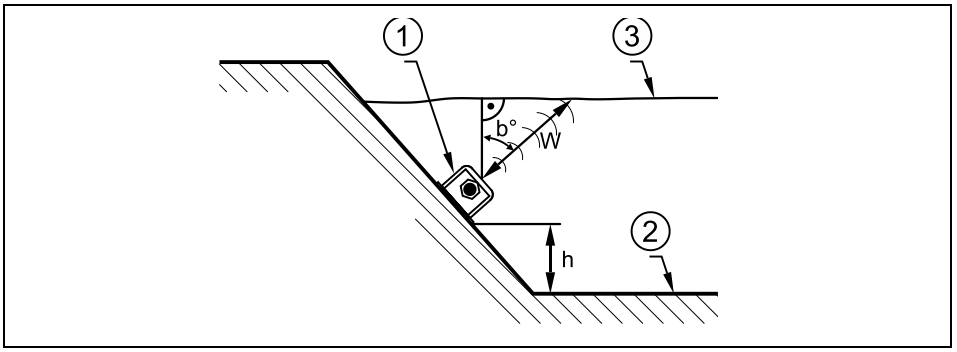


>height h< is the distance from the channel bottom to the bottom edge of the sensor ground plate.

>angle b°< is the sensor installation angle diverging from vertical.

>w< is the max. possible distance between sensor and an obstruction.
Example: the opposite wall in case of horizontal installation.
This dimension must be calculated and entered by the customer.
The path length (w) will be determined automatically as soon as the distance to the water surface is shorter due to the filling level.

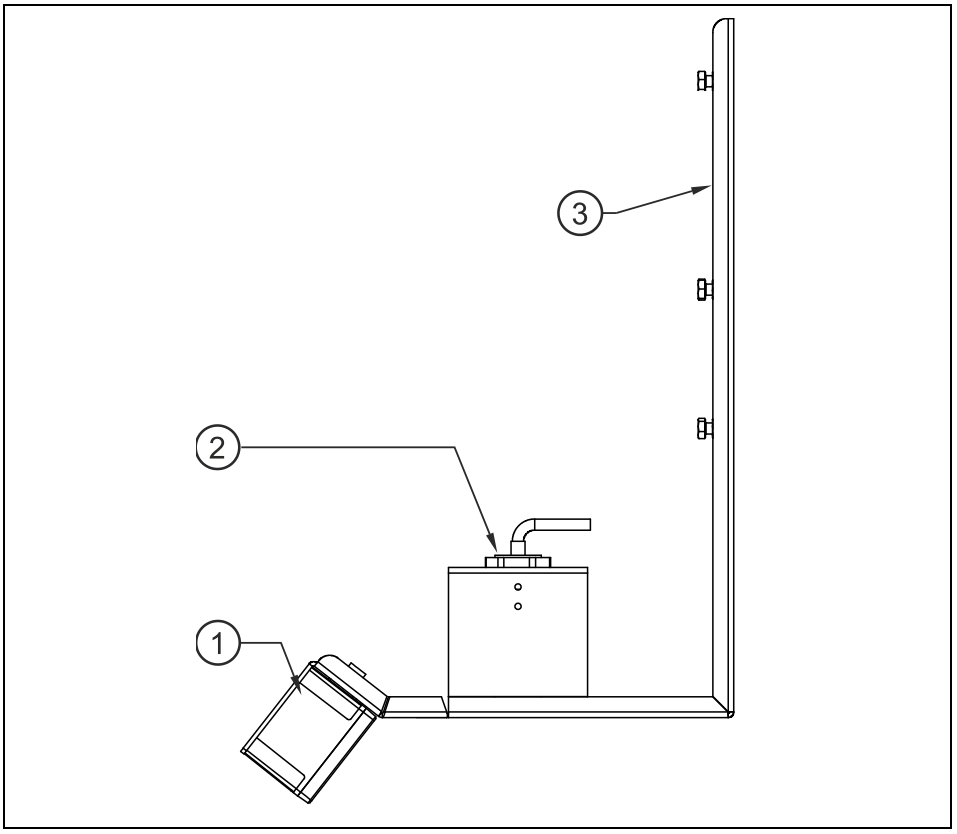
Fig. 9-56 Mounting place at „Pos-alpha“



1 Sensor body
2 Channel bottom
3 Surface

Fig. 9-57 Lateral displaced sensor installation (Pos-alpha)

After selecting >Radar< as sensor type, enter the distance from the channel bottom up to the horizontal bottom side of the radar combi holder as installation level.



1 Sensor OFR
2 Sensor for level measurement (P-Series or i-series sensors)
3 Combi holder made of stainless steel (ZUB0OFRHAL)

Fig. 9-58 Overview radar, level sensor and holder

Connecting 2 or 3 flow velocity sensors:

CAUTION

Avoid programming errors due to the lack of detailed knowledge

Programming additional sensors requires extensive hydraulic knowledge and has to be carried out exclusively by NIVUS staff!
This is why profile parameter setting with several sensors is not mentioned comprehensively.

Failure to observe may lead to fatal programming errors or even system failure.

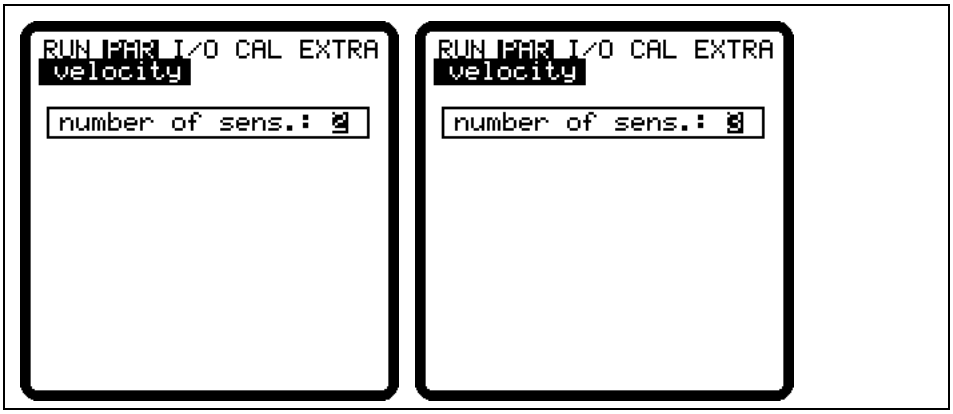


Fig. 9-59 Selecting the number of flow velocity sensors

If 2 or 3 flow velocity sensors have been selected the screen below appears:

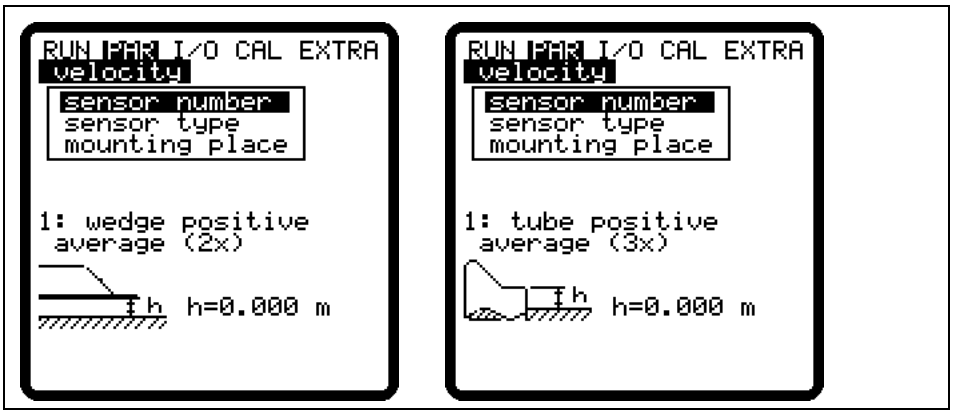


Fig. 9-60 Screen sensor type with 2 or 3 sensors

Select the sensor which is to be set under >Flow Velocity/Sensor No.<. The following screen appears:

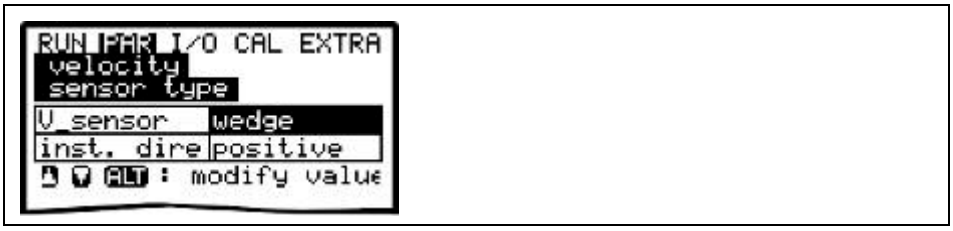


Fig. 9-61 Select sensor type and mounting position

Sensor type

Setting and choosing the several sensor types is the same procedure as if in case of using only one flow velocity sensor.

Mounting place

When using multiple sensors enter the mounting height for each sensor here. Please observe that sensor 1 operates as a guide, i.e. all level readings refer to this sensor. This is why this sensor has to be installed at the lowest point of the application (see Fig. 9-61)

Note

If several flow velocity sensors are used and one of them operates with ultrasonic level measurement from bottom up or pressure measurement cell, this sensor is always sensor 1 within the sequence and hence has to be installed on the lowest point of the application. One surface radar Type OFR can be installed per measurement place only.

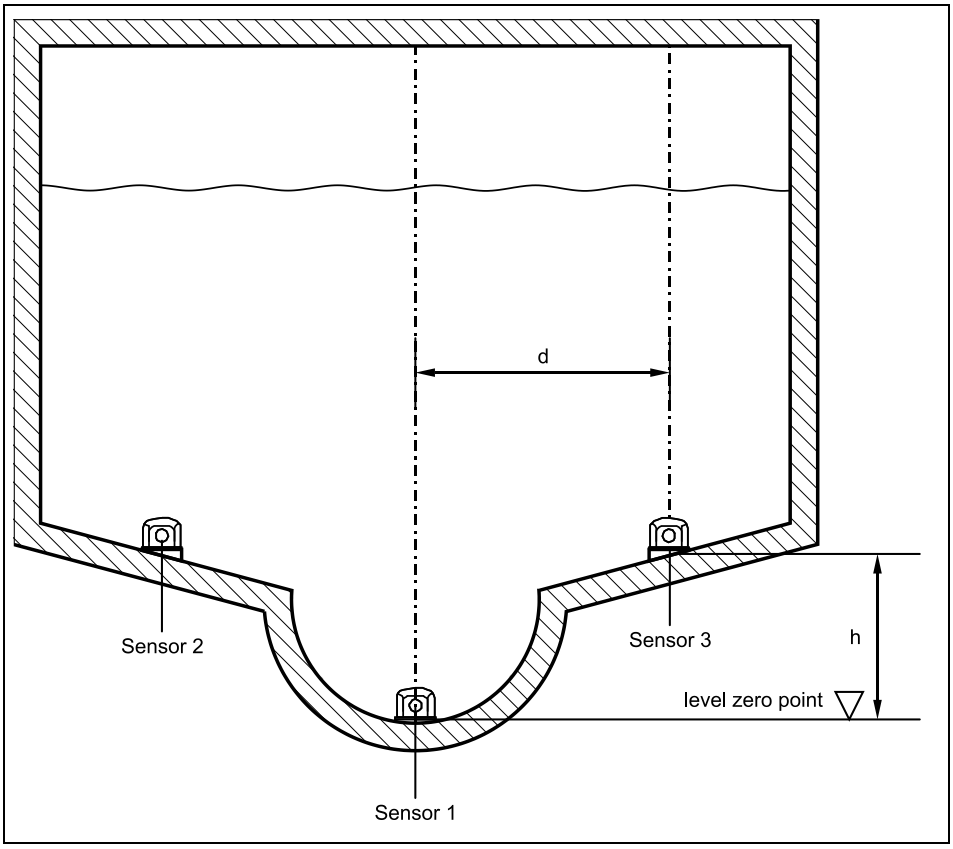


Fig. 9-62 Sensor Assignment if using multiple v-sensors

Note

If sensors 2 and 3 are located higher than sensor 1, this level difference shall be entered as height "h" under the menu point mounting place. In order to obtain a total result the velocity will not be referred to below this level.

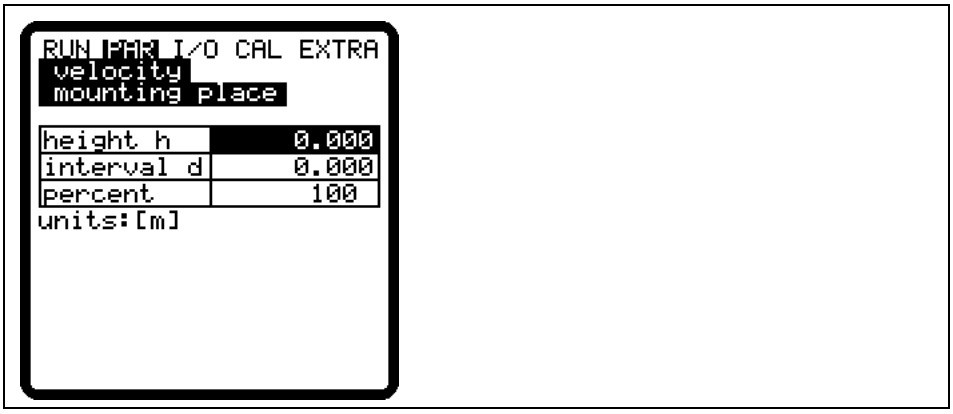


Fig. 9-63 Individual value assignment of flow velocity sensors

Interval d (Distance)

Distance "d" is the distance to the profile centreline. This parameter currently has no function and hence is not used for calculations. Any entries here will not influence the measurement result.

Percent

This parameter defines the share of the sensor regarding the total result. The following relation applies for the percentage of the individual flow velocities:

$$\frac{x\% + y\% + z\%}{100\%} = \frac{x\%}{\text{share x}} \text{ or } \frac{y\%}{\text{share y}} \text{ or } \frac{z\%}{\text{share z}}$$

x%, (y%), (z%) = percentage set sensor 1, (2), (3)
share x, (y), (z) = share of sensor in total velocity

9.5.4 Parameter Menu "Analog Inputs “

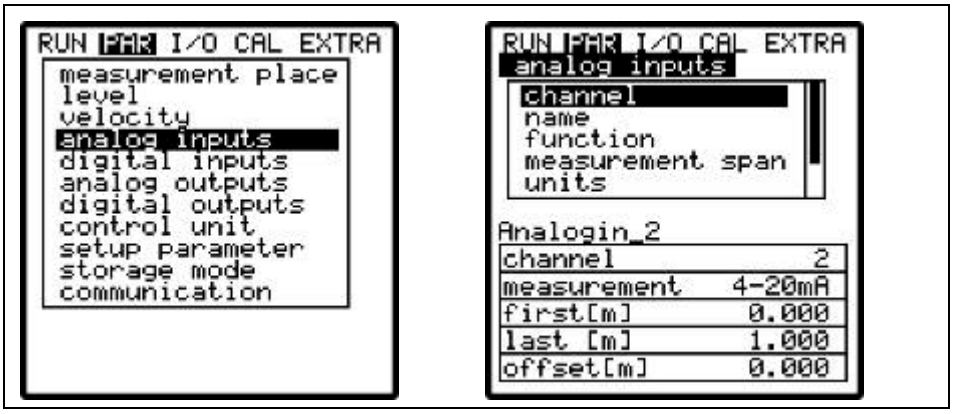


Fig. 9-64 Analog inputs – submenu

Various numbers of analog inputs are available depending on the type of transmitter, such as in case of transmitter type >S4<:

- 1 analog input (galvanically isolated) for 2-wire sensors
- 1 additional analog input for external level sensor connection

If using transmitter type >M4<:

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

Note

Basically any analog input can be chosen and set although transmitters type „S4“ are equipped with 2 analog inputs only.

Note

If in the >Level< menu of a type >S4< transmitter an external level sensor (connection: AI1) has been enabled before, there is no more analog input available for parameter setting.

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.

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

Name No entry required. This name will be saved on the memory medium only. Entering a name is only useful as soon as the analog input is going to be saved on memory card.
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 input which has been chosen by entering the >Channel Number<. Select from various functions by pressing the >ALT< key:

- OFF (analog input disabled)
- archive (analog input will be saved [data logging function of transmitter])
- set point (analog input operates as external setpoint for regulator mode)
- set+arch (setpoint + storage, analog input operates as external setpoint for regulator mode and will be saved additionally)

Measurement span Select between measurement spans of 0-20 mA and 4-20 mA here. Optional use of 0-5 V or 0-10 V voltage inputs requires the unit hardware to be modified respectively which can be carried out by NIVUS service personnel only.

Units This Parameter is going to be assigned to the breakpoint table below using the saved name.

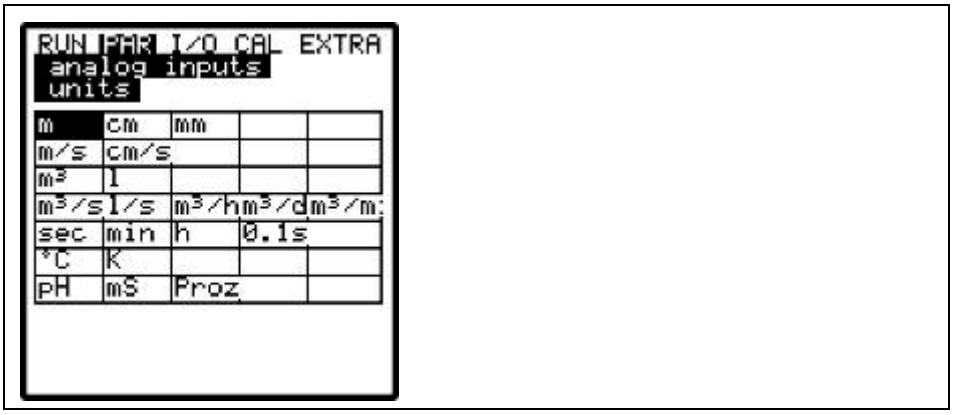


Fig. 9-65 Table of measurement units

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 OCM Pro 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.

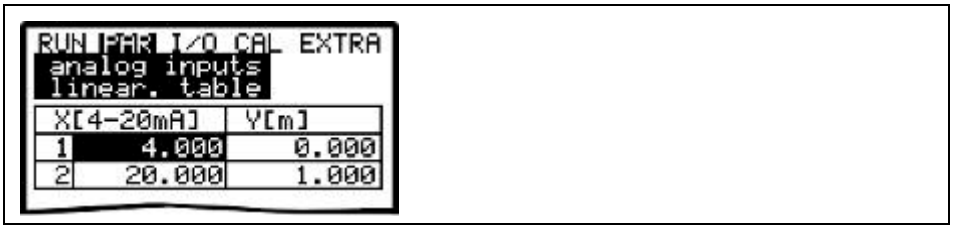


Fig. 9-66 Table of values for analog input span

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.

9.5.5 Parameter Menu "Digital Inputs "

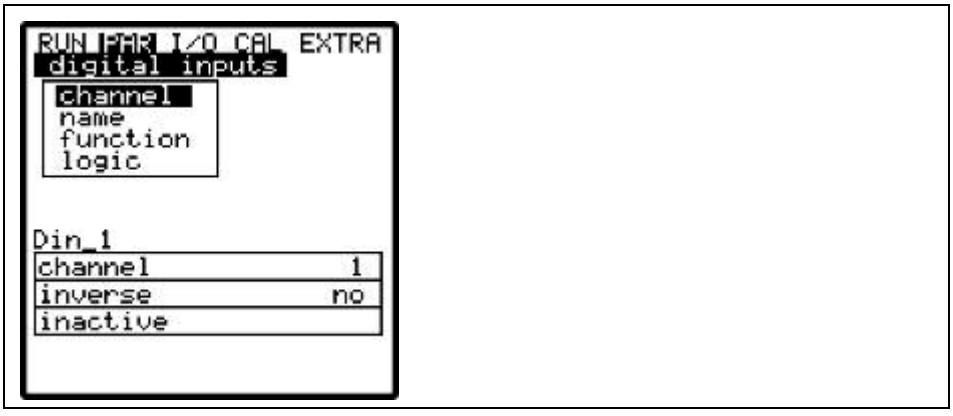


Fig. 9-67 Digital inputs – submenu

This section enables to set and to assign the digital input signals „Control OPEN“, „Control CLOSED“ and „Torque CLOSED“. The OCM Pro CF, type >M4< requires these inputs for regulator operation.

The function >Lock v-measurement< is exclusively available for digital input 1.

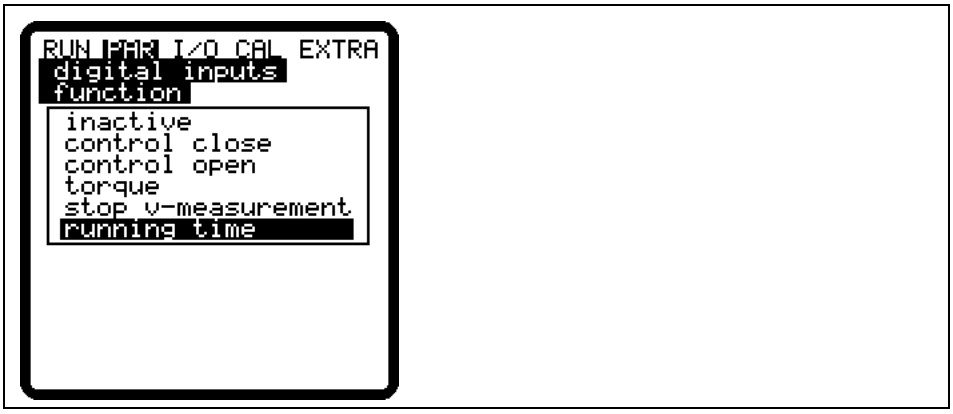


Fig. 9-68 Digital input functions

Channel number

Select from analog inputs 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 digital 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<.

Function

Regulator setting functions are going to be assigned to the digital input which has been chosen by entering the >Channel Number<. Select from various functions by pressing the >ALT< key:

- inactive
- control close (the slide end switch for closed condition is routed to the selected digital input.)
- control open (the slide end switch for open condition is wired to the selected digital input)
- torque (the torque switch for the closed condition is connected to the selected digital input)
- lock v-measurement (DI 1 can be configured to lock the measurement exclusively). The display will indicate >Measurement locked<. Flow values No output of flow values to programmed analog and digital outputs.
- This function is sufficient particularly for applications with permanent, unstable backwater conditions (overflow measurement in recipients tending to backwater formation). To achieve this, the flow velocity measurement is going to be either locked or released by a limit value contact using the overflow head as threshold (e.g. separate echo sounder, float switch, conductive sensor, dynamic pressure switch or similar). A locked measurement means that measured flow velocities will be set to >0<. Hence the volume will be calculated by using V=0 which means that no analog or digital flow values are going to be output.
- Single velocities will be saved without being used for calculation purposes if the option to save single gates has been enabled.
- runtime (the transmitter detects switching events via the digital inputs and saves the runtime accurate to the second on the CF card if the storage mode is active.)

Note

Please observe that the digital inputs are passive and therefore shall be supplied by an external 24 V DC power supply!

The required signal current is 10 mA. Please ensure reliable conductivity by using relay or end switch contacts made of high quality material.

Logic

Toggle between inverse and non-inverse input by pressing **>ALT<**. This means that e.g. slide valve signals can be configured as being normally closed, a constant signal level hence is equivalent to a disengaged end switch and cable breaks can be detected without any problem.

9.5.6 Parameter Menu "Analog Outputs"

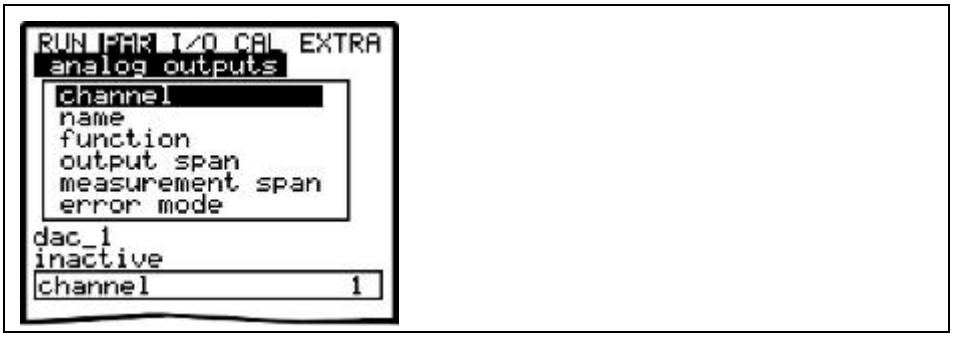


Fig. 9-69 Analog outputs – submenu

Function and measurement span of each analog output can be defined here.

Note

Basically 4 analog outputs can be chosen and set although transmitters type "S4" are equipped with 2 analog outputs only.

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:

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

- temperature air (output of air temperature measured by air-ultrasonic sensor type OCL as analog signal. Output only if sensor type OCL has been connected!)
- analog input 1 (output of value from analog input 1 as analog signal, value might be distorted due to characteristic)
- analog input 2 (output of value from analog input 2 as analog signal, value might be distorted due to characteristic)
- analog input 3 (output of value from analog input 3 as analog signal, value might be distorted due to characteristic)
- analog input 4 (output of value from analog input 4 as analog signal, value might be distorted due to characteristic)
- Modbus (allows remote access to analog outputs)

The functions described below are additionally available if in the >velocity< menu 2 or 3 sensors have been selected:

Function

- velocity output 1 (output of average velocity of sensor 1 as analog signal)
- velocity output 2 (output of average velocity of sensor 2 as analog signal)
- velocity output 3 (output of average velocity of sensor 3 as analog signal)

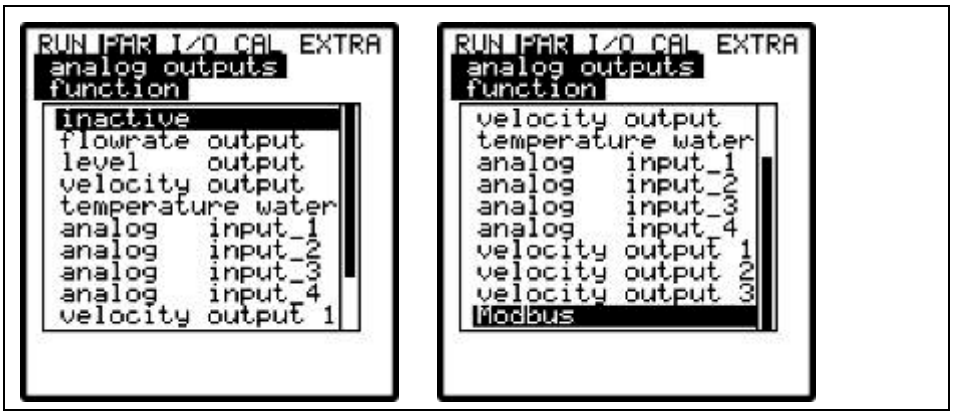


Fig. 9-70 Selection of analog output functions

Note

Due to its hardware configuration only type >M4< and >R4< allows to route the analog input to the analog output.

