Quick setup guide

Differential pressure transmitter with metallic measuring cell

VEGADIF 85

Modbus and Levelmaster protocol

Document ID: 53577

Contents

Information:
This quick setup guide enables quick setup and commissioning of your instrument.

You can find supplementary information in the corresponding, more detailed Operating Instructions Manual as well as the Safety Manual that comes with instruments with SIL qualification. These manuals are available on our homepage.

Operating instructions VEGADIF 85 - Modbus and Levelmaster protocol: Document-ID 53571
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1 For your safety

1.1 Authorised personnel

All operations described in this documentation must be carried out only by trained and authorized personnel.

During work on and with the device, the required personal protective equipment must always be worn.

1.2 Appropriate use

VEGADIF 85 is an instrument for measurement of flow, level, differential pressure, density and interface.

You can find detailed information about the area of application in chapter "*Product description*".

Operational reliability is ensured only if the instrument is properly used according to the specifications in the operating instructions manual as well as possible supplementary instructions.

1.3 Warning about incorrect use

Inappropriate or incorrect use of this product can give rise to application-specific hazards, e.g. vessel overfill through incorrect mounting or adjustment. Damage to property and persons or environmental contamination can result. Also, the protective characteristics of the instrument can be impaired.

1.4 General safety instructions

This is a state-of-the-art instrument complying with all prevailing regulations and directives. The instrument must only be operated in a technically flawless and reliable condition. The operating company is responsible for the trouble-free operation of the instrument. When measuring aggressive or corrosive media that can cause a dangerous situation if the instrument malfunctions, the operating company has to implement suitable measures to make sure the instrument is functioning properly.

The safety instructions in this operating instructions manual, the national installation standards as well as the valid safety regulations and accident prevention rules must be observed.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by us. Arbitrary conversions or modifications are explicitly forbidden. For safety reasons, only the accessory specified by us must be used.

To avoid any danger, the safety approval markings and safety tips on the device must also be observed.

1.5 Conformity

The device complies with the legal requirements of the applicable country-specific directives or technical regulations. We confirm conformity with the corresponding labelling.

The corresponding conformity declarations can be found on our homepage.

1.6 NAMUR recommendations

NAMUR is the automation technology user association in the process industry in Germany. The published NAMUR recommendations are accepted as the standard in field instrumentation.

The device fulfils the requirements of the following NAMUR recommendations:

● NE 21 – Electromagnetic compatibility of equipment
● NE 43 – Signal level for fault information from measuring transducers
● NE 53 – Compatibility of field devices and display/adjustment components
● NE 107 – Self-monitoring and diagnosis of field devices

For further information see www.namur.de.

1.7 Environmental instructions

Protection of the environment is one of our most important duties. That is why we have introduced an environment management system with the goal of continuously improving company environmental protection. The environment management system is certified according to DIN EN ISO 14001.

Please help us fulfil this obligation by observing the environmental instructions in this manual:

● Chapter " *Packaging, transport and storage*"
● Chapter " *Disposal*"

2   Product description

2.1   Configuration

Type label

The type label contains the most important data for identification and use of the instrument:

- Instrument type
- Information about approvals
- Configuration information
- Technical data
- Serial number of the instrument
- QR code for device identification
- Numerical code for Bluetooth access (optional)
- Manufacturer information

Documents and software

To find order data, documents or software related to your device, you have the following options:

- Move to " www.vega.com" and enter in the search field the serial number of your instrument.
- Scan the QR code on the type label.
- Open the VEGA Tools app and enter the serial number under " *Documentation*".

VEGA

3 Mounting

3.1 General instructions for use of the instrument

Process conditions

Note:
For safety reasons, the instrument must only be operated within the permissible process conditions. You can find detailed information on the process conditions in chapter " *Technical data*" of the operating instructions or on the type label.

Hence make sure before mounting that all parts of the instrument exposed to the process are suitable for the existing process conditions.

These are mainly:

● Active measuring component
● Process fitting
● Process seal

Process conditions in particular are:

● Process pressure
● Process temperature
● Chemical properties of the medium
● Abrasion and mechanical influences

Protection against moisture

Protect your instrument against moisture ingress through the following measures:

● Use a suitable connection cable (see chapter " *Connecting to power supply*")
● Tighten the cable gland or plug connector
● Lead the connection cable downward in front of the cable entry or plug connector

This applies mainly to outdoor installations, in areas where high humidity is expected (e.g. through cleaning processes) and on cooled or heated vessels.

Note:
Make sure that during installation or maintenance no moisture or dirt can get inside the instrument.

To maintain the housing protection, make sure that the housing lid is closed during operation and locked, if necessary.

