FLOW permanent

Instruction Manual

Flow Measurement Transmitter OCM F

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Instrumentation For Water Industry
NIVUS GmbH • Im Taele 2 • 75031 Eppingen, Germany • Internet: www.nivus.com
Phone: +49 (0)7262 9191-0 • Fax: +49 (0)7262 9191-999 • info@nivus.com

NIVUS AG, Switzerland

Burgstrasse 28
8750 Glarus, Switzerland
Phone: +41 (0)55 6452066
Fax: +41 (0)55 6452014
swiss@nivus.com
www.nivus.de

NIVUS Austria

Mühlbergstrasse 33B
3382 Loosdorf, Austria
Phone: +43 (0) 2754 567 63 21
Fax: +43 (0) 2754 567 63 20
austria@nivus.com
www.nivus.de

NIVUS Sp. z o.o., Poland

ul. Hutnicza 3 / B-18
81-212 Gdynia, Poland
Phone: +48 (0) 58 7602015
Fax: +48 (0) 58 7602014
biuro@nivus.pl
www.nivus.pl

NIVUS France

14, rue de la Paix
67770 Sessenheim, France
Phone: +33 (0)3 88071696
Fax: +33 (0)3 88071697
info@nivus.fr
www.nivus.fr

NIVUS U.K. Ltd.

Wedgewood Rugby Road
Weston under Wetherley
Royal Leamington Spa
CV33 9BW, Warwickshire
Phone: +44 (0)8445 3328 83
nivusUK@nivus.com
www.nivus.com

NIVUS Middle East (FZE)

Building Q 1-1 ap. 055
P.O. Box: 9217
Sharjah Airport International
Free Zone
Phone: +971 6 55 78 224
Fax: +971 6 55 78 225
middle-east@nivus.com
www.nivus.com

NIVUS Korea Co. Ltd.

#2502 M Dong, Technopark IT Center,
32 Song-do-gwa-hak-ro, Yeon-su-gu,
INCHEON, Korea 21984
Phone: +82 32 209 8588
Fax: +82 32 209 8590
korea@nivus.com
www.nivus.com

NIVUS Vietnam

21 Pho Duc Chinh, Ba Dinh
Hanoi, Vietnam
Phone: +84 12 0446 7724
vietnam@nivus.com
www.nivus.com

NIVUS Chile

Viña Cordillera Oriente 4565
Puente Alto, Santiago
Phone: +562 2266 8119
chile@nivus.com
www.nivus.com

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Translation

If the device is sold to a country in the European Economic Area (EEA) this instruction manual must be translated into the language of the country in which the device is to be used. Should the translated text be unclear, the original instruction manual (German) must be consulted or the manufacturer contacted for clarification.

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Names

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Table of Contents

General

1 About this manual

Important Note

READ CAREFULLY BEFORE USE.

KEEP IN A SAFE PLACE FOR LATER REFERENCE.

This Instruction manual 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.

The operation of the complete system is described in the separate manual “Technical Instruction for Doppler Sensors”. Instructions on how to connect external level sensors are provided with the standard delivery of the according sensors (e. g. NivuCompact, i-Series sensors…).

The installation of flow velocity sensors is described in the “Installation Instruction for Correlation and Doppler Sensors“. This instruction manual is a part of the standard sensor delivery and shall be read necessarily prior to sensor installation.

1.1 Applicable documentation

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

- Technical Instruction for Doppler Sensors
- Installation Instruction for Correlation and Doppler Sensors

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

1.2 Signs and definitions used

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

Table 1 Structural elements within the manual

1.3 Abbreviations used

1.3.1 Colour code for wires and single conductors

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

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

Safety Instructions

2 Used symbols and signal words

2.1 Valuation of the accident level

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

DANGER

Warnings in high degree of risk

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

WARNING

Warnings in medium degree of risk

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

CAUTION

Warnings in low-risk or property damages

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

WARNING

Danger by electric voltage

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

Important Note

Contains information that should be highlighted.

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

Note

Contains information and facts.

2.2 Warning notices on the product (option)

General warning label

This symbol is for operators to refer to this instruction manual.

Observing the information contained therein is required in order to maintain protection measured provided by the instrument during installation procedures and operation.

Protective conductor

This symbol refers to the protective conductor of the unit.

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

3 Safeguards and Precautions

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

WARNING

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 occupational safety regulations

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

Disregarding may lead in personal injury.

WARNING

Do not disable safety devices

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

Disregarding may lead in personal injury.

WARNING

Disconnect the systems from mains

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

Disregarding may lead to electric shocks.

Putting into operation by trained experts only

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

Integrated buffer battery

The exchange of the integrated buffer battery shall be carried out by NIVUS staff or personnel authorised by NIVUS only. Otherwise the guarantee expires.

4 Liability disclaimer

The manufacturer reserves the right to change the contents of this document including this liability disclaimer without prior notice and cannot be held responsible in any way for possible consequences resulting from such changes.
For connection, initial start-up and operation as well as maintenance of the unit the following information and higher legal regulations of the respective country (in Germany e. g. VDE regulations) such as applicable Ex regulations as well as safety requirements and regulations in order to avoid accidents shall be observed.
All operations on the device which go beyond installation or connection measures in principle shall be carried out by NIVUS staff or personnel authorised by NIVUS due to reasons of safety and guarantee.

Operate the transmitter only in technically perfect working order.

Improper Use

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

5 Use in accordance with the requirements

Note

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

The permanent flow meter Type OCM F including the respective sensor technology is intended to be used for continuous flow measurement and control tasks of slight to heavy polluted media in part filled and permanent full pipes, channels or similar.

The flow meter is designed and manufactured in accordance with the current state of the art and with the recognised safety rules and regulations applicable at the time this document is issued. Danger to persons or material damage cannot be completely ruled out, however.
The maximum permissible limit values as specified in chapter "10 Specifications" shall be necessarily observed. Any case varying from these conditions which is not approved by NIVUS GmbH in written form is left at the owner's risk.

Ex protection

The Ex-version of the transmitter is designed to be used in areas with explosive atmospheres (zone 1).

Approval measurement transmitter: II (2) G [Ex ib Gb] IIB

WARNING ***Risk of personal injury due to explosion hazard***

Install the transmitter out of Ex zones!
The Ex approval of the sensors is part of the concerning manual and/or Technical Description.
The approval is valid only in conjunction with the according identification on the transmitter's or sensor's nameplate.
The Ex approval of the sensors is part of the "Technical Instructions for Doppler Sensors".

Conformity certificates and test certificates

For installation and commissioning the conformity certificates as well as the test certificates issued by the respective authorities shall be followed.
The Ex version of the OCM F is adjusted solely to NIVUS Doppler sensors Type KDA regarding the intrinsically safe system review according to EN60079-25.
In the event of using sensors by third-party manufacturers the operator shall carry out a system review according to EN 60079-25!
The required specifications of the Ex version of the OCM F can be found in the according EC type examination certificate IBExU07ATEX1081.

6 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 2009/104/EC concerning the minimum safety and health requirements for the use of work equipment by workers at work, as amended, are to be observed and adhered to.
In Germany e. g. the Industrial Safety Ordinance must be observed.

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

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

Connections

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

7 Personnel requirements

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

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

Qualified personnel

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

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

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

III. First aid training

Product specification

8 Overview

1 Clear view door
2 Graphic Display
3 Keypad
4 Preparations for Cable Glands
5 Terminal Clamp Housing
6 USB-A-Interface
7 Pipe Sensor with retaining element
8 Wedge Sensor (flow velocity)

Fig. 8-1 Overview

9 Device identification

The instructions contained within this manual are valid only for the type of device specified on the title page. The name plate is fixed on top of the enclosure and contains the following:

- Name and address of the manufacturer
- CE label
- Information on type and series, serial no. if available.
- Year of manufacture: the first four digits of the serial number represent the year and the week number of manufacture (1804 OCF …..)
- Additional Ex identification for Ex-version devices (as mentioned in chapter “5 Use in accordance with the requirements“).

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

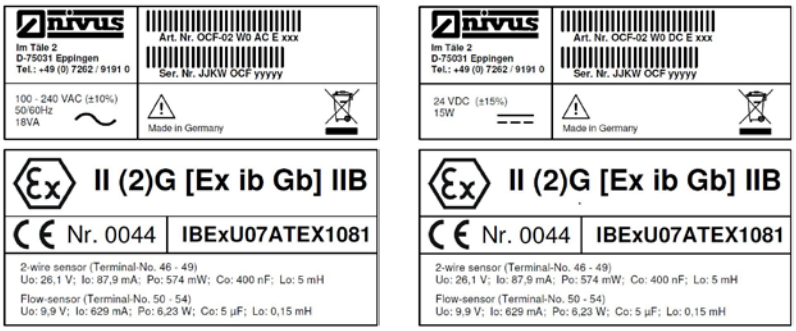


Fig. 9-1 Nameplates AC/DC (Ex versions)

Check the nameplates

Check the delivered instrument for accordance with your order by identifying the name-plates.
Check the nameplates for correct specification of the power supply.

The EU-Type examination certificate (incl. appendix) and the declaration of conformity are located at the end of the manual.

10 Specifications

Power supply	100…240 V AC, +10 % / -15 %, 47…63 Hz 24 V DC, ±15 %, 5 % residual fluctuation
Power consumption	AC: max. 18 VA, typ. 7 VA DC: max. 15 W, typ. 6 W
Enclosure	Material: Polycarbonate Weight: approx. 1200 g
Protection	IP65
Operating conditions	Protection class I Overvoltage category II Pollution degree 2
Altitude	AC unit for use in altitudes up to 3000 m above MSL. At relay voltages >150 V the use is restricted to an altitude of max. 2000 m (AC and DC units)
Operating temperature	-20 °C…+60 °C / for Ex: -20 °C…+40 °C
Storage temperature	-30 °C…+70 °C
Max. humidity	90 %, non-condensing
Display	Back-lit full graphic LCD, 128x64 pixel
Operation	6 keys, menu driven in German, English, French and Polish
Inputs	1x 4…20 mA for external level measurement (2-wire sensor) 2x 0/4…20 mA with 12 bit resolution for external level measurement and external set points 4x digital input 1x compact Doppler active sensor, type KDA, connectable
Outputs	3x 0/4...20 mA, load 500 Ohm, 12 bit resolution, accuracy better than 0.1 % (after adjustment) 5 switchable relays, loadable up to 230 V AC / 2 A (cos.φ 0.9)

Controller	Three-step controller, quick close control, adjustable slide valve position in error case
Data memory	4 MB, 64512 points, for programming and readings memory; read-out via front-side USB stick
Storage cycle	1 minute to 1 hour
Ex approval (option)	II (2) G [Ex ib Gb] IIB
Sensor circuits	Ignition protection type Ex ib IIB
2-wire sensors per channel	Terminal no. 46…49 U_O 26.1 V I_O 87.9 mA P_O 574 mW (linear characteristics) C_O 400 nF L_O 5 mH
Flow sensors	Terminal no. 50…54 U_O 9.9 V I_O 629 mA P_O 6.2 W (rectangular characteristics) C_O 5 µF L_O 0.15 mH
Data circuits	RS485 galvanically connected to sensor circuit Us 5 V
The maximum values also apply to concentrated capacitance / inductors that can be switched on.	

Table 2 Specifications

⇨ The type examination certificate can be found at the end of this manual.

Sensors

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

11 Configuration

11.1 Device Types

The OCM F transmitter is available in different versions as shown in the overview table below.
The transmitters primarily vary in terms of 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 this article key the type of device can be specified.

OCF	Type				
	02	Standard version for various pipe and channel shapes. 5 relays, 3 mA outputs (galv. isolated), 1 mA input (galv. isolated with 2-wire sensor supply) or for external level measurement, integrated 3-step controller			
		Construction			
		W0	Wall mount enclosure IP65		
			Power supply		
			AC	85…265 V AC, 47…63 Hz	
			DC	20…28 V DC	
				ATEX approval	
				0	None
				E	Intrinsically safe sensor supply in Ex-Zone 1
OCF	**02**	**W0**			

Table 3 Type key for measurement transmitter OCM F

11.2 Delivery

The standard delivery of the transmitter OCM F contains:

- Measurement transmitter OCM F
- The instruction manual including the certificate of conformity and approvals. It contains any relevant information on how to operate the measurement system.

Check additional accessories depending on your order and according to the delivery note.

11.3 Reception inspection

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

Important note

Mistakes cannot be rectified later.

11.4 Storing

Observe the minimum and maximum values on environmental conditions such as temperature and humidity according to chapter “10 Specifications”.
The measurement transmitter shall be protected from corrosive or organic solvent vapours, radioactive radiation as well as strong electromagnetic radiation.
Always store the instrument in its original packaging.

11.5 Transport

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

11.6 Return

In case of a required reshipment return the unit at customer cost to NIVUS GmbH in Eppingen using the original packaging.
Insufficiently franked shipments will not be accepted.

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

We herewith particularly emphasise that replacement parts or accessories not supplied by NIVUS moreover are not certified and approved by NIVUS too.
Installation and/or the use of such products hence may negatively influence predetermined constructional characteristics of the measurement system or even lead to instrument failures.
NIVUS cannot be held responsible for any damage resulting due to the use of non-original parts and non-original accessories.

⇨ You can find original manufacturer spare parts or accessories in chapter “34 Accessories” and/or in the valid price list.

12 Functional Principle

12.1 In General

The OCM F is a permanent measurement system for flow measurement and flow control. The device is designed to be used primarily in slight to heavy polluted media with various compositions. It can be operated in partial and permanent filled channels and pipes with various shapes and dimensions.

Important note

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

OCM F transmitters utilise a compact active Doppler sensor (KDA sensor). The KDA wedge sensor is available as flow velocity and as combi sensor. KDA combi sensors simultaneously determine the flow level along with the flow velocity by using a built-in pressure measurement cell. KDA pipe sensors, however, are available only as flow velocity sensors. Detailed information on the KDA sensors can be found in the Technical Description for Doppler Sensors.

12.2 Level Measurement using Pressure

The combi sensor type "KDA" additionally contains a hydrostatic level measurement via integrated pressure measurement cell. The piezo-resistive pressure sensor operates according to the relative pressure principle; i. e. the pressure of the standing water column above the sensor is direct proportional to the flow level. During initial start-up procedure, the pressure sensor is going to be adjusted by entering a manually investigated reference value.

12.3 Flow Velocity Detection

The flow velocity sensor, type "KDA" operates according to the continuous Doppler principle (CW-Doppler) using 2 built-in piezo crystals with a slope of 45°. The crystal surfaces are arranged parallel to the slope of the flow velocity sensor. One of the crystals continuously operates as ultrasonic transmitter, the other one as receiver detecting the reflected ultrasonic signal.

The sensor enclosure enables acoustic coupling of the high-frequency ultrasonic signal between piezo crystal/enclosure and enclosure/medium. Due to that reason an ultrasonic signal with an angle of 45° is sent permanently against the flow direction of the medium to be measured. As soon as the signal hits dirt particles, gas bubbles or similar a portion of the sonic energy is reflected, being converted into an electric signal by the receiving crystal subsequently.

Caused by the movement of the reflecting particles in relation to the acoustic source the frequency of the ultrasonic signal is shifted. The resulting frequency shift is directly proportional to the particles' movement within the medium and hence represents the flow velocity.

The sensor processes the received reflection signal, converting it to be sent to the transmitter. Due to varying velocities within the flow profile, vorticity, rotation of single reflecting particles, surface waves etc. a frequency mixture is emerging. This mixture is evaluated directly within the KDA sensor regarding statistic considerations related to average flow velocity. The frequency mixture is indicated on the transmitter display in >I/O / v-Histogram< (see chapter "24.7 I/O submenu "v-Histogram"".
It is recommended to verify the measurement if conditions are disadvantageous from a hydraulic standpoint. Verification should not be based on the CW-Doppler method since in this case it is not possible to spatially allocate recorded flow velocities.
In this case the VDI/VDE Directive 2640 is very helpful and important. NIVUS recommends the portable meter Type >PVM/PD< or >PCM Pro< as calibration measurement or the NIVUS initial start-up service.

Installation and Connection

13 General Installation Instructions

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

WARNING

Separate protection

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

Before feeding the rated voltage the transmitter and sensor installation must be correctly completed. The installation should be carried out by qualified personnel only.
Further statutory standards, regulations and technical rulings have to be taken into account.
All outer circuits, wires and lines connected to the device must have a minimum isolation resistance of 250 kOhm. 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 mm^2 (0.03 in^2) and must be in accordance to IEC 227 or IEC 245. The device protection rating is IP65. The maximum allowed switching voltage on the relay contacts must not exceed 250 V. According to Ex protection it must be checked if the devices power supplies must be integrated into the facility's emergency shutdown conception.

14 Transmitter Installation and Connection

Important hints on installation

- *Ensure proper installation.*
- *Follow applicable legal or operational guidelines.*
- *Improper handling may lead to personal injuries and/or equipment damage.*

14.1 General

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

- Direct sunlight (use weatherproof cover if necessary)
- Heat emitting objects (max. ambient temperature see chapter "10 Specifications")
- Objects with strong electromagnetic fields (e. g. frequency converters or similar)
- Corrosive chemicals or gas
- Mechanical shocks
- Installation close to footpaths or travel ways
- Vibrations
- Radioactive radiation

During installation works keep in mind that electronic components may be irreversibly damaged due to electrostatic discharge. Therefore avoid intolerably high electrostatic charge during installation by implementing appropriate grounding measures.

Clear view door

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

UV radiation

If the view door protection foil has been exposed to direct solar radiation for a long period, it cannot be removed easily.

Should this be the case try to clean the door using spirit or car polish.
If these measures should not be successful the clear view door can be replaced by NIVUS at extra costs.

14.2 Enclosure Dimensions

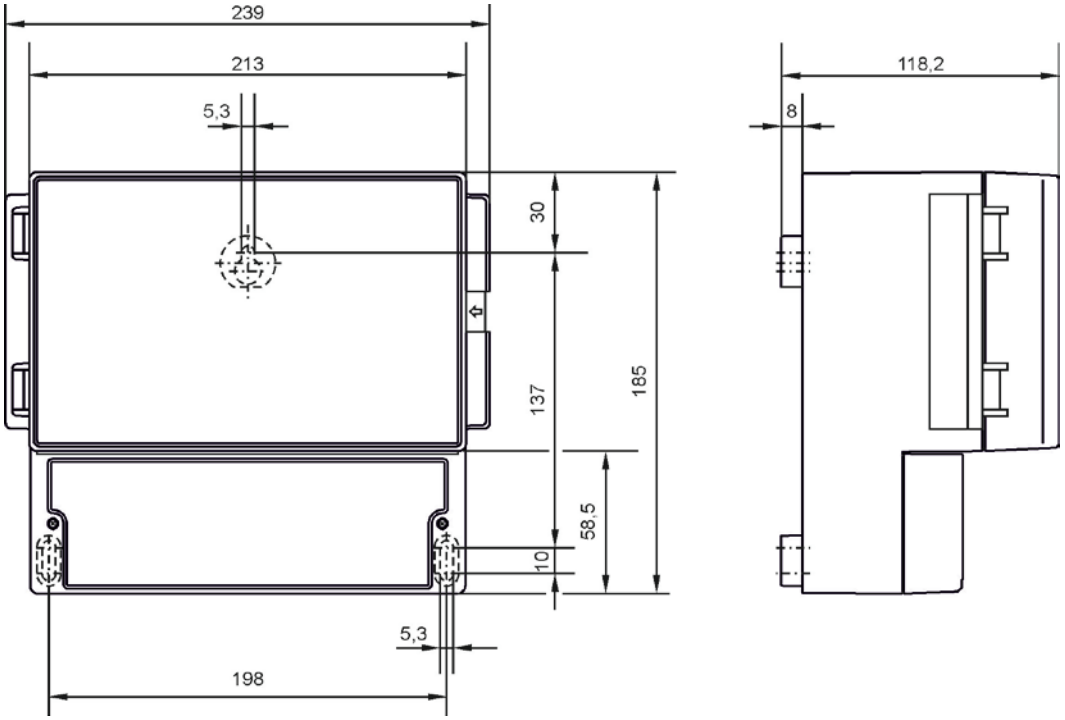


Fig. 14-1 Wall Mount Enclosure

14.3 Hints on how to avoid electrostatic discharge (ESD)

When connecting the OCM F the following warnings and hints shall be observed right as the warnings and hints found in the according chapters on installation.

WARNING

Disconnect the unit from mains power

Disconnect the instrument from mains power before you begin to carry out maintenance, cleaning and/or repair works (expert personnel only).

Disregarding may lead to electric shocks.

The sensitive electronic components inside of the instrument may be damaged by static electricity which may impair the instrument's performance or even lead to instrument failure. The manufacturer recommends the following steps to avoid equipment damage due to electrostatic discharge:

- Discharge static electricity from your body before touching the instrument's electronic components such as circuit boards and the components installed on the boards. To do so touch a grounded metal surface such as the unit's enclosure frame or a metal pipe.
- Avoid unnecessary movements to reduce the risk of building up static electricity.
- Transport statically sensitive components in antistatic containers or packing materials.
- To discharge your body and to stay free of static electricity wear an antistatic wristband grounded through a cable.
- Only touch components that are sensitive to electric charges in an antistatic working area. If possible, use antistatic mats and work pads.

14.4 Transmitter Installation

Front panel

It is not allowed to remove the front panel.

Tightness of the terminal housing

Water or dirt must not leak into the terminal housing. Seal the housing with the supplied lid and both screws respectively.