Type >S4< can be programmed accordingly but wiring however cannot be implemented!!

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!

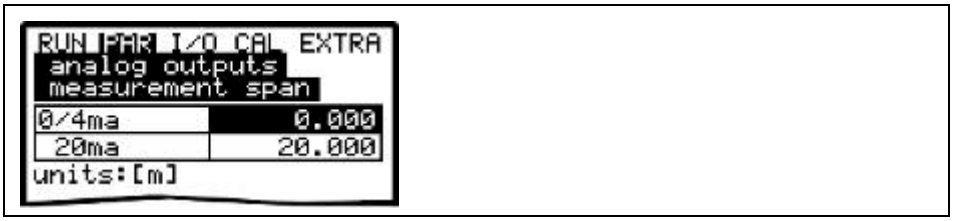


Fig. 9-71 Measurement span

Example of use:

A measurement place is partially tending to backwater formation. The negative flow value 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:

ALT

- 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

9.5.7 Parameter Menu "Digital Outputs “

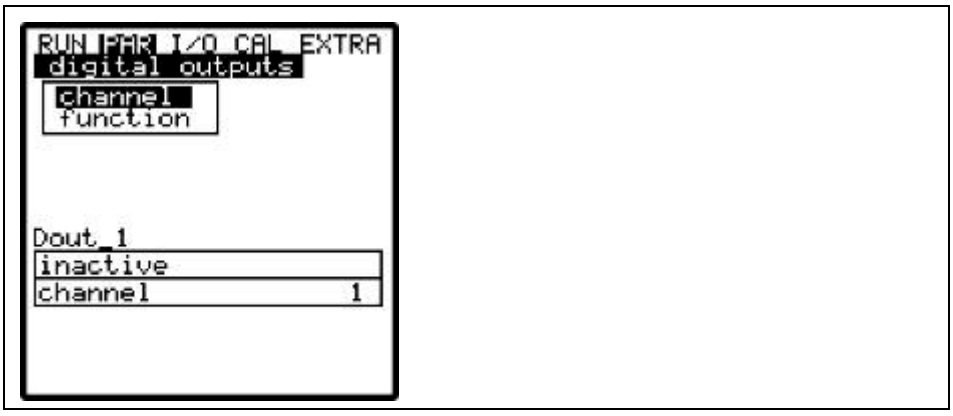


Fig. 9-72 Relay outputs – submenu

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.

Note

Basically 5 relays can be chosen and set although transmitters type >S4< are equipped with 2 relays only.

Note

Relays 4 and 5 are dedicated to regulator functions if the regulator has been enabled (only available with transmitter type >M4<).

Channel number

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

Name

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<.

Function

Functions are going to be assigned to the relay which has been chosen.
The functions below are available:

- inactive
- flow rate output (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])
- level output (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].)
- velocity output (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].))

Note

The functions below can be set only once:

- *Positive total impulse (relay will output volume-proportional impulses if the flow direction is positive. Weighting and impulse duration are free programmable.)*
- *Negative total impulse (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.)*
- *Modbus (allows remote access to the relay)*

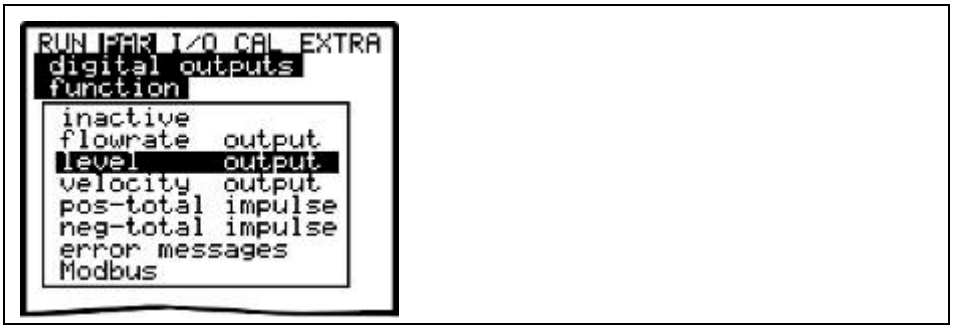


Fig. 9-73 Defining the relay function

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 Level

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

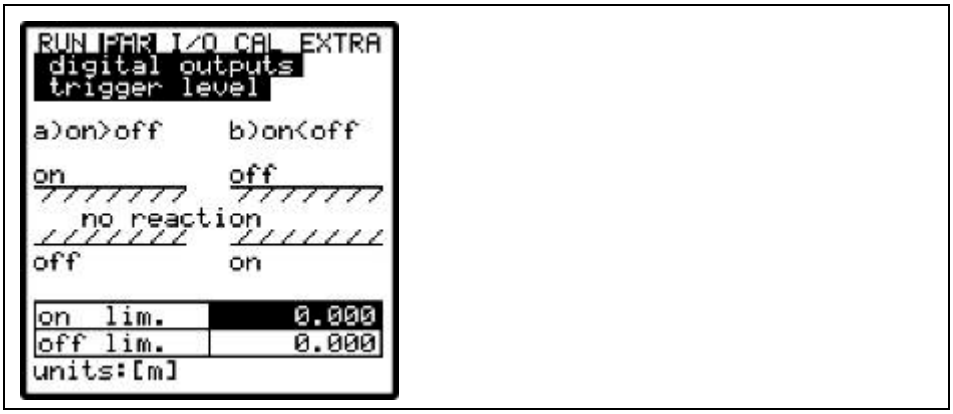


Fig. 9-74 Setting the trigger level

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).

Pulse parameter

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

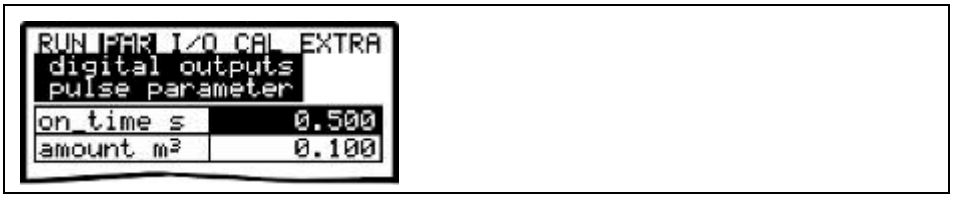


Fig. 9-75 Pulse parameter setting

Select from the options below:

- on_time s (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 m³ (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.)

9.5.8 Parameter Menu "Control unit "

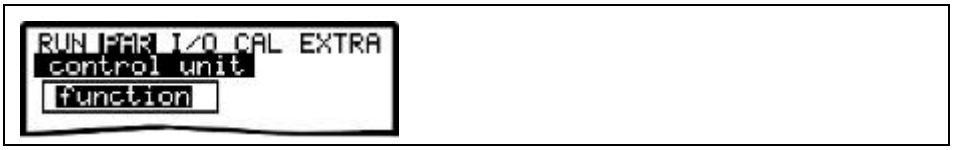


Fig. 9-76 Control unit basic settings

This menu allows you to adjust the transmitter to almost any waste water application for optimum performance. It enables to execute slide valve and torque monitoring as well as quick close control or automatic flush functions.
You can find more comprehensive information on setup and functional principle in Chapter 7.5.

Note

The flow controller function is only possible to be used in conjunction with transmitters type >M4< and >R4<. Type >S4< allows the according parameters to be set as well, the transmitter however nor is equipped with outputs for regulator operation neither with respective connections.

Function

The additional submenus are not indicated before the function has been enabled by pressing the >ALT< key. No regulator setting options will be shown if the regulator has not been enabled.

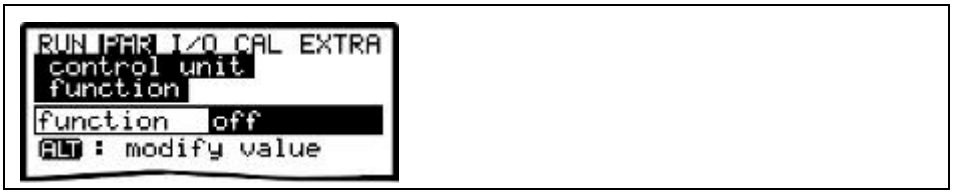


Fig. 9-77 Enabling the control unit

Set point

Type: choose between internal (setpoint defined in OCM Pro CF) and external setpoint (setpoint externally preset via dedicated analog input 4.

Fig. 9-78 Setting the set point type

Note

Analog input 4 is the dedicated hardware input for analog setpoint signals. This assignment cannot be modified.

Parameter:

Internal set point:

- define the internal setpoint in indicated unit

External set point:

- name (it is not necessary to enter a name, since it currently is used for device-internal purposes only)
- measurement range of external setpoint, select from 0/4-20 mA. 0-5/10 V can be set by NIVUS service personnel only.
- set point input linearisation (normally >2< is going to be entered as number of breakpoints. Set the setpoint start (=0) to 0/4-20 mA and the setpoint stop to 20 mA subsequently. The input area can be linearised as well.)

Offset:

- this values is going to be added to the external setpoint. Negative values are allowed to be set as well.

Cable break monitoring is being executed if the external setpoint has been set to a range of 4-20 mA. It is going to be switched over to the internal setpoint as soon as a cable break has been detected (default setting = 100 l/s).

Relays

The logic functions of both output relays can be modified using this menu.

Fig. 9-79 Assignment of relay functions

Control CLOSED: here you can enter the internal name (not required) as well as the logic function of relay 4 (normally closed or normally open). Select by pressing >ALT<.

Control OPEN: here you can enter the internal name (not required) as well as the logic function of relay 5 (normally closed or normally open). Select by pressing >ALT<.

Note

Relay 4 is defined as >slide valve CLOSED<, relay 5 as >slide valve OPEN< by hardware configuration. This assignment cannot be modified!!

Note

If >normally open< has been selected, the relay is going to energise for the calculated period of time if the according setpoint has been reached. If set to >normally closed< the relay will energise immediately after the parameters have been set and is going to de-energise for the calculated period of time as soon as the respective setpoint has been equalled.

End switch

This menu allows to assign functions and their logic to the corresponding digital inputs.
The channel number is equivalent to the number of the digital input.
Channel number 1 = digital input 1, channel number 2 = digital input 2 etc.
By selecting channel number and function subsequently it is possible to define which end switch is connected to which signal input.
The name is for internal use only and does not have to be set.
Modifying the logic (inverse / non-inverse) allows you to monitor cable breaks of end switch connections.

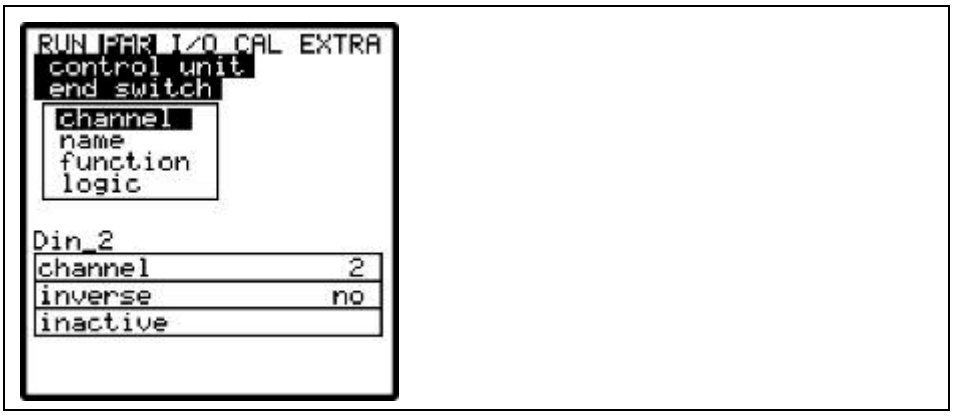


Fig. 9-80 End switch assignment

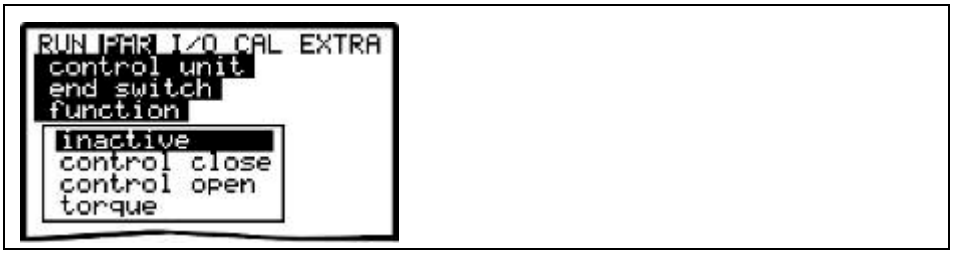


Fig. 9-81 Possible functions

P-Factor

The proportionality factor indicates, to which degree the regulating time is going to be affected in case of a deviation **Dw** from setpoint **w**. The higher the proportionality factor, the longer the regulating time of the slide valve at the same control deviation.

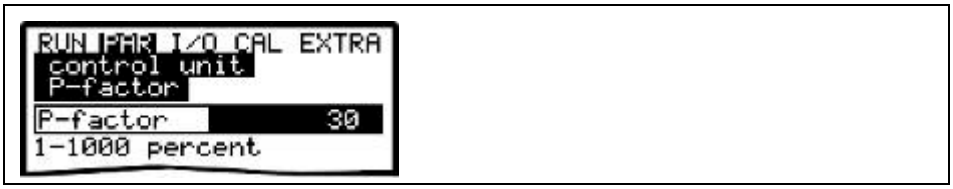


Fig. 9-82 Assignment of P-Factor

Cycle time

The processing interval of the controller

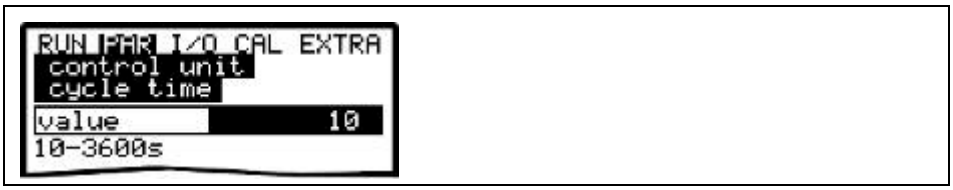


Fig. 9-83 Setting the cycle time

Short intervals will accelerate the control behaviour, however are going to result in oscillation of the control circuit as from a certain point if there are longer run times between regulating unit and the measurement.
A long interval is going to reduce the oscillation tendency of the controller but will however increase inertia of the regulating system.
Programming guideline:

$$\text{Interval} = \frac{\text{average flow velocity}}{\text{distance between regulating unit and measurement}} \times 1{,}3$$

Control deviation

This parameter defines the permissible setpoint deviation of the control system without a regulating event is allowed to be executed. The setting reduces the oscillation tendency of the system. Due to hydraulic reasons volume measurements are tending to fluctuate around values. If there is no setpoint deviation tolerance defined, the system will constantly attempt to exactly adjust the actual value according to the setpoint. Due to this reason the regulating unit might be driven permanently which may result in mechanical defects or higher wear and tear.
Both values have an AND relation between each other. Normally it is sufficient to define a percentage value here.
In case of external setpoint control (example: channel network management or channel network control systems) and large controlling ranges it is helpful to enter an absolute value as otherwise in case of low setpoints the permissible control deviation percentage may become too low if considered absolutely. Therefore the regulating unit will be tending to oscillate.

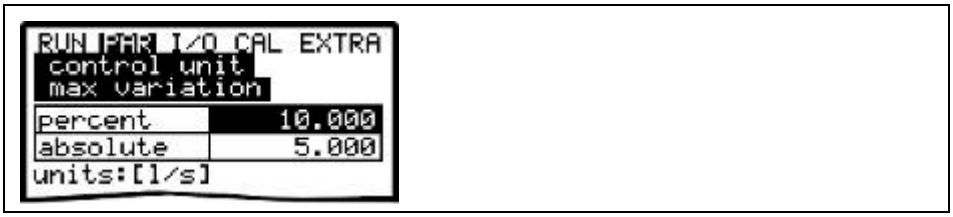


Fig. 9-84 Setting permissible control deviations

Min pulse time

This parameter can be considered as quite similar to the I-component of PID controllers. It defines a minimum regulating time of a regulating unit in order to ensure that calculated very short control impulses mechanically affect the regulating unit at all. Hence the minimum control impulse duration should be specified longer than motor start-up time + gear clearance + slide valve clearance.

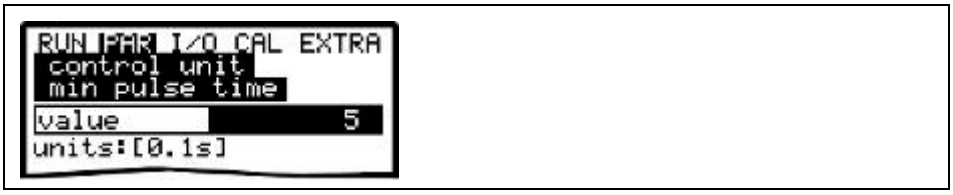


Fig. 9-85 Setting the minimum duration of control impulses

Shifter time

Use this parameter to monitor spindle breaks, slide valve gate breaks, gear defects, power failures on the regulating unit or other malfunction sources which may reveal because the regulating unit does not move although control signals are being generated.

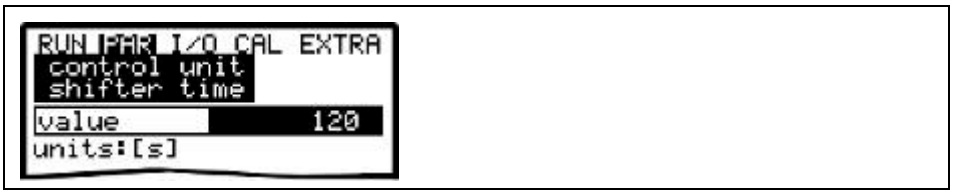


Fig. 9-86 Setting the shifter time

Important Note

An error message will be generated if the controller unit does not reach the end switch CLOSED after the slide run time has expired.

Programming guideline:
Slide run time to be set = time between open and closed condition of slide valve during permanent operation x 1.2 .....2.0.
(the longer the slide run time the lower the factor)

Important Note

*The slide run time has an effect similar to the P-factor and **has to be** set!*

Quick close function

The quick close function is used if certain conditions such as large diameters, long slide valve run times and long dead times of the measurement section are given. In case of sudden rainfall events this function will partially close the open slide valve independent of the calculated regulating time. During permanent operation this is going to be executed without any run time interruption.

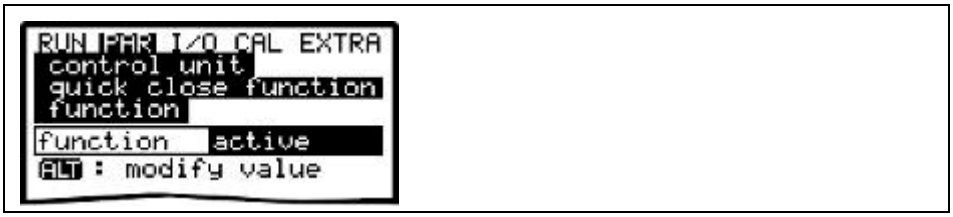


Fig. 9-87 Enabling quick close function

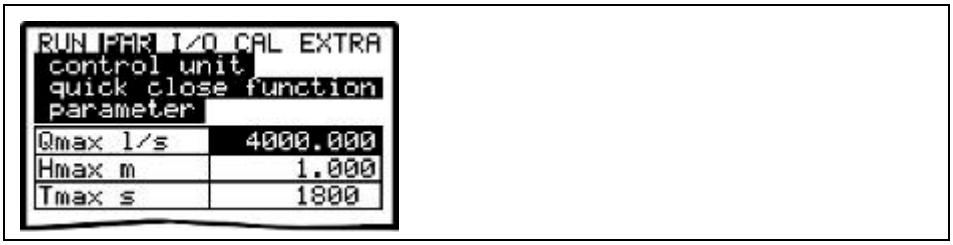


Fig. 9-88 Quick close parameters

Q_{max} and h_{max} operate as OR parameters. Depending on application they have to be set 10-50 % higher than the condition established when the system falls to regulator mode during dry weather operation.
T_{max} is the time the control unit requires to move from open position to the standard position during control operation mode.

Automatic flush function

This function allows to frequently flush the measurement section during dry weather operation. In order to dam up the medium and to generate a flush surge, set **Days** and **Time** of the control unit to be closed. The control unit will open up again after the **Impounding Duration** (to be set) has expired and will remain in open condition as long as the **Duration of Flush** has been set. This sequence will be repeated subsequently.
The number of **flush events** can be set from 1 to 9.

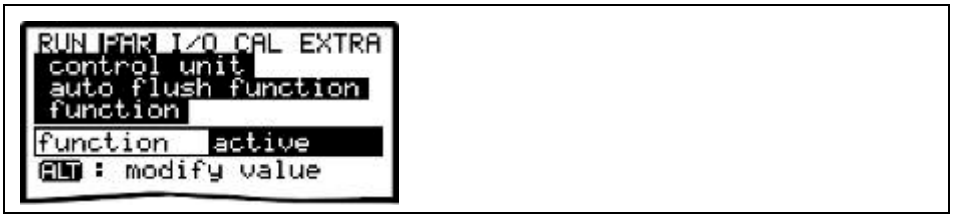


Fig. 9-89 Enabling the flush function

Note

The flush function is not available during active control operation.

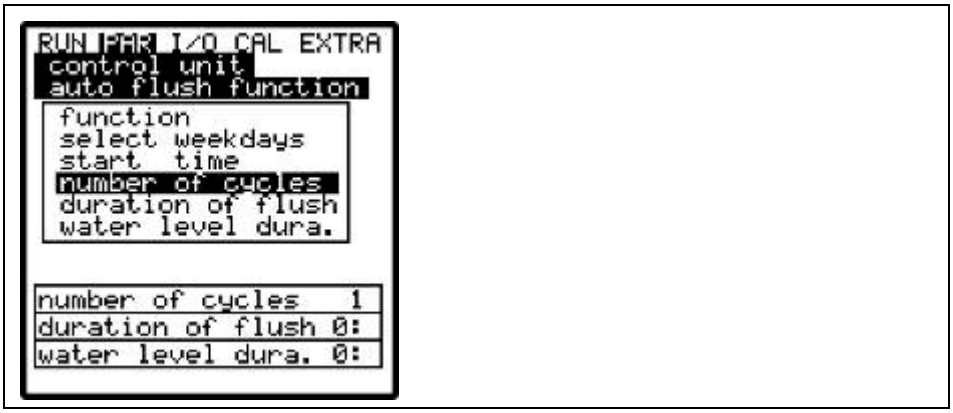


Fig. 9-90 Flush function parameters

Start days
ALT

= days to execute the flush function.
days can be selected individually using this key.

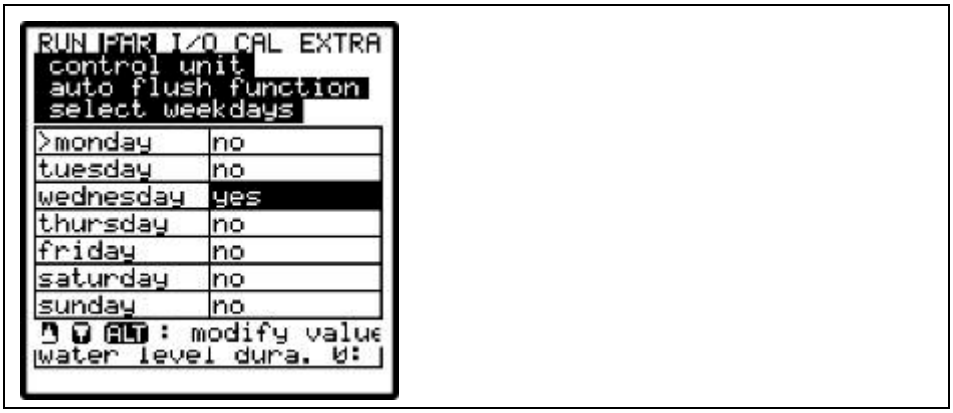


Fig. 9-91 Setting individual flush days

Start time

= defines the time when the flush is going to start. Each day set may have a different start time.

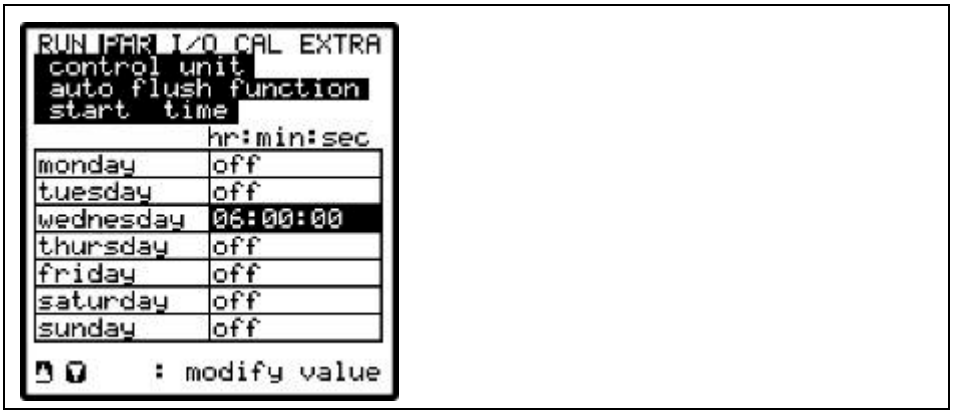


Fig. 9-92 Setting the flush start time

Number of cycles

= defines how many times the flush event is to be executed. A complete flush event consists of impounding duration + duration of flush.