Ventilation

The ventilation for the electronics housing is realised via a filter element in the vicinity of the cable glands.
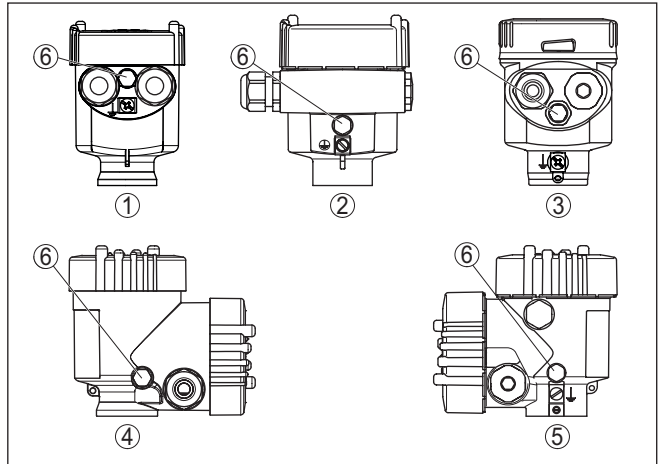
Fig. 1: Position of the filter element - non-Ex, Ex-ia and Ex-d-ia version

1   Plastic, stainless steel single chamber (precision casting)
2   Aluminium - single chamber
3   Stainless steel single chamber (electropolished)
4   Plastic double chamber
5   Aluminium, stainless steel double chamber housing (precision casting)
6   Filter element

●
ℹ **Information:**
Make sure that the filter element is always free of buildup during operation. A high-pressure cleaner may not be used for cleaning.

4 Connecting to power supply

4.1 Connecting

Connection technology

The voltage supply and signal output are connected via the spring-loaded terminals in the housing.

Connection to the display and adjustment module or to the interface adapter is carried out via contact pins in the housing.

i Information:
The terminal block is pluggable and can be removed from the electronics. To do this, lift the terminal block with a small screwdriver and pull it out. When reinserting the terminal block, you should hear it snap in.

Connection procedure

Proceed as follows:

1. Unscrew the housing lid

2. If a display and adjustment module is installed, remove it by turning it slightly to the left

3. Loosen compression nut of the cable gland and remove blind plug

4. Remove approx. 10 cm (4 in) of the cable mantle, strip approx. 1 cm (0.4 in) of insulation from the ends of the individual wires

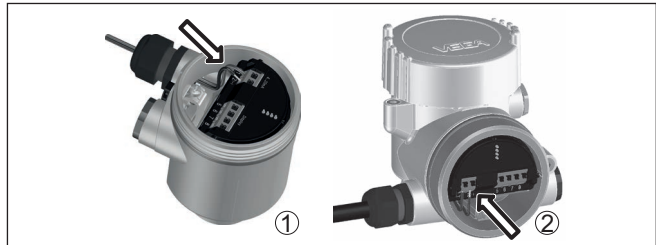5. Insert the cable into the sensor through the cable entry

Fig. 2: Connection steps 5 and 6

1 Single chamber housing
2 Double chamber housing

6. Insert the wire ends into the terminals according to the wiring plan

i Note:
Solid cores as well as flexible cores with wire end sleeves are inserted directly into the terminal openings. In case of flexible cores without end sleeves, press the terminal from above with a small screwdriver, the terminal opening is then free. When the screwdriver is released, the terminal closes again.

7. Check the hold of the wires in the terminals by lightly pulling on them

8. Connect the shielding to the internal ground terminal, connect the external ground terminal to potential equalisation

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9. Tighten the compression nut of the cable entry gland. The seal ring must completely encircle the cable

10. Reinsert the display and adjustment module, if one was installed

11. Screw the housing lid back on

The electrical connection is finished.

4.2 Single chamber housing

The following illustration applies to the non-Ex, Ex ia and Ex d version.
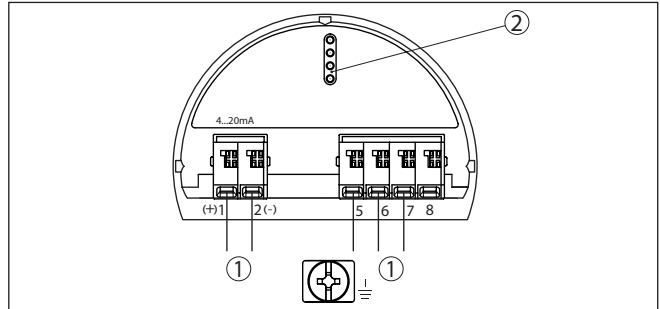
Electronics compartment