Mounting Wall Mount Enclosure

Ensure proper installation.
The most simple way to install a wall mount enclosure is to fasten a DIN rail with a length of 210 mm (8.3 in.) and then to snap-on the enclosure.
It is possible to install the enclosure by using three screws as well. Use a pan head screw with a head diameter of 5.5...8.0 mm (0.22...0.32 in.) for this. This screw must be screwed into the mounting plate protruding 4 mm (0.16 in.). Then hang the enclosure on the screw and additionally fix it with two more screws from the terminal clamp housing. Make sure to screw them not less than 40 m into the wall or 50 mm into appropriate dowels which need to be set previously.

General

The field enclosure has cable glands and dummy plugs. Some of them are screwed in and some are enclosed as spare parts or additional parts.
The transmitter contains:

- 1x gland M16x1.5 with counter nut
- 2x gland M20x1.5 with counter nut

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

- M16x1.5 3.5…10.5 mm
- M20x1.5 6.0…14 mm

Cables featuring **larger** outside diameters need to be equipped with cable glands (min. IP65). To guarantee the protection IP65 unused lead-ins have to be locked with an appropriate dummy plug before the initial start-up.

14.5 Electrical Installation

14.5.1 Transmitter Connection

Important Note

The complete measurement system shall be installed and put into operation by qualified personnel exclusively.

WARNING

Disconnect the unit from mains power

Each time before opening the terminal clamp housing ensure to disconnect the transmitter from any voltage.

Disregarding may lead to electric shocks.

In terms of electric connection please note the device configuration since unspecified inputs, outputs as well as power supply connections are not connected.

Warranty of a correct clamp-connection

Supply power and grounding are connected as described below using the spring clamps 1…3 (AC unit) or 3…5 (DC unit):

- *To open the spring contact use a slot screwdriver (blade width 2.4…3.5 mm) from the top (hanging device from the front) to press down the clamp through the appropriate opening (see drawing below) and insert the connection wire/strand from the front (hanging device from the bottom) into the contact opening up to stop.*

- *Remove the screwdriver and check the mechanical strength of the connection.*

Any other clamps are equipped with screw clamp terminals.

Front panel

It is not allowed to remove the front panel.

Tightness of the terminal housing

Water or dirt must not leak into the terminal housing. Seal the housing with the supplied lid and both screws respectively.

On power supply and relay clamps one copper wire with a maximum cross section of 2.5 mm² (0.01 in.) can be connected per clamp.
Connection is made by using terminal clamps and a screwdriver with a max. 3.5 mm (0.14 in.) blade.

When connecting the transmitter observe the terminal clamp specifications listed below:

Power supply (terminal 1…5):
Spring cage terminal; wire up to 2.5 mm², strand up to 1.5 mm²,
Screwdriver for pushing in, max. blade width 3.5 mm

Relay (terminal 12…17):
Screw terminals; wire up to 2.5 mm², strand up to 1.5 mm²,
Screwdriver blade width max. 3 mm

Plug connectors with screw terminal connection (terminal 24…54):
Screw terminal connection; wire up to 1.5 mm², strand up to 1.5 mm²,
Screwdriver blade width max. 2.5 mm

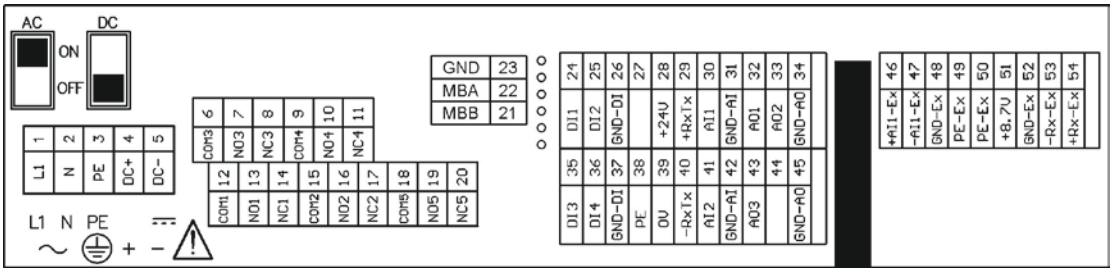
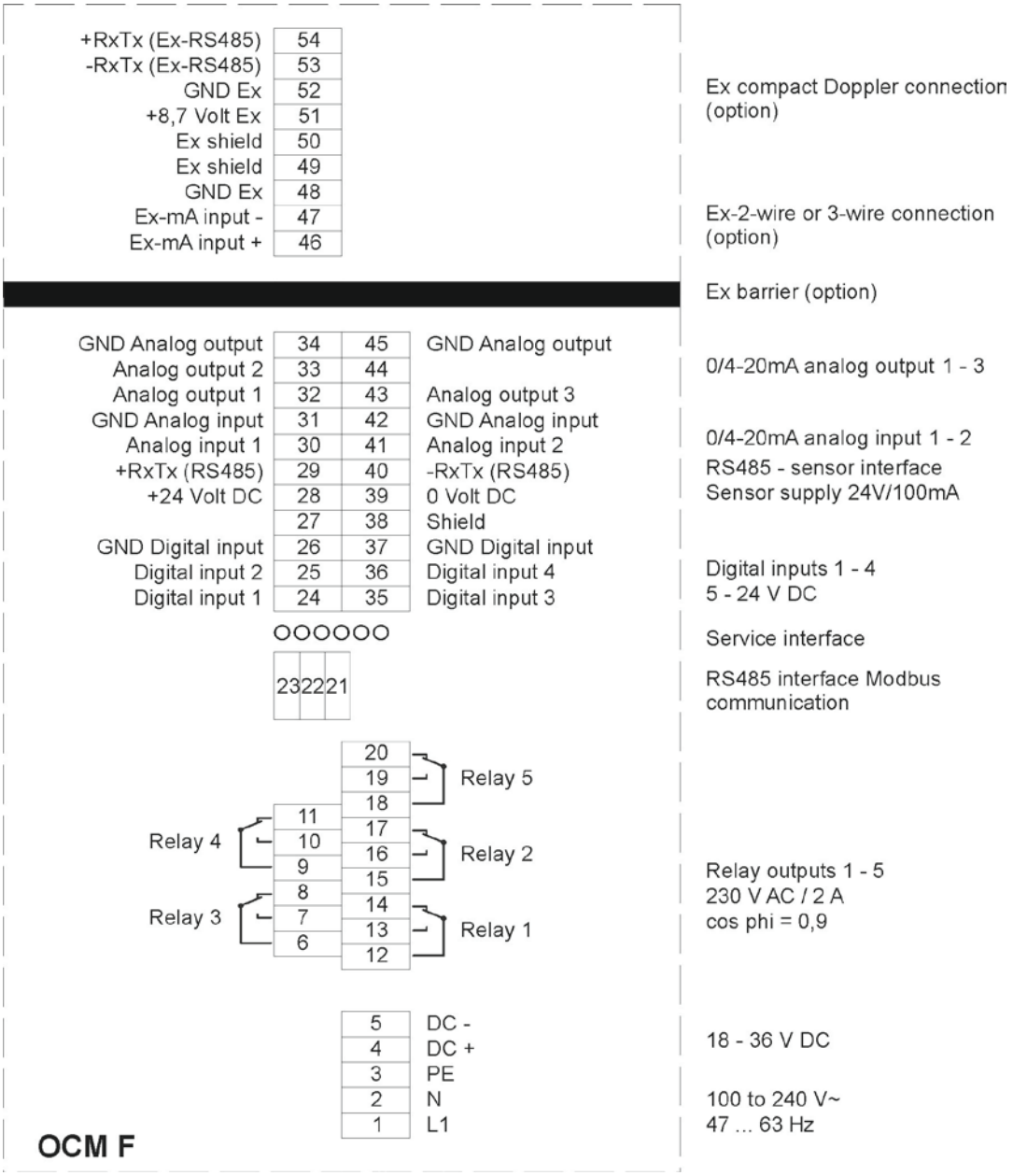


Fig. 14-2 Terminal housing, Ex version



- Low-impedance connection exists between '0 V DC' and GND analog output.
- GND digital input, GND analog input and GND Ex are galvanically insulated from each other as well as from '0 V DC'.
- DC-powered units have 'DC +' and 'DC –' galvanically insulated from all other clamps.
- AC-powered units permit to tap the 24 V auxiliary voltage, which is also available on '+24 Volt DC' (28) and '0 V DC' (39), from connections 'DC +'/'DC –' (clamps 4 and 5) too.
  AC units therefore have a low-impedance connection between 'DC –' and GND analog output via the '0 V DC' connection.
  In contrast to the 24 V available on clamps 28 and 39, the auxiliary voltage on 'DC +'/'DC –' (clamps 4 and 5) is conducted through an internal extra common mode filter and 'DC +' can be enabled/disabled by using the DC switch.

Fig. 14-3 Clamp wiring transmitter OCM F

14.5.2 KDA Sensor Connection

WARNING

Disconnect the unit from mains power

Always disconnect the measurement system from mains prior to connecting any sensors.

Disregarding may lead to electric shocks.

Route the cable correctly within the Ex zone

For use of the KDA sensors in the Ex-area, the sensor cables must not be directed past the mechanical shield between the termination blocks.

Use only the two cable connections of the Ex-connection block.

The sensor cable has to be connected to the transmitter at the termination block using connectors with screw clamps.

- Lead the sensor cable from outside through the cable gland.
- Connect the sensor cables to the connection board as descripted in the wiring diagram.
- Tighten the cable gland to fix the sensor cable.

The diagram below applies in case of connecting a KDA flow sensor:

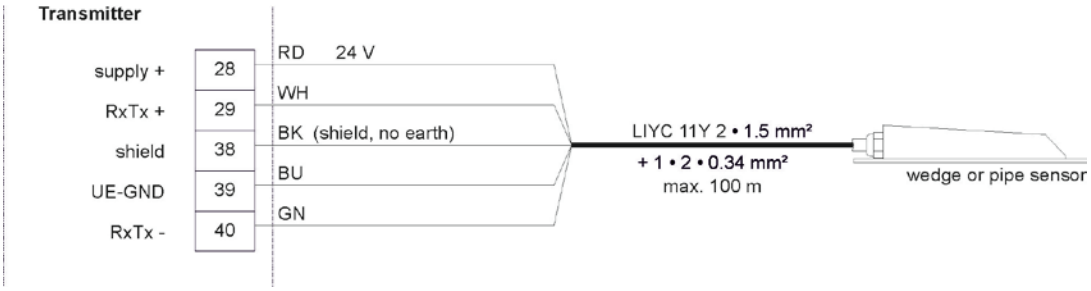


Fig. 14-4 KDA wedge or pipe sensor, Type K0 or R0 (Non-Ex)

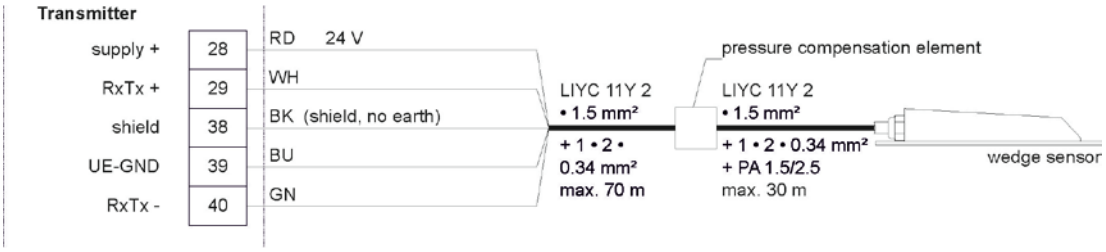


Fig. 14-5 KDA combi sensor with integrated pressure measurement cell, Type KP (Non-Ex)

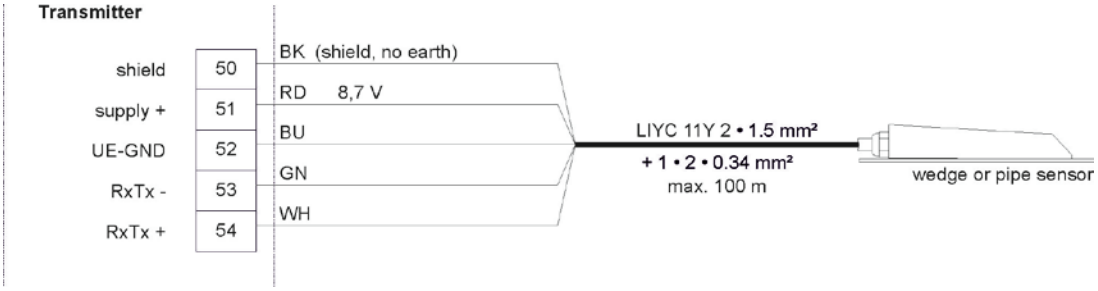


Fig. 14-6 KDA wedge or pipe sensor, Type K0 or R0 (Ex)

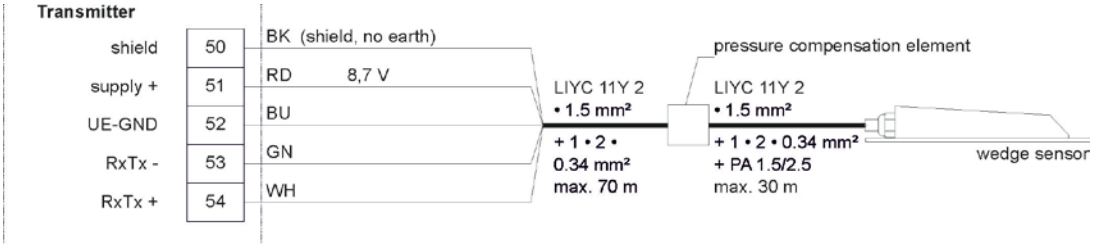


Fig. 14-7 KDA combi sensor with integrated pressure measurement cell, Type KP (Ex)

Observe the maximum cable length

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 250 m (820 ft) between KDA sensor and transmitter by taking the maximum permissible resistance into account.

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 F, please follow the wiring diagram below:

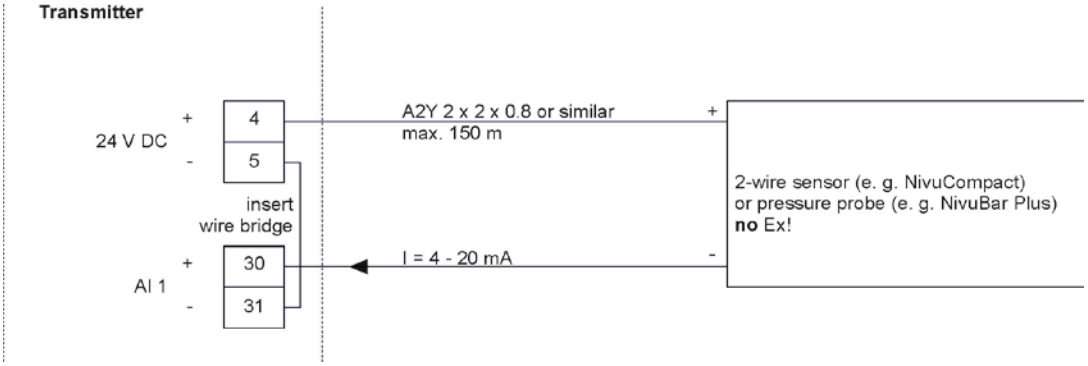


Fig. 14-8 Ext. 2-wire sensor for flow level measurement (Non-Ex)

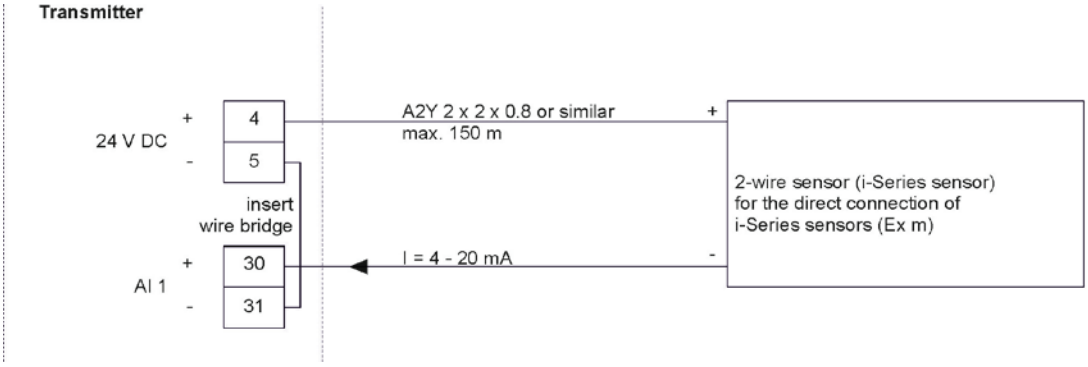


Fig. 14-9 NIVUS i-Series sensor for level measurement in Ex-Zone 1

Do not connect to intrinsically safe clamps

The Zone 1 Ex approval of i-Series sensors is guaranteed thanks to protection encapsulation category "Ex m". These sensors hence must not be connected to the intrinsically safe terminal clamps (Ex ia) of the transmitter.

This would cancel the protection rating of the intrinsically safe terminal clamps (47/46) of the transmitter and thus invalidate the according Ex approval.

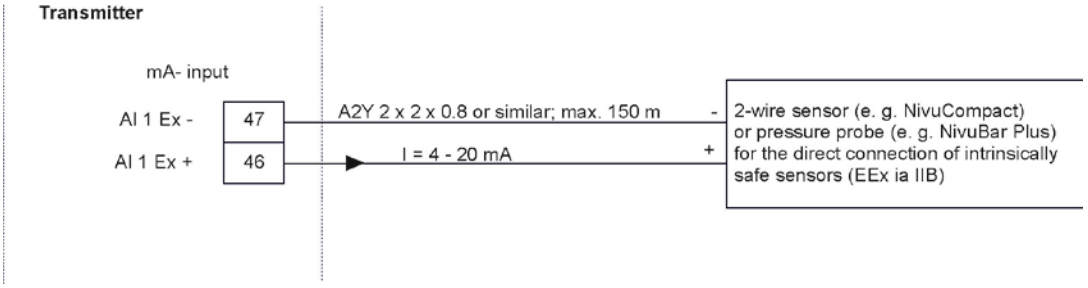


Fig. 14-10 Ext. 2-wire sensor for level measurement (Ex)

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

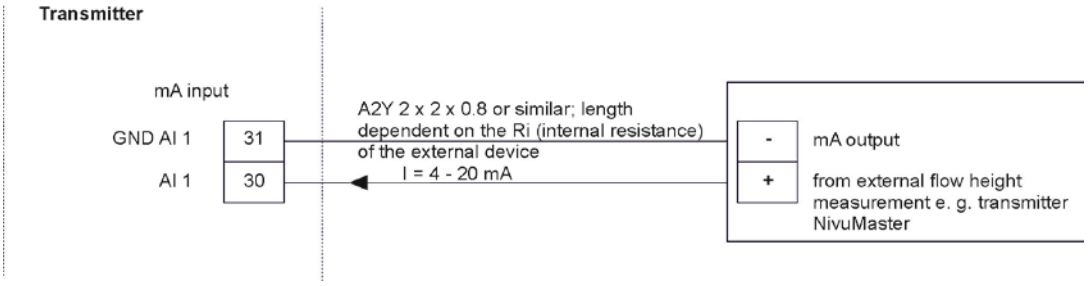


Fig. 14-11 Ext. flow level measurement via NivuMaster

14.6 Power supply of OCM F

Depending on the type of OCM F used, it can be supplied with 100…240 V AC or with 24 V DC (see chapter “10 Specifications”). The two slide switches (located above the terminals) serve as additional power switches.

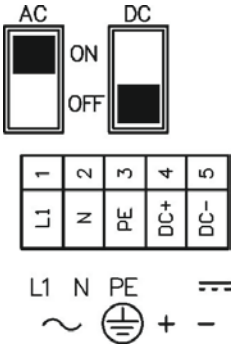


Fig. 14-12 Slide switch position in terminal clamp housing

Operation with AC voltage / DC voltage

*A DC unit can be operated **exclusively** with 24 V (±15 %) **DC voltage**.*

*An AC unit can be operated **exclusively** with 100…240 V (+10 % / -15 %) **AC voltage**.*

When operated with alternating current, the direct current supply clamps 4 and 5 both provide a voltage of 24 V and max. 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 looped through the complete switchgear in order to keep disturbing interferences as low as possible.

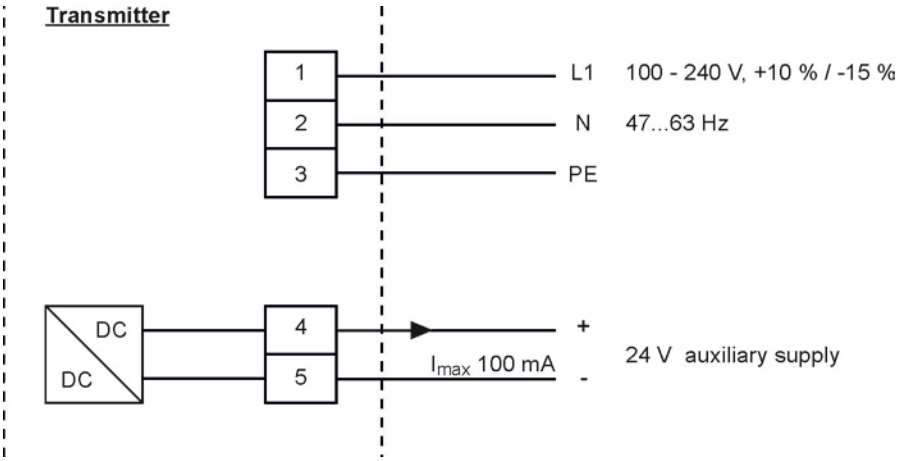


Fig. 14-13 AC model power supply

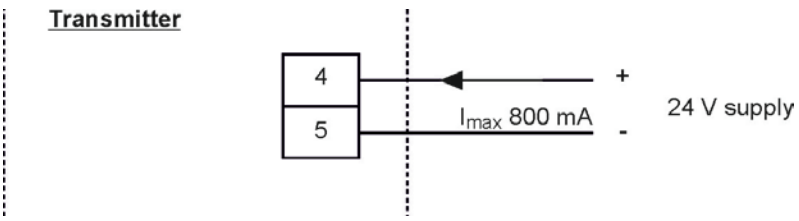


Fig. 14-14 DC model power supply

14.7 Overvoltage Protection Precautions

Reduction of the possible cable length with overvoltage protection

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.