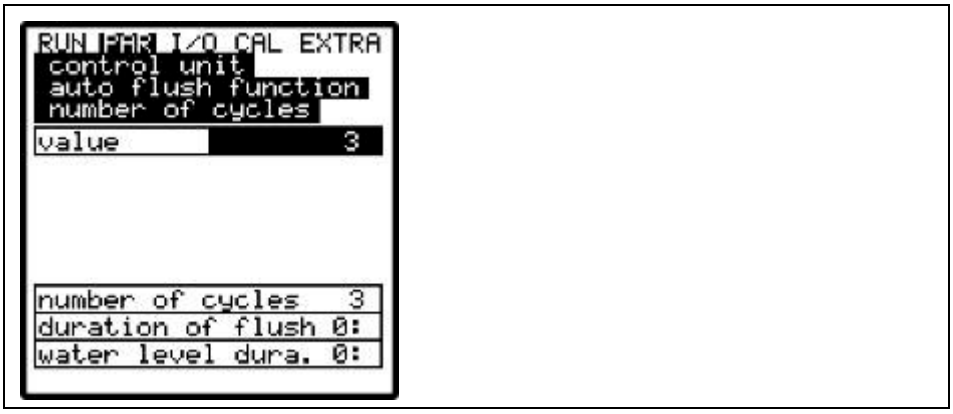


Fig. 9-93 Setting the number of cycles (flush events)

Duration of flush = defines how long the regulating unit remains in open condition independent of the current measurement value.

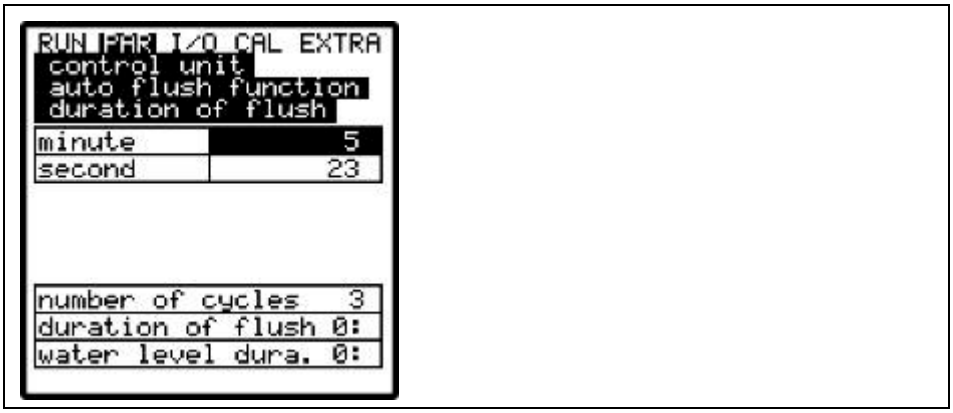


Fig. 9-94 Setting duration of flush

Water level duration = defines how long the regulating unit remains in closed condition independent of the current measurement value in order to dam up the medium for flush purposes.

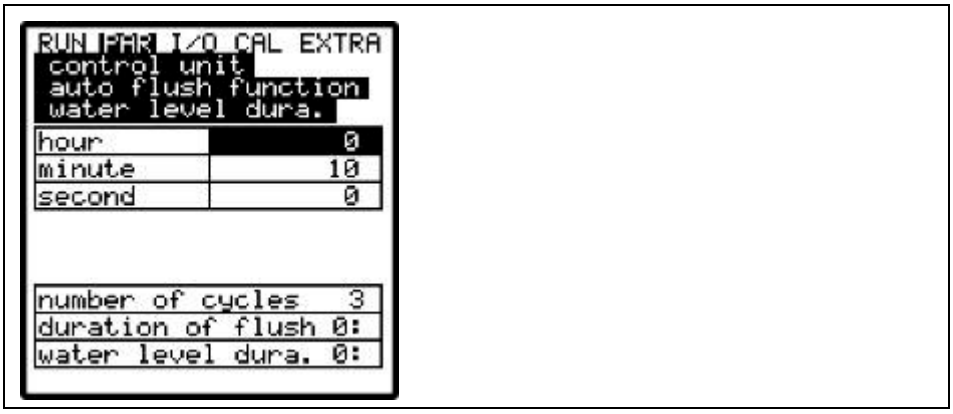
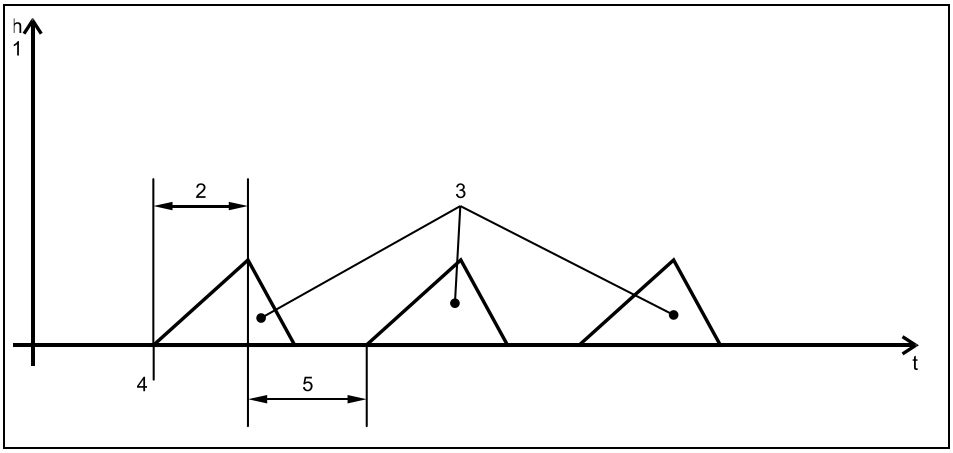


Fig. 9-95 Setting water level duration



1 Backwater
2 Impounding duration
3 Number of flush events
4 Start day, start time
5 Duration of flush

Fig. 9-96 Graphic representation of the flush function

9.5.9 Parameter Menu "Settings “

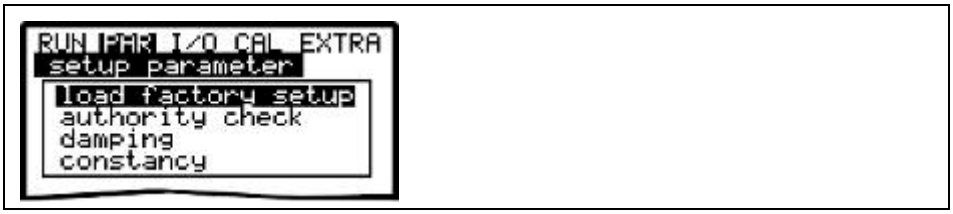


Fig. 9-97 Settings – submenu

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

Load Factory Setup Enables a system reset of the measurement transmitter. Selecting this point will bring up the screen below:

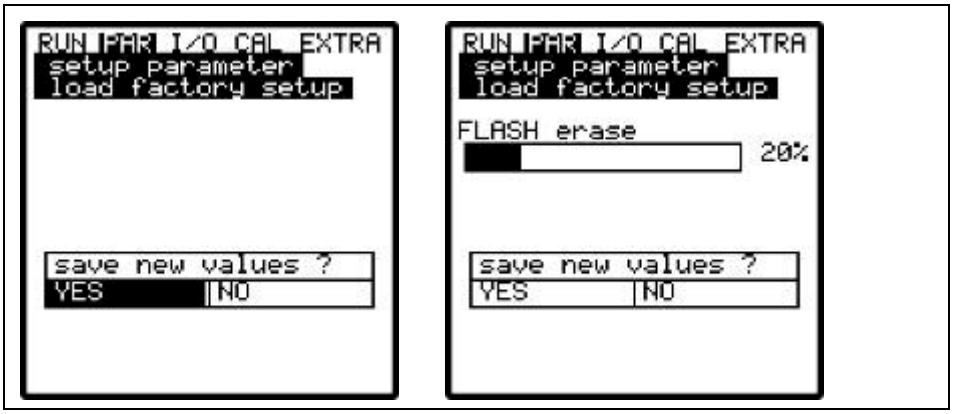


Fig. 9-98 Executing a system reset

Selecting "YES" will erase the internal flash memory. The settings however will not get lost yet. When exiting the PAR menu the screen below appears.

CAUTION

Loss of customer settings

Selecting >YES< in Fig. 9-99 (Save new values?) takes the system to the basic parameter settings. The default settings will be restored and all customer modifications will be set to default condition (system general reset).

System controls set previously will be lost.

When exiting the PAR menu the screen below appears:

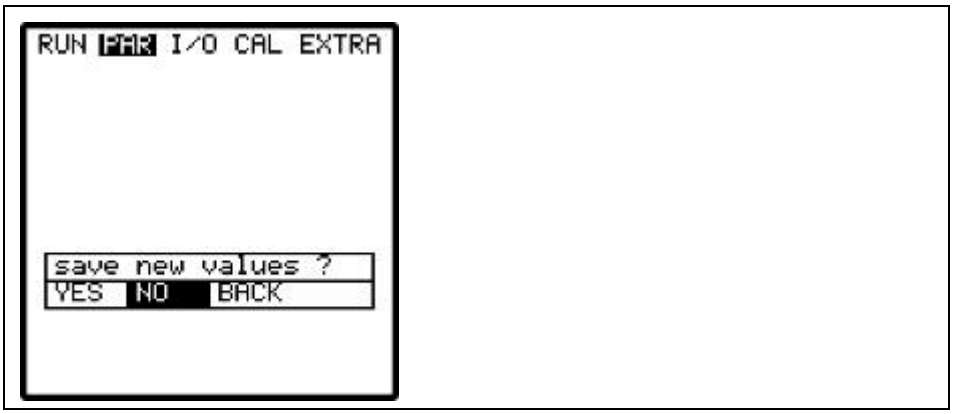


Fig. 9-99 Request to complete the system reset

Service code

Additional system setting options are going to be revealed once a special number has been entered.
These settings are reserved to be used by the NIVUS initial start-up service since 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.

Damping, example 1:

Damping 30 seconds, jump from 0 l/s to 100 l/s (=100 %) – instrument needs 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 %) – instrument needs 6 seconds to run from 80 l/s to 100 l/s.

Stability

The period the OCM Pro will operate in without a current level / height measurement value.
The OCM Pro 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.

9.5.10 Parameter Menu "Storage Mode “

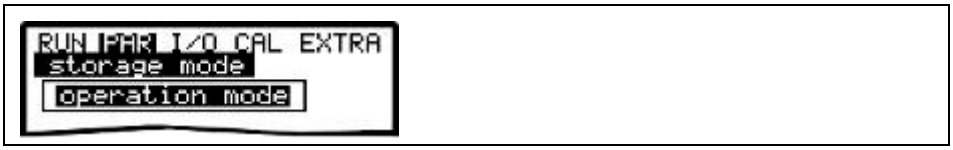


Fig. 9-100 Storage mode - submenu

The OCM Pro CF allows to save detected flow velocities, levels, temperatures and flow rates as well as input and output signal values on Compact Flash Card. It is possible to use NIVUS Compact Flash cards with capacities from 8 to 128 MB. These cards can be purchased from your local NIVUS representative.

Important Note

Use memory cards purchased from NIVUS only. Other manufacturer’s cards or cards with greater capacities than 128 MB may lead to partial or complete loss of data or measurement failure (permanent transmitter reset).

NIVUS do not accept any liability due to data loss or measurement failure resulting from the use of third-party memory cards.

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 instead.

Fig. 9-101 Memory card slot

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

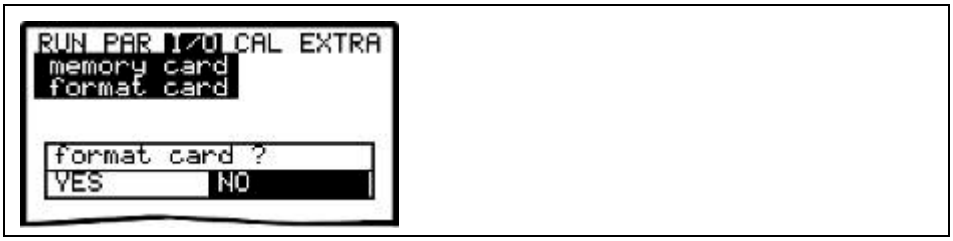


Fig. 9-102 Card formatting request

Card formatting may be executed also in the menu I/O – Memory Card – Format card (see chapter 9.5.8)
Due to the card's technically restricted number of storage cycles (approx. 100.000 writing events), the OCM Pro does not constantly save upcoming data on card but only each full hour. The transfer interval from the internal memory to Compact Flash card is determined 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 ASCII format using a data file with the measurement place name set previously. The file suffix is >.txt<.
Such files can be read and processed using common data processing programs with ASCII interface such as NivuSoft or EXCEL (see also chapter 9.5.11).

Important Note

Do not 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.

The memory card may get irreversibly damaged. Data cannot be saved anymore.

Note

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

Operation mode

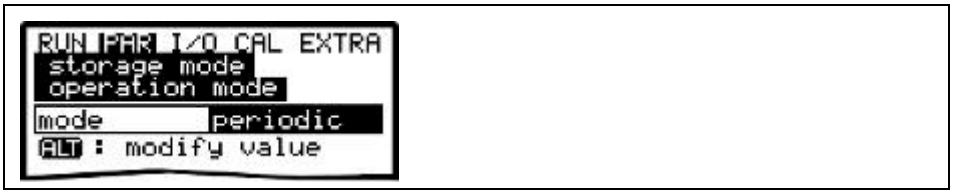


Fig. 9-103 Enabling operation mode

Mode

ALT Pressing this key toggles between:

disabled = no data storage
cyclic = cyclic storage of flow, average flow velocity, level and temperature

Periodic 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 OCM Pro to set the next lower interval value.

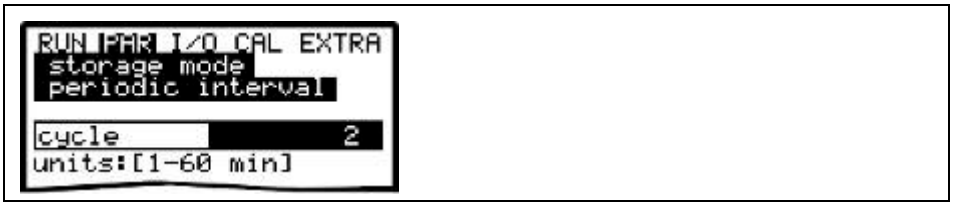


Fig. 9-104 Entering the storage cycle

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. 9-105 Selectable data

Analog I1 to I4

This setting has no meaning except for type OCP/M4 since this is the only unit type which is equipped with additional analog inputs.

ALT Use this key to toggle between:

NO = according analog input will not be saved
and
YES = according analog input will be saved

System

ALT Use “Alt” key to toggle between:

NO = system parameters will be saved
und
YES = system parameters will be saved (system errors, error messages, system ON and OFF events etc.)

Units

Define which units are to be used to save the 3 parameters flow, level and velocity. Select from metric (e.g. litres, cubic metres, cm/s and more), English (ft, in, gal/s, and more.) or American system (fps, mgd and more). After your selection has been confirmed the display will jump to the next screen automatically.

When it comes to be saved on memory card, it is possible to define a unit for each of the measured and calculated flow, velocity and fill level readings. These settings do not have an effect on the display.
There are various units available depending on the selection made previously. (see chap. 9.3).

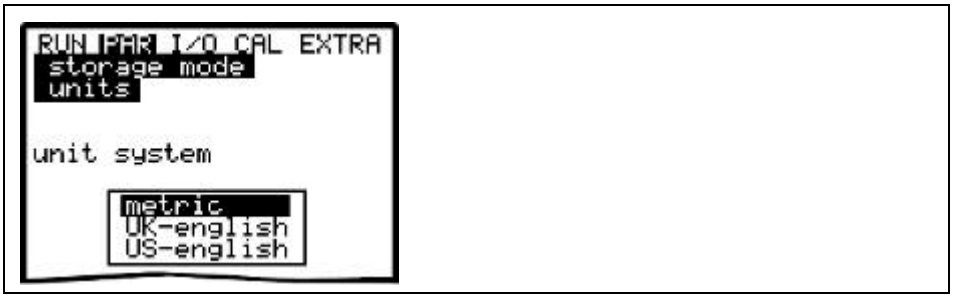


Fig. 9-106 Selecting the unit system in storage mode

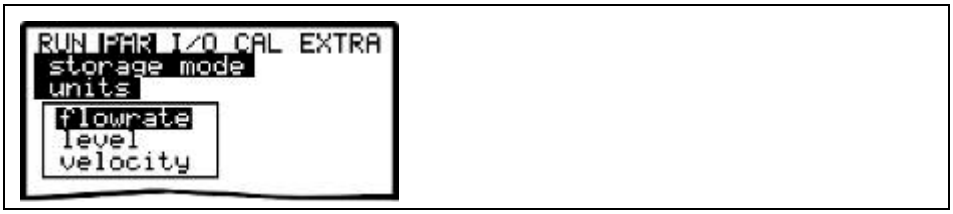


Fig. 9-107 Selecting the measurement value in storage mode

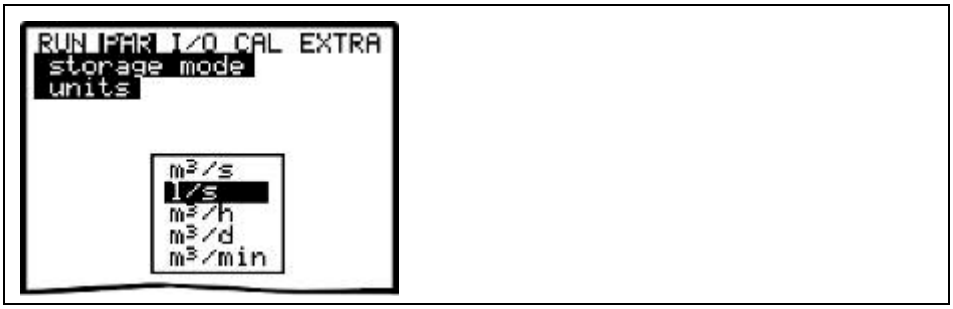


Fig. 9-108 Selecting the units in storage mode

Format of numbers

Choose between commas or dots to be used as decimal points. For further processing in other programs such as EXCEL in Europe mainly commas are used as separators. Otherwise dots are in use.

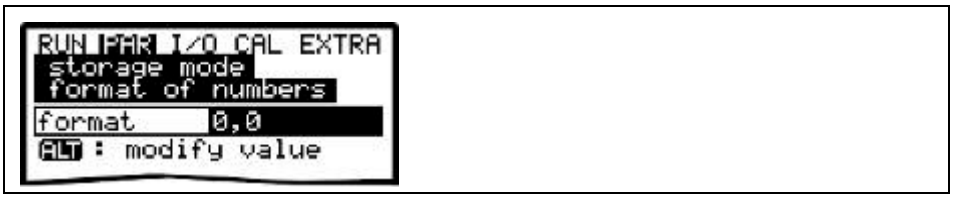


Fig. 9-109 Selecting the number format

9.5.11 Data Structure on Memory Card

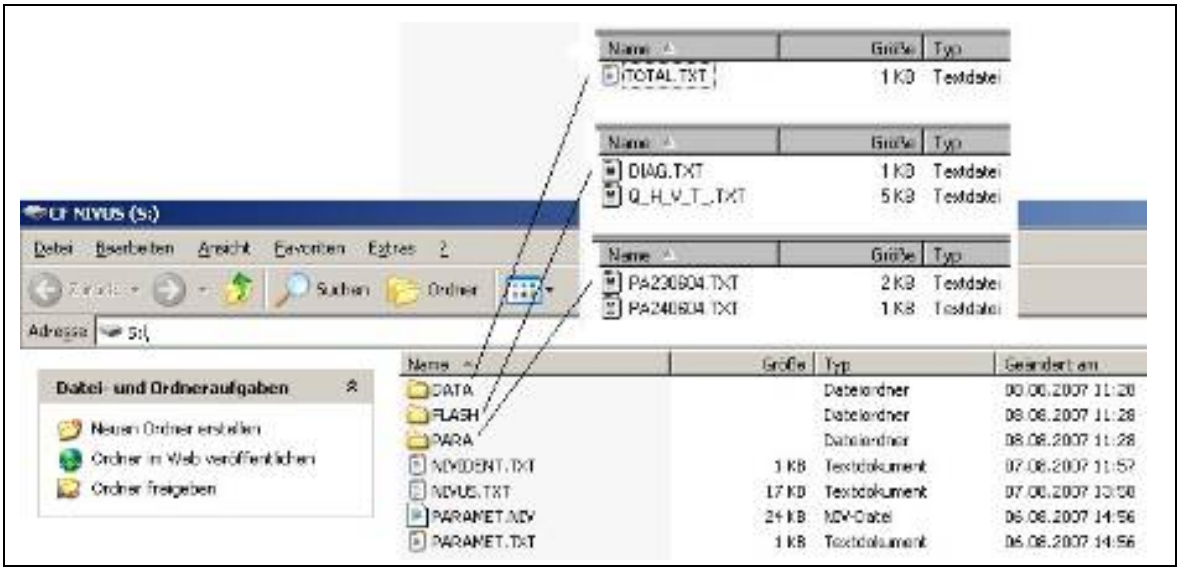


Fig. 9-110 Data structure on memory card

DATA

Day totals are saved in the data file >TOTAL.TXT< in this folder. Save by using the menu points >I/O/Memory card/Day values< (see chapter 9.5.8)

Flash

This is the folder where the backup file is saved. Carry out the saving process by calling it up under >I/0 – 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
Execute saving the DIAG by calling up from >I/0 – 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 OCM Pro CF, the unit will prompt to format the card. The OCM Pro CF will not save any data as long as the card has not been 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 the OCM Pro. PARAMET.TXT is the print version of PARAMET.NIV as text file (only parameters modified before are going to be exported).

Important Note

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

9.5.12 Parameter Menu "Communication “

Note

Communication can be used only in conjunction with wall mount enclosure units! Communication can be programmed on a panel mount unit as well, this transmitter however is not equipped with an Ethernet interface!

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 2.7) communication via local Intranet, analog modem, ISDN modem or GPRS modem is available. Direct data exchange via Ethernet / Modbus TCP is possible as well.
If no other NIVUS device has been connected to Internet at the moment of initial start-up, it is indispensable to have the portal initialised by the NIVUS service. Due to this reason please complete the >Internet connection< form and return it to the NIVUS commissioning service in order to prepare the connection setup. The form can be found in the download area on www.nivus.com. Please fill out as complete as possible to avoid later requests.

Note

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

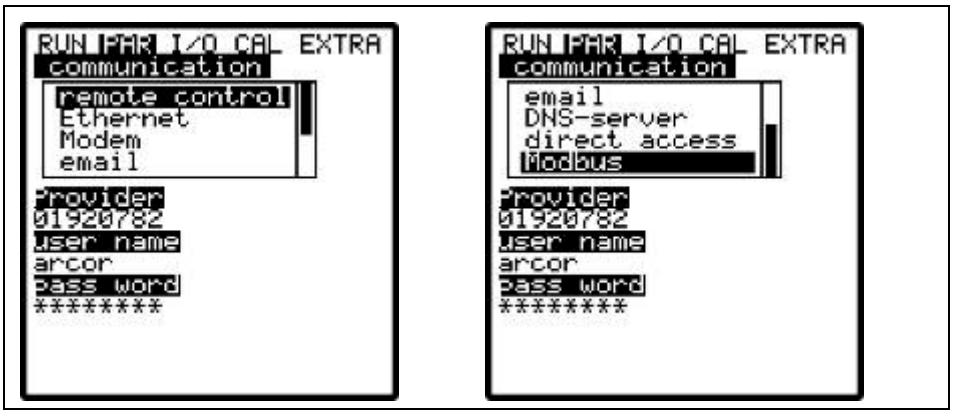


Fig. 9-111 Internet connection options

Remote control

Select from the following options for remote access:

Off:	no remote access possible
Modem:	connection via built-in modem (GPRS, analog or ISDN)
Ethernet:	communication via local network (Ethernet)
Mod. à 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 2.7)

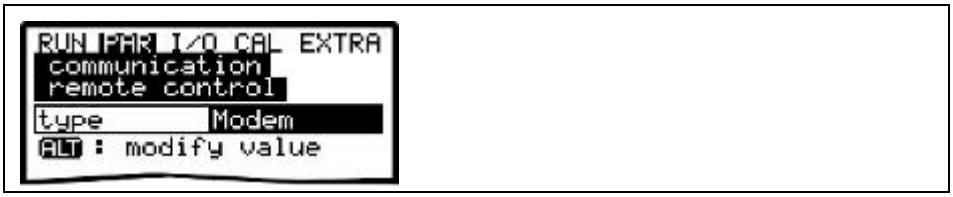


Fig. 9-112 Remote access options

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.
à Observe the current network configuration!!!

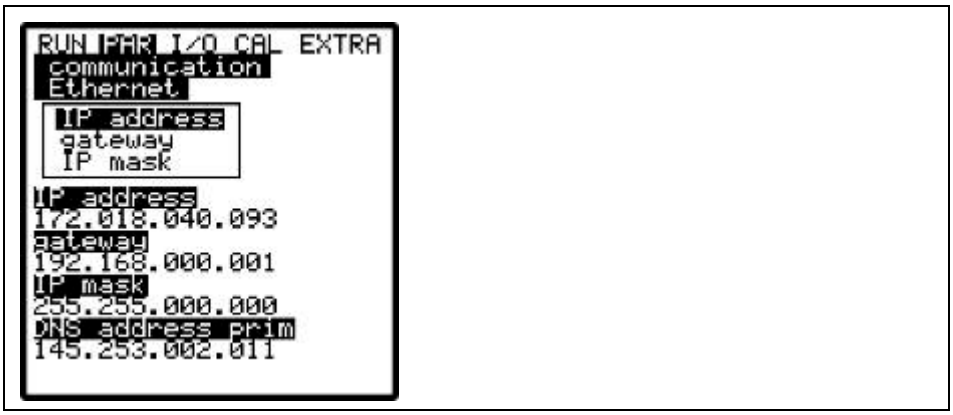


Fig. 9-113 IP address assignment

If manual IP address assignment has been selected enter IP address, gateway (optional, in case of interdigitated subnets) as well as IP mask.
The default setting (255.255.000.000) is normally suitable for most connections.