Fig. 3: Electronics compartment - double chamber housing

1 Internal connection to the connection compartment
2 For display and adjustment module or interface adapter

4.3 Double chamber housing

The following illustrations apply to the non-Ex as well as to the Ex-ia version.
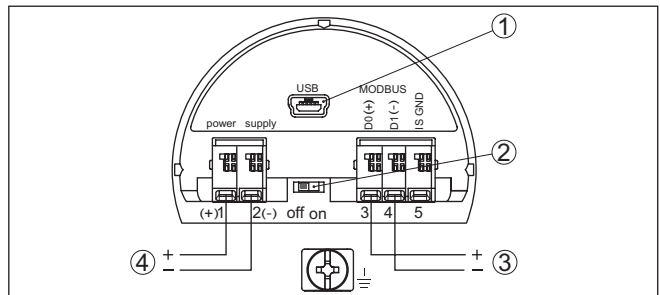
Connection compartment

Fig. 4: Connection compartment

1 USB interface
2 Slide switch for integrated termination resistor (120 Ω)
3 Modbus signal
4 Voltage supply

Terminal	Function	Polarity
1	Voltage supply	+

Terminal	Function	Polarity
2	Voltage supply	-
3	Modbus signal D0	+
4	Modbus signal D1	-
5	Function ground when installing according to CSA (Canadian Standards Association)	

5 Set up with the display and adjustment module

5.1 Insert display and adjustment module

The display and adjustment module can be inserted into the sensor and removed again at any time. You can choose any one of four different positions - each displaced by 90°. It is not necessary to interrupt the power supply.

Proceed as follows:

1. Unscrew the housing lid

2. Place the display and adjustment module on the electronics in the desired position and turn it to the right until it snaps in.

3. Screw housing lid with inspection window tightly back on

Disassembly is carried out in reverse order.

The display and adjustment module is powered by the sensor, an additional connection is not necessary.

Fig. 5: Installing the display and adjustment module in the electronics compartment of the single chamber housing

Fig. 6: Installing the display and adjustment module in the double chamber housing

1   In the electronics compartment
2   In the connection compartment

> **Note:**
> If you intend to retrofit the instrument with a display and adjustment module for continuous measured value indication, a higher lid with an inspection glass is required.

5.2   Parameter adjustment - Quick setup

To quickly and easily adapt the sensor to the application, select the menu item " *Quick setup*" in the start graphic on the display and adjustment module.

Carry out the following steps in the below sequence.

You can find " *Extended adjustment*" in the operating instructions VEGADIF 85.

Presettings

Measurement loop name
In the first menu item you assign a suitable measurement loop name. Permitted are names with max. 19 characters.

Application
In this menu item, you select the application. The selection comprises level, flow, differential pressure, density and interface measurement.

Units
In this menu item you determine the adjustment and temperature unit as well as the unit of the static pressure of the instrument. Depending on the selected application in the menu item " *Application*", different adjustment units are available.

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Measurement loop name	Application	Units of measurement
Sensor	✓Level Flow Differen. press. Density Interface	m ▼ Temperature unit °C ▼

Position correction

In this menu item you compensate the influence of the installation position of the instrument (offset) on the measured value.

Differen. press.	Sensor mounting correction
Offset = 0.0000 bar Act. 0.0071 bar Static pressure Offset = 0.0000 bar Act. 0.0000 bar	Auto.correction Edit differential pressure Edit static pressure

Quick setup - Level measurement

Min. adjustment

In this menu item you carry out the min. adjustment for level.

Enter the percentage value and the corresponding pressure value for the min. level.

Max. adjustment

In this menu item you carry out the max. adjustment for level.

Enter the percentage value and the corresponding pressure value for the max. level.

Min. adjustment	Max. adjustment
0.00 % ≙ 0.0500 bar 0.0000 bar	100.00 % ≙ 1.0000 bar −0.0001 bar

Quick setup - Flow measurement

Min. adjustment

In this menu item you carry out the min. adjustment for flow.

Enter the percentage value and the corresponding pressure value for the min. flow.

Max. adjustment

In this menu item you carry out the max. adjustment for flow.

Enter the percentage value and the corresponding pressure value for the max. flow.

Linearisation

In this menu item, you select the characteristics of the output signal.

Min. adjustment	Max. adjustment	Linearization
0.00 % ≙ 0.0500 bar −0.0001 bar	100.00 % ≙ 0.1000 bar 0.0000 bar	✓Linear To square root bi-directional linear bi-directional square root User prog.

Quick setup - Differential pressure measurement

Zero adjustment

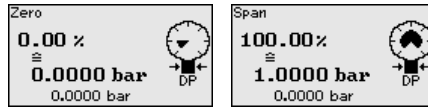In this menu item you carry out the Zero adjustment for the differential pressure.

Enter the corresponding pressure value for 0 %.

Span adjustment

In this menu item you carry out the Span adjustment for the differential pressure

Enter the corresponding pressure value for 100 %.

Quick setup - Density measurement

Distance
In this menu item, you enter the distance between the two measuring points.
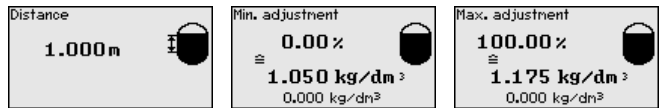
Min. adjustment
In this menu item you carry out the min. adjustment for density.