Observe the "Technical Instructions of Doppler sensors".

Overvoltage protection elements are subject to natural wear and tear and therefore shall be inspected regularly and replaced if necessary in the course of maintenance measures as well as after electric malfunctions.

For effective protection of the OCM F transmitter it is necessary to protect power supply and mA inputs and outputs.

NIVUS recommends

- **for the mains supply the types**
  >EnerPro 220 Tr< for 230 V AC
  and/or
  >EnerPro 24 V< for 24 V DC
- **for the mA-out-/inputs the type**
  >DataPro 2x1 24 V / 24 V<

The flow velocity sensors are internally protected against overvoltage. In case of an expected high hazard potential it is possible to protect the sensors by using a combination (on a single end) of the following Types.

- **for Ex sensors**
  >SonicPro 3x1 24 V / 24 V Ex<
  and
  >DataPro 2x1 12 V / 12 V 11µH Tr (N)<
- **for Non-Ex sensors**
  >SonicPro 3x1 24 V / 24 V<
  and
  >DataPro 2x1 24 V / 24 V Tr<

Permissible cable length

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 (KDA) additionally.

The maximum permissible NIVUS cable lengths in Ex areas are:

- *Single-side overvoltage protection: 135 m*
- *Double-side overvoltage protection: 120 m*

Observe the connection direction

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.

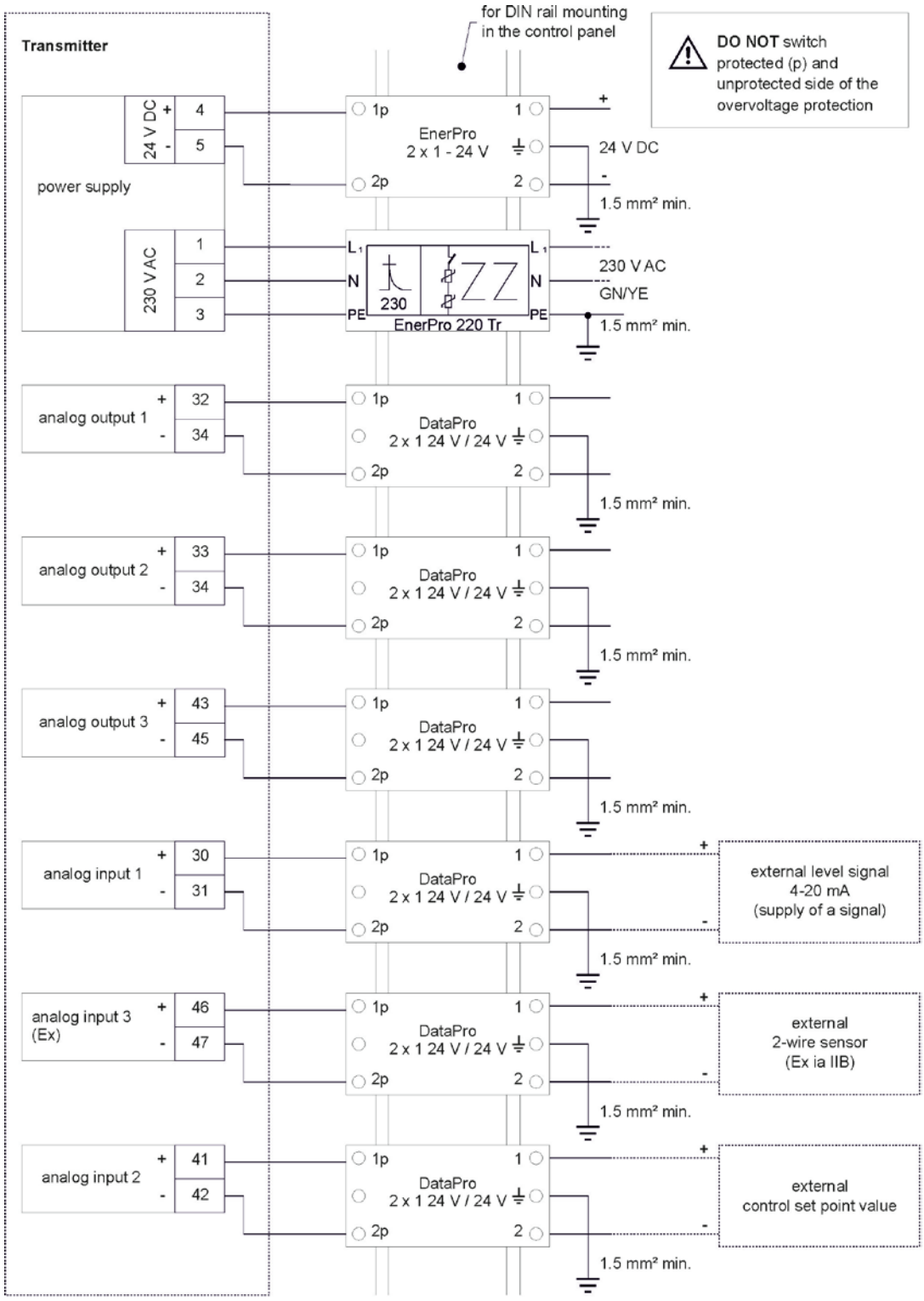


Fig. 14-15 Overvoltage protection for power supply and analog in-/outputs

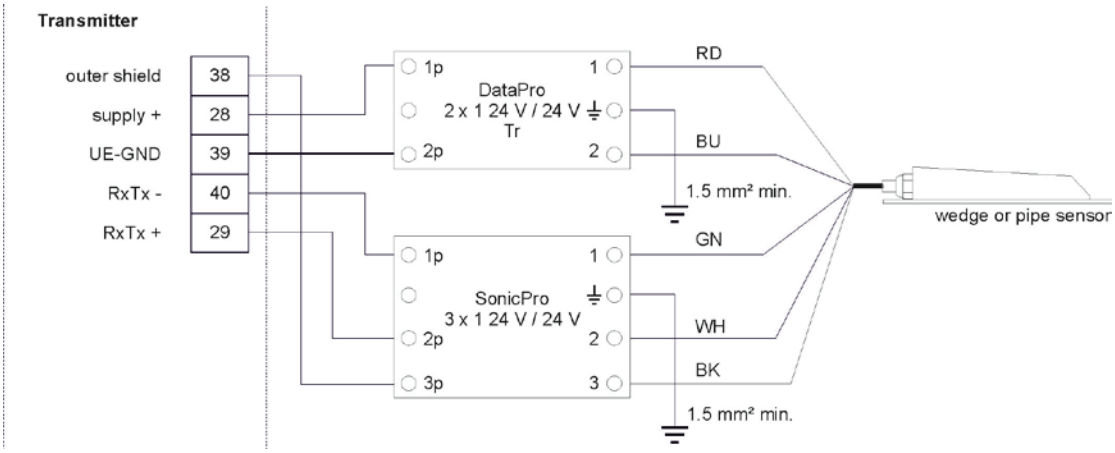


Fig. 14-16 Overvoltage protection for KDA velocity sensor Non-Ex version

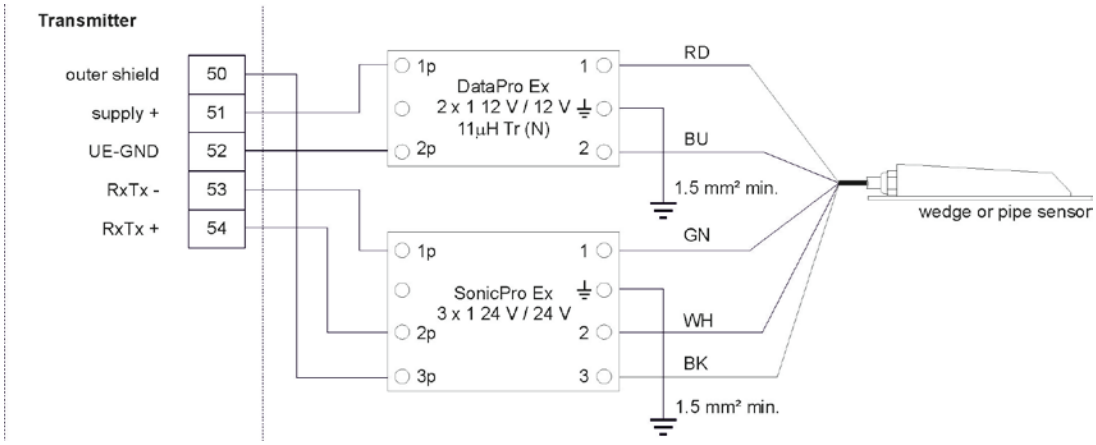


Fig. 14-17 Overvoltage protection for KDA velocity sensor Ex version

14.8 Controller Mode

14.8.1 General

Qualified personnel required

Knowledge in control technologies is necessarily required to correctly and safely set the controller.

Typically there are sluice gate valves, knife gate valves or iris gate valves with electrically driven three-step controller in use. Analog-driven 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:

- ≤ DN300 (11.8 in): min. 60 seconds
- ≤ DN500 (19.7 in): min. 120 seconds
- ≤ DN800 (31.5 in): min. 240 seconds
- ≤ DN1000 (39.4 in): min. 300 seconds

For the correct driving as well as for error monitoring of the slide valve, the Way-End-Switches “OPEN” and “CLOSE” as well as the torque switches “CLOSE” are a mandatory requirement. These signals have to be connected to the digital inputs 1…3 of the measurement transmitter. Please note to select gold-plated contacts in order to ensure contact reliability. Connect a signal relay between switches and measurement transmitter digital input to safely conduct the 10 mA input current. Analog position feedback to the measurement transmitter is not planned.
The measurement transmitter OCM F 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 relays 4 and 5 are assigned as default. Hence, relay 4 as “slide valve closed” and relay 5 as “slide valve open” are defined. Analog input 2 is assigned for entering external setpoints (see Fig. 14-19).

Assignment of the relays

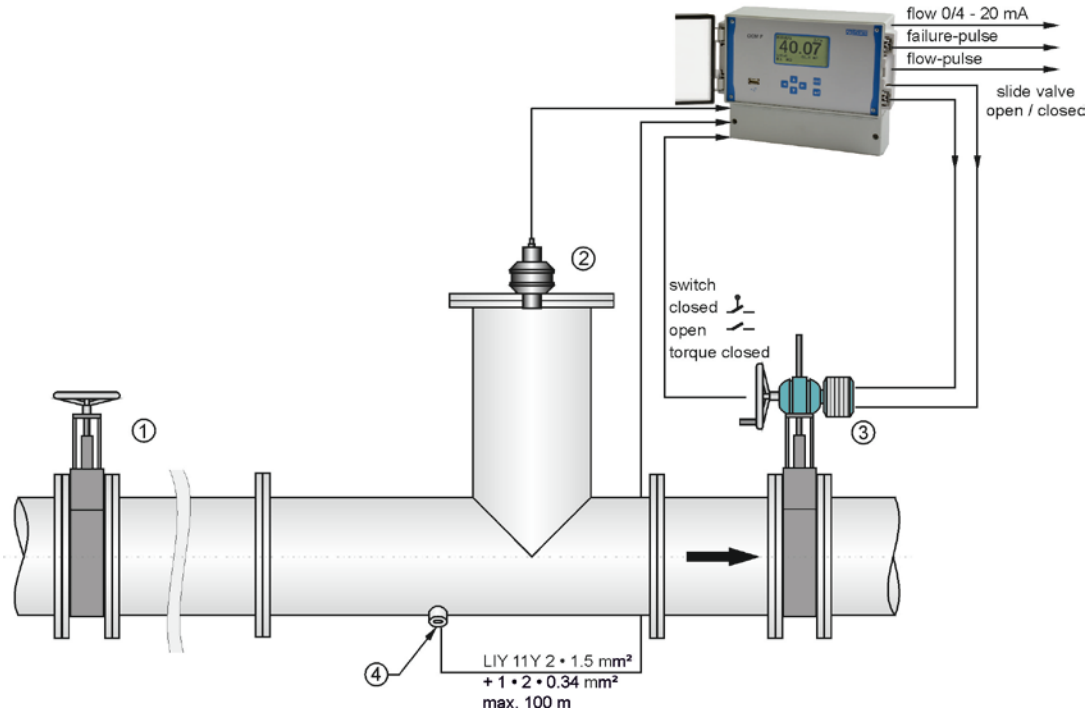
The assignment of the relays for the controller cannot be modified.

Selection of sufficient contact material

The input current on the digital inputs of the OCM F is 10 mA. Please ensure contact reliability by selecting sufficient contact materials on the end switch of the control slide valve.

14.8.2 Construction of Measurement Section and Control Section

You can find a detailed description of measurement and control sections in the “Installation Instruction for Correlation and Doppler Sensors” manual.



1 Hand slide valve

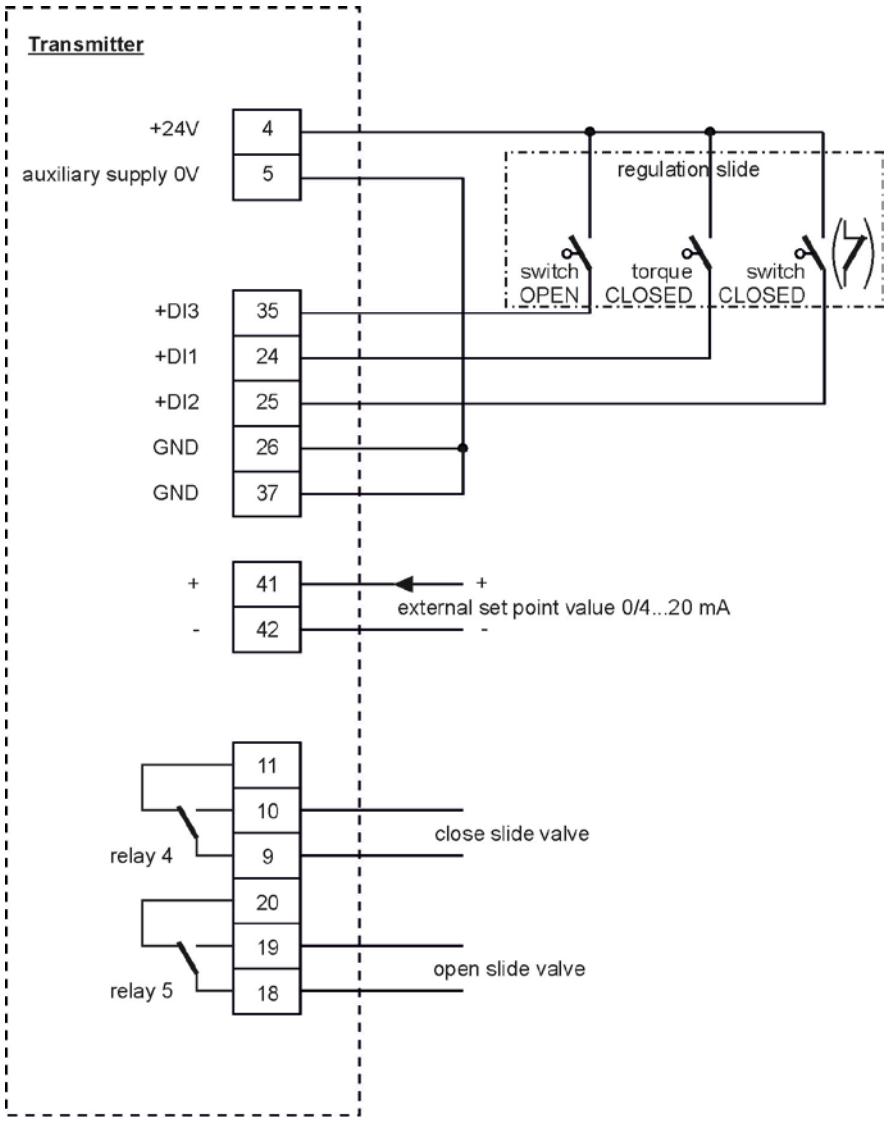
2 Ultrasonic sensor i-Series

3 Regulation-slide valve

4 Install pipe sensor using nozzle or tapping saddle

Fig. 14-18 Setup of a controlled system such as a discharge control

14.8.3 Connection for Controller Operation



Note: Relay 1, 2 and 3 are not suitable to control the regulation slide valve.

Fig. 14-19 Wiring diagram for controller operation

14.8.4 Control Algorithm

If the regulator function is selected (see also chapter “23.7 Parameter Menu “Control Unit””), relay 4 is used for “CLOSE SLIDE VALVE” and relay 5 for “OPEN SLIDE VALVE” function. 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 “SWITCH OPEN”, “SWITCH CLOSED” and “TORQUE CLOSED” of the slide valve drive.
The input current per digital input is 10 mA.

Slide valves driving messages

In case of driving the slide valves via the digital inputs always use all the three messages. Activating one message only may result in disturbed regulator operation.

The regulator can be operated with external or internal set point.
External setpoints have to be routed to analog input 4 (clamps 41+ and 42 GND).
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 F is going to access the internal setpoint (→ 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:

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

Initial start-up

15 Notes to the user

Required documentation

To put the entire system into operation it may be necessary to additionally consult the instruction manuals of the following accessories as well.

- *Installation Instruction for Correlation and Doppler Sensors*
- *Technical Instruction for Doppler sensors*

These manuals are provided with the delivery of the accessories.

Before connecting and operating the transmitter the instructions below shall be followed.
This instruction manual contains all information required for the setting of parameters and for the use of the instrument. The manual is intended for qualified personnel. Appropriate knowledge in the areas of measurement systems, automation technology, control engineering, information technology and wastewater hydraulics are preconditions for putting the transmitter into operation.
Read this instruction manual carefully in order to guarantee proper function of the transmitter.
The transmitter shall be wired according to chapter “14.5.1 Transmitter Connection”.
In case of doubt regarding installation, connection or the setting of parameters contact our hotline:

- +49 (0) 7262 9191 955

To put the entire system into operation additionally consult the instruction manuals of the following accessories as well. These manuals are provided with the delivery of the accessories.

16 General principles

The system shall not be put into operation before 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 F programming via display and keyboard by reading the instruction manual before you begin to program the device.

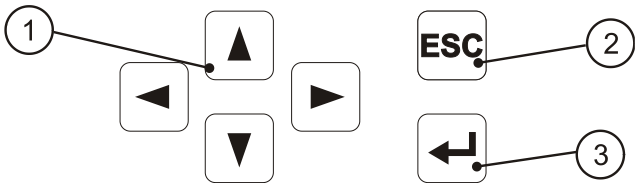
After transmitter and sensors are connected the parameters must be set. In most cases all you need is:

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

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

17 Operator Panel

There is a comfortable 6-button keypad available to input required data.
Due to reasons of mechanic and electronic protection the push button keypad is sealed completely by means of a plastic membrane with indelible marking.



1 Control buttons

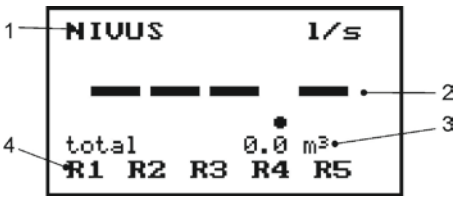
2 Abort button

3 Confirmation button

Fig. 17-1 Operator panel

18 Display

The OCM F has a large back-lit graphic display with a resolution of 128x64 pixels. This ensures a comfortable communication mode for the user.



1 Name of measurement place

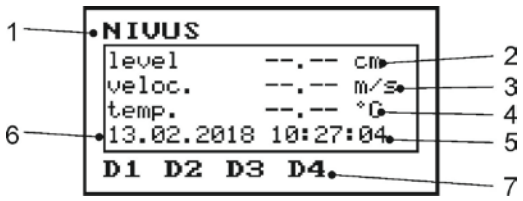
2 Flow

3 Total

4 Relay status

Fig. 18-1 Overview main menu

Press >ENTER< once in order to get to the secondary screen of the main menu.



1 Name of measurement place

2 Level

3 Measured average flow velocity

4 Measured medium temperature

5 System time

6 System date

7 Digital input status

Fig. 18-2 Overview secondary screen

Five basic menus for selection, programming or diagnostics are visible in the headline of the display. They can be selected individually using the >left< and >right< arrow keys.