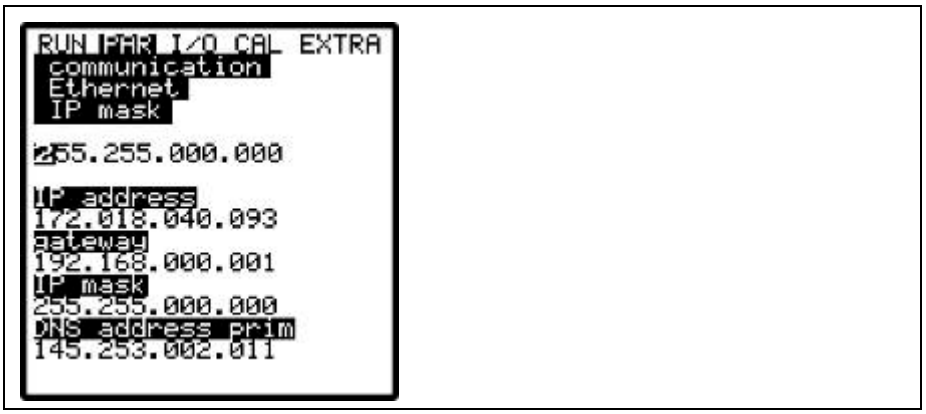


Fig. 9-114 Setting the IP address manually

Important Note

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

Modem

If connection type >Modem< or >Mod à 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 2.7).
Choose between the following options:

Off:	no modem enabled
analog:	integrated analog modem
ISDN:	enables built-in ISDN modem
GPRS:	internal GPRS modem is going to be used.
GPRS perm.	The internal GPRS Modem is permanently online

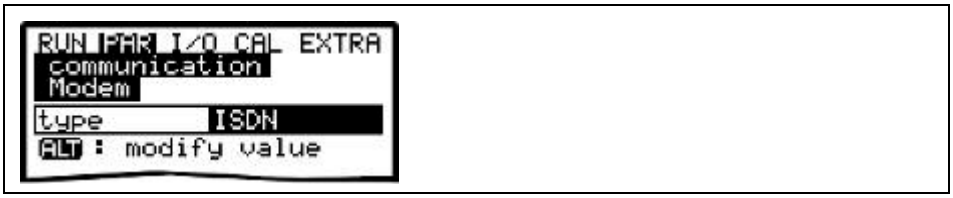


Fig. 9-115 Selecting the modem type

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

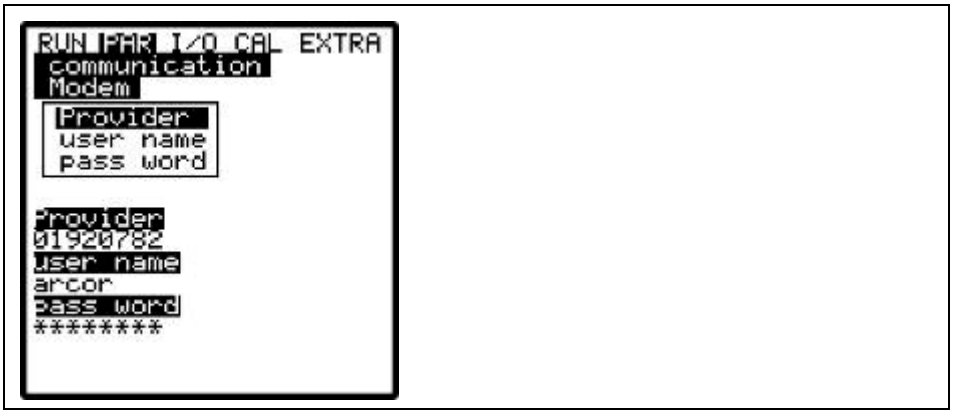


Fig. 9-116 Setting analog modem parameters

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.

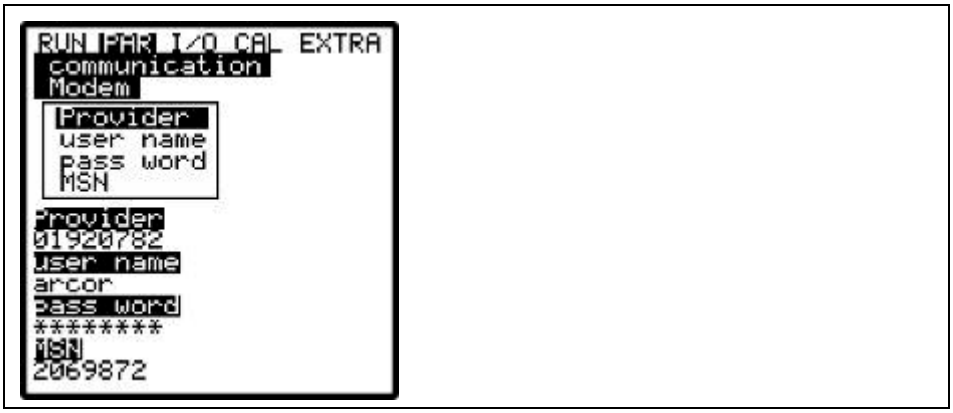


Fig. 9-117 ISDN modem parameter settings

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).

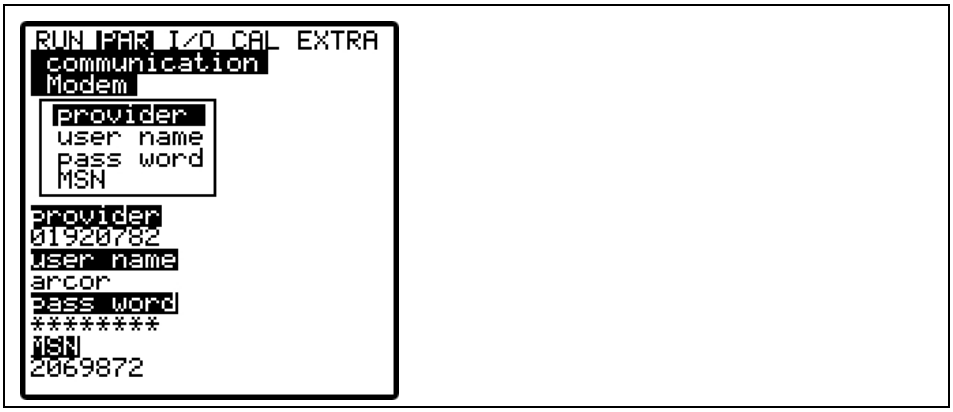


Fig. 9-118 GPRS modem parameter settings

GPRS-modem:

- User name: to be assigned by the provider
- Password: password associated with account
- PIN: with SIM module associated PIN (**P**ersonal **I**dentification **N**umber)
- APN: name supplied by provider / address of access (**A**ccess **P**oint **N**ame)

GPRS- modem perm.

Same settings as GPRS modem, however the modem remains to be connected with the provider permanently. The connection will be interrupted briefly every night at 02:00 AM. The modem then is reconnecting automatically with the provider and is provided with a new IP address.

E-Mail

This option allows to send received data to up to 4 recipients.
To achieve this select "active ".

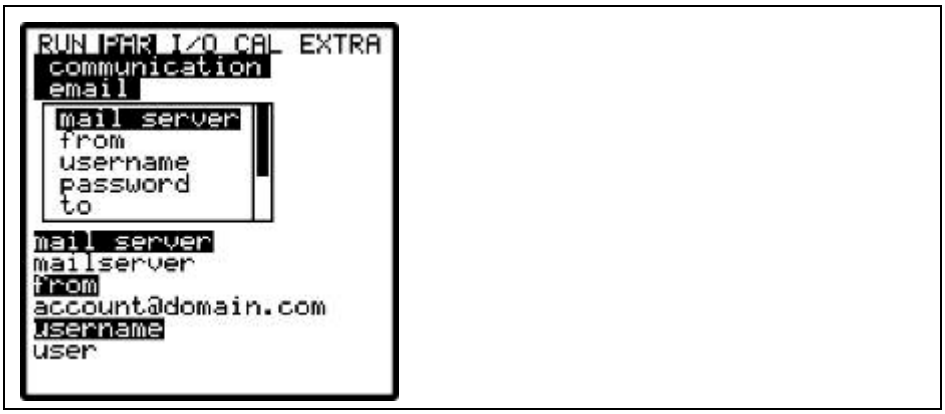


Fig. 9-119 E-Mail parameter settings

Email:

- Mail-Server: Enter the smtp server address of your email account here)e.g. smtp.gmx.net)t
- From: Enter a valid email address of the smtp-server mentioned above here. This is the unit's sender address.
- Username: Enter the user name of the aforementioned email account
- Password: : Enter the password of the aforementioned email account
- To: Here it is possible to determine up to 4 email addresses the mail is to be sent to at the same time.
- Data format: Select between text file and binary file. Binary files are for integration of the unit into the "NICOS" process conducting system by NIVUS.
- Cycle: This defines the cycle to send the data mails (e.g. every 24 hours)
- Delay: The delay entered here refers to the transmission cycle set. The mail will be sent using the determined delay (example: cycle 24 h. Delay 07:00 causes the mail to be sent each day at 07:00 AM.

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. 9-120 Entering the DNS manually

Direct access

Required only if a direct 1:1 connection to the OCM Pro CF 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.

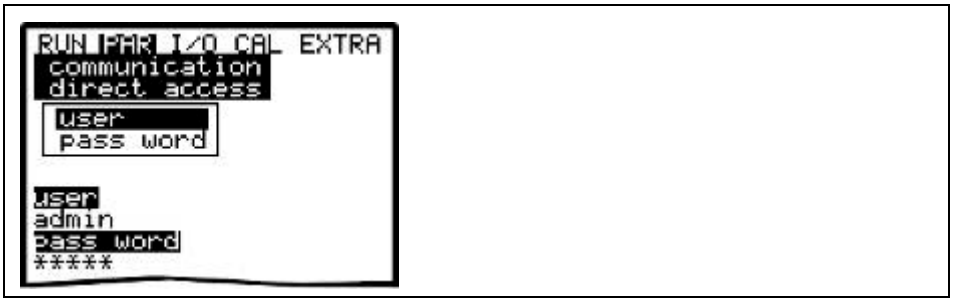


Fig. 9-121 Enabling direct unit access

Modbus

This menu determines communication to a master via Modbus TCP. The connection is made on the Ethernet interface.
The respective interface settings (such as IP address etc.) shall be carried out according to the network topology.

Modbus

Measurement span: here you can modify pre-determined measurement spans of analog signals which are to be transmitted via Modbus. It is however not recommended to do so since modifying the measurement span here will have an effect on the length and the contents of the protocol to transmit.

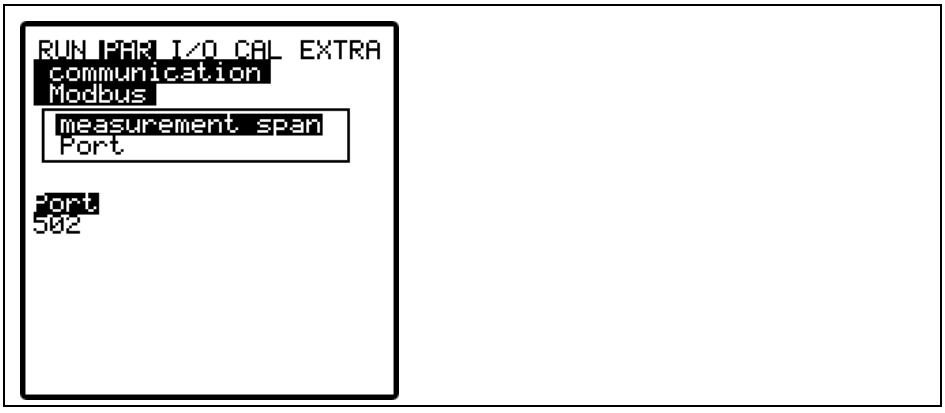


Fig. 9-122 Port registration

Port: Enter the interface port used for protocol transmission here. Please observe the port to be unlocked at the master (e.g. PC) and contact your responsible system administrator if required.

9.6 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.

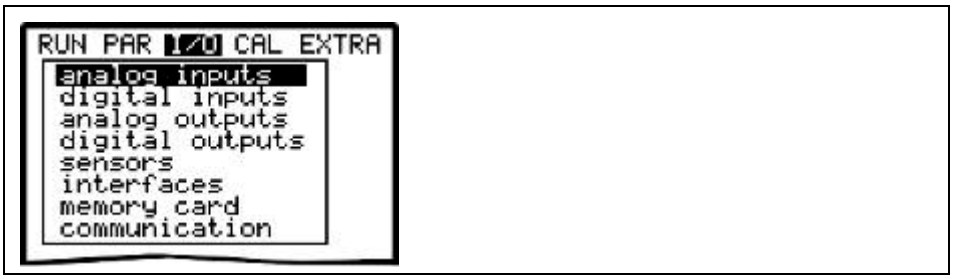


Fig. 9-123 I/O-submenu

Note

The menu basically allows to indicate any input and output theoretically possible even if (right as with transmitter type >S4<) it might not be connected or available.

9.6.1 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.

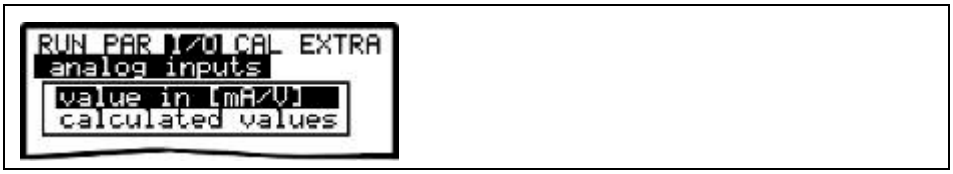


Fig. 9-124 Value selection screen

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:

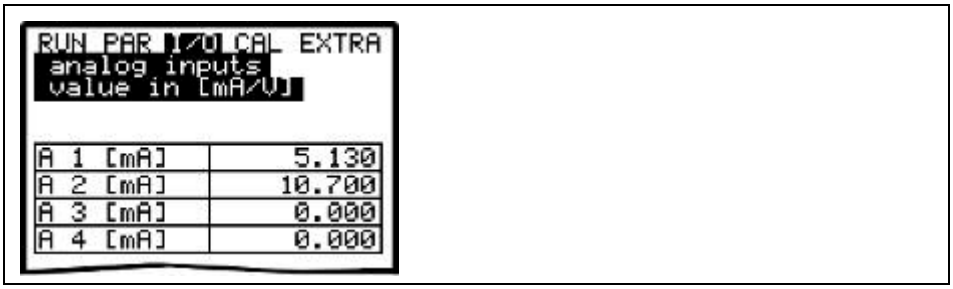


Fig. 9-125 Analog values screen

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

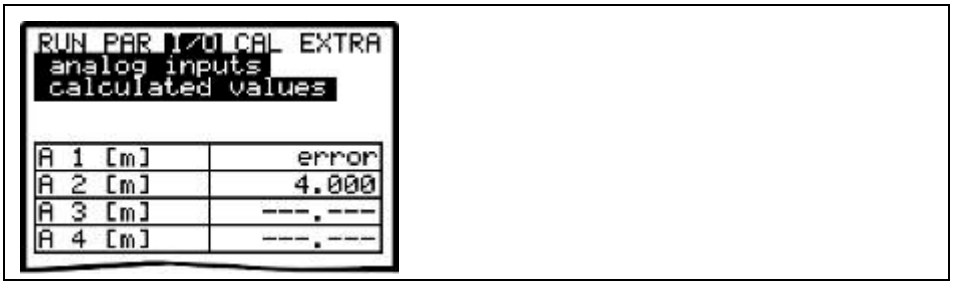


Fig. 9-126 Error screen

9.6.2 I/O Menu "Digital Inputs "

Digital input values routed to the transmitter input clamps can be viewed here. Select from either logically "OFF“ or "ON".

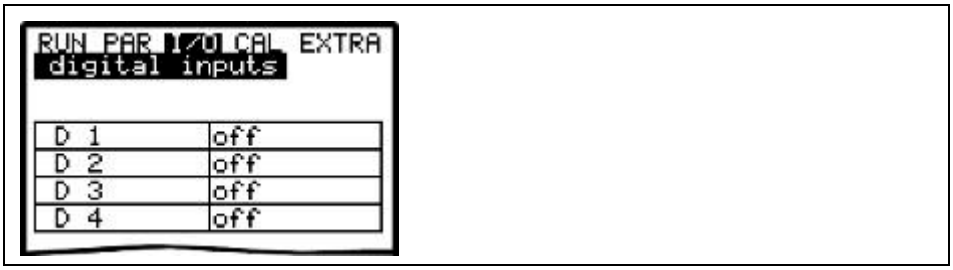


Fig. 9-127 Screen digital values

9.6.3 I/O Menu „Analog Outputs”

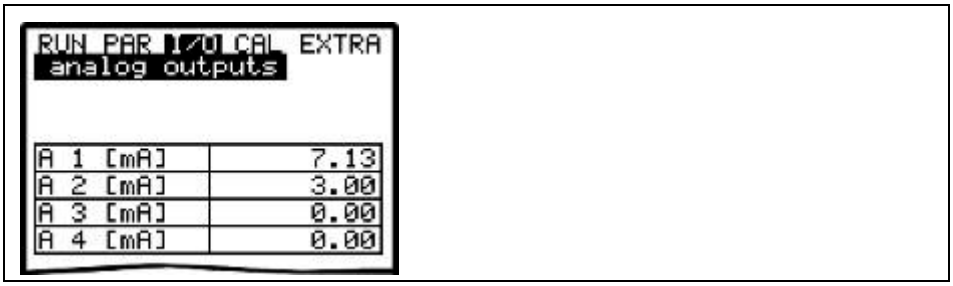


Fig. 9-128 Screen analog values

This menu indicates the calculated values which have to be sent to the analog converter as mA signals. Please note that a transmitter type >S4< allows 4 analog outputs to be set and displayed, analog outputs 1 and 2 however are physically available only.

Note

The actual current on the output clamps will not be displayed. The only signal visible is the one the analog output converter is receiving for output purposes.

External faulty wiring neither can be detected nor indicated in this menu.

9.6.4 I/O Menu „Digital Outputs”

Conditions which are calculated by the transmitter and routed to the relay for output purposes subsequently can be viewed here. Select from either logically "OFF“ or "ON".

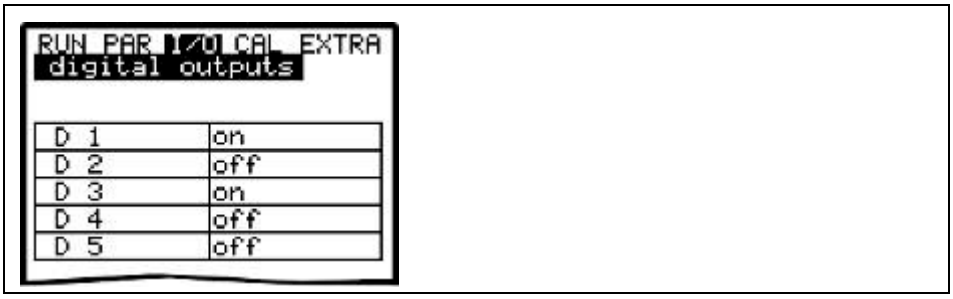


Fig. 9-129 Digital values

Note

The actual output condition of the relay contacts on the output clamps will not be displayed. The only signal visible is the one the relay is receiving for output purposes. Mechanical or electrical defects of the output relay cannot be detected this way.
External faulty wiring neither can be detected nor indicated in this menu.

9.6.5 I/O Menu „Sensors”

This menu including the respective submenus allows to view and to assess 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.
In case of using 2 or 3 flow velocity sensors select the sensor by choosing the according channel number.
Depending on the sensor configuration used (level measurement from bottom up, level measurement from top down, pressure measurement or measurement via external sensor) several menus may come up:

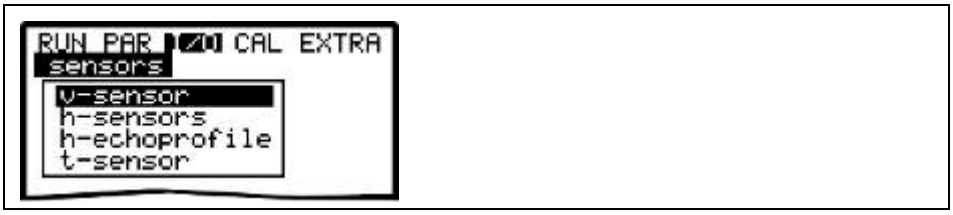


Fig. 9-130 Basic selection menu

V-Sensor Choosing this point is going to bring up a 2-page table including all individual velocities measured and the heights of the respective measurement windows.

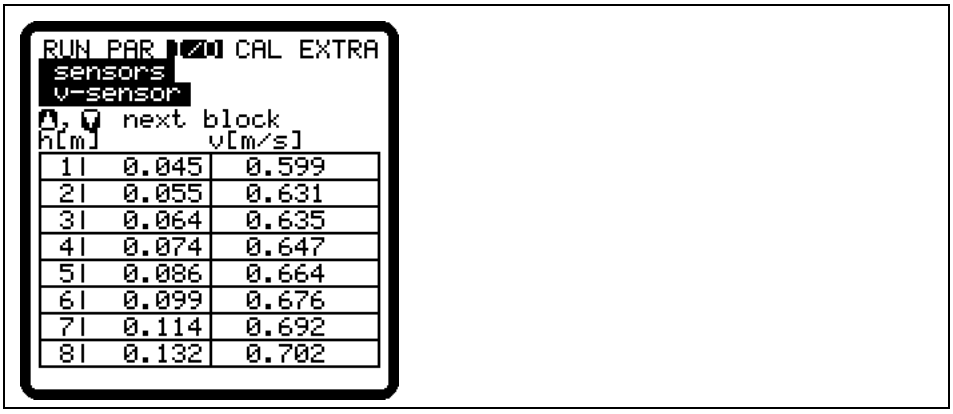


Fig. 9-131 Indication of measured single velocities

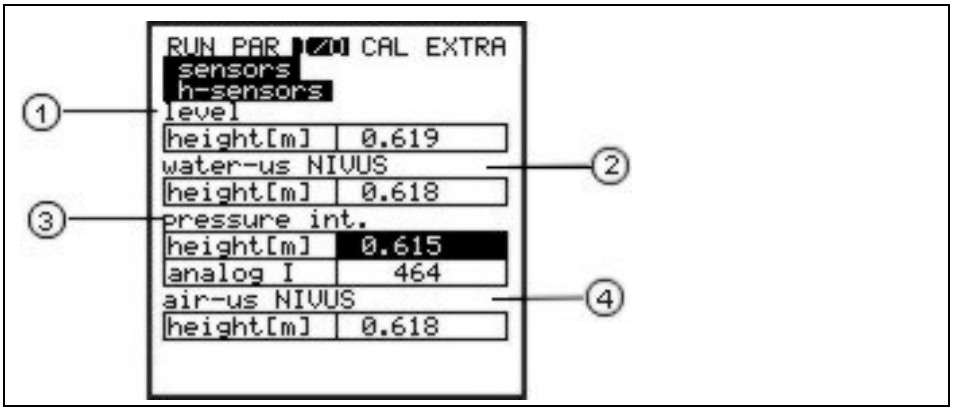
▲ + ▼ Toggle between both pages (measurement windows 1-8 and 9-16) by using the up and down keys.

Depending on the sensor type used the first measuring window can be found at varying height level positions.
A reading of ------ in a measurement window indicates that there is currently no flow velocity able to be measured in the according window. This might happen due to very clean water or vorticity within this area. This effect might occur as well in case of low flow levels, however is caused due to the OCM Pro automatically reducing the number of measurement windows here.
The measurement result will not be influenced even if one or few windows should fail!

H sensors

This menu indicates the measured filling levels. Depending on the used sensors for level measurement (via water-ultrasonic, pressure, air-ultrasonic or 2-wire sensor, see chapter 9.5.2) different menus are displayed:

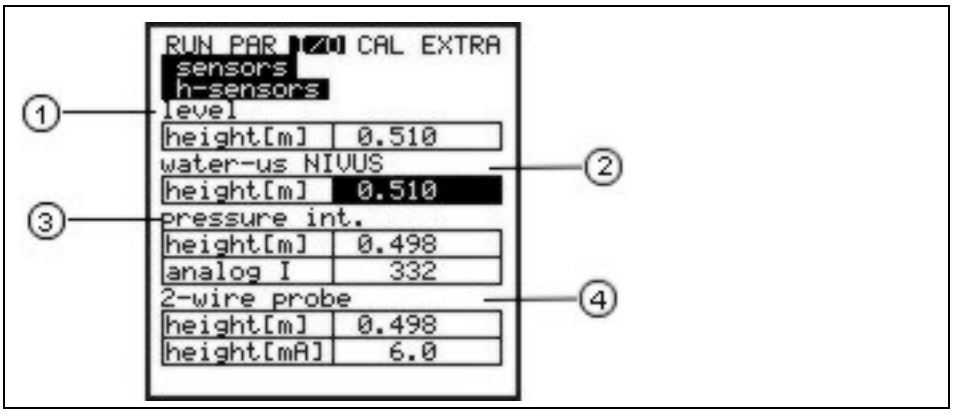
Example 1:



1 Level
2 Level water-ultrasound
3 Level pressure internal
4 Level air-ultrasound NIVUS

Fig. 9-132 Menu selection with water-ultrasonic, pressure and air-ultrasonic

Example 2:



1 Level
2 Level water-ultrasound
3 Level pressure internal
4 Level 2-wire probe

Fig. 9-133 Menu with water-ultrasonic, pressure and 2 wire probe

If 1 or 2 sensor types were selected only this will be indicated respectively

H echo profile

Active on level measurement via water-ultrasonic from the bottom and air-ultrasonic from the top.

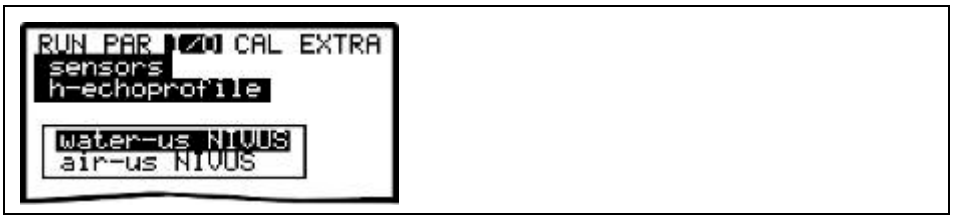


Fig. 9-134 Selecting level measurement echo profile

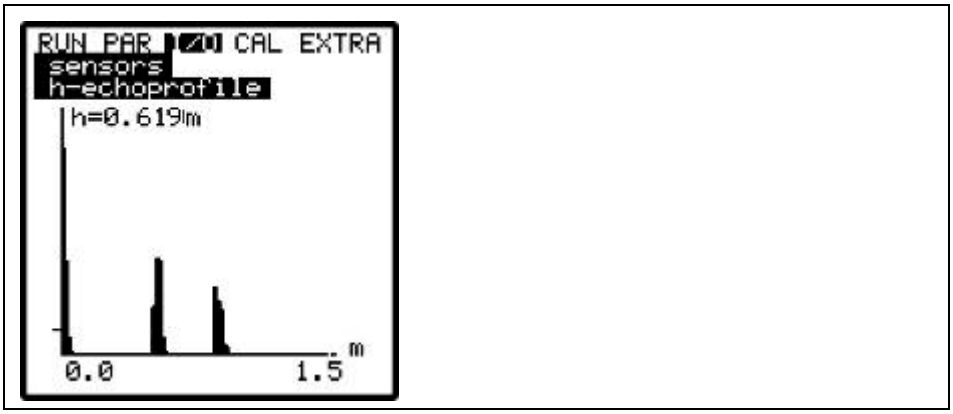
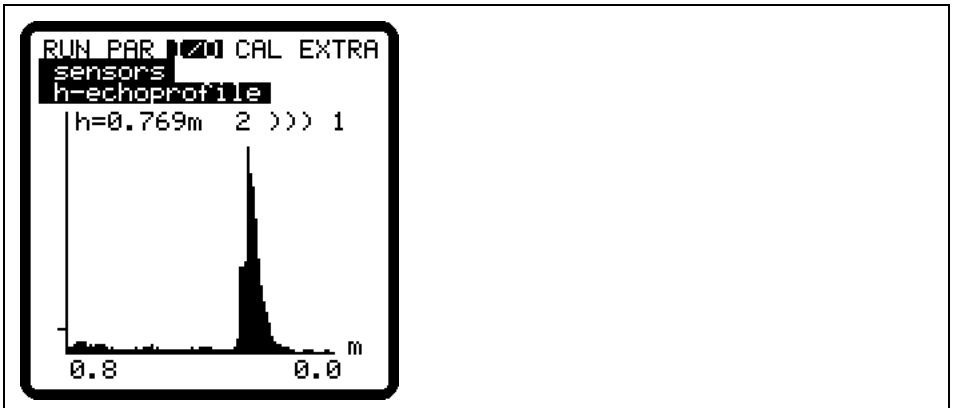


Fig. 9-135 Display echo profile with sensor type POA/OCL

This graphic enables the service personnel to assess the quality of the echo signal in the measured acoustic path. Ideally the first peak (reflections from the interface between water and air) is very narrow, steep and high, all further peaks (double and multiple reflections caused by the echo signal moving back and forth between the interfaces water/air and water/ground) are lower and wider.



h: Distance from piezo crystal to water surface

2 >>> 1: Currently active piezo crystal

0,8 m: Channel height

Fig. 9-136 Echo profile screen with sensor type DSM

The screen shown above indicates the current level in the channel at a mounting height of 0.862 m – 0.776 m = 0.086 m.

T-Sensor

This screen allows to view the measured water and air temperature. The air temperature measurement only possible by using one external air-ultrasonic sensor type OCL/DSM driven by OCM Pro.
Invalid values indicate cable break, short circuits or incorrectly clamped connections.

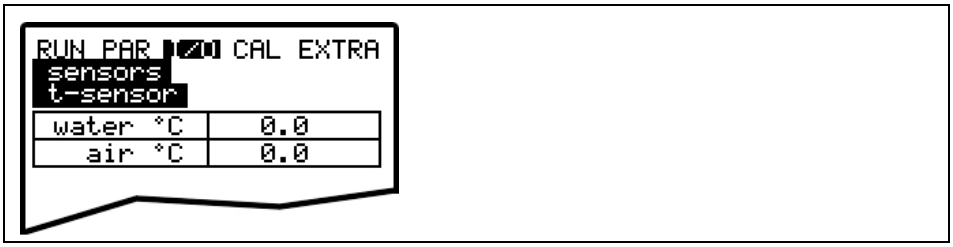


Fig. 9-137 Temperature screen

9.6.6 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.

9.6.7 I/O Menu "Controller"

This menu is visible only if the controller has been enabled in the PAR menu. Having the controller enabled will bring up the screen below:

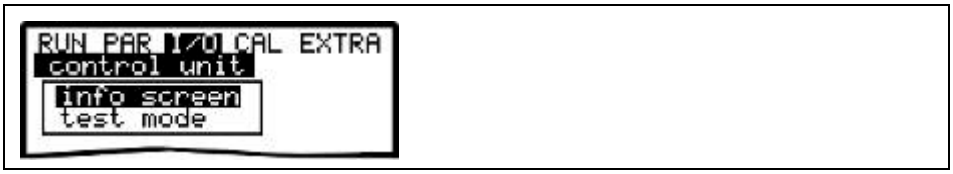


Fig. 9-138 Select controller information

Info screen

The menu indicates all signals (end switch) and settings (proportionality factor, slide valve run time, control deviation etc.) which are required for controller operation. The output signal times (regulating and switching time) are going to be displayed as well.
Use this info screen to detect missing end switch conditions as well as the current control deviation, the calculated regulating time, the current controller condition and more. It provides straightforward diagnostic options if internal controller errors or problems should occur.

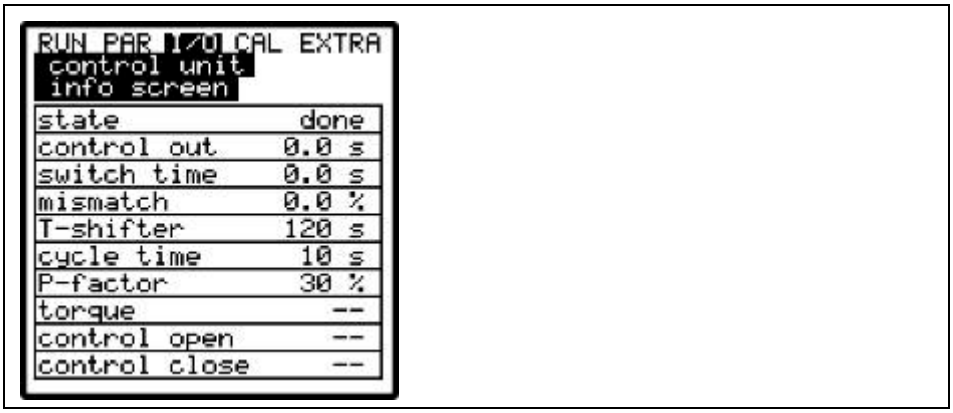


Fig. 9-139 Overview on current controller processes

Manuel operation

The slide valve can be manually opened and closed for testing purposes.
The arrow keys ▲ and ▼ serve as manual control elements.

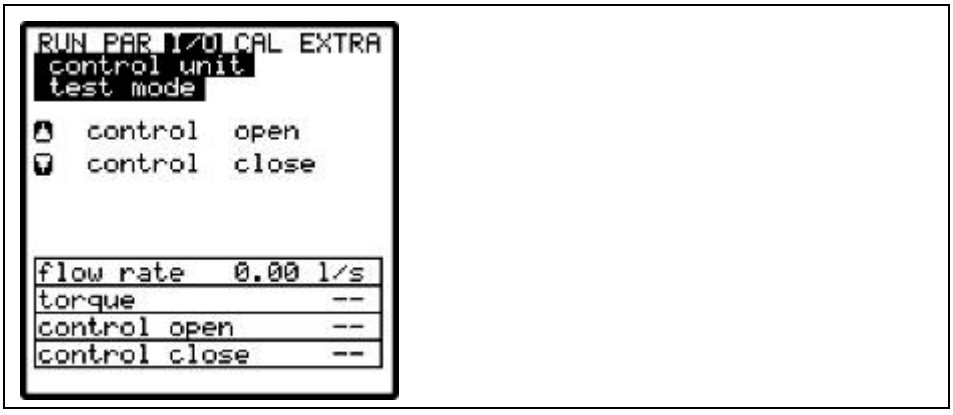


Fig. 9-140 Control menu for manual controller operation

9.6.8 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.

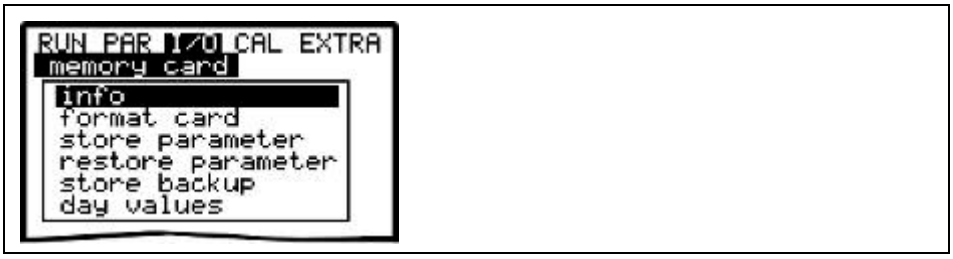


Fig. 9-141 Memory card menu

Info

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 into the OCM Pro for one hour at least.

Fig. 9-142 Card information

Note

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

Format card

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

Important Note

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.

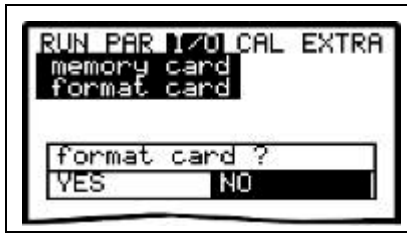


Fig. 9-143 Card formatting request

Important Note

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

Make sure to save your data prior to formatting!

Store parameter

The OCM Pro CF parameter settings can be read in or read out in order to transfer the settings to similar measurement places or for data backup.
This menu point is used to save all parameters on the memory card. This procedure takes approx. 30 seconds.
The progress is indicated by a corresponding bar.

Fig. 9-144 Saving parameters on memory card

Load parameters

This menu point first of all shows all programming files available on the plugged card. After being selected by using the cursor keys and subsequently confirming with >Enter<, the desired file is going to be transmitted to the OCM Pro CF.
The name of the required file is "PARAMET.NIV".

save = OCM Pro CF à card
load = card à OCM Pro CF

Store backup

Data which have been stored within the past 14 days in the OCM Pro CF can be "rescued" in case of data loss due to faulty data readout, defect cards, unintentional formatting or similar. These data from the internal memory is used for trend indication in RUN menu as well.

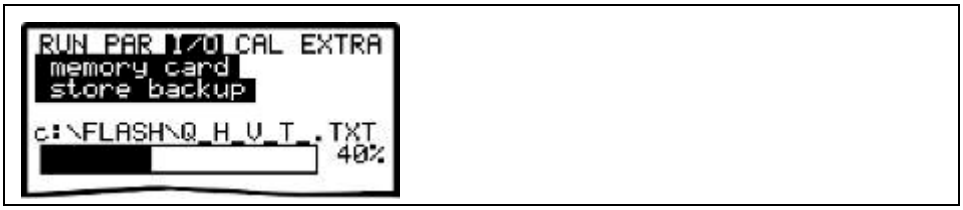


Fig. 9-145 Data backup

Day totals

It is possible to save day totals collected over 90 days to the memory card. The data is saved as a file named >Total.txt< in the "Data" folder including date, time and total (difference to previous day). The totalising time refers to the settings in the "RUN / Day totals / Cycle" (see Fig. 9-10).
The memory operates as circular memory. This is why always the precious 90 days will be indicated.

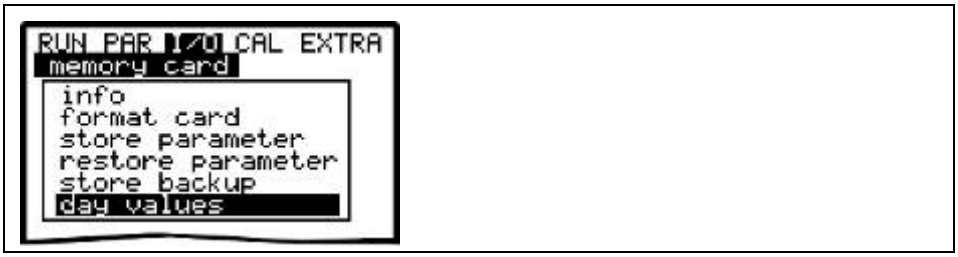


Fig. 9-146 Save day totals

9.6.9 I/O-Menu Communication

This menu currently contains the sub-item Modbus.
Here "Read Input Register" and "Read Holding Register" can be called up for control purposes.

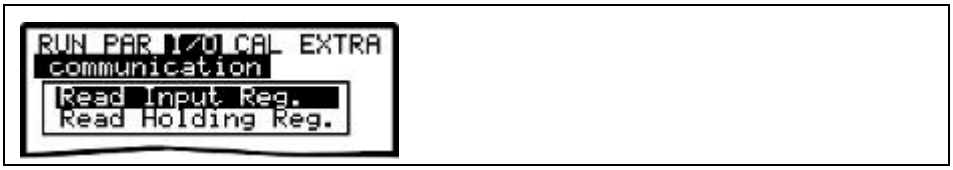


Fig. 9-147 "Read Input Register" / "Read Holding Register"

9.7 Calibration and Calculation Menu (CAL)

This menu allows to adjust level measurements (sensor with integrated pressure measurement cell), to adapt analog outputs to following systems and to emulate relay switching events and analog outputs.
Furthermore it is possible to enable and/or to modify the automatic self-calculation function (open channel discharge calculation).

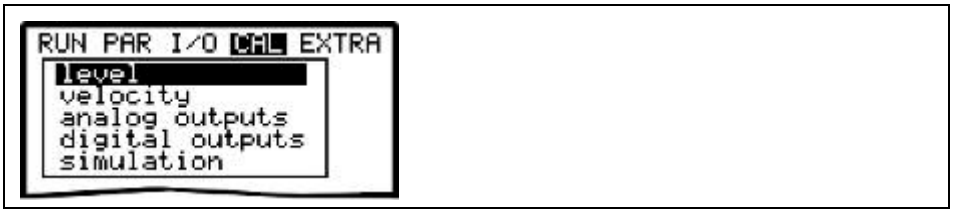


Fig. 9-148 Menu selection

9.7.1 Cal-Menu "Level“

If using a combi sensor with pressure measurement cell for level measurement please note that due to physical reasons the pressure measurement cell is subject to zero point drift during a longer period. Therefore it is useful to adjust the pressure sensor to the zero point regularly (recommended interval: 6 months).
If the sensor with pressure measurement cell is installed laterally displaced or in a higher position, it is necessary to either enter the installation height in the PAR menu additionally or the pressure sensor must be adjusted as well.
Values for adjustment of the pressure probe installed on the bottom (no higher installation position) must be investigated with the sensor being removed if possible or if the water level is as low as possible.
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.

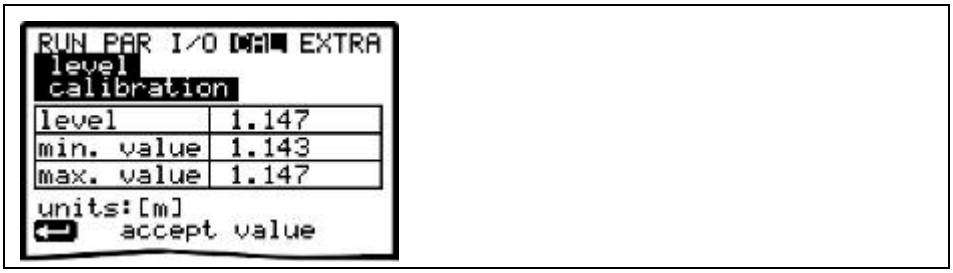


Fig. 9-149 Adjusting the level measurement

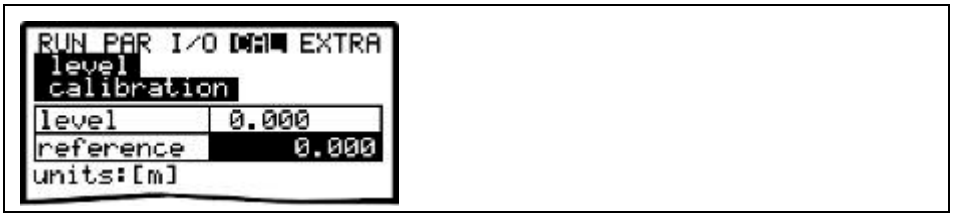


Fig. 9-150 Entering the correct filling level

Note

*Adjusting the zero point of the pressure measurement cell is often carried out by measuring the current filling level with a yardstick, a ruler or similar without removing the sensor. This method however is tending to errors. As soon as the ruler (or yardstick) is being put into the flowing water the resulting surge will lead to measurement errors depending on the current flow velocity. This is why the filling level for reference measurement purposes has to be measured **always** from top down!*

Please find detailed information in Chap. 12.1

9.7.2 Cal-Menu "Flow Velocity “

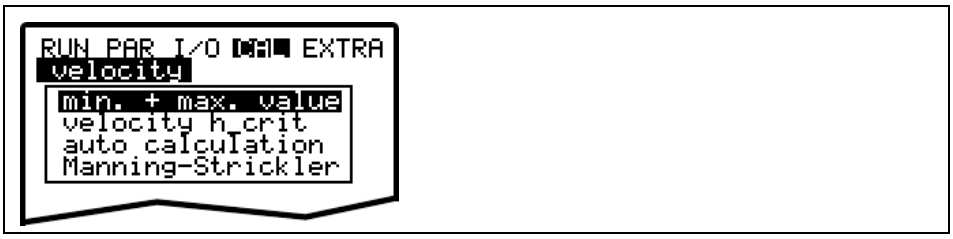


Fig. 9-151 Flow velocity indication

min. + max. value Defines the flow velocity range the OCM Pro CF shall yet be able to measure and to process.

Note

The basic setting of this parameter should not be modified. Otherwise there will be the risk of measurement interruptions or errors.
Exception: in case of negative flow velocities higher than -30cm/s the minimum value should be set to -1,0m/s.

If in case of negative flow the value is set to >0<, it is not possible to measure and to output the negative velocity.

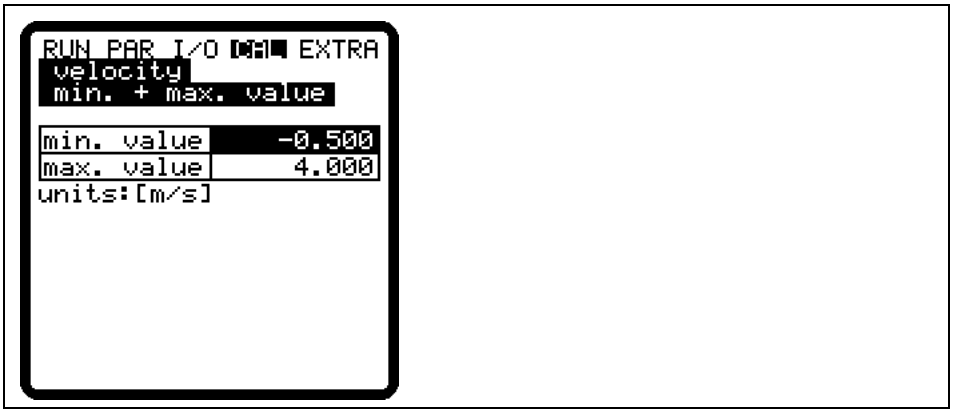


Fig. 9-152 Flow velocity measurement range

Velocity h_crit

This table either indicates the latest associated values which have been determined during normal operation in automatic mode (measured level and associated velocity) or according values will be set here.

Depending on the setting chosen in the following menu, the values set are either going to be verified or corrected (automatic YES and/or modification of Strickler coefficients) or otherwise these values are going to be used permanently (automatic NO) at the subsequent measuring event.

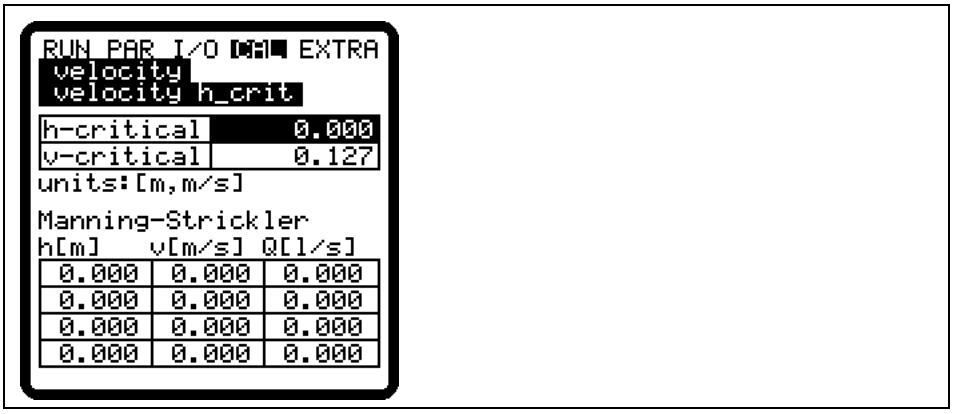


Fig. 9-153 Table of values for automatic Q/h relation

h_crit

It is no longer possible to measure the flow velocity as soon as a certain filling level has been undershot. This level is named h_crit.
The level h_crit is defined by the sensor construction, the sensor type and the measurement method. After initial start-up h_crit is set to 0.000 m. This allows to automatically accept the values saved in the sensor:
POA-Sensor: 0.065 m / CS2-Sensor: 0.10 m / CSM-Sensor: 0.030 m.
These values will be adjusted automatically in the background as soon as PAR/Flow velocity/Mounting height is modified. If after the initial start-up with the automatic mode activated no flow velocity is indicated, a level of 0.065 m (POA), 0.10 m (CS2) or 0.030 m (CSM) has not been overshot yet. In this case a flow velocity value prevailing at h_crit may be entered manually. If this value should be unknown it may possibly be assessed or calculated hydraulically. The automatic mode is not required as long as it is not necessary to indicate and to output flow rates lower than h_crit. In this case leave the entry >0< under v_crit unmodified.

Auto calculation

Automatic self-calculation is used as soon as, in addition to the standard condition, lowest discharge volumes at very low filling levels (e.g. nightly discharge, extraneous water or similar) are to be detected.
A prerequisite for the use of this function is that the application is **FREE OF BACKWATER**!
The detection principle is that the level in the channel decreases to a level which no longer allows flow velocity detection. This happens with sensor type POA as soon as the water level above the sensor falls below approx. 40-50 mm, with sensor type CS2 at a level of approx. 60-70 mm (2.36-2.76 in), with sensor type CSM at a level of approx.10 mm (0.394 in).

Please make sure to reliably detect level 0 (e.g. by using an external level measurement device, see also chap. 6.4).
If due to the constantly decreasing level (which hence at some point will be too low) it is no longer possible to detect a flow velocity, the OCM Pro CF creates an internal table of Q/h values by using the flow velocity value prevailing at the minimum flow level h_crit (flow level which is barely sufficient to reliably detect flow velocities) previously set. The exponent of the programmed channel shape will be considered automatically to calculate this curve.
This table uses assumes a flow velocity corresponding with the measured level for calculation even if this velocity cannot be measured any longer..

Due to hydraulic uncertainties this method may cause errors which may be significantly higher than if measuring by using flow velocity and level.

The function is only appropriate for minimum rate measurements in channels free of backwater and sedimentation and cannot be used apart from that! (risk of partly significant measurement errors!)

Depending on the setting selected the entered values will be verified and corrected if required in the course of the next measurement procedure (automatic >YES<). Another possibility is to permanently use the value set in "v-critical" (automatic >NO<). In this case however changes in flow behaviour e.g. caused by roughness on the measurement point or changes in viscosity will not be considered. On the other hand possibly faulty measurement values, e.g. caused by h_crit set too deep or vorticity, will not be saved at the moment of measuring and hence will not be used for calculation below h_crit.

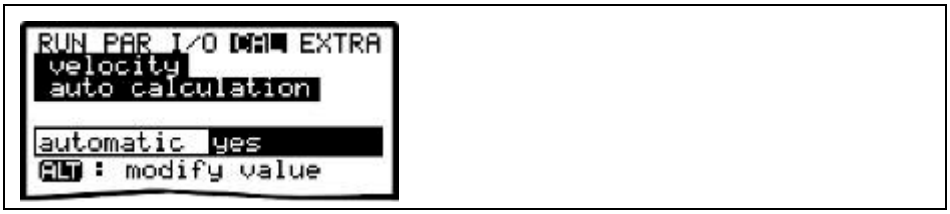


Fig. 9-154 Auto calculation

Manning-Strickler

The theoretical discharge curve is calculated using the settings under >Dimensions<, >Slope< and >Roughness<.
This function may be combined with the automatic mode (auto calculation YES). This setting corrects the theoretical discharge curve after modifying the Strickler coefficients.

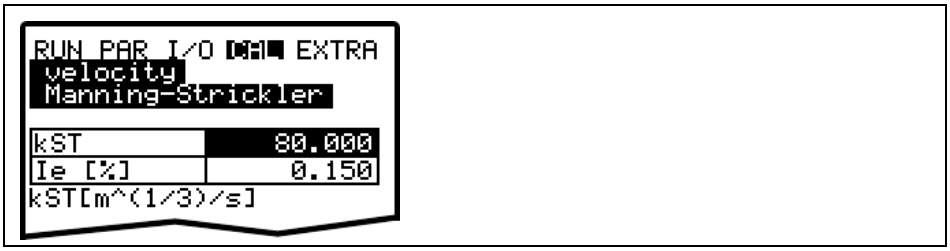


Fig. 9-155 Manning Strickler v-crit determination

kst Enter the Manning - Strickler coefficient
Ie [%] Enter the slope at the measurement point in %

Please see the table "Manning – Strickler Coefficients" in Chapter 0 for more information.

9.7.3 Cal-Menu "Analog Outputs “

Basic Hints on Simulation :

WARNING

Personal or material damages

The simulation of analog inputs and outputs is allowed to be carried out by specialist electricians only. These professionals need to know the complete regulation and control system of the facility.

Prepare the simulation in detail:
- *Switch following systems to manual operation.*
- *Disengage control elements or limit the respective functions.*

Make sure to have a safety person available during simulation!

Failure to observe may result in damages affecting persons or plant equipment.

NIVUS herewith in advance refuse responsibility 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!

CAUTION

Effects on following facility sections

*The simulation of OCM Pro outputs will access any following facility sections **without any safety locking measures**!*

Simulations are allowed to be executed exclusively expert personnel

Observe the above warning hints!