RUN	Standard operation mode: - Indication of day totals - Indication of possible error messages - Definition of time of 24-hour totalising - Reset day totalizer
PAR	Parameter setting (most extensive menu; for initial start-up): - Parameter setting of dimensions of the measurement - Parameter setting of sensors - Parameter setting of analog and digital outputs - Controller settings - Damping settings - System reset
I/O	Diagnostics and display menu: - Indication of current readings on digital inputs - Indication of current readings on analog outputs - Indication of current readings on relays - Transmission of measurement data and parameters to USB stick - Indication of current flow velocity - Indication of spatially allocated single velocities - Indication of current sensor data - Indication of velocity histogram - Indication of current data on h-crit
CAL	Calibration and Simulation: - Definition of maximum and minimum measurable flow velocity - Calibration of level - Calibration of analog outputs - Simulation of analog and digital outputs - Simulation of the calculated volume

EXTRA	Basic system and display settings: - Display - Contrast - Language - Units - Decimal digits - System times - Totalizer presets

Table 4 Functions of the basic menus

19 Operation Basics

The entire operation is menu driven. To navigate within the menu structure use the four control keys (see chapter “17 Operator Panel”).

▲ **>up<**	- Navigates upward in the respective submenu (e. g. PAR/measurement place/name) - Select preset values e. g. units (m, cm, l/s, m³/s etc.) - Increase values
▼ **>down<**	- Navigates downward in the respective submenu (e. g. PAR/measurement place/name) - Select preset values e. g. units (m, cm, l/s, m³/s etc.) - Decrease values - Set decimal point
◄ **>left<**	- Press once to toggle between indication mode and overview menu (main menu) - Jump across in main or submenu - Jump across between identical measurement values (e. g. span of analog outputs 1…3)
► **>right<**	- Press once to toggle between indication mode and overview menu (main menu) - Jump across in main or submenu - Jump across between identical measurement values (e. g. span of analog outputs 1…3)
ESC **>ESC<**	- Delete values - Each key action in menu → jumps back one level until RUN menu
↵ **>ENTER<**	- Press once to toggle from RUN menu to overview menu (main menu) - Activate a submenu - Accept and store values, units and so on

Table 5 Functions of the control keys

Parameter Setting

20 Basics of Parameter Setting

The transmitter in the background operates with the settings which have been entered at the beginning of the parameter setting. The system will not ask to accept the modifications before the settings or modifications have been finished.

Choosing >Save values< will prompt you to enter the system-PIN (may be abbreviated as “PIN” within the display context).

2718 Enter the system PIN if prompted (password) here.

Share password / system-PIN only with authorised persons

Never share the system-PIN with unauthorised persons. Do not even leave the code next to the equipment nor write it down on it.

The system-PIN protects from unauthorised access.

Single input of system-PIN within 24 hours

*The system-PIN must be entered only once within 24 hours. The transmitter will save more password-protected settings within this period **without** the need to **re-enter** the PIN.*

After correctly entering the PIN the modified parameters are accepted and the unit will restart. The OCM F is ready for operation again after approx. 20…30 seconds.

Options at the end of setting parameters:

- Save modified parameters by pressing >save new values< and inserting the System-PIN
- Jumping back to the previous level using the >back< function to modify settings which might have been forgotten (without the need to buffer previously modified settings)
- Quit setting parameters and reject any modification by pressing >cancel<

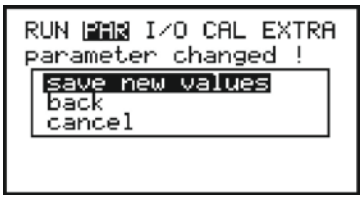


Fig. 20-1 Screen on end of parameter setting

The transmitter will indicate if the **system-PIN** should have been **entered incorrectly** and then waits for correct entry.
If you should have forgotten to enter the system-PIN use the >ESC< key to go back within the menu.

Modifications concerning language, units and contrast do not require the code to be entered as these settings influence just the way of representation and not measurement or output.
If parameter settings are not going to be modified but just verified by selecting each parameter, there will also be no request at the end of the dialog.

Regard the measuring units

Please observe the bottom line of the display whilst programming, indicating the pre-selected measuring unit.

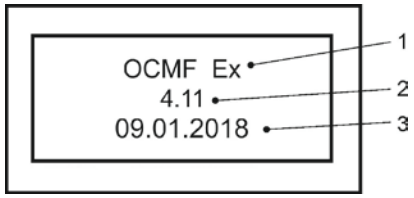
After mounting and installing sensor and transmitter (see previous chapters) activate the power supply.

On **initial start-up** the operating language needs to be selected:

Fig. 20-2 Language options for initial start-up

Use >up< and >down< arrow keys to choose the desired language and confirm with >Enter<. The language can be changed later at any time by using the >EXTRA< / >Language< menu.

On **start-up** the screen below comes up:



1 Device version (see chapter “11.1 Device Types”)

2 Device software version no.

3 Device software version date

Fig. 20-3 Start screen

This screen will remain for a couple of seconds before the main display appears.

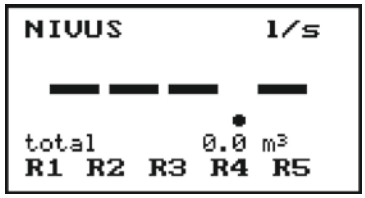


Fig. 20-4 Main display

➲ Press >ENTER< in order to get to the secondary screen of the main display.

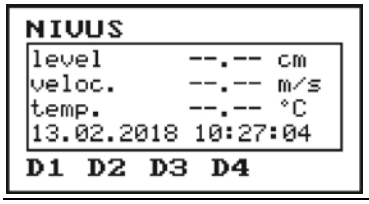


Fig. 20-5 Secondary screen of the main display

➲ The display will return to the previous screen either if pressing >ENTER< again or approx. 30 seconds after the last key action.

21 Operation Mode (RUN)

This menu is a display menu for standard operation mode and indicates day values and error messages. Containing the following submenus, it is not required for parameter setting:

Submenues **>day values<** and **>error messages<**:

>Day values<

>Info<

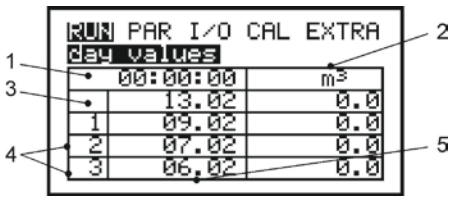
- Selecting the >Info< submenu allows you to view the total flow values of the past 14 days (see Fig. 21-1).
  Presumption: the transmitter was operated without any interruption in the past 14 days. Otherwise it shows the total for the uninterrupted days of operation.
- When selected first the current date and the first three saved days are visible. Browse to other days by using the key >down<.
- The oldest day total will be overwritten as soon as the 24h-total of the 15th day has been created (circular memory function).

>Cycle<

- The flow totals of 24 hours will be indicated. Totalisation normally is carried out at 00:00 h (midnight). If desired, this value can be modified under >Cycle< (see Fig. 21-2).

>Erase counter<

- All day counters can be erased under >Erase counter<. Due to safety reasons it is required to enter the system-PIN and confirmation with >ENTER< after erasing.



1 Time of day totalising

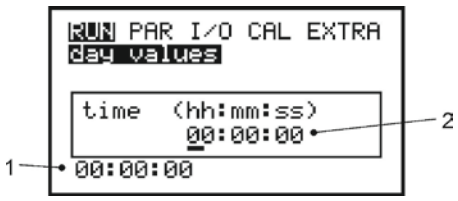
2 Day values (and unit)

3 Current day with cumulated total

4 24 h-day totals

5 Date

Fig. 21-1 Display day values / info



1 Current time of day totalising

2 Programmable time of future totalising in >hours:minutes:seconds< format

Fig. 21-2 Time of day totalising (cycle)

Information concerning the totalising

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

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

>Error messages<

>Error<

- This menu is to monitor any interruptions in the unit function. Errors are going to be saved and ordered by type of error, date and time.
- Selecting the menu will always indicate the latest error message.
  Browse through error messages using the keys >left< and >right<.
  Pressing the >ENTER< key will delete all error messages one by one.
  The maximum number of stored error messages is limited to 10. The oldest of 11 error messages will be overwritten as soon as saved old error messages are not going to be erased (circular memory function).

Information on error messages:

- “Doppler-Sensor” - at interruption of the sensor communication or with defective KDA sensor
- “External level” - at interruption of communication to external level measurement or if value falls below the limit of 3.5 mA
- “External level short-circuit” – in case of exceeding the input signal 20 mA
- “Temperature” -in case of exceeding maximum or minimum permissible temperature ranges by ±10 °C (as from -30 °C to +60 °C) or if the temperature sensor should be defect
- “Ext. set point” - if external set point is not available
- “Control unit” - in case of error of the control unit (“Valve OPEN”, “Valve CLOSED”, “Valve TORQUE”)
- “Battery” - transmitters buffer battery empty

1 Error number

2 Number of stored messages

3 Date of error message

4 Time of error message

5 Type of error / error message

Fig. 21-3 Error message

Information on error memory

*Remaining errors are **not** going to be re-written into the error memory if once deleted. As soon as the error occurs repeatedly (or if the power supply has been interrupted for a short period) the same error will be saved into the error memory again.*

22 Display Menu (EXTRA)

This menu allows modifying settings such as units, language, system time as well as the display itself. The following submenus are available:

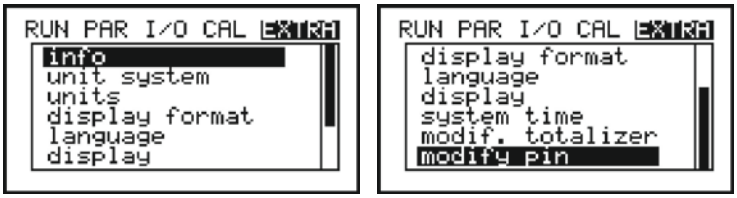


Fig. 22-1 EXTRA Submenus

Due to reasons of limited space it is not possible to indicate the entire menu on the display. This can be seen from the black scroll bar on the right-hand side of the display.

▲ ▼ Scroll through the menu using the >up< and >down< keys.

>Info< This point provides comprehensive information on unit type, transmitter serial no. and software version (see Fig. 22-2). The menu is subdivided into four single pages. Pressing the key >right< and >left< will take you through the pages. Among other information these pages contain information on last parameter setting/parameter change as well as mains power failure which might have been occurred.

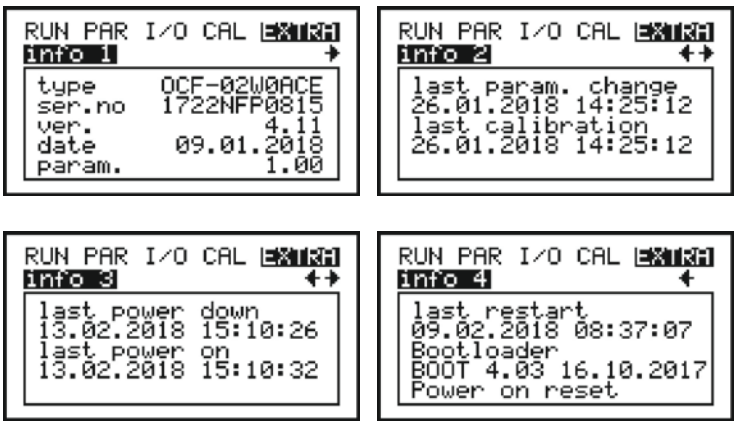


Fig. 22-2 System information / info 1…4

>Unit system< Here the unit systems can be pre-selected.
Available units:

>metric<	l/s, m³/h, cm/s etc.
>UK-english<	ft, in, gal/s etc.
>US-english<	fps, mgd etc.

>Units< For each of the three measured/calculated values
>Flow rate<
>Veloc.<
>Level<
>Total<
a unit which appears on the display can be selected. Depending on the unit system selected, there are various units available.

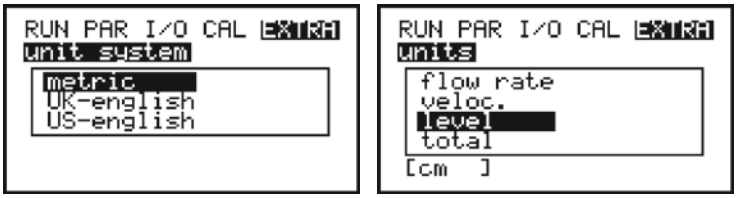


Fig. 22-3 Selecting the units system and units

>Display format< Choose the display format (decimal position) to indicate flow rates, velocity, level and total.
The decimal positions can be selected. Since the transmitter cannot indicate more than a maximum of five digits (incl. comma/dot), the decimal places, however, may be reduced as soon as multiple digits need to be indicated left of the decimal point.
Example:
a total of 10 litres is indicated as 10.00 (xx.yy) instead of x.yyy

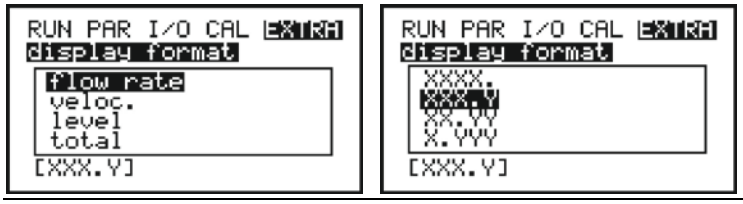


Fig. 22-4 Selecting the display format

>Language< Select from German, English, French and Polish

>Display< Permits to adjust the display contrast. Use the arrow key >down< to decrease and >up< to increase the value in steps of 5 %. The new setting will be saved automatically.
The contrast can be set also directly in the main and secondary screen by using the >up< and >down< arrow keys. In this case the percentage steps will not be indicated and the modifications are merely temporary. The transmitter will go back to the previously set values at the next power on.

>System time< In order to perform various memory functions, the unit includes an internal system clock. The clock settings can be modified if required (different time zones, summer time / winter time etc.).

>Info<	Indicates the current (adjusted) values for date and time
>Set date<	Modify date
>Set time<	Modify time
>Date format<	Adjust date format
>Time format<	12- or 24-hours format

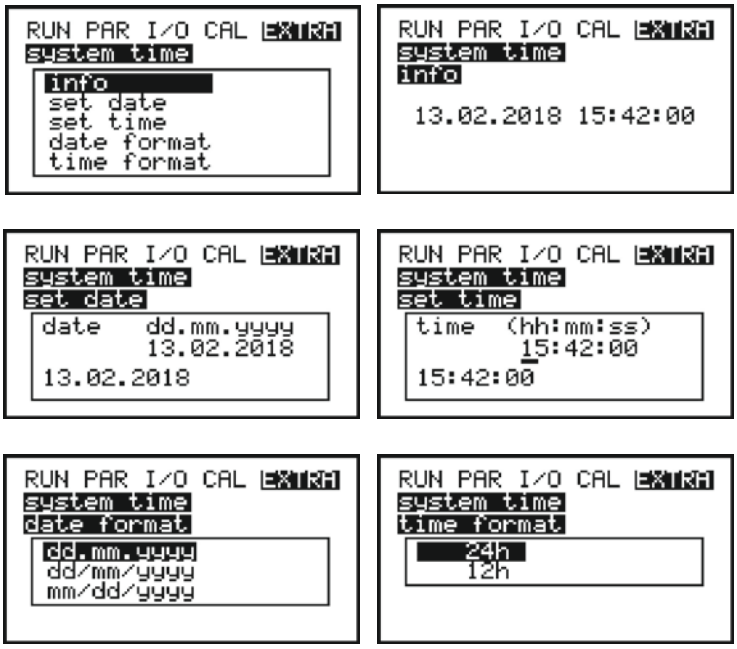


Fig. 22-5 System time submenus

>Modif. totalizer< This menu allows to newly set the totalizer indicated on the main screen. This function is used if the transmitter has been replaced and the new transmitter is to show the same total value.
- Specify new total value
- Confirm with Enter key
- Enter system-PIN and confirm
- New total value is shown in the main screen

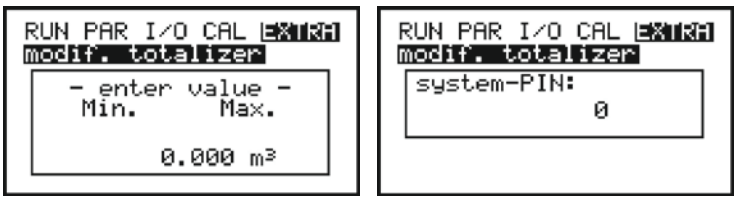


Fig. 22-6 Modification of totalizer

>Modify PIN< **>System-PIN<** The system-PIN is the transmitter password and for parameter modifications.
Default system-PIN: 2718
NIVUS recommend to change the PIN to protect the system from unauthorised access. The PIN is arbitrarily selectable (max. six digits).

Tip:
For your own safety we recommend to share the system-PIN only with authorised persons. Make a note of the system-PIN and store it in a safe place.

>Service-Code< This menu point is for the NIVUS commissioning service only.

>Reset all pins< If the system-PIN should get lost a PUK (Personal Unlocking Key) can be generated by NIVUS (upon request) which will reset all modified PINs to factory default and hence restores transmitter access.

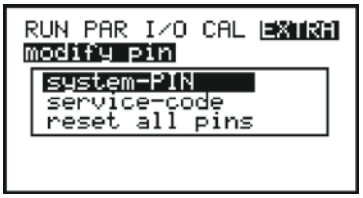


Fig. 22-7 Submenu modify PIN

23 Parameter Menu (PAR)

This menu is used to set all relevant parameters required to ensure reliable device function. Choose from the following parameters:

- Name of measurement place
- Channel shape
- Channel dimensions
- Measurement place application (mode and medium)
- Sensor types
- 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 (controller 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 eight partially very extensive submenus which are described individually on the following pages.

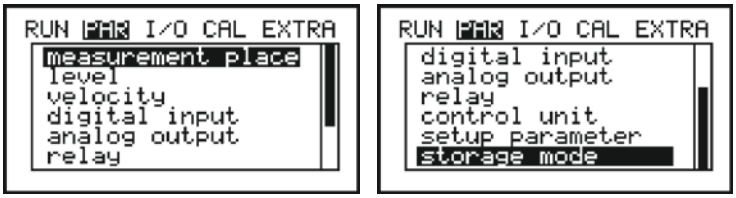


Fig. 23-1 Parameter menu

▲ ▼ Scroll through the menu using the >up< and >down< keys.

23.1 Parameter Menu “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.

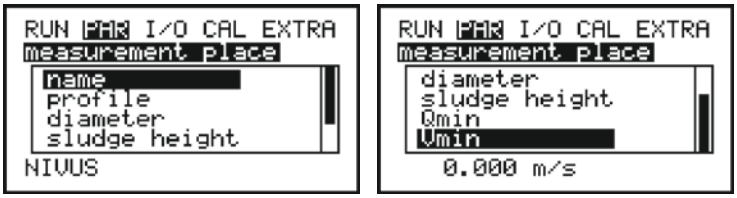
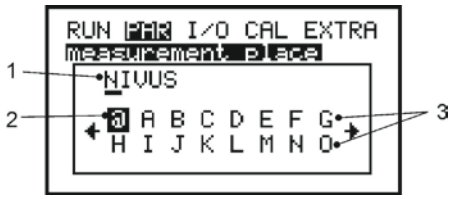


Fig. 23-2 Submenu measurement place

>Name< NIVUS recommends to coordinate and to define names according to names stated in the respective documents. Names may contain up to 20 letters. The display, however, does not necessarily indicate the complete name; what is decisive is the available space on each individual page.
After the submenu >Name< has been selected the basic setting “NIVUS” will come up. There is a cursor blinking below the first digit which can be modified.
Underneath the measurement place name you can find a table with 20 lines containing all uppercase and lowercase letters as well as a large number of special characters (see Fig. 23-3). Use the keys >up<

and >down< to jump across two lines up or down at each key action.
To complete the name of the measurement place use the four arrow keys and confirm your selection with >ENTER<. The cursor subsequently will jump one digit to the right enabling you to choose the next character.
Surplus or incorrect characters can be overwritten by entering a blank which can be found top left in the table.
In order to modify an existing name move the input cursor right by simultaneously pressing the >right< + >down< or >up< arrow keys.
Press >left< + >down< or >up< to move to the left.



1 Current name of the measurement place

2 Selected character

3 Selection list

Fig. 23-3 Setting the name of the measurement place

The >right< or >left< arrow keys can be used to move the cursor even after the cursor reaches the right or left margin of the table. Pressing the >right< or >left arrow keys once again after the input cursor has reached the right or left table margin will move the cursor one more step in the desired direction.
Press ESC to finish the measurement place name entry:

>Save new values<	Saves the input
>Back<	Enables corrections
>Cancel<	Aborts the input and the previous name will be kept

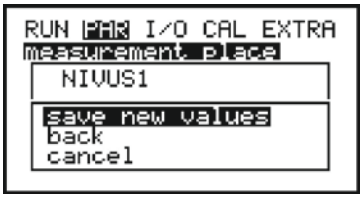


Fig. 23-4 Accepting the new measurement place name

>Profile< You can select between following standard profiles according to ATV A110 (dimensions to be entered in brackets):
- Round pipe (diameter)
- 3r Egg (radius)
- Rectangular (profile height and width)
- U-Profile (profile height and diameter)
- Trapezoid (profile height, profile width down/up, max. chn. height)
- Custom shape h/A (channel shape(s))
- Custom shape h/b (channel shape(s))

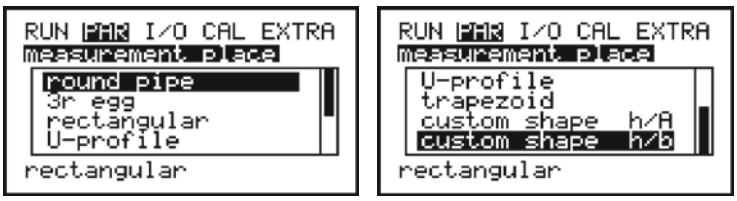


Fig. 23-5 Channel shape selection

▲ ▼ Select channel shape with >Up< and >Down< keys.

↵ Confirm selection with >Enter<.

The selected profile will be indicated in the bottom line of the display.

Fig. 23-6 Selected profile screen

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

↵ Confirm with >Enter<.

>Custom shape< After having >Custom shape< selected, first choose >Channel dimensions<.

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

Units

Please observe indicated units.

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

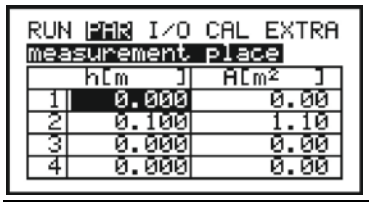


Fig. 23-7 List of breakpoints for >Custom shape<

In order 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 required to use all of the 32 breakpoints possible. The OCM F however is going to use a linearization function between the breakpoints. Decrease the distance between breakpoints in case of heavy and irregular fluctuation within the area.

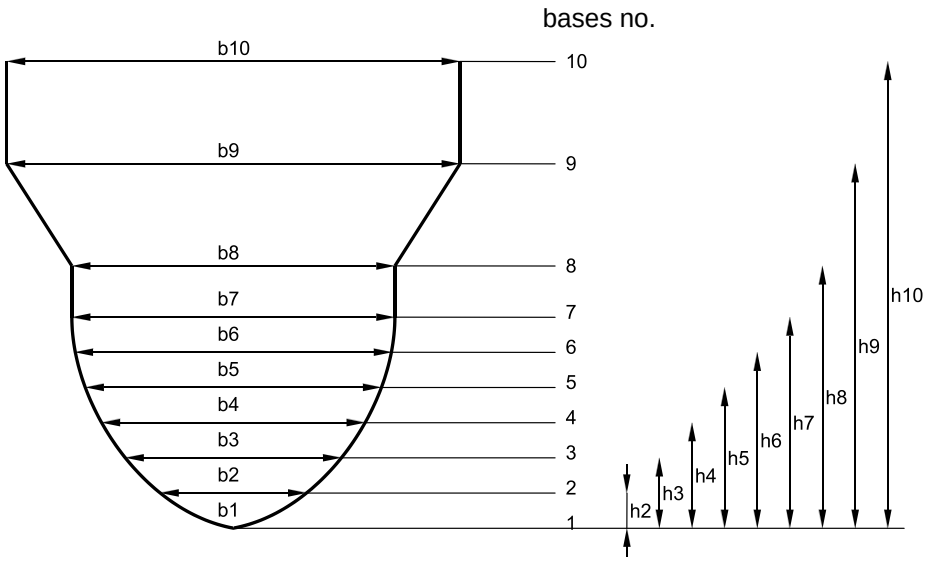


Fig. 23-8 Breakpoints for >Custom shape<

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

>Qmin< This parameter is to suppress lowest evaluated and indicated volumes which are either undesired or not relevant. The main area of use is the measurement of discharge volumes in structures which are permanently filled up by the receiving water stage.
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.

>Vmin< 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}
V_{min}: Flow velocities below this value will be set to “0” which will set the calculated volume to “0” as well. Only positive values are allowed to be set. These values are going to be considered as absolute values and therefore affect positive as well as negative velocities.

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

Fig. 23-9 Selection low-flow volumes

Offset

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

23.2 Parameter Menu “Level”

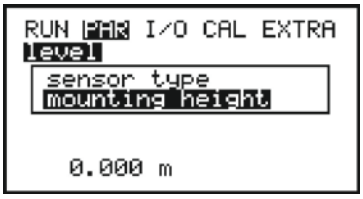


Fig. 23-10 Selection level measurement

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

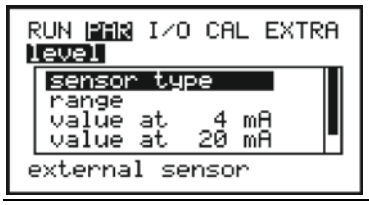


Fig. 23-11 Example in case of external level sensor

Basically determine the sensor type (Fig. 23-12) first.

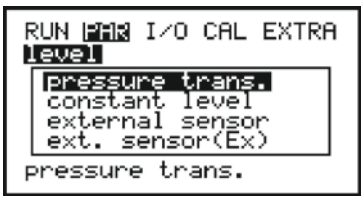
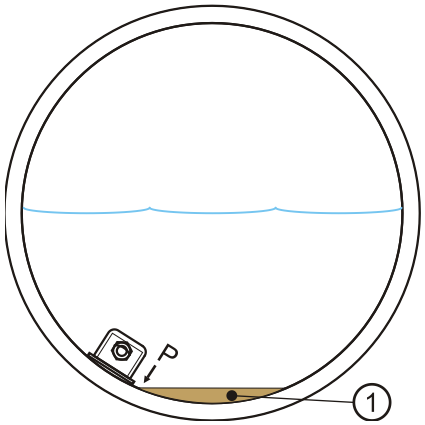


Fig. 23-12 Determine the sensor type

Sensor type	No.	
Pressure	**01**	Level measurement by a KDA combi sensor which is directly connected to OCM F according Fig. 14-5. Offset installation e. g. due to sedimentation or high dirt load is possible. Level measurement in case of flooding is possible as well.



1 Sedimentation or soiling

Fig. 23-13 Sensor type 1: Pressure

Sensor type	No.	
Constant level	**02**	Use this point to set parameters for constantly full filled pipes and channels. Such applications normally do not require level measurements. The constant filling level must be set under >value< and is used for flow calculation. This parameter is helpful too at initial start-up or in case of performing tests without having level values available.

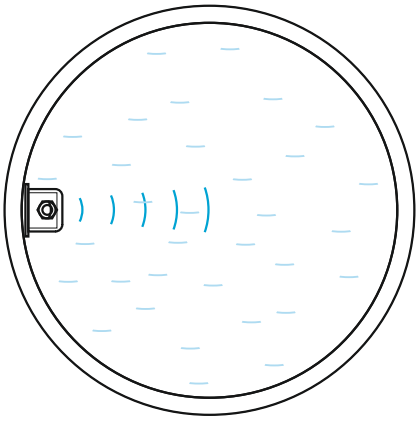


Fig. 23-14 Sensor type 2: Constant level

Sensor type	No.	
External sensor	**03**	In this case the level is measured by using external transmitters such Type NivuMaster with echo sounder or an external 2-wire sensor such as NivuCompact (non-Ex) or i-Series sensor for Ex-Zone 1. Connect as shown in Fig. 14-8, Fig. 14-11 or or i-Series connection plan Fig. 14-9.

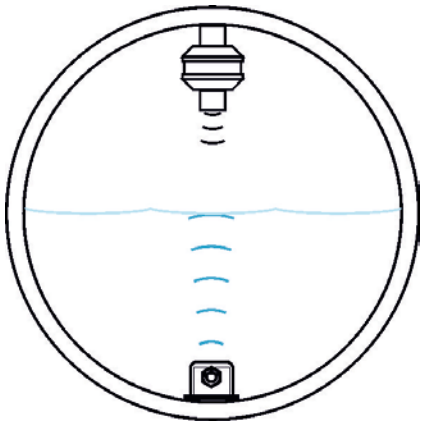


Fig. 23-15 Sensor type 3: 2-wire probe

Sensor type	No.	
Ext. sensor (Ex)	**04**	Level measurement by external Ex 2-wire sensor supplied by OCM F e. g. a pressure probe, type NivuBar Plus or echo sounder type NivuCompact). Connect as described in Fig. 14-10.

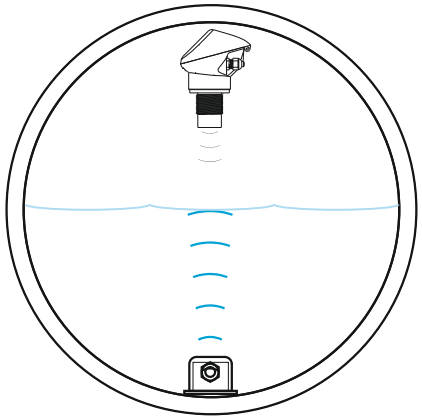


Fig. 23-16 Sensor type 4: 2-wire probe Ex

Please select the appropriate level measurement method prior to planning the facility.

Observe correct connection of sensors

The transmitter will access only the clamps which have been programmed in the menu!

Due to this reason please observe correct sensor connection (see chapter "14.5.2 KDA Sensor Connection").

>Mounting height<
Only visible, if sensor type no. 1 is selected.
This value is set to 0 mm as KDA combi sensors as default. The value needs to be adjusted in case of elevated (block or similar) or lowered installation. Then the altered mounting height is specified (positive or negative value).

>Value<
Enter a fixed value for the level here. Only visible, if sensor type no. 2 is selected.
Default setting: 0.1 m (3.9 in)

>Measurement range<
Select between measurement ranges 4…20 mA or 0…20 mA.
Only visible, if sensor type no. 3 is selected.

>Value at 0 mA<
Enter a level value for 0 mA here.
Only visible if 0…20 mA has been selected as measurement range for sensor type no. 3.
Default setting: 0 m (0.0 in)

>Value at 4 mA<
Enter a level value for 4 mA here.
Only visible, if sensor type no. 3 or 4 is selected.
Default setting: 0 m (0.0 in)

>Value at 20 mA<
Enter a level value for 20 mA here.
Only visible, if sensor type no. 3 or 4 is selected.
Default setting: 4 m (13.1 ft)

>Offset<
This entry will move the zero point of the external sensor.
Only visible, if sensor type no. 3 or 4 is selected.
Default setting: 0 m (0.0 in)

>Damping<
This value is to damp a fluctuating signal of an external level measurement.
Only visible, if sensor type no. 3 or 4 is selected.
This value is set to 0 s as default and can be set to up to 10 s.

23.2.1 Information on how to connect i-Series sensors

Observe correct connection of sensors

The i-Series sensors feature pre-programmed measurement ranges. Please refer to the according instruction manual. The sensor can be operated even without HART modem.

Setting the parameter "Value at 20 mA" requires entering the measurement span of the sensor. Depending on the installation height of the sensor a negative offset value may be additionally necessary.

	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
Measurement span (value at 20 mA)	2.875	5.7	9.7	14.5

Table 6 i-Series sensors measurement range

23.3 Parameter Menu “Velocity”

Fig. 23-17 Sensor settings

>Sensor type< Select between wedge or pipe sensor.
Default setting: wedge sensor

>Install. direction< Default setting: positive
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 setting “negative” here.

23.4 Parameter Menu “Digital Inputs”

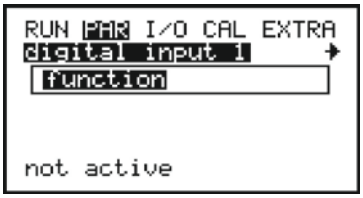


Fig. 23-18 Digital inputs – submenu

Select from digital inputs 1…4 using the >left< or >right< arrow keys as long as the regulator function is active. This section enables to set and the digital input signals “switch OPEN”, “switch CLOSE” and “torque close”.

The OCM F requires these inputs for regulator operation.
The function >Stop v-measurement< is exclusively available for digital input 4.

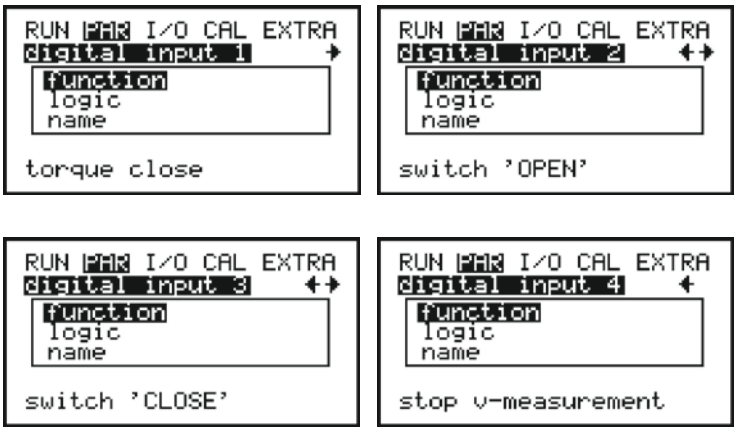


Fig. 23-19 Digital inputs functions

>Function< One certain function is assigned to each digital input.
Choose from:
- “Not active” - the digital input has no function
- DI1 – “torque close” - the torque switch for the closed condition is

connected to the selected digital input
- DI2 – “switch open” - the slide end switch for open condition is wired to the selected digital input
- DI3 – “switch close” - the slide end switch for closed condition is routed to the selected digital input
- DI4 – “stop v-measurement” - the digital input is used to block/release the measurement using an external signal such as flood messages or limit values for measurement start or similar. Indicated as: 0 l/s, inputs and outputs set will de-energise

>Logic< Toggle between inverse and non-inverse input by pressing >up< or >down< arrow keys. This means that e. g. slide valve signals can be configured as being normally closed and cable breaks can be detected without any problem.
Default setting: not inverted

>Name< The name of a digital input can have up to 3 characters. These names will be indicated in the main screen and in overview menu; see overview menu. Set the names as described in chapter “23.1 Parameter Menu “Measurement Place””.

Ensure reliable contacting

Please observe that the digital inputs are passive and therefore shall be supplied by an external 24 V DC power supply. The signal current is 10 mA.

Please ensure reliable conductivity by using relay or end switch contacts made of high quality material.

23.5 Parameter Menu “Analog Output”

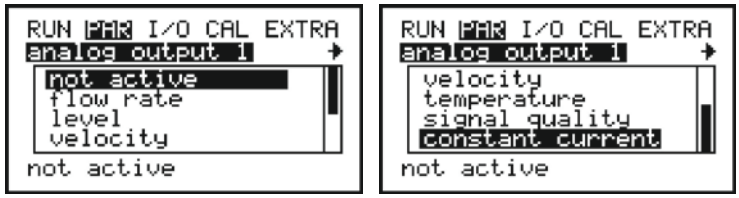


Fig. 23-20 Menu Analog output

Use the >right< or >left< arrow key within this menu to select analog outputs 1…3.

>Function< The selected analog output can be assigned to one certain function. Choose from:

>Not active< Digital output is without function.

>Flow rate< Output of analog signal which is proportional to calculated flow volume.

>Level< Output of analog signal which is proportional to measured filling level.

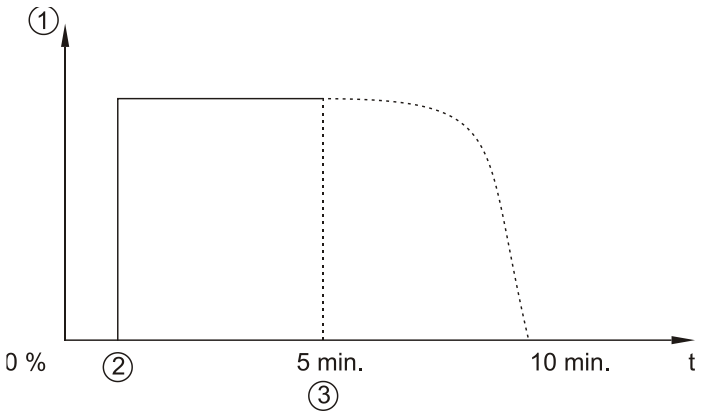
>Velocity< Output of analog signal which is proportional to mean flow velocity averaged from measured individual velocities.

>Temperature< Output of measured water temperature as analog signal.

>Signal quality< Calculates from the ratio between valid readings to total readings resulting from velocity measurement, output as analog signal. This function is not conceived for control purposes, but for monitoring, remote analysis and for determination of sensor cleaning intervals.

Use >Flow rate<, >Level<, >Velocity<, >Temperature< and >Signal quality< to adjust the settings below (see Fig. 23-22):
>Span<
>Value at 0/4 mA<
>Value at 20 mA<
>Error mode<

>Constant current< The analog output can be set to output a constant current which is independent from any readings.
For constant current enter the desired initial current (max. 21 mA) (see Fig. 23-23).



1 Analog output
2 Start measurement
3 Stop measurement (obstruction, standing water or no water etc.)

Fig. 23-21 Analog output signal quality

The Fig. 23-21 signal quality shows the analog output signal if the signal quality has been programmed. The signal will steeply rise at the beginning of the measurement (Fig. 23-21/2). The signal is damped in order to avoid heavy signal fluctuation.

As soon as e. g. the sensor is going to be removed from the medium or no velocity can be measured at all (Fig. 23-21/3), signal first slopes gently getting steeper subsequently.

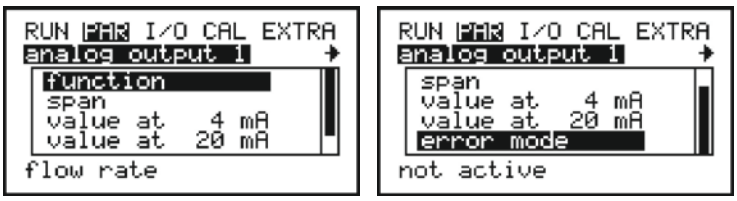


Fig. 23-22 Selection flow

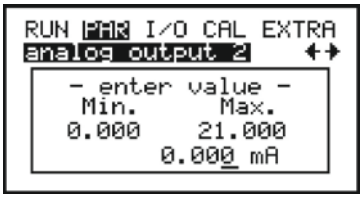


Fig. 23-23 Setting constant current

The following menu points will not be indicated on the display before the analog output has been enabled for output of flow, level, velocity, signal quality or temperature readings.

>Span< Toggle between measurement ranges of >0…20 mA< or >4…20 mA<

>Value at 4 mA< Enter the measurement value at 4 mA.
Example:
A measurement place is partially tending to backwater formation. Negative values shall be recorded as well; the following recording or process conducting system however has only one analog input left available. In this case the analog output signal is set to have a “floating” behaviour.
This means that flow = 0 is going to output the 12 mA analog signal:

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

Backwater will cause the analog signal to decrease, positive flow will cause the signal to increase.

>Value at 20 mA< Enter the measurement value at 20 mA

>Error mode< If this parameter has been enabled it is possible to set the analog output to a defined value in case of error. After activation the points “Error input mask” as well as “Value at errors” can be selected (see Fig. 23-24).

>Error input mask< This point is accessible only if error mode has been activated. Output signals can be assigned to the respective error here.
Available are:
- Sensor
- External level
- Temperature
- Battery
- External setpoint
- Control unit

Velocity is currently not yet available.
Choose the desired function with the >up< or >down< arrow keys and confirm by pressing ENTER. A tick will appear as soon as the function has been confirmed. Pressing ENTER once more will deactivate the function again. Leave this point by pressing ESC (see Fig. 23-25).

All errors will be saved in the error memory (see chapter “21 Operation Mode (RUN)“ subitem “Error messages”).

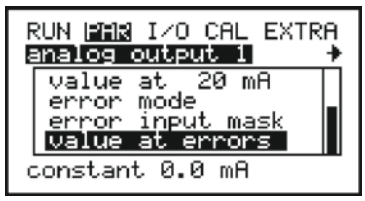


Fig. 23-24 Extended submenu analog output

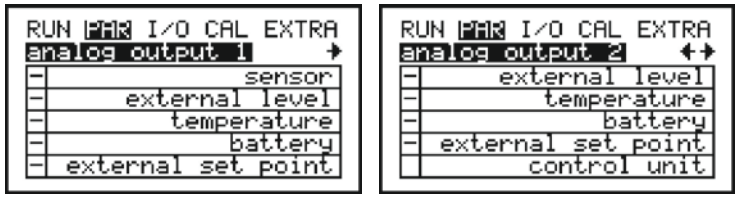


Fig. 23-25 Error input mask

>Value at errors<

Visible only if error mode has been enabled. This parameter is to define the desired analog output condition if an error should occur (see also Fig. 23-26).
The following functions are available:
- Hold old value (holds the last value prior to error)
- Constant 0,0 mA
- Constant 3,5 mA
- Constant 4,0 mA
- Constant 21,0 mA

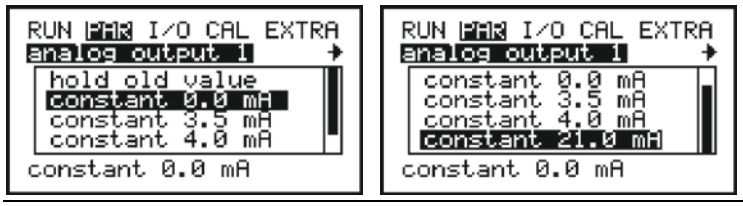


Fig. 23-26 Programming error output

23.6 Parameter Menu “Relay”

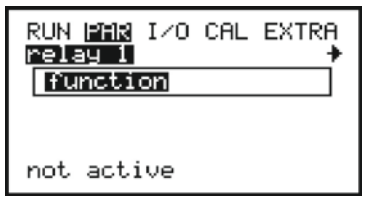


Fig. 23-27 Menu relay

This menu allows defining both functions as well as accompanying parameters (such as limit values, duration of impulse and more) of individual relay outputs. Select parameter >function< in order to indicate the available functions.

◄ ► Toggle between relays using the >left< and >right< arrow keys.

Assignment of regulator dedicated

Relays 4 (close slide valve) and 5 (open slide valve) are dedicated to regulator functions if the regulator has been enabled.