This parameter allows to simulate the OCM Pro 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.

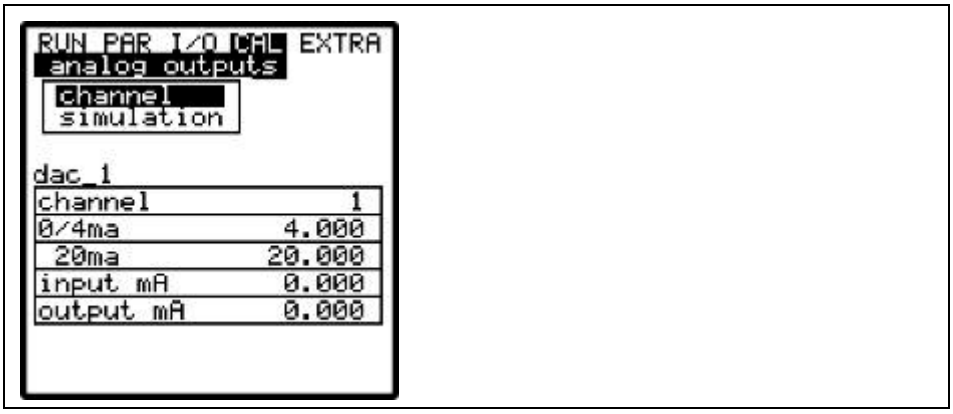


Fig. 9-156 Selecting the analog output simulation

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 here and confirm with Enter in order to directly output it on the according clamp assigned to the analog output selected before.

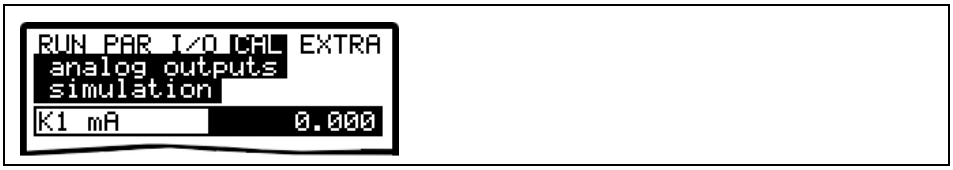


Fig. 9-157 Executing the simulation

9.7.4 Cal-Menu "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.

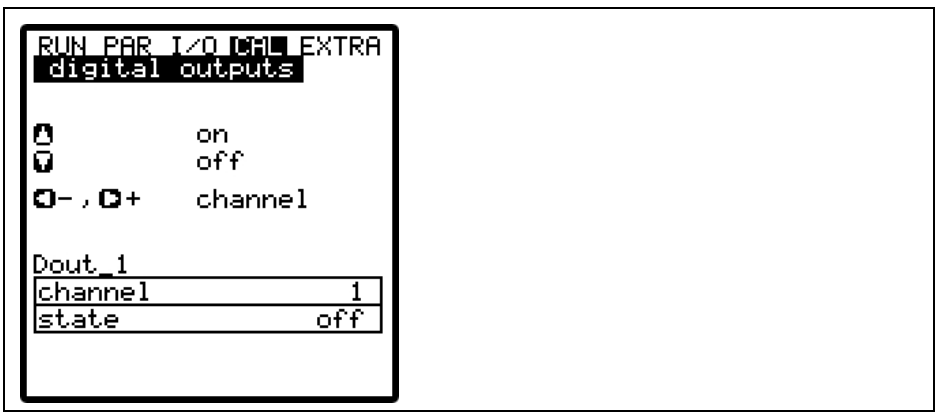


Fig. 9-158 Relay simulation

9.7.5 Cal-Menu „Simulation“

This function allows to simulate a theoretical flow by entering supposed level and velocity values without having these values actually available. The OCM Pro CF 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.

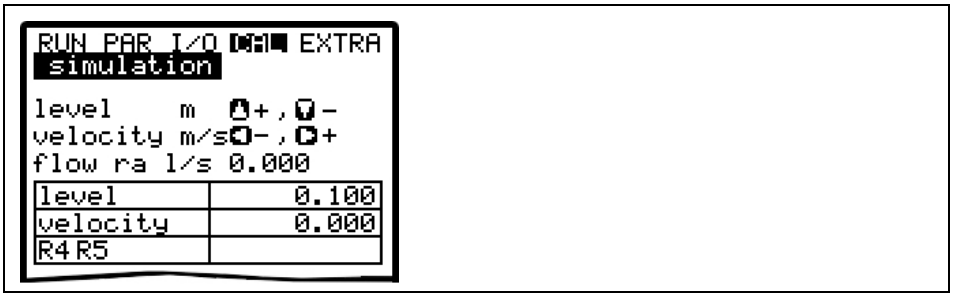
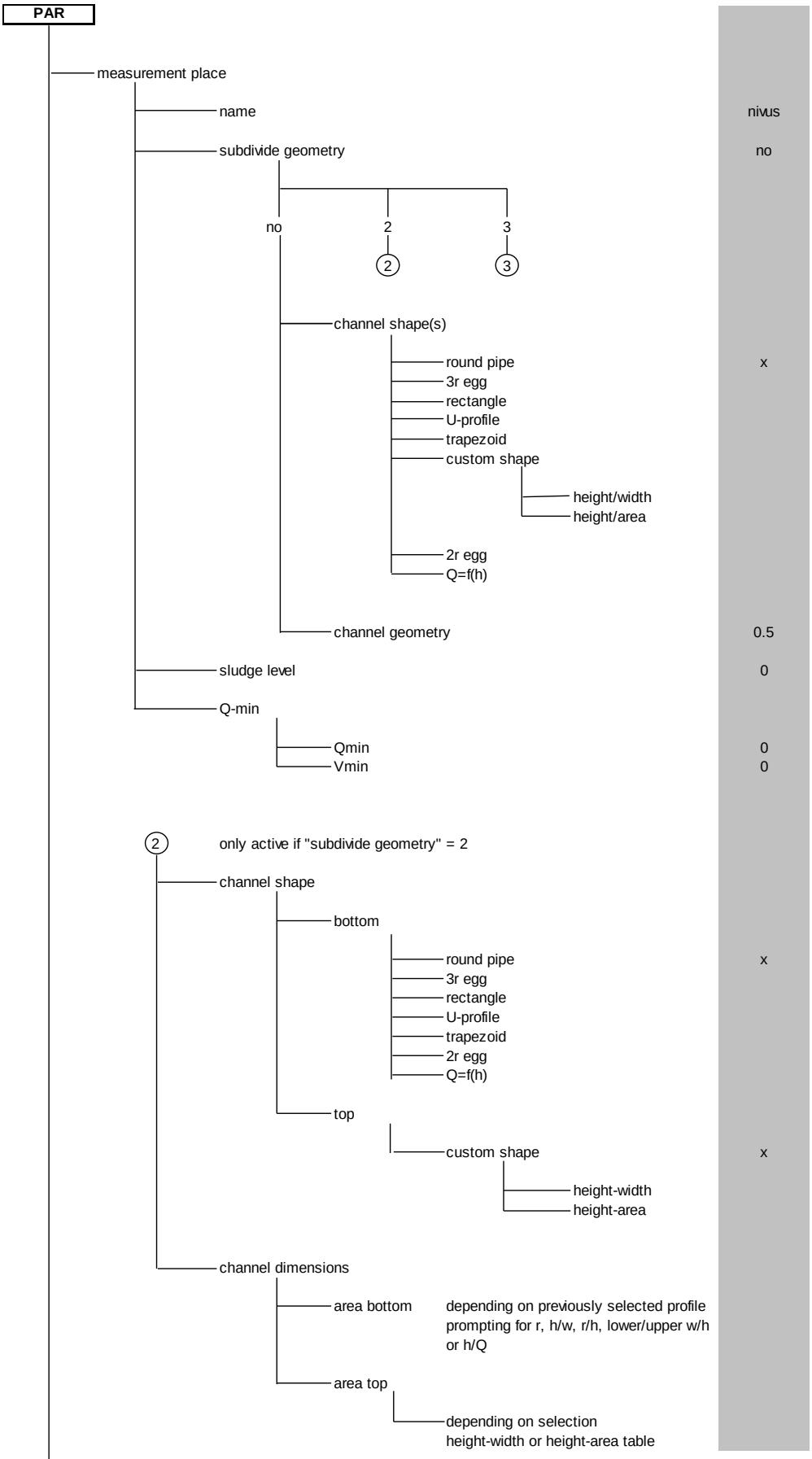