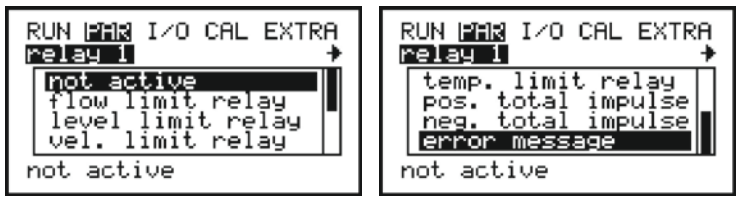


Fig. 23-28 Relay submenu

Possible relay functions:

>Not active< No relay function; default setting

>Flow limit relay< 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).

>Relay mode< It is possible 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.

>ON point< Defines the “ON” point for the selected limit value. This value is required for all limit functions.

>OFF point< Defines the “OFF” point for the selected limit value. This value is required for all limit functions.

>ON delay< The “ON” event in case of reaching the limit value can be delayed by up to 9999 seconds max. The relay will not energise before the time set is expired and the limit value is present yet.
If the value falls below the limit threshold for a moment the cycle will begin anew.

>OFF delay< The “OFF” event in case of reaching the limit value can be delayed by up to 9999 seconds max. The relay will not de-energise before the time set is expired and the limit value is present yet.
If the value falls below the limit threshold for a moment the cycle will begin anew.

>Name< The relay output name may consist of four characters max. which will be indicated in main menu and in overview menu. Set the name as described in chapter “23.1 Parameter Menu “Measurement Place””.

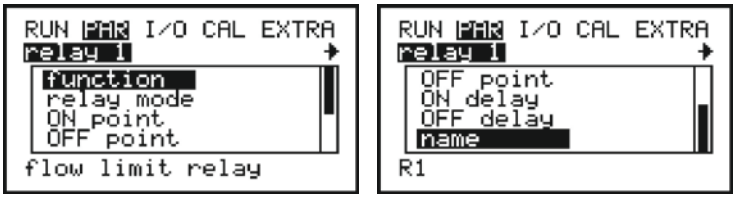


Fig. 23-29 Limits submenu

>Level limit relay< Relay will energise if a level limit value (to be set) has been exceeded and will de-energise if flow falls below a second limit value (to be set).
>Relay mode<, See >Flow limit relay<
>ON point<,
>OFF point<,
>ON delay<,
>OFF delay<,
>Name<

>Vel. limit relay< Relay will energise if a velocity limit value (to be set) has been exceeded and will de-energise if flow falls below a second limit value (to be set).
>Relay mode<, See >Flow limit relay<
>ON point<,
>OFF point<,
>ON delay<,
>OFF delay<,
>Name<

>Temp. limit relay< Relay will energise if a temperature limit value (to be set) has been exceeded and will de-energise if flow falls below a second limit value (to be set).
>Relay mode<, See >Flow limit relay<
>ON point<,
>OFF point<,
>ON delay<,
>OFF delay<,
>Name<

Fig. 23-30 Submenu impulse

>Pos. total impulse<

Relay will output volume-proportional impulses if the flow direction is positive. Weighting and impulse duration are free programmable.

>Name<
The relay output name may consist of four characters max. which will be indicated in main menu and in overview menu. Set the name as described in chapter “23.1 Parameter Menu “Measurement Place””.

>Impulse duration<
The impulse duration can be adjusted between 0.1 seconds and 1.0 seconds. The impulse-pause ratio here is 1:1.
Default setting: 0,5 seconds
It is useful to extend impulse duration e. g. in case of using slow SPS (PLC) inputs or sluggish mechanic counters.

>Volume impulse<
Defines the impulse value. The measured volume will be added internally until the value set has been reached. Then an impulse signal with the duration set will be output and the internal counter will be set to 0 again.
The course of events will repeat again subsequently.

>Neg. total impulse<

Relay will output volume-proportional impulses if the flow direction is negative (= backwater). Weighting and impulse duration are free programmable.

>Name<, >Impulse duration<, >Volume impulse<
See >Pos. total impulse<

>Error message<

Relay will energise in case of error messages. After activation >Error input mask< can be chosen.

>Error input mask<
This point is accessible only if error mode has been activated. Output signals can be assigned to the respective error here.
Available are:
- Sensor
- External level
- Temperature
- Battery
- External setpoint
- Control unit

Tick the checkboxes of the elements to check: sensor, external level, temperature, battery, external setpoint and control unit.
Choose the desired function with the >up< or >down< arrow keys and confirm by pressing ENTER. A tick will appear as soon as the function has been confirmed. Pressing ENTER once more will deactivate the function again.

Leave this point by pressing ESC.
All errors will be saved in the error memory (see chapter “21 Operation Mode (RUN)“ subitem “Error messages”).

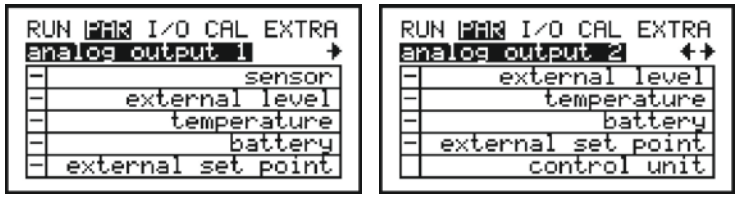


Fig. 23-31 Error input mask

23.7 Parameter Menu “Control Unit”

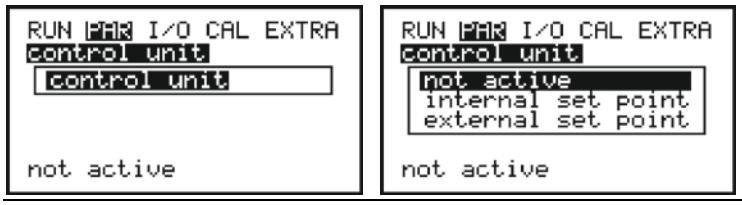


Fig. 23-32 Control unit – not active

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. The digital inputs >Switch open<, >Switch close< and >Torque close< have to be activated for the control unit to operate.

⇨ You can find more comprehensive information on setup and functional principle in chapter “14.8 Controller Mode”.

Qualified personnel

It is absolutely necessary to have sound knowledge on control technology to correctly and safely set the controller.

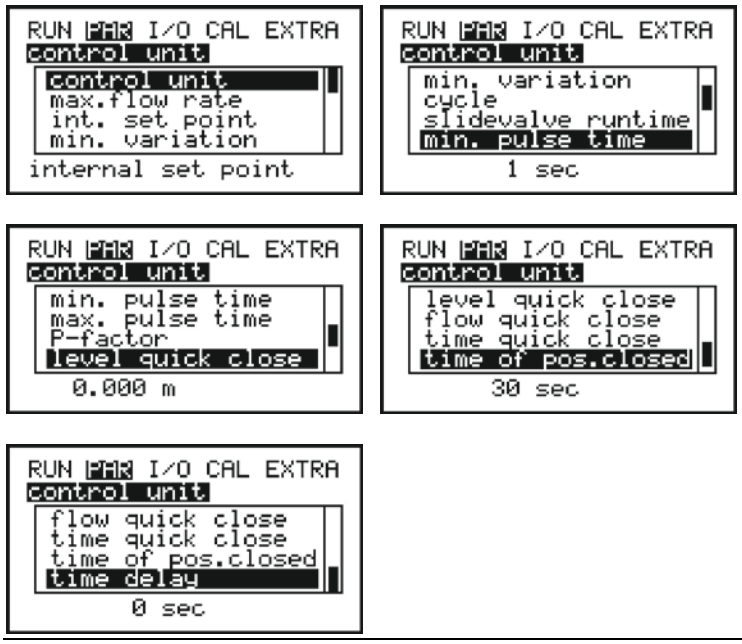


Fig. 23-33 Submenu >Internal set point<

>Not active< The function is disabled.

>Internal set point< The set point is determined in the OCM F.

>Max. flow rate< Enter the max. possible flow rate of the measurement place here in l/s. This value is required for improved system control.

>Int. set point< This parameter is to determine the internal flow set point in l/s.

>Min. variation< This parameter defines the permissible set point deviation of the control system without a regulating event is allowed to be executed. The setting reduces the oscillation tendency of the system. If there is no set point deviation tolerance defined, the system will constantly attempt to exactly adjust the actual value according to the set point. Due to this reason the regulating unit might be driven permanently which may result in mechanical defects or higher wear and tear. Normally the deviation should be approx. 10 % of the set point value.

>Cycle< The processing interval of the controller. Short intervals will accelerate the control behaviour, but are going to result in oscillation of the control circuit as from a certain point. A long interval is going to reduce the oscillation tendency of the controller but will however increase inertia of the regulating system.

$$\text{Interval} = \frac{\text{Average flow velocity}}{\text{Distance between regulating unit and measurement}} \bullet 1{,}3$$

>Slidevalve runtime< 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.

$$\text{Slide run time to be set} = \text{time between open and closed condition of slide valve during permanent operation} \bullet 1{,}2\ldots2{,}0$$

Information concerning slide run time

An error message is going to be generated if the controller unit does not reach the end switch CLOSED after the slide run time has expired (see chapter "21 Operation Mode (RUN)" sub item "Error messages").

The longer the slide run time the lower the factor.

Set slide run time

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

There will be no error message generated e. g. in case of a broken spindle if the slide run time has not been set!

>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.
If 0 has been set an impulse duration of 0.25 seconds will be used.

>Max. pulse time< This parameter defines the maximum control impulse duration of the regulating unit. This allows limiting the slider run time. The maximum control impulse duration should be shorter than the cycle time.

>P-factor< The proportionality factor indicates, to which degree the regulating time is going to be affected in case of a deviation ∆w from set point w. The higher the proportionality factor, the longer the regulating time of the slide valve at the same control deviation.

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. This function requires “level, flow and time quick close” to be set.

>Level quick close< Level quick close acts as OR-parameter related to Flow quick close. This parameter defines the desired maximum flow level of the medium. “Time quick close” will be activated as soon as this value has been reached.
Depending on application, this parameter shall be set approx. 60…80 % higher than the set point.
Before setting this parameter observe waves at the measurement place as well as the unit’s

regulating deviation.

>Flow quick close<

“Flow quick close” acts as OR-parameter related to “Level quick close”. This parameter defines the desired maximum flow rate of the medium.
“Time quick close” will be activated as soon as this value has been reached.
Depending on application; this parameter shall be set approx. 10…50 % higher than the condition which makes the system go to regulator mode during dry weather operation.
Before setting this parameter observe the unit set point deviation tolerance.

>Time quick close<

“Time quick close” is the time the regulating unit needs to move from open condition to the position it has whilst being in normal regulator mode. “Level quick close” or “Flow quick close” are the conditions for “Time quick close” to switch.

>Time of pos closed<

This period is for error cases, e. g. interrupted sensor communication or defect sensor. In this case the regulating unit goes to closed condition before it opens again for the period set in this parameter “Time of pos closed”.

>Time delay<

This is the time to elapse before the position control comes into effect in case of errors.
The adjustable range is 0…240 seconds.

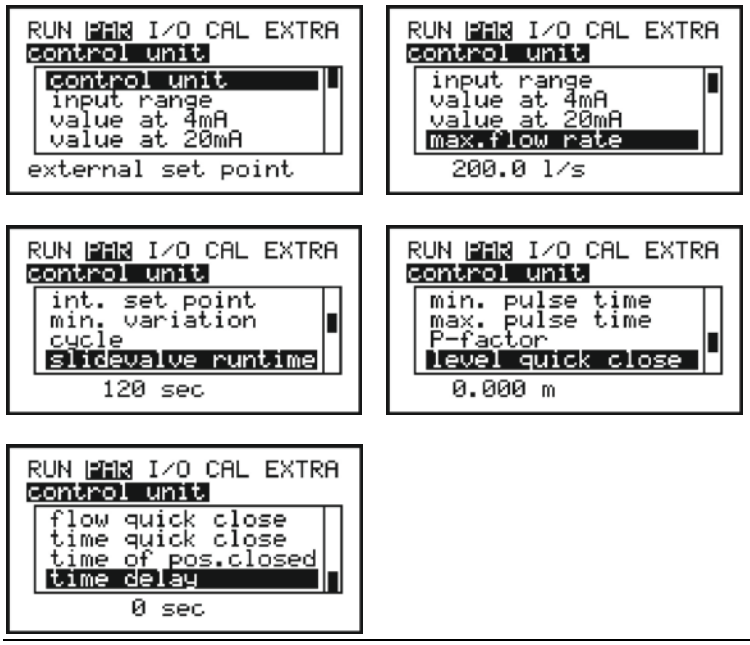


Fig. 23-34 Submenu >External set point<

>External set point< The set point is pre-set externally using the dedicated analog input 2. This can be accomplished e. g. by using a process conducting system. It is recommended to always set the “internal set point” since the system will switch to internal automatically as soon as the external set point 4…20 mA fails.

>Input range< Measurement range selection of external set point between 4…20 mA and 0…20 mA. Linearization of set point input: set point start is at 0/4 mA, set point end is at 20 mA.

>Value at 4 mA< The flow values can be set to 0/4 mA.

>Value at 20 mA< Flow values for 20 mA can be entered here.

>Max. flow rate<, >Int. set point<, >Min. variation<, >Cycle<, >Slidevalve runtime<, >Min. pulse time<, >Max. pulse time<, >P-factor<, >Level quick close<, >Flow quick close<, >Time quick close<, >Time of pos closed< and **>Time delay<** See >Internal set point<

23.8 Parameter menu “Setup Parameter”

CAUTION

Data loss due to systemreset

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

Fig. 23-35 Setup parameter – submenu

This menu allows resetting the system to default condition, to modify special settings by using the service code as well as to adjust damping and stability of measurement detection/output.

>System reset< Enables a general reset of the measurement transmitter. Entering the system-PIN will cause the transmitter to execute a general reset. The unit will be in initialising mode subsequently which requires the operation language to be set.

The transmitter will now overwrite the flash memory restarting the program. Displays and settings are the same as with initial start-up (see chapter “20 Basics of Parameter Setting”).

>Service mode< Additional system setting options are going to be revealed as soon as a special code has been entered. This parameter is reserved for NIVUS service personnel as the settings require comprehensive expert knowledge and are not needed for common applications.

>Damping< Allows adjusting indication and analog output damping between 20…200 seconds. This means that if the calculated volume jumps from 0 % to 100 % the system will need the time set here to indicate and to output this jump.

>Constancy< This menu permits to modify the stability of the flow velocity measurement. The time specified here will hold the latest valid measured flow velocity value in order to avoid short-term measurement failures. The value can be increased in case of poor hydraulic conditions.
Default setting: 8 seconds

23.9 Parameter menu “Storage mode”

This menu permits to modify the storage cycle and various format settings.

Fig. 23-36 Parameter menu “Storage mode”

>Memory cycle< Selectable options for the storage cycle are 1, 2, 3, 5, 10, 15, 20, 30 minutes or 1 hour.
Default setting: 1 minute

>Format of numbers< Use of comma or dot (XX.YYY or XX,YYY) for data storage.
Default setting: XX,YYY

>Unit system< Define the units/unit system used for data storage (metric, UK-english or US-english).
Default setting: metric

>Date format< Define the date format for data storage (TT.MM.YYYY or TT/MM/YYYY or MM/TT/YYYY).
Default setting: TT.MM.YYYY

>Time format< Define the time format for data storage (24h or 12h).
Default setting: 24h

24 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 indicating various values (current values of inputs and outputs, relay conditions, distribution of frequency groups 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 as well as to transmit data to USB stick.

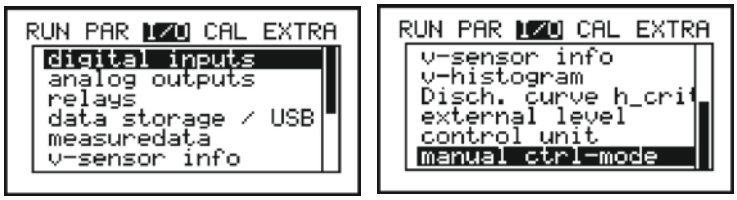


Fig. 24-1 I/O menu

24.1 I/O submenu “Digital Inputs”

This menu enables to view the digital status of the transmitter’s input terminal. It is distinguished between logical “OFF” and “ON”.

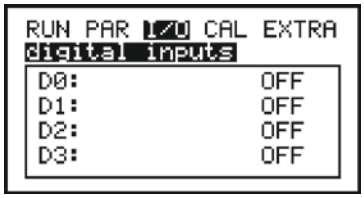


Fig. 24-2 Indication of digital input status

24.2 I/O submenu “Analog Outputs”

This menu shows the values to be issued on the D/A-converter calculated by the transmitter as mA-signal.

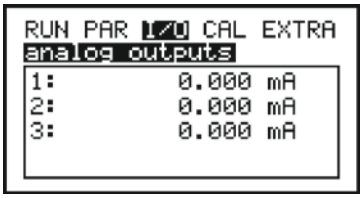


Fig. 24-3 Indication of values on analog outputs

Observe the signal display

The currents actually present on the output terminals are not shown here. Only the signal received by the D/A-converter for output is indicated here.

This menu cannot be used to detect and to view external incorrect connections.

24.3 I/O submenu “Relay”

This submenu indicates the conditions calculated by the transmitter to be sent to the relay. It is distinguished between logical “OFF” and “ON”.

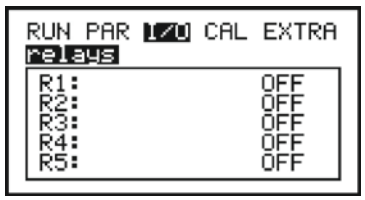


Fig. 24-4 Indication of relay output status

Observe the signal display

The actual output conditions of the relay contact on the output terminals are not shown here. Only the signals received by the relays for output are indicated here.

This menu cannot be used to detect and to view external incorrect connections.

24.4 I/O submenu “Data storage / USB”

The >Data storage / USB< menu allows access to all measurement values saved internally.

Fig. 24-5 Submenu Data storage / USB

>Info< Number of measurement data sets including the recording time.

>Erase< Erase internal readings memory.
System PIN required.

>USB stick< Transmission of measurement data to USB stick.
Instrument parameters can be saved to USB stick.
Saved parameter can be restored from USB stick back to the instrument.

Requirements to USB stick:
- USB 2.0 supported
- FAT 32 format (or FAT 12 or FAT 16)
- Maximum permissible memory 32 GB

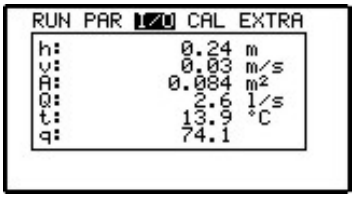
Working with USB stick:
Plug the USB stick into the USB slot located next to the keypad.

>Store NivuSoft< **>All<**
All readings saved in the internal memory are transmitted to USB stick in txt-format. The readings can be easily imported into NivuSoft using the “Quick Import” function.

	>New only< Only readings saved after the time of the last data readout are transmitted to USB stick in txt-format. The readings can be easily imported into NivuSoft using the “Quick Import” function.
>Store CSV<	**>All<** All readings saved in the internal memory are transmitted to USB stick in csv-format. The measurement data can be easily opened and processed using Excel. File name: DTA_DATE_TIME.txt **>New only<** Only readings saved after the time of the last data readout are transmitted to USB stick in csv-format. The measurement data can be easily opened and processed using Excel. File name: DTA_DATE_TIME.csv
>Save parameter<	**>All<** The complete current parameter set of the transmitter is transmitted to USB stick. File name: PAR_DATE_TIME.csv **>Changed only<** Nur die geänderten (von der werksseitigen Einstellung abweichenden) Parameter werden auf den USB-Stick übertragen. Only modified (= other than the default settings) parameters are transmitted to USB stick. File name: CHGPARAM_DATE_TIME.csv
>Load parameter<	All parameter files on the USB stick are shown. The file chosen using ENTER will be loaded to the transmitter.

24.5 I/O submenu “Measure Data”

This menu can be used to view the currently measured and calculated measurement data at one sight.

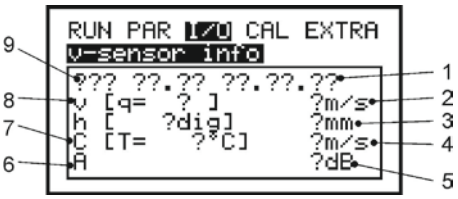


H = Measured level
V = Measured flow velocity
A = Calculated area
Q = Calculated flow rate
t = Measured temperature
q = Quality of velocity measurement (damped)

Fig. 24-6 Screen measure data

24.6 I/O submenu “v-Sensor Info”

This menu is to indicate various information regarding the sensor and is mainly for service purposes.

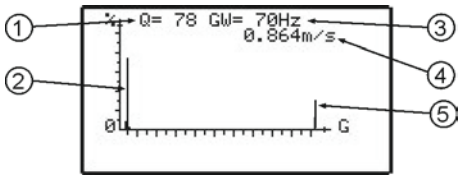


1 Creation date of sensor firmware
2 Calculated average flow velocity
3 Height measured by pressure sensor
4 Velocity of sound resulting from medium temperature
5 Amplification value of sensor
6 Amplification mode of sensor
7 Measured medium temperature
8 Quality of velocity measurement
9 Firmware version of sensor

Fig. 24-7 Status of sensors and velocity evaluation

24.7 I/O submenu “v-Histogram”

The frequency histogram indicates the spreading of the investigated Doppler frequency. Each bar (peak) represents a frequency group.
This is particularly important to assess and to choose measurement places as well as to find a place for sensor installation.