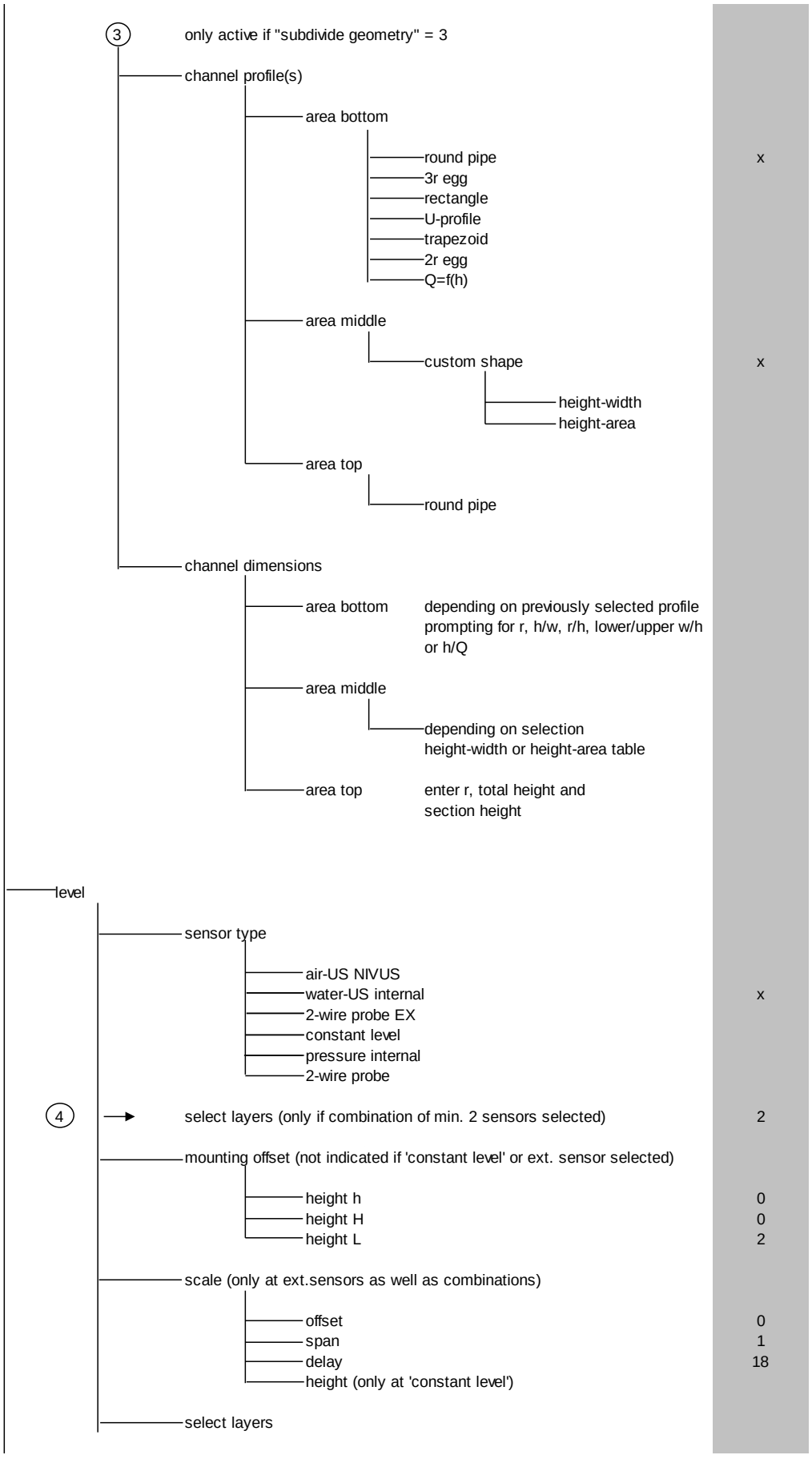
Fig. 9-159 Flow measurement simulation

10 Parameter Tree

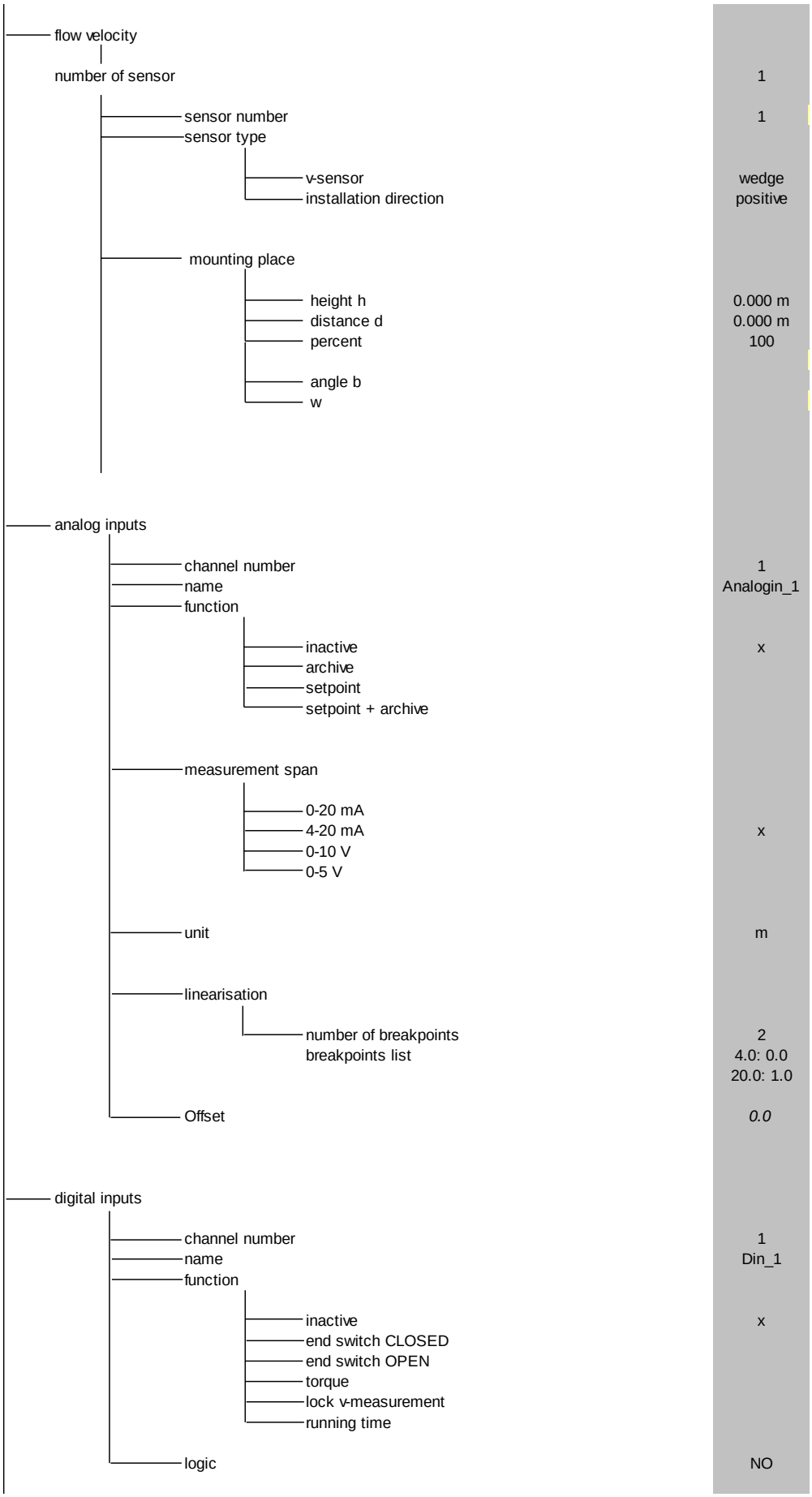
Parameter Menu (PAR) Part 1



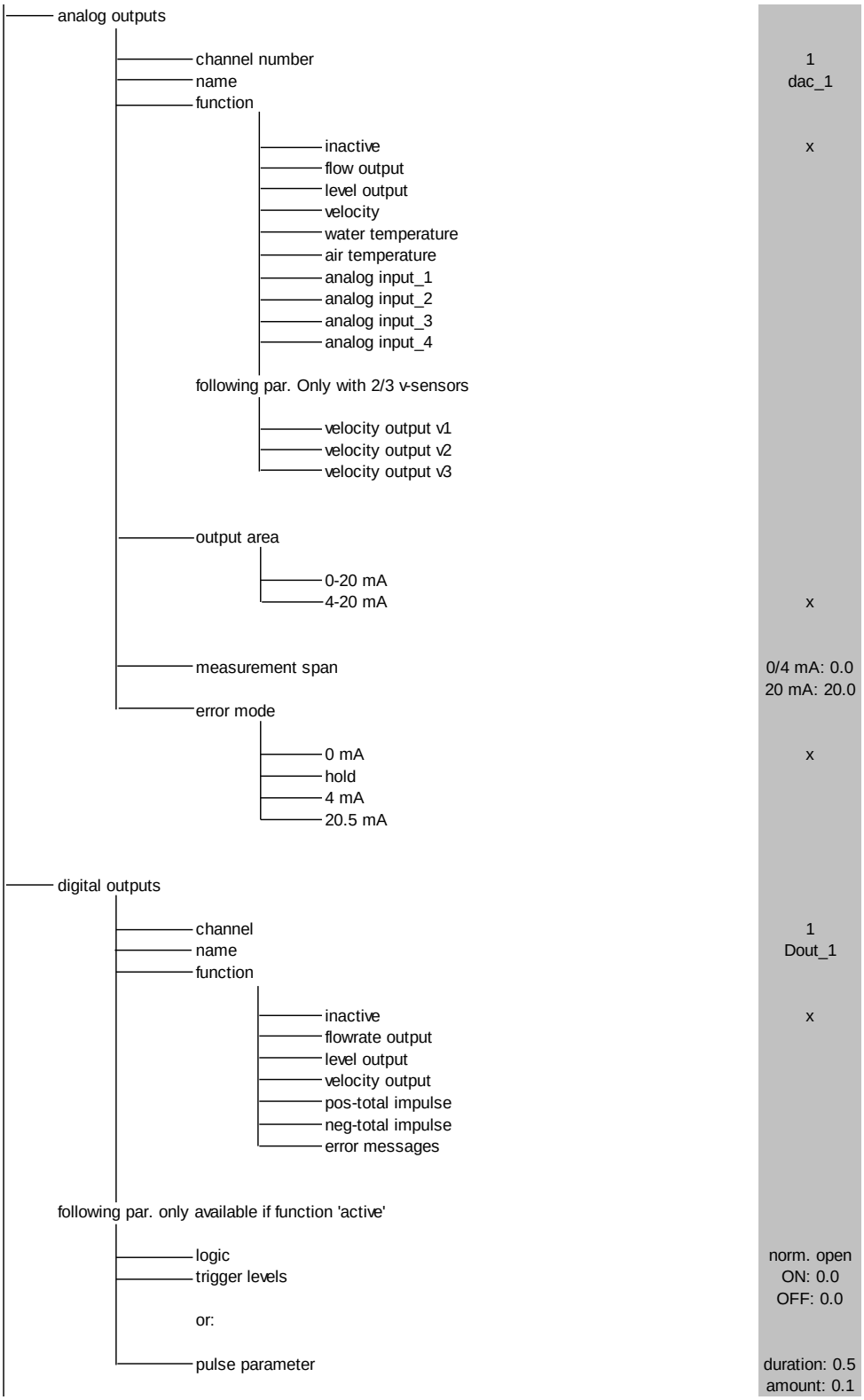
Parameter Menu (PAR) Part 2



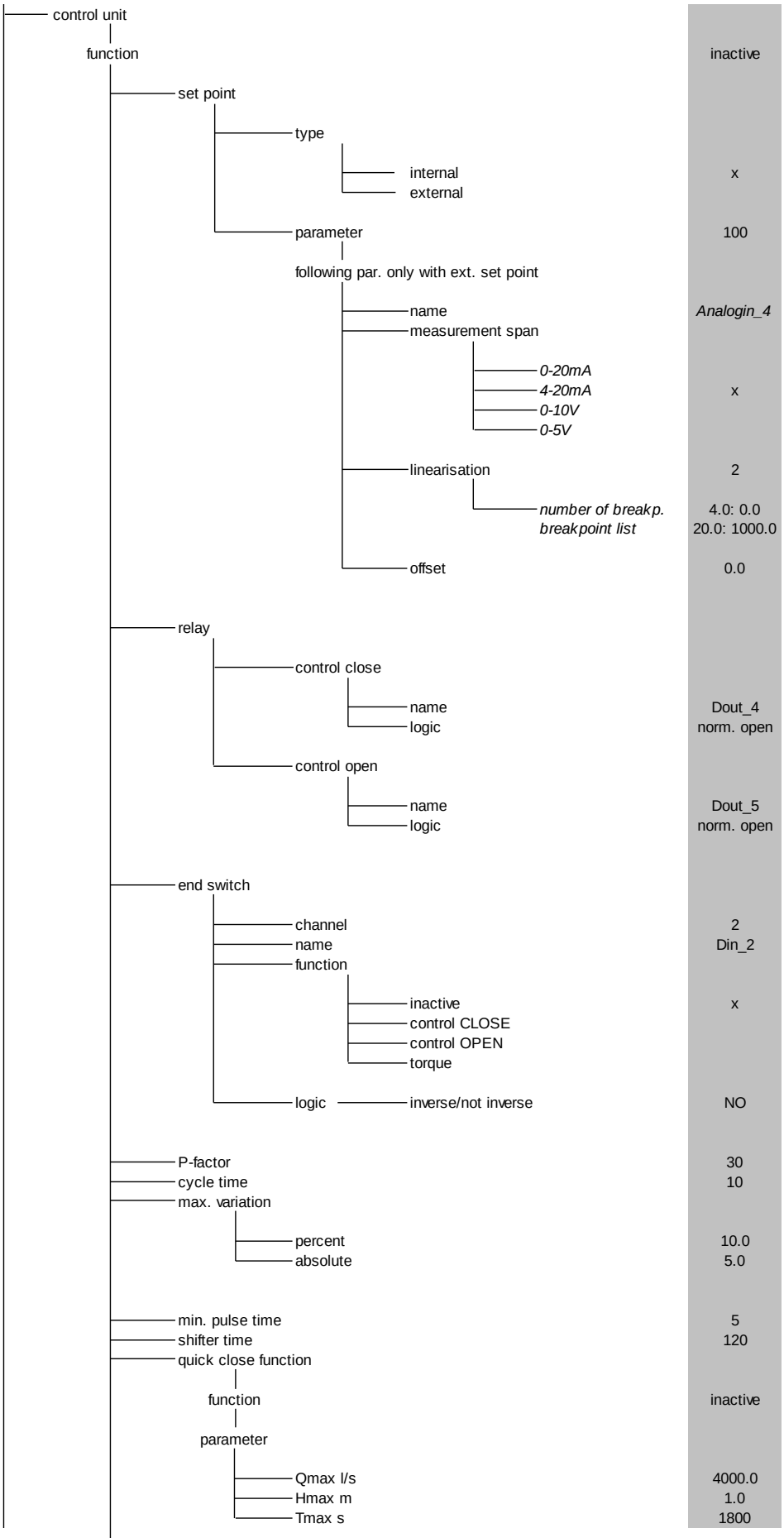
Parameter Menu (PAR) Part 3



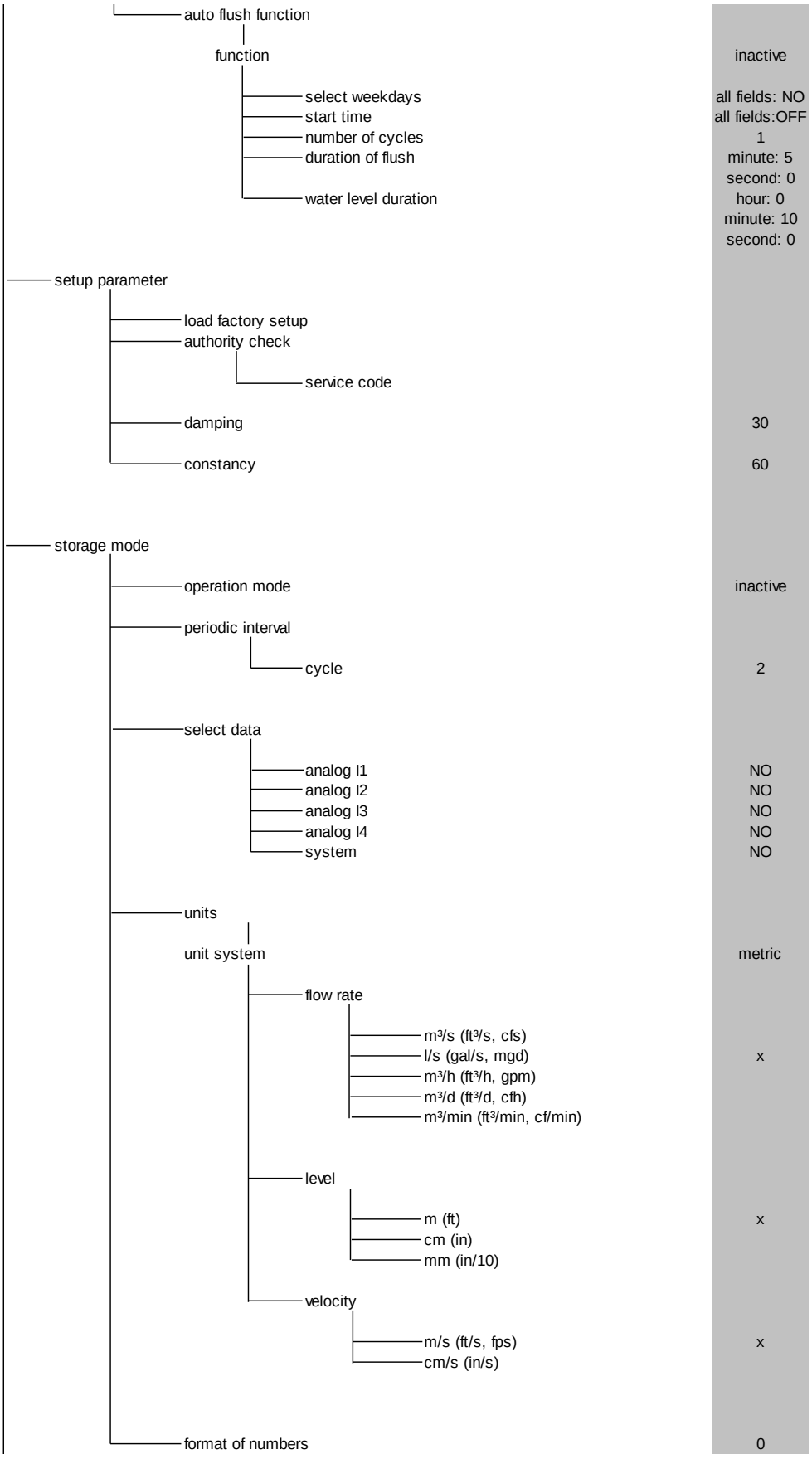
Parameter Menu (PAR) Part 4



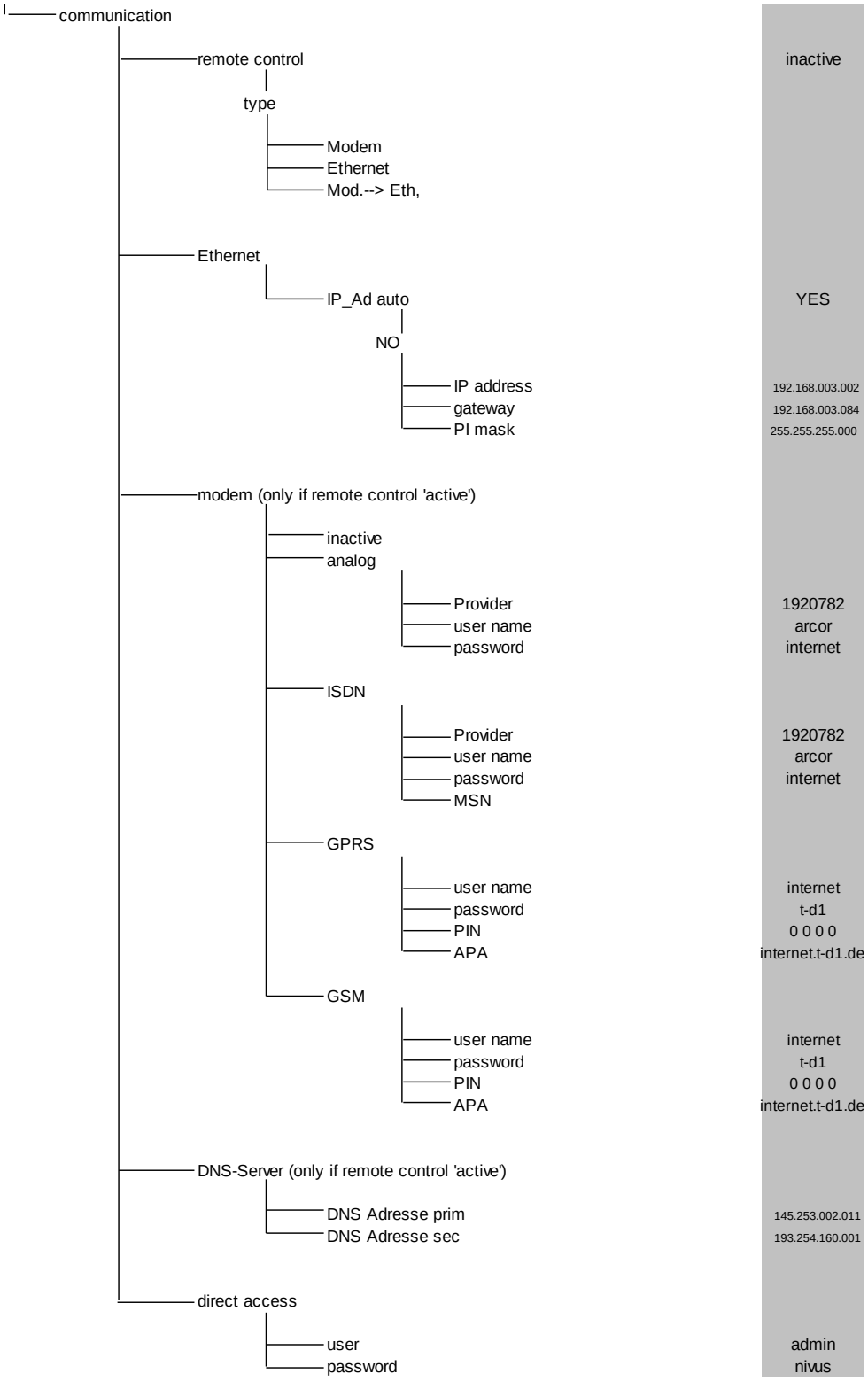
Parameter Menu (PAR) Part 5



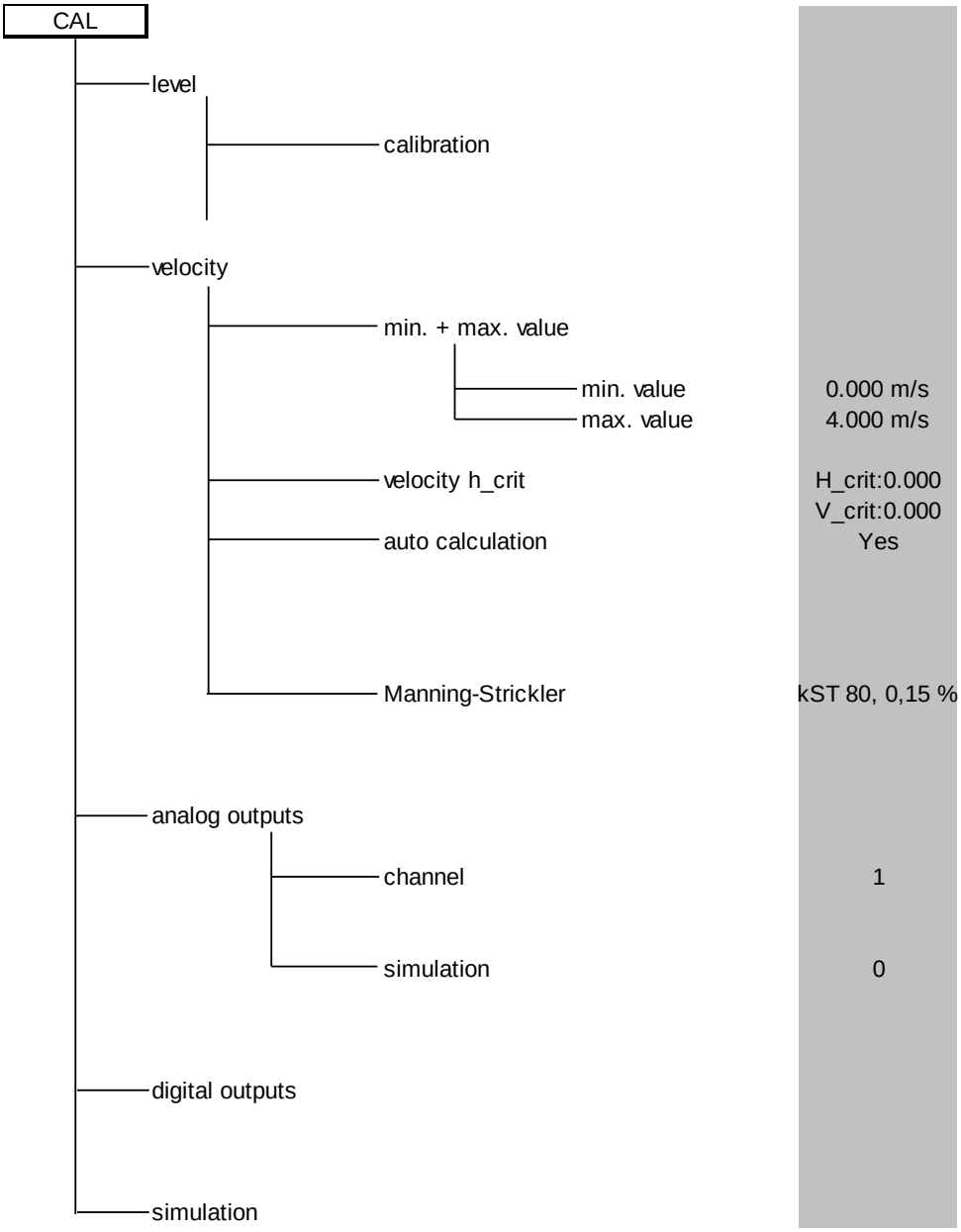
Parameter Menu (PAR) Part 6



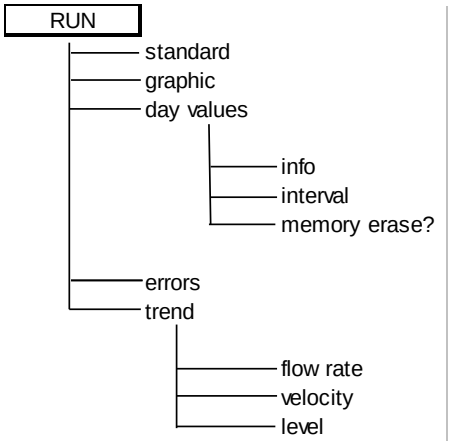
Parameter Menu (PAR) Part 7



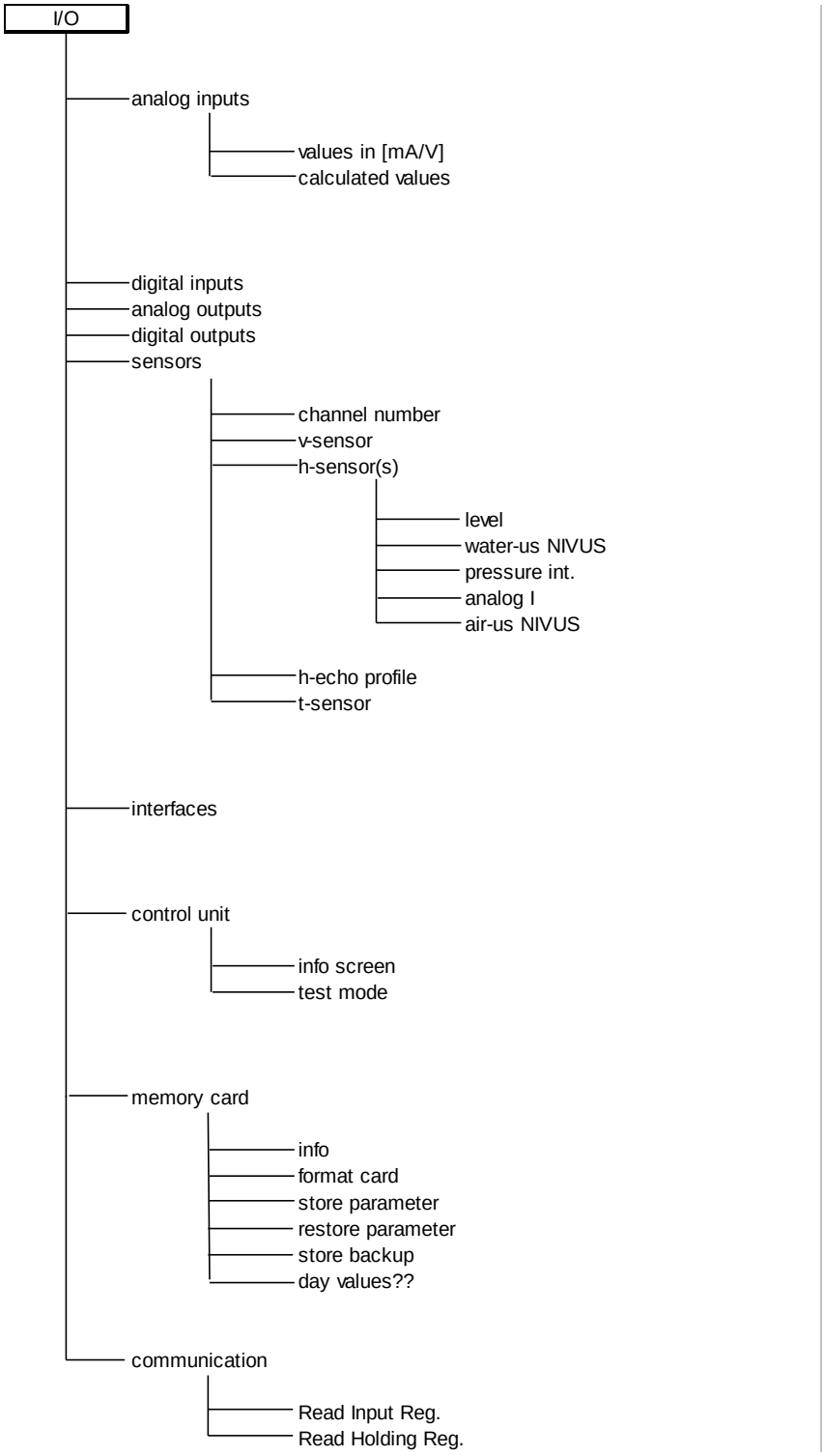
Calibration Menu (CAL)



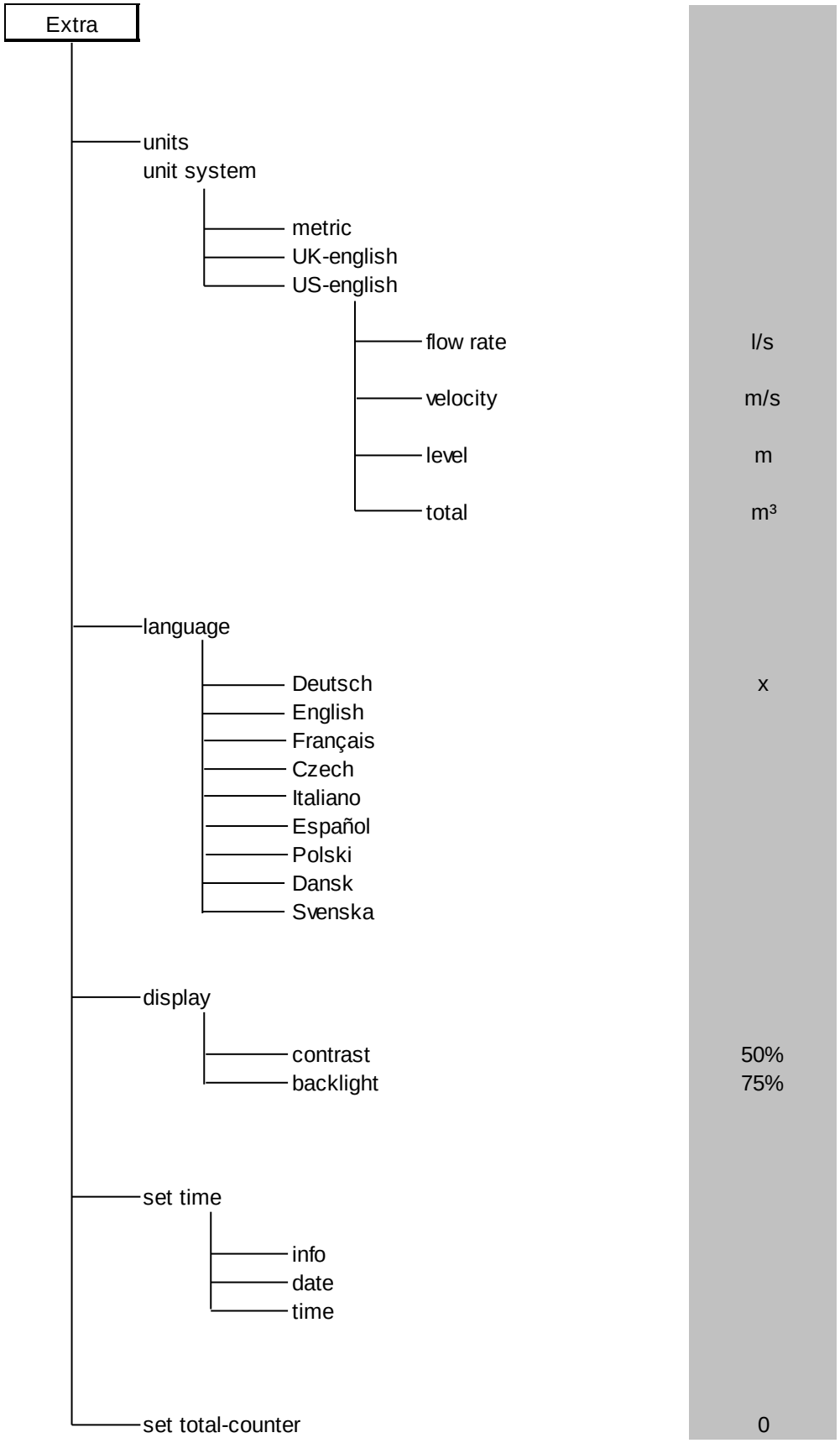
Operation Mode (RUN)



Signal Input/Output Menu (I/O)



Display Menu (EXTRA)



11 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 or air compensation element for correct connection or moisture.
	Sensor	Check sensor installation (towards flow direction, horizontal installation)
		Check sensor for soiling, sedimentation, silting (à to be removed) or mechanical damage or sensor body and cable (à replace sensor).
	Flow level measurement	**Important:** no flow level à no flow velocity measurement possible!! In case of water-ultrasonic measurement: check sensor for horizontal installation. Check sensor function in menu >I/O - Sensors - H-Sensor >echo profile<. In case of external level measurement: check external transmitter for function and signal transmission (cables, clamp connections, short circuits, contact resistances). In case of measurement with pressure cell: check compensation channel at sensor body for obstructions.
		Flow level > 65 mm (if using sensor type CS2: 150 mm? Type DSM >30 mm?)? In this case the OCM Pro is in Q/H measurement mode at initial start-up. Enter the velocity prevailing at a level of 65/150/30 mm manually in parameter CAL – Flow vel. – Velocity h_crit. This must be done only once.
		Check level measurement parameter "Fixed value“ in case of measuring in full channel without using level measurement.
	Transmitter	Call up error memory. Depending on error messages take the respective measures (check cables, plug and socket connections, sensor installation). If >CPU Error< is indicated consult NIVUS service personnel. Investigate the moment of failure in menu RUN – Trend.
	Negative flow direction	Check installation direction of the sensor, rotate sensor if required. If the flow direction is reversed only occasionally and the measurement fails subsequently à set min. value to –1.0m/s in menu CAL-Flow vel. – min. + max. value.
	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 à use NIVUS memory card.
		Improper memory size? à use card with permissible maximum capacity
		Card formatted on PC? à send card to NIVUS.
Display Error Sensor >X<	Connection	Check cable connection. Wiring on terminal strip switched? Cables firmly connected to plugs (retighten screws, pull at cable ends)? Insulation of single wires unintentionally clamped in? Hint: error messages indicating sensor number 1, 2 or 3 refer to flow velocity sensor 1, 2 or 3. >Error Sensor 4< refers to the air-ultrasonic sensor.
	Communication	Communication to sensor disturbed. Can be checked by pressing the I key. Sensors should be indicated in the third line of the following screen. Check cables for interruption or loose connection. Check sensor for mechanical damage.
Messwert instabil	Messstelle hydraulisch ungünstig	Check quality of measurement place by using the graphic flow profile display. Relocate the sensor to a hydraulically more suitable place (extend calming section).
		Remove soiling, sedimentation or obstructive constructions in front of the 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 value	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.
		Check if sensor is installed on a vibration-free place. Check sensor installation (towards flow direction, horizontal installation), check sensor for soiling.
	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 connections on terminal clamp strip.
		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 transmitter type. Type S4 has only 2 relay outputs, type M4 however 5 relays.
	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.
No controller function	Connection	Check terminal clamps (relays 4 and 5 are dedicated to controller function).
		Check power supply of external control relays.
		Check input signals from limit contacts and setpoint.
		Check output control function by using menu manual controller operation.
	Transmitter	Check transmitter type. Only type M4 is suitable for controller operation.
	Programming	Check settings. Controller enabled? Controller parameters set? Analog input set and enabled as setpoint? Relay outputs enabled?
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	Output enabled?
		Check if functions have been assigned to correct output channel.
		Check output range (0 or 4-20 mA)

		Check output span
		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 – Memory card – Info.
		Unauthorised manufacturer à use NIVUS memory card.
		Improper memory size? Older systems are able to read only memory cards up to 32 or 64 MB. à Verify by checking the CPU version (press I key). 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 in Memory Mode –Operation Mode – Mode not enabled.

12 Verification of the Measurement Systems

12.1 General

The verification of the measurement system should be carried out by the NIVUS service if possible or by an expert company authorised by NIVUS.
In case of an initial general verification carried out by hydraulically and technically well-versed personnel, proceed according to the guidelines described below:

- Check the power supply on the OCM Pro CF. The according slide switch on the board must be engaged (see Fig. 7-35) The main screen must be visible on the transmitter display
- Check the communication between flow velocity sensor or combi sensor and transmitter by pressing the I-key (see chapter 9.1, Fig. 9-3)
  If the sensor(s) is/are not recognised, check the connections as well as overvoltage protection elements which might have been used.
- Check the level measurement
- Check the flow velocity measurement
- Check analog and digital inputs and outputs (see Chap. 9.5.1; 9.5.2; 9.5.3 and 9.5.4 as well as Chap. 12.2 und 12.3)

For initial assessment mainly the I/O menu as well as the >I-key< on the transmitter are helpful.
Refer to chapter 11 to locate the most prominent errors.

12.2 Verification of Combi Sensor with Pressure Measurement Cell

Due to physical reasons, the level measurement using sensors with pressure measurement cell is subject to long-term drift (see >Technical Instructions of Correlation Sensors<). NIVUS therefore recommend to calibrate sensors with integrated pressure measurement cells twice per year regarding the zero point. The best calibration results can be achieved if the water level is as low as possible or by dismantling and removing the sensors from the measurement medium. The calibration procedure is described in Chapter 9.7.

Note

Adjusting the zero point by measuring the current filling level with a yardstick, a ruler or similar in the flowing medium is tending to errors. As soon as the ruler (or yardstick) is being put into the flowing water the resulting surge will lead to measurement errors depending on the current flow velocity. This is why the filling level for reference measurement purposes has to be measured ***always*** *from top down.*

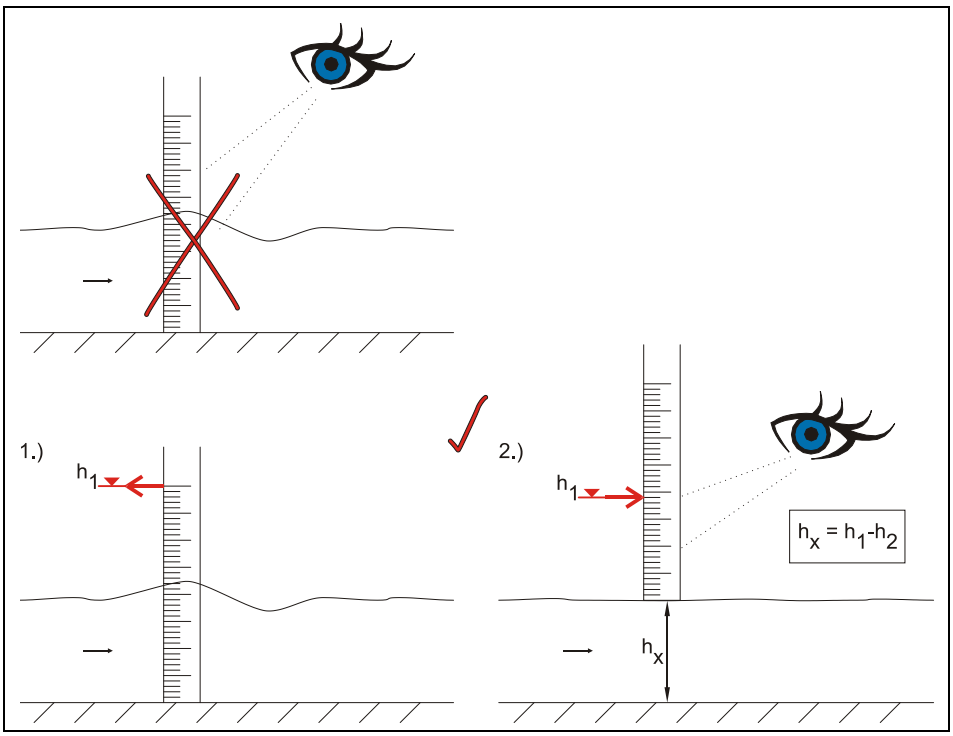


Fig. 12-1 Determination of reference level under operating conditions

CAUTION

Use care when cleaning the pressure measurement cell

Uninstall flow velocity sensors with pressure measurement sensor (type V1D, V1U, V2D, V2U) as soon as the pressure level measurement fails.

Immerse the sensor in water for a while.

Flush the pressure channel carefully or clean it with a soft (see Fig. 6-3 and Fig. 6-4).

It is not allowed to flush the sensor with high pressure. This may lead to misadjustment of the 0-point or may even destroy the built-in pressure sensor.

Furthermore never remove the ground plate (risk of leakage or sensor destruction).

12.3 Verification of external Level Measurement

When using an external level measurement (e.g. NivuMaster) proceed as follows:

- measure the filling level in the channel with a yardstick (see Fig. 12-1)
- adjust the zero point on the level transmitter if required
- Then compare output signal as well as measurement span of the external measurement with the analog input signal and the measurement span of the OCM Pro CF in PAR menu as well as in I/O menu and adjust accordingly if required.

12.4 Verification and Simulation of Input and Output Signals

The I/O menu (see Chap. 9.6) allows to verify connected sensors as well as to check signal inputs and outputs with the aid of several submenus.
The I/O menu allows to indicate various values:

- current input and output values,
- relay conditions, echo profiles,
- single velocities etc.

The menu however does not allow to affect signals or conditions (offset, adjustment, simulation or similar).
Analog output signals, relay conditions as well as the theoretical flow can be simulated in the CAL menu.

12.5 Verification of Flow Velocity Measurement

Flow velocities within the single gates can be viewed in:

- I/O Menu\Sensors\V-Sensor
- RUN menu under >Graphics<.

the bottom line of the screen shows

- the individually selected level positions
- the accompanying flow velocity

One more possibility can be found in I/O-Menu\Sensors\V-Sensor (see Chap. 9.5.5, Fig. 9-131). These individual velocities can be verified using a portable flowmeter (e.g. PCM Pro, PVM-PD, hydrometric vane etc.).

In chapter 9.2, Fig. 9-6 a disturbed flow velocity graph is depicted.

Mechanical disturbance

A disturbed graph may have several reasons:

- sensor build-up
- sensor blockage

Measures: remove these disturbances (blockage or build-up).

Hydraulic disturbance

Another reason may be:

- sensor may have been installed at a hydraulically unfavourable position

Low quality or inaccurate readings.

Measures: check installation position of sensor and relocate the sensor if required.

The sensor is obstructed due to build-up or soiling (à to be removed) as soon as the flow velocity graph indicates visible disturbances as depicted Chap. 9.2, Fig. 9-6. Another reason is that the sensor may have been installed in position with improper hydraulic conditions tending to low measurement quality or measurement failure (à check installation position of sensor).

Missing level measurement

Note: Without a working level measurement it is not possible to measure flow velocities and hence the flow cannot be computed.

Alternative flow velocity determination:

The flow velocity measurement can be verified even if a level measurement is defective or not even. To do so, the instrument needs to be reprogrammed temporarily.
For the period of verification proceed as follows:

- set the level sensor to >Fixed value< in menu >PAR\Level\Sensor type<
- enter a plausible value
- Observe that the value is higher than the value entered in parameter h_crit
- Confirm the entries

The OCM Pro CF now operates using the fixed value. This makes sure that the flow velocity sensor is capable of positioning its measurement windows in different levels in order to carry out measurement.

Velocities still do not display?

After all measures described above have been taken, finally proceed as follows:

- Is the sensor connected correctly?
- Check the cable routing
- Check the transmitter clamp terminals for proper connection
- Check if the overvoltage protection is connected properly

Should all these measures not be successful, return the sensor to the manufacturer. The flow velocity sensor might be defective.

In various countries it may be necessary to carry out regular maintenance with comparative measurements in particular applications to comply with official regulations:

- evidence of compliance with official regulations
- regular maintenance
- comparative measurements

Within the scope of a maintenance contract NIVUS offers the services below:

- regular inspection
- hydraulic and technical assessment
- calibration
- troubleshooting and repairs

These services will be carried out according to DIN 19559 incl. the agreed proof of the remaining residual error, as well as according to rules in the respective countries.

13 Maintenance and Cleaning

WARNING

Important Note:

During maintenance and cleaning works the instrument shall be disconnected from mains power.

WARNING

Exposure to germs

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

Disregarding may lead to personal injury.

Maintenance extents as well as the according cycles depend on the following factors:

- measurement principle of the level sensor
- material wear
- measurement medium and channel hydraulics
- general regulations for the operator of this measurement plant
- ambient conditions

To ensure reliable, accurate and error-free function of the measurement system, we recommend annual inspections of the entire measurement system by NIVUS.

13.1 Transmitter

The device type OCM Pro CF is designed to be virtually maintenance-free, free of material wear and does not need to be calibrated.
If required clean the transmitter enclosure if with a dry, lint-free cloth.
For heavy pollution NIVUS recommends the use of commercial detergents or surface-active agents.
Do not use any abrasive cleansing agents.

WARNING

Disconnect instrument from mains

Disconnect the unit from mains before you start cleaning. This particularly applies as soon as the enclosure surface is cleaned with a damp cloth.

Disregarding may lead to electric shocks.

13.2 Sensors

Beachten Sie unbedingt die Hinweise zur Wartung und Reinigung der Sensoren. You can find a comprehensive description on sensor maintenance and cleaning in the "Technical Instructions of Correlation Sensors".

14 Accessories

ZUB0 ZMCC F128	Typ: Compact Flash Card; memory capacity: 128 MB
ZUB0 ZMCC FADA	Adapter for Compact Flash memory card for PCMCIA slot
BSL0 XXX	Overvoltage Protection for power lines and enclosures
SW0N SPRO	Evaluation software, NivuSoft Professional with matched functions: documentation of measurement sites, output as graphs and tables, creation of statistics/reports etc.
ZMS0 18XX	Weather protective roof for ZMS 160 or 161

15 Table "Manning - Strickler Coefficients “

Channel wall consistency		M in $m^{1/3}/s$	k in mm
smooth	glass, PMMA, polished metal surfaces	> 100	0...0,003
	plastic (PVC, PE) new steel plate with protective coating; smoothened cement plaster	[3] 100	0,05 0,03...0,06
moderately rough	asphalt coated steel plate; concrete from steel or vacuum formwork, no joints, carefully smoothened; planed wood, joint-free, new; asbestos cement, new	90...100	0,1...0,3
	smoothened concrete, smooth finish; planed wood, well-joint	85...90	0,4 0,6
	concrete, good formwork, high cement contents	80	0,8
rough	non-planed wood; concrete pipes	75	1,5
	hard-burned bricks, carefully joint; well-manufactured ashlar facing; concrete from joint-free wooden formwork	70...75	1,5...2,0
	rolling-cast asphalt finish	70	2
	ashlar masonry, well-manufactured; moderately incrusted steel pipes; non-finished concrete, wooden formwork; squared stones; old and swelled wood; cement walls	65...70	3
	non-finished concrete; old wooden formwork; brickwork, no joints, finished; dry stone wall, less carefully manufactured; soil material, smooth (fine-grained)	60	6
Rougher surfaces are difficult to measure under hydraulic aspects and hence are not described here			

16 Emergency

In case of emergency

- press the emergency-off button of the main system or
- set the slide switch (see Fig. 7-35) on the unit to OFF.

17 Dismantling/Disposal

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

18 Table of Pictures

19 Index

20 Certificates and Approvals

Translation

(1) **EC-TYPE EXAMINATION CERTIFICATE**

(2) Equipment and protective systems intended for use in potentially explosive atmospheres - **Directive 94/9/EC**

(3) EC-Type Examination Certificate Number

TÜV 00 ATEX 1572

(4) Equipment: Measuring transducer type OCP/...

(5) Manufacturer: NIVUS GmbH

(6) Address: D-75031 Eppingen, Im Täle 2

(7) This equipment or protective system and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The TÜV NORD CERT GmbH & Co. KG, TÜV CERT-Certification Body, notified body number N° 0032 in accordance with Article 9 of the Council Directive of the EC of March 23, 1994 (94/9/EC), certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential report N° 00 PX24000.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50 014: 1997 **EN 50 020: 1994**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type examination certificate relates only to the design, examination and tests of the specified equipment in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment or protective system must include the following:

II (2) G [EEx ib] IIB

TÜV NORD CERT GmbH & Co. KG
TÜV CERT-Certification Body
Am TÜV 1
D-30519 Hannover
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Fax: 0511 986-2555

Head of the Certification Body

TÜV NORD CERT

Hanover, 2004-02-11

TÜV NORD CERT GmbH & Co. KG legal successor of the notified body of TÜV Hannover/Sachsen-Anhalt e.V. German original certificate issued on 2000-12-18

(13) **SCHEDULE**

(14) **EC-TYPE EXAMINATION CERTIFICATE N° TÜV 00 ATEX 1572**

(15) Description of equipment

The measuring transducer type OCP/... is used together with associated sensors for the measurement of flow speed and the flow level in open and closed channels via supersonic technology.

Electrical data

Supply circuit (a1 to a3) (b2, b3)	U = 90 ... 250 V AC, 25 VA or U = 18 ... 36 V DC, 25 W
Digital inputs (a12...a14, b12...b14)	U = 24 VDC, I = 12 mA
Analogues inputs (a15...a17, b15...b17)	U = 12 VDC, I = 55 mA
Analogous outputs (a18...a20, b18...b20)	Current output I = 0 ... 30 mA
Contact circuit (a4...a8, b4...b8, c4...c8)	U = 250 VAC, I = 6 A at cos φ = 0,9
Analogous sensor connection (a21, b21, c21)	in type of protection Intrinsic Safety EEx ia IIB only for the connection of certified sensors Maximum values U_o = 25.2 V I_o = 128 mA Characteristic line: linear max. permissible outer inductance 9 mH max. permissible outer capacitance 820 nF
Sensor connections (a22...a29, b22...b29, c22...c29)	in type of protection Intrinsic Safety EEx ib IIB only for the connection of associated sensors type OCS/... according to TÜV 00 ATEX 1573 Maximum values per circuit: U_o = 10.5 V I_o = 500 mA Characteristic line: rectangular max. permissible outer inductance 0.15 mH max. permissible outer capacitance 100 nF

The intrinsically safe circuits are safely galvanically separated from all other circuits up to a peak value of the nominal voltage of 375 V.

(16) Test documents are listed in the test report No.: 00 PX 24000.

(17) Special conditions for safe use

none

(18) Essential Health and Safety Requirements

no additional ones

Translation

1. SUPPLEMENT to

EC TYPE-EXAMINATION CERTIFICATE No. TÜV 00 ATEX 1572

of the company: NIVUS GmbH
Im Täle 2
D-75031 Eppingen

The measuring transducer type OCP/... may also be manufactured according to the test documents listed in the test report.

The amendments concern the internal design and the electrical data.

Electrical data

Supply circuit (a1 to a3) (b2, b3)	U = 90 ... 250 VAC, 20 VA or U = 18 ... 36 VDC, 20 W resp. Auxiliary voltage output of the AC version 24 V / 3 W
Contact circuit (a4...a8, b4...b8, c4...c8)	U = 250 VAC, I = 6 A at cos φ = 0.9
RS232 interface (terminal a and b) (a9...a11, b9...b11)	U = ±10 V
CAN bus interface (terminal c) (c9...c11)	U = 5 V
Digital inputs (a12...a14, b12...b14)	U = 24 VDC, I = 12 mA
Analogous inputs (a15...a17, b15...b17)	U = 12 VDC, I = 55 mA
Analogous outputs (a18...a20, b18...b20)	current output I = 0 ... 30 mA

1. Supplement to EC Type-Examination Certificate No. TÜV 00 ATEX 1572

Analogous sensor connection (a21, b21, c21)	in type of protection Intrinsic Safety EEx ia IIB only for the connection of certified sensors Maximum values: U_o = 23.1 V I_o = 162 mA Characteristic line: linear max. permissible outer inductance 6 mH max. permissible outer capacitance 1020 nF
Sensor connections (a22...a29, b22...b29, c22...c29)	in type of protection Intrinsic Safety EEx ib IIB only for the connection of associated sensors type POA/... und OCL/...according to TÜV 03 ATEX 2262 Maximum values per ciruit: U_o = 10.5 V I_o = 640 mA Characteristic line: rectangular max. permissible outer inductance 0.12 mH max. permissible outer capacitance 4.8 µF

The intrinsically safe circuits are safely galvanically separated from all other circuits up to a peak value of the nominal voltage of 375 V.

All other data apply unchanged for this supplement.

Test documents are listed in the test report N° 04 YEX 551173.

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Hannover, 2004-01-26

Head of the
Certification Body

TÜV NORD

Translation

2. SUPPLEMENT to

EC-TYPE EXAMINATION CERTIFICATE No. TÜV 00 ATEX 1572

Equipment:	Measuring transducer OCM-Pro aktiv type OCP-x2xx xx x3 E xx and Measuring transducer OCM-Pro CF type OCP-x3W0 xx x3 E xx
Manufacturer:	NIVUS GmbH
Address:	Im Täle 2 75031 Eppingen

In the future, the measuring transducer type OCP/... may also be manufactured according to the test documents listed in the test report.

The changes refer to the electrical data and the protection level of the circuit „Analogous sensor connection", the execution of the OCM Pro Backplane and the type designation of the measuring transducer.
In the future, this reads: Measuring transducer OCM-Pro aktiv/CF type OCP-xxxx xx xx E xx .

The type designations according to this 2. supplement to
EC-Type Examination Certificate TÜV 00 ATEX 1572 read as follows:
„Version 2": Measuring transducer OCM-Pro aktiv type OCP-x2xx xx x3 E xx
„Version 3": Measuring transducer OCM-Pro CF type OCP-x3W0 xx x3 E xx

Electrical data

Measuring transducer OCM-Pro aktiv type OCP-x2xx xx x3 E xx and
Measuring transducer OCM-Pro CF type OCP-x3W0 xx x3 E xx

Supply circuit (Terminals a1 [L1], a2 [N], a3 [PE] resp. b2 [+], b3 [GND])	U = 90 ... 250 V a. c., 20 VA or U = 18 ... 36 V d. c., 20 W resp. auxiliary voltage output of the a. c. version 24 V / 3 W
Contact circuits (Terminals a4...a8, b4...b8, c4...c8)	U = 250 V a. c., I = 6 A at cos φ = 0.9
RS232 interface (Terminals a9...a11, b9...b11)	U = ±10 V
CAN bus interface (Terminals c9...c11)	U = 5 V
Digital inputs 1 to 4 (Terminals a12...a14, b12...b14)	U = 24 V d. c., I = 12 mA

Measuring transducer OCM-Pro CF type OCP-x3W0 xx x3 E xx

Auxiliary voltage output 24 V / 3 W (Terminals a14, b15) — U = 18 ... 36 V d. c., 3 W

Analogous inputs 1 to 4 — U = 12 V d. c., I = 55 mA
(Measuring transducer OCM-Pro aktiv type OCP-x2xx xx x3 E xx:
Terminals a15...a17, b15...b17;
Measuring transducer OCM-Pro CF type OCP-x3W0 xx x3 E xx:
Terminals a16...a18, b16...b18)

Analogous outputs 1 to 4 — Current output 0 ... 30 mA
(Measuring transducer OCM-Pro aktiv type OCP-x2xx xx x3 E xx:
Terminals a18...a20, b18...b20;
Measuring transducer OCM-Pro CF type OCP-x3W0 xx x3 E xx:
Terminals a19...a21, b19...b21)

Measuring transducer OCM-Pro aktiv type OCP-x2xx xx x3 E xx and Measuring transducer OCM-Pro CF type OCP-x3W0 xx x3 E xx

Analogous sensor connection ..... (OCM-Pro aktiv: Terminals a21, b21, c21; OCM-Pro CF: Terminals D8, D9) — in type of protection "Intrinsic Safety" EEx ib IIB only for connection to certified sensors
Maximum values:
U_o = 25.2 V
I_o = 90 mA
Characteristic line: linear

max. permissible external inductance	2 mH	1 mH	0.5 mH	0.2 mH
max. permissible external capacitance	380 nF	430 nF	510 nF	660 nF

Sensor connections ..... (OCM-Pro aktiv: Terminals a22...a29, b22...b29, c22...c29; OCM-Pro CF: Terminals D1 ... D5, E1 ... E5, F1 ... F5, G1 ... G5) — in type of protection "Intrinsic Safety" EEx ib IIB only for connection to the belonging sensors type POA/... and OCL/... according to TÜV 03 ATEX 2262
Maximum values per circuit:
U_o = 10.5 V
I_o = 640 mA
Characteristic line: rectangular
max. permissible external inductance: 0.12 mH
max. permissible external capacitance: 4.8 µF

The intrinsically safe circuits are safely galvanically separated from all other circuits up to a peak value of the voltage of 375 V.

All other data apply unchanged for this 2. supplement.

The equipment inclusive of these changes meets the requirements of the following standards:

EN 50 014:1997 +A1+A2 EN 50 020:2002

(16) The test documents are listed in the test report N° 05 YEX 552376.

(17) Special conditions for safe use

none

(18) Essential Health and Safety Requirements

no additional ones

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Hannover, 2005-12-01

Head of the
Certification Body

Translation

3. SUPPLEMENT

to Certificate No.	**TÜV 00 ATEX 1572**
Equipment:	Measuring transducer type OCP-x4W0xxx4Exx
Manufacturer:	NIVUS GmbH
Address:	Im Täle 2 75031 Eppingen, Germany
Order number:	8000555840
Date of issue:	2010-08-06

In the future, the measuring transducer according to the EC-Type Examination Certificate TÜV 00 ATEX 1572 is only manufactured as type OCP-x4W0xxx4Exx.

The changes refer to
- the pc boards for the power supply and the backplane,
- the assemblies for limitation of voltages and currents of the intrinsically safe circuits,
- data for the intrinsically safe RS485 interface and
- the application of new optoelectric couplers for a faster data transfer rate.

In the future, the electrical data for the measuring transducer are valid as listed below.

In the future, the marking of the measuring transducer reads as follows:
II (2) G [Ex ib] IIB

Electrical data

Supply circuit	U = 85 ... 264 V a. c., 31 VA
(Klemmen	U_m = 264 V a. c.
a1 [L1], a2 [N], a3 [PE] resp.	or
b2 [+], b3 [GND])	U_n = 24 V d. c. (9 ... 36 V d. c.), 34 W
	U_m = 36 V d. c.

For all other non intrinsically safe data circuits (not for the relay contacts and for the auxiliary voltage output), a maximum voltage for safety reasons of U_m = 30 V is valid.

Analogue sensor connection	in type of protection Intrinsic Safety Ex ib IIB
(Terminals D8, D9)	only for connection to certified sensors
	maximum values:
	U_o = 25.4 V
	I_o = 91 mA
	P_o = 577 mW
	characteristic line: linear
	effective internal capacitance: 14 nF
	The effective internal inductance is negligibly small.

max. permissible external inductance	10 mH	1 mH	0.5 mH	0.1 mH
max. permissible external capacitance	356 nF	406 nF	486 nF	796 nF

Sensor voltage supply .....
(Terminals D3...5, E3...5, F3...5, G3...5)

in type of protection Intrinsic Safety Ex ib IIB
only for connection of the belonging sensors
type POA-x1... and OCL-L0... as well as
type POA-x2..., OCL-L1... and CS2-... according to
EC-Type Examination Certificate TÜV 03 ATEX 2262
maximum values per circuit:
U_o = 10.5 V
I_o = 640 mA
P_o = 6.72 W
characteristic line: rectangular
effective internal inductance: 3 µH
effective internal capacitance: 2 µF

max. permissible external inductance	117 µH	97 µH	47 µH
max. permissible external capacitance	4.2 µF	4.9 µF	8 µF

Sensor communication interface
RS485 .....
(Terminals
D1, D2; E1, E2; F1, F2; G1, G2)

in type of protection Intrinsic Safety Ex ib IIB
only for connection of the belonging sensors
type POA-x1... and OCL-L0... as well as
type POA-x2..., OCL-L1... and CS2-... according to
EC-Type Examination Certificate TÜV 03 ATEX 2262
maximum values per circuit:
U_o = 6.51 V
I_o = 167 mA
P_o = 272 mW
characteristic line: linear
The effective internal inductance and capacitance are negligibly small.

max. permissible external inductance	8 mH	2 mH	1 mH	0.5 mH
max. permissible external capacitance	4.5 µF	9 µF	11 µF	14 µF

U_i = 12.3 V
I_i = 164 mA

The maximum values of the tables are also allowed to be used up to the permissible limits as concentrated capacitances and as concentrated inductances.
The intrinsically safe circuits are safely galvanically separated from the non intrinsically safe circuits up to the peak value of the voltage of 375 V.

All other details remain unchanged for the 3. supplement.

The equipment according to this supplement meets the requirements of these standards:

EN 60079-0:2006 EN 60079-11:2007

(16) The test documents are listed in the test report No. 10 203 555840.

(17) Special conditions for safe use

none

(18) Essential Health and Safety Requirements

no additional ones

TÜV NORD CERT GmbH, Langemarckstraße 20, 45141 Essen, accredited by the central office of the countries for safety engineering (ZLS), Ident. Nr. 0044, legal successor of the TÜV NORD CERT GmbH & Co. KG Ident. Nr. 0032

The head of the certification body

Schwedt

Hanover office, Am TÜV 1, 30519 Hanover, Tel.: +49 (0) 511 986-1455, Fax: +49 (0) 511 986-1590

Translation

4. SUPPLEMENT

to Certificate No.	**TÜV 00 ATEX 1572**
Equipment:	Measuring transducer OCM Pro CF front panel housing/wall housing type OCP-x4F0/x3W0/x4W0 xx x4 E xx (see below)
Manufacturer:	NIVUS GmbH
Address:	Im Täle 2 75031 Eppingen, Germany
Order number:	8000556184
Date of issue:	2011-03-02

In the future, the measuring transducer according to the EC-Type Examination Certificate TÜV 00 ATEX 1572 may be manufactured according to the documents listed in the test report.

The changes refer to the pc boards for the backplane.
In the future, the "Power mains adapter" built up on a plug-in board according to the 3. supplement to TÜV 00 ATEX 1572 may also be operated together with the backplane of the 2. and 3. generation certified in the 2. supplement.

Designation of the equipment:

Measuring transducer OCM Pro CF front panel housing (FP)	type	OCP-x4F0 xx x4 E xx
Measuring transducer OCM Pro CF wall housing	type	OCP-x3W0 xx x4 E xx
Measuring transducer OCM Pro CF wall housing	type	OCP-x4W0 xx x4 E xx

In the future, the marking of the measuring transducer reads as follows:
II (2) G [Ex ib Gb] IIB

The „Electrical data" for the intrinsically safe circuits are only valid as listed below:

Analogue sensor connection	in type of protection Intrinsic Safety Ex ib IIB
(OCM Pro CF FP: Terminals b21, c21	only for connection to certified sensors
OCM Pro CF: Terminals D8, D9)	maximum values:
	U_o = 25.4 V
	I_o = 91 mA
	P_o = 577 mW
	characteristic line: linear
	effective internal capacitance: 14 nF
	The effective internal inductance is negligibly small.

max. permissible external inductance	10 mH	1 mH	0.5 mH	0.1 mH
max. permissible external capacitance	356 nF	406 nF	486 nF	796 nF

Sensor voltage supply ..... (OCM Pro CF FP: Terminals a22, a25, a26; b22, b25, b26; c22, c25, c26 OCM Pro CF: D3…5, E3…5, F3…5, G3…5 Terminals D3…5, E3…5, F3…5, G3…5)	in type of protection Intrinsic Safety Ex ib IIB only for connection of the belonging sensors type POA-x1... and OCL-L0... as well as type POA-x2..., OCL-L1... and CS2-… according to EC-Type Examination Certificate TÜV 03 ATEX 2262 maximum values per circuit: U_o = 10.5 V I_o = 640 mA P_o = 6.72 W characteristic line: rectangular effective internal inductance: 3 µH effective internal capacitance: 2 µF

max. permissible external inductance	117 µH	97 µH	47 µH
max. permissible external capacitance(cumulative value)	4.2 µF	4.9 µF	8 µF

Sensor communication interface RS485 ..... (OCM Pro CF FT: Terminals a23, a24; b23, b24; c23, c24 OCM Pro CF: Terminals D1, D2; E1, E2; F1, F2; G1, G2)	in type of protection Intrinsic Safety Ex ib IIB only for connection of the belonging sensors type POA-x1... and OCL-L0... as well as type POA-x2..., OCL-L1... and CS2-… according to EC-Type Examination Certificate TÜV 03 ATEX 2262 maximum values per circuit: U_o = 6.51 V I_o = 167 mA P_o = 272 mW characteristic line: linear The effective internal inductance and capacitance are negligibly small.

max. permissible external inductance	8 mH	2 mH	1 mH	0.5 mH
max. permissible external capacitance (cumulative value)	4.5 µF	9 µF	11 µF	14 µF

U_i = 12.3 V
I_i = 164 mA

The maximum values of the tables are also allowed to be used up to the permissible limits as concentrated capacitances and as concentrated inductances.
The intrinsically safe circuits are safely galvanically separated from the non intrinsically safe circuits up to the peak value of the voltage of 375 V.

All other details remain unchanged for the 4. supplement.

The equipment according to this supplement meets the requirements of these standards:

EN 60079-0:2009 EN 60079-11:2007

(16) The test documents are listed in the test report No. 11 203 556184.

(17) Special conditions for safe use

none

(18) Essential Health and Safety Requirements

no additional ones

TÜV NORD CERT GmbH, Langemarckstraße 20, 45141 Essen, accredited by the central office of the countries for safety engineering (ZLS), Ident. Nr. 0044, legal successor of the TÜV NORD CERT GmbH & Co. KG Ident. Nr. 0032

The head of the certification body

Schwedt

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DE / EN / FR

EU Konformitätserklärung

EU Declaration of Conformity

Déclaration de conformité UE

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

Für das folgend bezeichnete Erzeugnis:

For the following product:

Le produit désigné ci-dessous:

Bezeichnung:	**Durchflussmessumformer stationär OCM Pro CF**
Description:	*permanent flow measurement transmitter*
Désignation:	*convertisseur de mesure de débit fixe*
Typ / Type:	**OCP-…**

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 61326-1:2013
- EN 61010-1:2010

Diese Erklärung wird verantwortlich für den Hersteller:

This declaration is submitted on behalf of the manufacturer:

Le fabricant assume la responsabilité de cette déclaration:

NIVUS GmbH
Im Taele 2
75031 Eppingen
Allemagne

abgegeben durch / *represented by / faite par:*

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

Eppingen, den 20.04.2016

Gez. *Marcus Fischer*

DE / EN / FR

EU Konformitätserklärung

EU Declaration of Conformity

Déclaration de conformité UE

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E-Mail: info@nivus.com
Internet: www.nivus.de

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

Bezeichnung:	**“Ex“ Durchflussmessumformer stationär OCM Pro CF**
Description:	*“Ex” permanent flow measurement transmitter*
Désignation:	*“Ex”convertisseur de mesure de débit fixe*
Typ / Type:	**OCP-x4F0/x4W0 xxx 4E..**

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
- 2014/34/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 61326-1:2013
- EN 60079-0:2012 +A11:2013
- EN 60079-11:2012
- EN 61010-1:2010

Ex-Kennzeichnung */ Ex-designation / Marquage Ex* : ⟨Ex⟩ II (2)G [Ex ib Gb] IIB

EG-Baumusterprüfbescheinigung / *EC-Type Examination Certificate / Attestation d'examen «CE» de type:*

TÜV 00 ATEX 1572 (4. Ergänzung)

Notifizierte Stelle (Kennnummer) / *Notified Body (Identif. No.) / Organisme notifié (№ d’identification)*

TÜV Nord CERT GmbH, Am TÜV 1, 30519 Hannover, Allemagne (0044)

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

NIVUS GmbH
Im Taele 2
75031 Eppingen
Allemagne

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

Eppingen, den 26.07.2017

Gez. *Marcus Fischer*