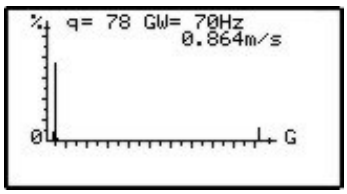
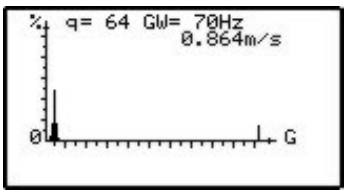
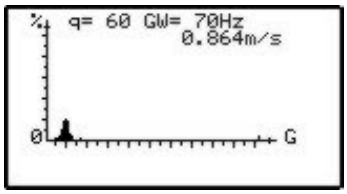
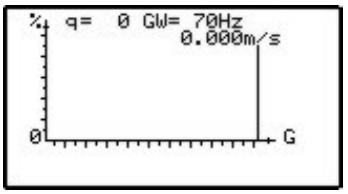
1 Quality of velocity measurement
2 Frequency group (peak)
3 Measurement frequency
4 Currently measured flow velocity
5 Invalid values

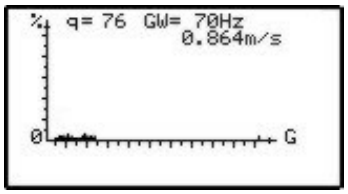
Fig. 24-8 Distribution of frequency groups

The measurement quality (0…100 %) indicates the relation between the evaluated Doppler frequency and the entire frequency spectrum measured. The higher the quality, the more reliable the indicated flow velocity reading. There are no limit values for the quality (Q) since the shape of the frequency distribution has to be considered additionally. This shape is more important for hydraulic assessment than “Q”.

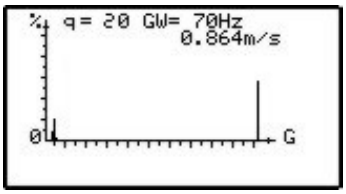
Flow velocity measurement value through poorly distributed frequency groups

There are cases where, despite comparatively high quality values, it is not possible to correctly investigate the flow velocity reading due to poor frequency group distribution. In such cases install the flow velocity sensor in another place (see “Installation Instruction for Correlation and Doppler Sensors”).

 Quality = very good Frequency distribution = very good	 Quality = good Frequency distribution = good
 Quality = satisfactory Frequency distribution = satisfactory	 Quality = none Frequency distribution = none



Quality = very good
Frequency distribution = poor



Quality = poor
Frequency distribution = satisfactory

Fig. 24-9 Flow velocity profiles

24.8 I/O submenu “External Level”

This menu is visible only if external level measurement is enabled. Here the prevailing currents on analog input 1 and the height of the external level measurement are indicated.

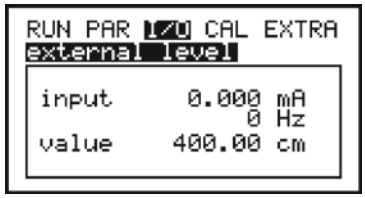
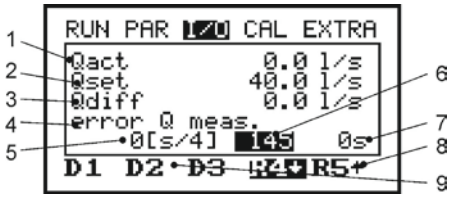


Fig. 24-10 External level selection

24.9 I/O submenu “Control unit”

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:



1 Currently measured flow rate
2 Set point of regulator
3 Difference between Qact and Qset
4 Regulator status: Normal, Quick close, Idle, Error
5 Current regulating time calculated from “Qdff” [sec./4]
6 Time how long activated relay remains energised [Sek./4]
7 Remaining cycle time [sec.]
8 Status of three digital inputs
9 Status of both relays

Fig. 24-11 Control unit selection

24.10 I/O submenu “Test control unit – manual mode”

WARNING

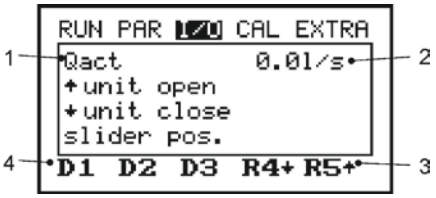
No safety locking measures active

The manual controller operation directly will access any following facility areas without any safety locking measures. This might result in personal injuries.
Manual operation is for test purposes exclusively.

Safety precautions must be taken.

This menu is visible only if the controller has been enabled. The slide valve can be manually opened and closed for testing purposes.

▲ ▼ Use these keys to manually drive the slide valve.



1 Currently measured flow rate

2 Time how long activated relay remains energised manually [s]

3 Status of both relays

4 Status of three digital inputs

Fig. 24-12 Control menu for test control unit

25 Calibration and Calculation Menu (CAL)

This menu permits to adjust the level measurement, to adapt flow velocity and analog outputs to the following system as well as to simulate relay switching actions and analog outputs.

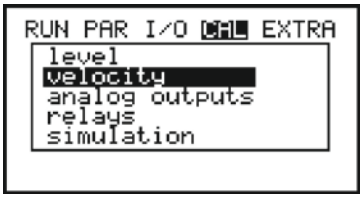


Fig. 25-1 CAL Menu selection

25.1 CAL submenu “Level”

This menu allows to adjust level measurements.
Values from -1000…+1000 mm (39.4 in) can be entered. This adjustment is required only if the level measurement utilises a pressure measurement cell.

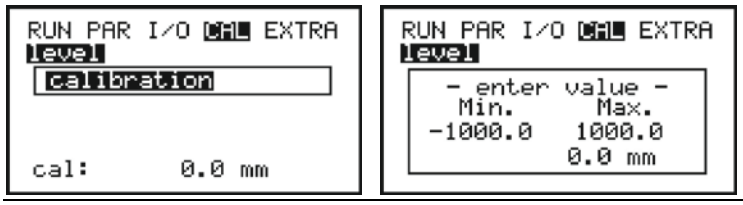


Fig. 25-2 Submenu level

Zero point drift.

Due to physical reasons the pressure measurement cell is subject to zero point drift. It is recommended to adjust the pressure sensor to the zero point regularly (recommended interval: 6 months).

Required values have to 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.

Measurement error

Investigating 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. After the ruler or similar has been held into the medium, the respective reading is entered as reference value.

If this procedure is performed in flowing water the turbulence emerging on the ruler may lead to measurement errors. This is why the filling level for reference measurement purposes has to be measured always from top down (see Fig. 27-1).

25.2 CAL submenu “Flow Velocity”

Fig. 25-3 Submenu flow velocity

>min. velocity< Defines the minimum flow velocity range measured and evaluated by the transmitter.
Default setting: -4 m/s
The minimum velocity can be set to “0” as soon as it is not desired to measure the negative flow direction.

>max. velocity< Defines the maximum flow velocity range measured and evaluated by the transmitter.
Default setting: 4 m/s

Positive and negative velocities are not measured

*If the **maximum** value is set to **“0”** it is not possible to measure and to issue the positive velocity!*

*If the **minimum** value is set to **“0”** it is not possible to measure and to issue the negative velocity!*

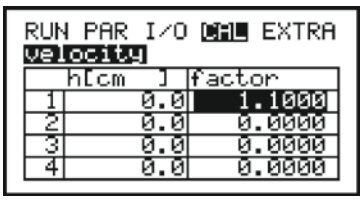


Fig. 25-4 Flow velocity h-v-one-point-calibration

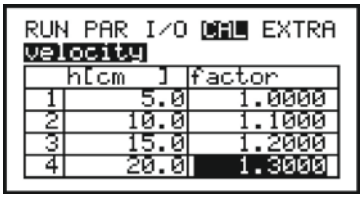


Fig. 25-5 Flow velocity h-v-multi-point-calibration

>h-v Calibration<

One-Point-Calibration:
Enter a factor in the first line and leave the level set to 0. This factor is used over the entire level range.

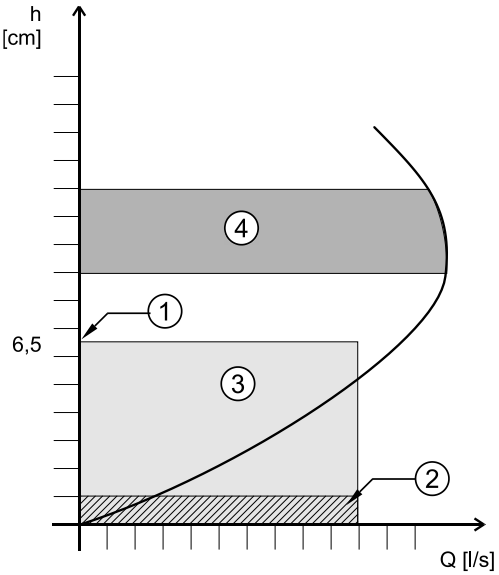
Multi-Point-Calibration:
Level-based multiplication (linearisation) of the measured flow velocity using multiple calibration factors.
Particularly in very large dimensions the detection range of the velocity sensor covers only a part of the entire wetted cross section. Here it is recommended to use this calibration method.
Up to 16 breakpoints can be specified in the table.

>h_crit.<

Measuring the flow velocity is no longer possible as soon as the level falls below a certain level called h_crit.
The level h_crit is pre-determined by the construction of the sensor as well as the measurement method.
Default setting: 0.065 m (2.56 in)
After initial start-up, the OCM operates using the start values found in the Manning-Strickler table (see >CAL< / >velocity< / >v-crit determinat.< / >Manning-Strickler<) until it reaches the h-crit value set.
Going through a level range of 9…12 cm featuring a decreasing trend causes the unit to determine an application coefficient (automatic activated).
Then the OCM under h-crit operates using the investigated application coefficient.
In case of a raised sensor installation position enter +0.065 m as installation height here.
Example: enter 0.085 m under “h-crit” in case of using a sensor installation height of 0.02 m.

>h-crit. min<

The flow velocity will not be calculated below “h_crit. min” and hence will be set to 0.



1 h_crit.

2 h-crit. min

3 Range of automatic Q/h relation

4 Determination of application coefficient

Fig. 25-6 Flow velocity determination graph

>auto. disch. curve< Depending on the selected setting, entered values are verified and corrected if necessary with the next measuring event (auto. disch-curve >active<).
Another option is to permanently operate using the values entered in “Manning Strickler” or “manual” (auto. disch. curve >not active<).

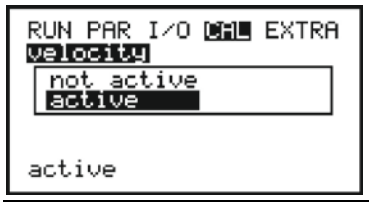


Fig. 25-7 Automatic discharge curve

Observe to avoid backwater

Please avoid backwater up to levels of 0.012 m if auto. discharge curve is >active<.

>v-crit determi-nat.< This menu is conceived to be used for commissioning at low filling levels lower than **6.5 cm**.
There are two options to determine the flow velocity:
- Manning Strickler (if slope and roughness are known)
- Manual (if a reference value can be determined)

Qualified personnel

Comprehensive expert knowledge is required to properly utilise these parameters. We therefore recommend the NIVUS commissioning service or thorough device training.

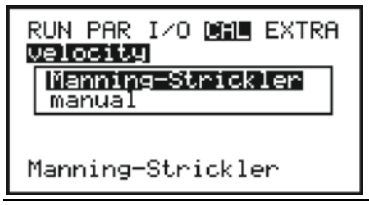


Fig. 25-8 Selecting v-crit determination

>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.
This action will overwrite the theoretical settings after the application coefficient has been determined (see Fig. 25-6/4).

>Slope< Enter the slope at measurement point [%]

>Strickler-Coeff.< Enter the Manning-Strickler coefficient

Fig. 25-9 Manning Strickler v-crit determination

Table "Manning-Strickler coefficients"

For detailed information see table "Manning-Strickler coefficients" on page 102.

>Manual< Enter the current level and the current flow velocity (measured using a reference) directly. The theoretical discharge curve is calculated from these values.
This function may be combined with the automatic mode. The theoretical settings will be overwritten after the application coefficient has been determined (see Fig. 25-6/4).

>h manual< Entry of current level

>v manual< Entry of current flow velocity

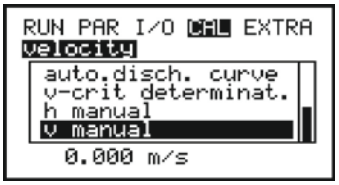


Fig. 25-10 Manually setting v-crit determination

25.3 CAL submenu “Analog Outputs”

25.3.1 Basic Information on Simulation

DANGER

High risk of danger during simulation conditions

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 (direct access to following facility sections) and unforeseeable consequences in case of incorrect or faulty simulation.

Simulations shall be carried out exclusively by trained expert personnel.

>Calibration< The three analog outputs can be adjusted to following systems within a range of -4…+4 mA (see Fig. 25-11).
These values will be added or subtracted to/from the analog outputs. Adjustment is not possible as soon as the analog output is set to >Constant current<.

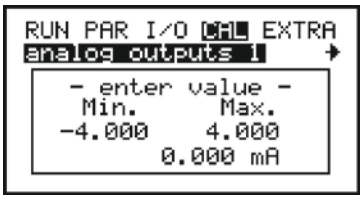


Fig. 25-11 Calibration of analog outputs

DANGER

Personal injury

The simulation of OCM F outputs will access any following facility areas without any safety locking measures!
Simulations may only be carried out by NIVUS expert personnel or by specialist companies trained by NIVUS in cooperation with qualified operator personnel.

Always pay attention to safety.

It is absolutely necessary to have a safety person available!

The simulation of analog inputs and outputs is allowed to be carried out by specialist electricians only who have sound knowledge on the control system of the facility. This requires detailed preparation.

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

>Simulation< It is possible to simulate a freely adjustable analog output current for the three analog outputs. Choose the desired analog output by using the >right< or >left< arrow keys.
In case of output current simulation it is possible to increase or decrease the mA value in steps of 0,01 mA by pressing arrow keys >up< and >down<. Furthermore it is possible to directly enter the desired simulation value by pressing ENTER. A maximum output current of 21.000 mA can be simulated (see Fig. 25-12).

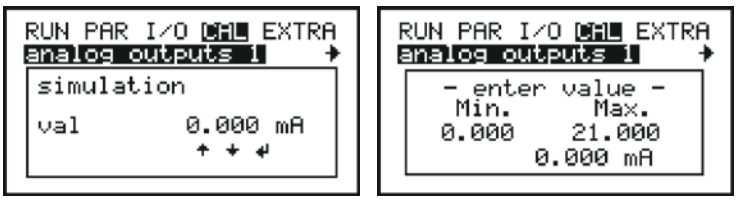


Fig. 25-12 Simulation of analog outputs

25.4 CAL submenu “Relays”

>Relays<

Selecting the >Relay< option requires to enter the system PIN once again to make sure that simulations can be carried out by authorised personnel only.
Select the desired relays to simulate by using the >up< or >down< arrow keys. Use ENTER to directly energise or de-energise the chosen relay. Energised relays will de-energise as soon as you exit the menu.

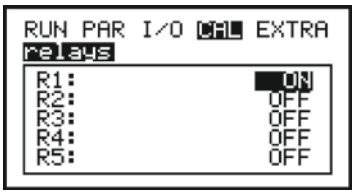
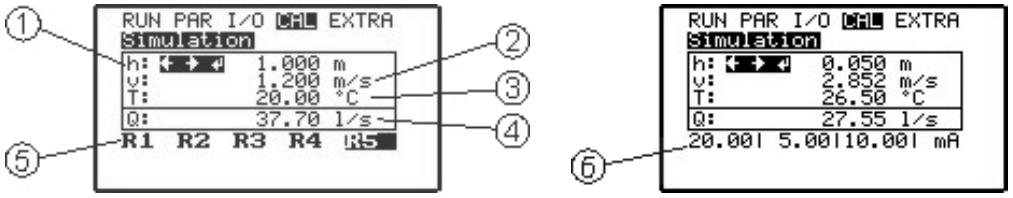


Fig. 25-13 Relay simulation

25.5 CAL submenu “Simulation”

>Simulation< Simulation of measurement.
After entering the PIN code select between level, velocity and medium temperature by using the arrow keys >up< and >down<. Pressing the arrow keys >left< or >right< will increase or decrease the simulated flow velocity, level or temperature value in steps of 1 cm or 0.1 °C. Using ENTER enables to enter the desired simulation value directly. The flow value which has been calculated by means of the simulated readings will be indicated on the bottom line of the screen. Relays which might have been set will switch and programmed mA outputs supply according current values simultaneously.
In position “h” use the >up< and in position “t” use the >down< arrow key to toggle between the relay status and the analog output signals on the bottom line of the screen.



1 Simulated height/level
2 Simulated flow velocity
3 Simulated medium temperature
4 Calculated simulated flow value
5 Programmed relay activated by simulation
6 Analog output signals

Fig. 25-14 Simulation mode

Parameter tree / Menus available

Operation mode (RUN)					Default settings
RUN	Day values	Info			
		Cycle			
		Erase counter			
	Error messages				

Parameter menu (PAR)					Default settings
PAR	Measurement Place	Name			NIVUS
		Profile	Round pipe		x
				Diameter	0,225
			3r Egg	Radius	0,225
			Rectangular	Profile height	1
				Profile width	1
			U-Profile	Profile height	1
				Diameter	0,225
			Trapezoid	Profile height	1
				Profile width down	1
				Profile width up	2
				Max. channel height	1
			Custom shape h/A	Channel shape(s)	
			Custom shape h/b	Channel shape(s)	
		Sludge height			0
		Q_{min}			0
		V_{min}			0
	Level	Sensor type	Pressure trans.		x
				Mounting height	0,0
			Constant level	Value	0,1
			External sensor	Range	4-20 mA
				Value at 0/4 mA	0
				Value at 20 mA	4
				Offset	0
				Damping	3

PAR	Velocity	Sensor type			Wedge
		Install. direction			Positive
	Digital input	Function	DI4 Stop v-measurement	Logic	Non-inverse
				Name	D1
			DI1 torque switch “close”		
			DI2 switch “close”		
			DI3 switch “off”		
	Analog output	Function			A1
			Not active		x
			Flow		
			Level		
			Velocity		
			Temperature		
			Signal quality		
			Constant current		
		Span	0-20 mA		
			4-20 mA		x
		Value at 0/4 mA			1 m/s
		Value at 20 mA			0,8 m/s
		Error mode	Inactive		
			Active		
		Error input mask (*only with error mode active*)			
		Value at error case (*only with error mode active*)	Hold old value		
			Constant 0 mA		x
			Constant 3,6 mA		
			Constant 4,0 mA		
			Constant 21 mA		

PAR	Relay	Relay function			1
			No function		x
			Flow limit relay		
			Level limit relay		
			Velocity limit relay		
			Temperature limit relay		
			Pos. total impulse		
			Neg. total impulse		
			Error message	Error mask	
				Name	R1
			Relay mode (*only with relay function active*)	Normally open	x
				Normally closed	
			ON point (*only with relay function active*)		
			Off point (*only with relay function active*)		
			ON delay (*only with relay function active*)		0
			OFF delay (*only with relay function active*)		0
			Name (*only with relay function active*)		R1
			Impulse duration (*only with relay function impulses*)		5
			Volume impulse (*only with relay function impulses*)		1

PAR	Control unit	Control unit function	Not active		
			Internal set-point active		
			External set-point active		
		Max. flow rate *(only with active controller)*			
		Internal set-point *(only with active controller)*			
		Min. variation *(only with active con-troller)*			
		Cycle *(only with active controller)*			
		Slidevalve runtime *(only with active controller)*			
		Min. pulse time *(only with active controller)*			2
		Max. pulse time *(only with active controller)*			
		P-factor *(only with active controller)*			30
		Level quick close *(only with active controller)*			1
		Flow quick close *(only with active controller)*			0

PAR	Control unit (continuation)	Time quick close *(only with active controller)*			30
		Time of Pos. closed *(only with active controller)*			10
		Time delay *(only with active con-troller)*			0
	Setup pa-rameter	System reset			
		Service mode	Service code		
		Damping			20
		Stability			60
	Storage mode	Memory cycle			1 min
		Format of numbers			,
		Unit system			metric
		Date format			TT/MM/JJJJ
		Time format			24

Signal In-/Output menu (I/O)					Default settings
I/O	Digital inputs				
	Analog outputs				
	Relays				
	Data storage/ USB	Info			
		Erase			
		USB stick	Store NivuSoft		
			Store CSV		
			Save parameter		
			Load parameter		
	Measuredata				
	v-Sensor Info				
	v-Histogram				
	External setpoint *(only with active controller ext. setpoint)*				
	External level *(only with external sensor)*				
	Control unit *(only with active controller)*				
	Manual ctrl-mode *(only with active controller)*				

Calibration menu (CAL)					Default settings
CAL	Level	Calibration			
	Velocity	Min. velocity			-4,0000
		Max. velocity			4,0000
		h-v-calibration			
		v-crit-determination	Manual		x
			Manning-Strickler		
		h-crit.			0,75
		v-crit. at h_crit.			
	Analog outputs	Calibration			0

Display menu (EXTRA)					**Default settings**
Extra	Info (1-4)	Info 1			
		Info 2			
		Info 3			
		Info 4			
	Unit system	Metric			x
		UK-english			
		US-english			
	Units	Flow rate			
		Veloc.			
		Level			
		Total			
	Display format	Flow rate			
		Veloc.			
		Level			
		Total			
	Language	German			x
		English			
		French			
		Polish			
	Display	Contrast			50 %
	System time	Info			
		Set date			
		Set time			
		Date format			TT.MM.JJJJ
		Time format			24
	Modif. totalizer				0
	Modify PIN	System-PIN			2718
		Service-Code			
		Reset all pins			

Troubleshooting

Error	Possible Reason	Correction
No indication of flow (>0< resp. >----<)	Connection	Check connection between sensor cable and terminal strip; Check complete cable incl. possible clamp connections and overvoltage protection elements for breaks, short-circuits or too high resistances; Sensor connection cable connected to correct terminal strip (Ex or non-Ex)?
	Sensor	Sensor alignment facing the flow direction, check correct installation depth and horizontal installation.
		Check sensor for soiling, sedimentation, silting (→ to be removed) or mechanical damage or sensor body and cable (→ replace sensor).
	Flow level measurement	Important: no flow level → no flow velocity measurement possible! Check level sensor for horizontal installation. Check sensor function in menu I/O – >v-Histogram<. In case of external level measurement: check function and signal transmission (cables, clamp connections, short circuits and contact resistances). In case of measurement with pressure cell: check compensation channel at sensor body for obstructions. Remove yellow cap from filter element.
		Check level measurement parameter "Fixed value“ in case measuring in full channel without using level measurement.
	Transmitter	Call up error memory. Take appropriate measures depending on error message (check cables and clamp connections, check sensor installation) or call NIVUS service personnel.
	Negative flow direction	Check sensor installation direction, rotate sensor if required. If measurement fails only with the flow direction reverted → go to CAL-Flow Velocity – min. + max. value: set min value to -6.0 m/s.
	Programming	Completely check the transmitter parameter settings.

Error	Possible Reason	Correction
Display >Error Doppler Sensor<	Connection	Check cable connection. Wiring on terminal strip switched? Cables firmly connected to plugs (re-tighten screws, pull at cable ends)? Insulation of single wires unintentionally clamped in?
	Communica-tion	Communication to sensor disturbed. Can be checked by choosing menu I/O >v-Sensor Info<. Sensor should be indicated in the first line of the following screen. Check cables for interruption or loose connection. Check sensor for mechanical damage.
Unstable measurement values	Hydraulically unsuitable measurement place	Check quality of measurement place by using the graphic flow profile display. Relocate the sensor to a hydraulically more suita-ble place (extend calming section).
		Remove soiling, sedimentation or obstructive con-structions in front of the sensor.
		Straighten the flow profile by installing appropriate baffle plates and calming elements, flow straight-eners or similar upstream of measurement.
		Increase damping.
	Sensor	Check sensor position (towards flow direction, horizontal installation) and correct installation depth.
		Check sensor for sedimentation or obstructions.

Error	Possible Reason	Correction
Implausible measurement values	Hydraulically unsuitable measurement place	See Error: “Unstable measurement values”.
	External level signals	Check for correct connection.
		Check if cables are crushed. Check 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. Check 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.
	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.

Error	Possible Reason	Correction
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.
	Programming	Check settings. Controller enabled? Controller parameters set? Analog input set and enabled as setpoint? Relay outputs enabled? Observe controller status in I/O menu.
Faulty mA output	Connection	Check connection clamps for correct wiring and polarity.
		In case of using one or 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 sys-tem.
		Check input span of following system.
		Check offset of following system.
PC / Laptop unable to detect device	No device driver installed	Reinstall driver, on WINDOWS warning press "Continue anyway“.
Real time clock shows incorrect time	Buffer battery is empty	Let NIVUS replace the built-in buffer battery. Attention: replacement must be carried out only by NIVUS or personnel authorised by NIVUS. Otherwise the warranty will expire.
Parameter memory shows no parameters	Buffer battery is empty	Let NIVUS replace the built-in buffer battery. Attention: replacement must be carried out only by NIVUS or personnel authorised by NIVUS. Otherwise the warranty will expire.

Verification of the Measurement System

26 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 power supply on the OCM F. The according slide switch on the board must be engaged (see Fig. 14-12). The main screen must be visible on the transmitter display.
- Check the communication between flow velocity sensor or combi sensor and transmitter at >I/O< / >Doppler-Info<.
- 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 chapter „24.1 I/O submenu “Digital Inputs”“, “24.2 I/O submenu “Analog Outputs”” and chapter “27 Verification of Combi Sensor with Pressure Measurement Cell” and “28 Verification of external Level Measurement“).

For initial assessment mainly the I/O menu is helpful. Refer to chapter “Troubleshooting” starting at page 92 to locate the most prominent errors.

27 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 Doppler 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 “25 Calibration and Calculation Menu (CAL)“.

Measurement errors

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!

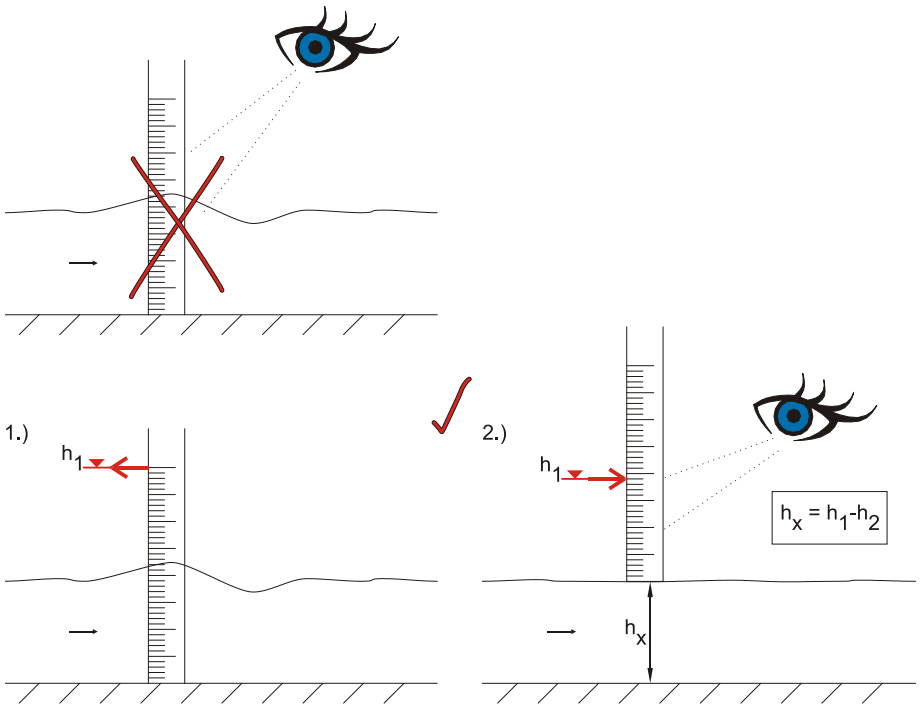


Fig. 27-1 Determination of reference level under operating conditions

Important note

Flow velocity sensors with pressure measurement sensor (Type KP) must be uninstalled as soon as the pressure level measurement fails. The sensor shall be soaked for an appropriate period and the pressure channel shall be flushed carefully of shall be cleaned with a soft brush.

Do not use high pressure to flush the channel. 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)!

28 Verification of external Level Measurement

Using an external level measurement (e. g. i-Series sensor) needs to measure the filling level in the channel with a yardstick (see Fig. 27-1) to 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 F in PAR menu as well as in I/O menu and adjust accordingly if required.

29 Verification and Simulation of Input and Output Signals

The I/O menu (see chapter “24 Signal Input/Output Menu (I/O)”) allows to verify connected sensors as well as to check signal inputs and outputs with the aid of several submenus. Various values can be indicated (current input and output values, relay conditions, echo profiles, single velocities etc.), signals or conditions however (offset, adjustment, simulation or similar) cannot be influenced.
Analog output signals, relay conditions as well as the theoretical flow can be simulated in the CAL menu (see chapter “25 Calibration and Calculation Menu (CAL)”).

30 Verification of Flow Velocity Measurement

Use the menu >I/O< / >v-histogram< to view the frequency histogram of the v-sensor. Chapter “24.7 I/O submenu “v-Histogram“” describes how to assess the histogram.
The velocity can be verified using a portable flowmeter e. g. PCM Pro, hydrometric vane etc.). A calibration factor can be entered here if the deviation of the flow velocity should be strong (see chapter “25.2 CAL submenu “Flow Velocity“).
The sensor is obstructed due to build-up or soiling (→ to be removed) as soon as the histogram indicates visible disturbances.
Another reason is that the sensor may have been installed at a hydraulically un-favourable position tending to low measurement quality or measurement failure (→ check installation position of sensor).
Please note, that without a working level measurement it is not possible to measure flow velocities and hence the flow cannot be computed.
If the flow velocity measurement fails, the sensor however is connected correctly and lines, clamping connections and overvoltage protection have been checked, the sensor possibly may 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. If desired, NIVUS is going to carry out all required verifications, hydraulic and technical assessment, calibration, troubleshooting and repairs if an according maintenance agreement has been contracted. 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.

Please obtain information on the local applicable (national) regulations.

Maintenance and Cleaning

WARNING

Disconnect instrument from mains

Disconnect the instrument form mains power and safeguard the higher system against restart before you begin maintenance works.

Disregarding may lead to electric shocks.

WARNING

Contamination by hazardous germs

Due to being frequently used in wastewater applications, some portions of the measurement system may be loaded with hazardous germs. This is why precautionary measures shall be taken while being in contact with the system, cables and sensors.

Wear protective clothing.

31 Maintenance

31.1 Maintenance interval

The transmitter OCM F is conceived to be virtually free of calibration, maintenance and wear. (requirements of the Industrial Safety Regulations are unaffected).
NIVUS recommends having the entire measurement system inspected by the NIVUS customer service **once per year**.
Depending on the area of use the maintenance intervals however may vary.
Extent and intervals of maintenance depend on the following conditions:

- Measurement principle of the level sensors
- Material wear
- Measurement medium and channel hydraulics
- General regulations for the operator of this measurement plant
- Ambient conditions

NIVUS recommends to have the measurement system completely be inspected by the manufacturer **after latest ten years**.
Generally the verification of instruments and sensors is a basic measure in order to improve operational reliability and to increase the lifetime.

31.2 Customer Service Information

For the recommended annual inspection of the entire measurement system and/or the extensive inspection after latest ten years contact our customer service:

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

32 Cleaning

32.1 Transmitter

WARNING

Disconnect instrument from mains

Disconnect the instrument from mains power before cleaning.

Disregarding may lead to electric shock.

Clean the transmitter enclosure if required using a dry, lint-free cloth.

For stubborn dirt the enclosure can be cleaned using a damp cloth. Do not use sharp cleansing agents or solvents. Light household cleaners or soapy water can be used.

32.2 Sensors

The hints on how to maintain and clean the sensors shall be necessarily observed. These hints can be found in the Technical Instruction and/or the Instructor Manual.
This (these) document(s) is (are) part of the standard sensor delivery.

33 Dismantling/Disposal

Improper disposal may be harmful to the environment.

➲ Always dispose equipment components and packaging materials according to applicable local regulations on environmental standards for electronic products:

1. Disconnect the unit from mains power.
2. Use appropriate tools to remove the connected cables from the faceplate of the instrument.
3. Remove the transmitter from the DIN rail.
4. Remove the buffer battery and make sure that the buffer battery will be disposed of separately.

EC WEEE-Directive logo

This symbol indicates that the Directive 2012/19/EG on waste electrical and electronic equipment requirements shall be observed on the disposal of the equipment. The unit contains a buffer battery (Lithium coin cell), which must be disposed separately.

34 Accessories

KDA sensor *KDA-…*	Ultrasonic Doppler sensor for flow velocity or combi sensor for flow velocity and level for connection to OCM F
USB stick *ZUB0 USB 08*	USB stick 8 GB, for readout of parameter settings and measurement values using the USB interface of OCM F
Pressure compensation element *ZUB0 DAE*	For connection to sensors with pressure measurement cell; Material: aluminium, plastic; Degree of protection: IP54
Replacement filter *ZUB0 FILTER02*	For sensors with pressure measurement cell for connection to pressure compensation element ZUB0 DAE
Pipe mounting system *ZUB0 RMS2…* *ZUB0 RMS3...* *ZUB0 RMS4…*	For temporary installation of KDA wedge sensors in pipe lines DN200…DN800
Stop ball valve *ZUB0 HAHNR15*	For removal of pipe sensors from pipes without pressure
Tapping saddles *ZUB0 ABS01…* *ZUB0 ABS02…* *ZUB0 ABS03…*	For installation of 1½“ pipe sensors in pipe lines
Welding nozzle *ZUB0 STU15…*	For pipe sensors; material: steel or stainless steel
NivuSoft *SWON SPRO*	Software for project and document management, visualisation of measurement data and evaluation
Overvoltage protection *BSL0*	Overvoltage protection for transmitters and sensors

You can find more accessories for sensor installation in our current price list.

Table “Manning-Strickler Coefficients”

Channel wall consistency		M [m 1/3/s]	k [mm]
Smooth	Glass PMMA Polished metal surfaces	> 100	0...0.003
	Plastic (PVC, PE) New steel plate with protective coating Smoothened cement plaster	≥ 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			

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Approvals and Certificates

IBExU Institut für Sicherheitstechnik GmbH
An-Institut der TU Bergakademie Freiberg

[1] **EU-TYPE EXAMINATION CERTIFICATE** - Translation

[2] Equipment or protective systems
intended for use in potentially explosive atmospheres, Directive 2014/34/EU

[3] EU-type examination certificate number **IBExU07ATEX1081** | Issue 1

[4] Product: **Permanent flow measurement transmitter**
Types: OCM F, OCM FR, OCM FM, NFP und NivuLevel 350

[5] Manufacturer: NIVUS GmbH

[6] Address: Im Täle 2
75031 Eppingen
GERMANY

[7] This product and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

[8] IBExU Institut für Sicherheitstechnik GmbH, notified body number 0637 in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the essential health and safety requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential test report IB-17-3-0089 of Oct, 16th 2017.

[9] Compliance with the essential health and safety requirements has been assured by compliance with:
EN 60079-0:2012+A11:2013 EN 60079-11:2012
except in respect of those requirements listed at item **[18]** of the schedule.

[10] If the sign "X" is placed after the certificate number, it indicates that the product is subject to the specific conditions of use specified in the schedule to this certificate.

[11] This EU-type examination certificate relates only to the design and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

[12] The marking of the product shall include the following:

⟨Ex⟩ II(2)G [Ex ib Gb] IIB

IBExU Institut für Sicherheitstechnik GmbH
Fuchsmühlenweg 7
09599 Freiberg, GERMANY

Tel: + 49 (0) 37 31 / 38 05 0
Fax: + 49 (0) 37 31 / 38 05 10

By order

Dipl.-Ing. [FH] Henker

- Seal -
(notified body number 0637)

Certificates without signature and seal are not valid. Certificates may only be duplicated completely and unchanged. In case of dispute the German text shall prevail.

Freiberg, 2017-11-14

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An-Institut der TU Bergakademie Freiberg

[13] **Schedule**

[14] **Certificate number IBExU07ATEX1081** | Issue 1

[15] **Description of product**
The OCM F, OCM FR, OCM FM, NFP und NivuLevel 350 systems are different versions of stationary measuring systems for flow measurement and flow control. These devices are designed for use in the range of low to heavily polluted water-based liquids of different mixtures.

The permanent flow measurement transmitter is used as associated equipment in non-hazardous areas. It is used for galvanically isolated supply and signal transmission for 2-wire and flow sensors. The electronic components are located on a printed circuit board within a wall-/DIN-rail housing. The electrical connection is made using screw terminals and plug connectors. The device is equipped with LC display and membrane keyboard as well as USB-A interface for service purposes and data exchange.

technical data

operating temperature range:	-20 °C to +40 °C
Enclosure protection class:	IP65 (≥ IP54)
zone classification:	[Ex ib Gb]
gas explosion class:	IIB

electrical data

power supply circuits:	Terminal no. 4[DC+], 5[DC-] and 3[PE] U_N 20 - 28 VDC Terminal no. 1[L1], 2[N] and 3[PE] U_N 85 - 264 VAC P_N 18 W
signal circuits:	Terminal no. 6 to 45 U_N 24 VDC resp. IN 0/4 -20 mA U_N 250 VAC (relay)
rated voltage:	U_M 264 VAC
sensor circuits OCF	ignition protection type Ex ib IIB
2-wire sensors per channel	Terminal no. 46 - 49 and 55 - 58 U_O 26.1 V I_O 87.9 mA P_O 574 mW (linear characteristic) C_O 400 nF L_O 5 mH
Flow rate sensors (not for NivuLevel 350)	Terminal no. 50 - 54 and 59 - 63 U_O 9.9 V I_O 629 mA P_O 6.2 W (rectangular characteristic) C_O 5 µF L_O 0.15 mH
data circuits RS485 (not for NivuLevel 350)	galvanically connected to sensor circuit U_s 5 V
sensor circuits NFP	
Flow rate sensors POA V2 oder ähnlich	Terminal no. 50 - 52 and 59 - 61 U_O 9.9 V I_O 629 mA P_O 6.2 W (rectangular characteristic)

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	C_o 5 µF L_o 0.15 mH
Sensor communication interface with type of protection Ex ib IIB	Terminal no. 53 - 54 and 62 – 63 U_o 9.9 V I_o 130.3 mA P_o 322 mW ((linear characteristic) C_o 9.7 µF L_o 0.15 mH Ui 10.1 V Ii 136 mA The maximum values also apply to concentrated capacitance/inductors that can be switched on.

Variations compared to issue x of this certificate:

Variation 1
The two voltage limiting Z-diodes 1N5361D (D11, D12) were replaced by three SMD Z-diodes BZG05C8V2 each. The third Z-diode 1N5361D (D13) is no longer in use because it is not required for protection level "ib".

Variation 2
The CNY65 optocouplers (current interface) and the QEE122/QSE158 optocouplers (data interface) have been replaced by HCWN136 optocouplers. The circuit part for automatic data direction switching has been omitted.

Variation 3
The fuse F2 (63 mA) is replaced by a 50 mA type.

Variation 4
A partition wall area in the area of the connection terminals between Ex- and non-Ex-area has been inserted.

Variation 5
The type designation has been specified.

nomenclature: AAA-BB W0 vv E xxx	
AAA	3-digit product code OCF, NFP or N35
BB	Product variant (software and/or hardware): 02 - Standard R2 - Controller M2 - Alternative type designation 2s - Standard version with Specification of the instrument measuring range 2c – Device basic configuration Interfaces (variant specific full or partial assembly)
W0	wall-/DIN-rail housing
vv	AC or DC version
E	Ex - design
xxx	Not Ex-relevant, customer-specific versions, e.g. software adaptations

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An article number with a 3-digit device key is used for identification on the nameplate:

Device type	Part number
OCM F	OCF-02 W0 vv E xxx
OCM FR	OCF-R2 W0 vv E xxx
OCM FM	OCF-M2 W0 vv E xxx
NFP	NFP-2s W0 vv E xxx
NivuLevel 350	N35-2c W0 vv E xxx

The associated equipment meets the requirements of the current standards.

[16] **Test report**
The test results are recorded in the confidential test report IB-17-3-0089 dated October, 16th 2017.

The test documents are part of the test report and they are listed there.

Summary of the test results
The permanent flow measurement transmitter meet all explosion protection requirements for a corresponding electrical equipment of device group II in device category 2G in ignition protection class "ib" intrinsically safe equipment of explosion group IIB.

[17] **Specific conditions of use**
None

[18] **Essential health and safety requirements**
In addition to the essential health and safety requirements (EHSRs) covered by the standards listed at item [9], the following are considered relevant to this product, and conformity is demonstrated in the test report: none

[19] **Drawings and Documents**
The documents are listed in the test report.

IBExU Institut für Sicherheitstechnik GmbH
Fuchsmühlenweg 7
09599 Freiberg, GERMANY

By order

Dipl.-Ing. [FH] Henker

Freiberg, 2017-11-14

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DE / EN / FR

EU Konformitätserklärung

EU Declaration of Conformity

Déclaration de conformité UE

NIVUS GmbH
Im Täle 2
75031 Eppingen

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

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

Bezeichnung:	**Durchflussmessumformer stationär**
Description:	*permanent flow measurement transmitter*
Désignation:	*convertisseur de mesure de débit fixe*
Typ / Type:	**OCF-02... / OCF-R2... / NFP-2...**

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

- 2014/30/EU
- 2014/35/EU
- 2011/65/EU

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

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

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

NIVUS GmbH
Im Taele 2
75031 Eppingen
Allemagne

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

Eppingen, den 07.12.2017

Gez. *Marcus Fischer*

DE / EN / FR

EU Konformitätserklärung

EU Declaration of Conformity

Déclaration de conformité UE

NIVUS GmbH
Im Täle 2
75031 Eppingen

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

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

Bezeichnung:	**"Ex" Durchflussmessumformer stationär OCM F / OCM FR / NFP**
Description:	*"Ex" permanent flow measurement transmitter*
Désignation:	*"Ex" convertisseur de mesure de débit fixe*
Typ / Type:	**OCF-02W0xxExxx / OCF-R2W0xxExxx / NFP-2xW0xxExxx**

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
- 2011/65/EU

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

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

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

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

IBExU 07 ATEX 1081 | Ausgabe 1

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

IBExU Institut für Sicherheitstechnik GmbH, 09599 Freiberg, Allemagne (0637)

Qualitätssicherung ATEX / *Quality assurance ATEX / Assurance qualité ATEX:*

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 07.12.2017

Gez. *Marcus Fischer*