Enter the percentage value and the corresponding density value for the min. density.

Max. adjustment
In this menu item you carry out the max. adjustment for density.

Enter the percentage value and the corresponding density value for the max. density.

Quick setup - Interface measurement

Distance
In this menu item, you enter the installation distance between Primary and Secondary sensor.
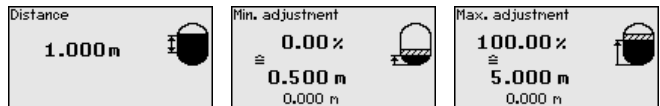
Min. adjustment
In this menu item, you carry out the adjustment for the min. height of the interface.

Enter the percentage value and the corresponding height of the interface.

Max. adjustment
In this menu item, you carry out the adjustment for the max. height of the interface.
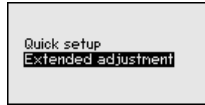
Enter the percentage value and the corresponding height of the interface.
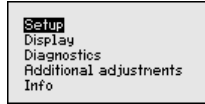
The quick setup is finished.

5.3 Parameter adjustment - Extended adjustment

For technically demanding measuring points, you can carry out extended settings in " *Extended adjustment*".

Main menu   The main menu is divided into five sections with the following functions:

Setup: Settings e. g. for measurement loop name, application, units, position correction, adjustment, signal output, disable/enable operation

Display: Settings, e.g., for language, measured value display, lighting

Diagnosis: Information, for example, of device status, peak indicator, simulation

Additional adjustments: date/time, reset, copy function

Info: Instrument name, hardware and software version, calibration date, sensor features

Note:
For optimum setting of the measuring point, the individual submenu items in the main menu item " *Setup*" should be selected one after the other and provided with the correct parameters. If possible, go through the items in the given sequence.

The submenu points are described below.

5.4 Menu overview

Setup

Menu item	Parameter	Default value
Measurement loop name		Sensor
Application	Application	Level
Units	Unit of measurement	mbar (with nominal measuring range ≤ 400 mbar)
		bar (with nominal measuring ranges ≥ 1 bar)
	Temperature unit	°C
Position correction		0.00 bar
Adjustment	Zero/Min. adjustment	0.00 bar
		0.00 %
	Span/Max. adjustment	Nominal measuring range in bar
		100.00 %
Damping	Integration time	0.0 s

Menu item	Parameter	Default value
Linearisation		Linear
Lock adjustment		Released

Display

Menu item	Default value
Menu language	Order-specific
Displayed value 1	Current output in %
Displayed value 2	Measuring cell temperature in °C
Display format 1 and 2	Number of positions after the decimal point, automatically
Backlight	Switched on

Diagnostics

Menu item	Parameter	Default value
Device status		-
Peak indicator	Pressure	Actual measured value
	Temperature	Actual measuring and electronic temperature values
Simulation		Process pressure

Additional adjustments

Menu item	Parameter	Default value
Date/Time		Actual date/Actual time
Copy instrument settings		No reset
Special parameters		No reset
Scaling	Scaling size	Volume in l
	Scaling format	0 % corresponds to 0 l
		100 % corresponds to 0 l

Info

Menu item	Parameter
Device name	Device name
Instrument version	Hardware and software version
Factory calibration date	Date
Sensor characteristics	Order-specific characteristics

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6 Set up with smartphone/tablet, PC/ notebook via Bluetooth

6.1 Preparations

Activate Bluetooth

Make sure that the Bluetooth function of the display and adjustment module is activated. For this, the switch on the bottom side must be set to " *On*".
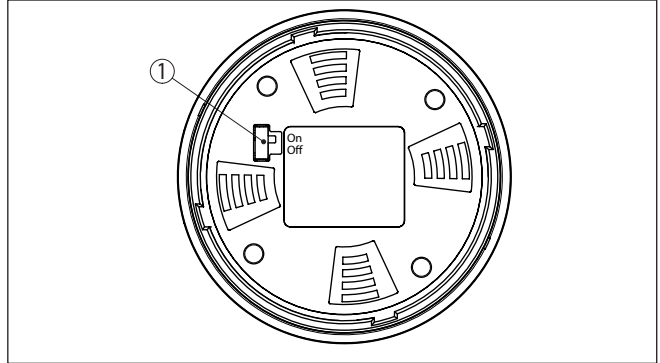

Fig. 7: Activate Bluetooth

1 Switch
On =   *Bluetooth active*
*Off =*   *Bluetooth not active*

Change sensor PIN

The security concept of Bluetooth operation absolutely requires that the default setting of the sensor PIN be changed. This prevents unauthorized access to the sensor.

The default setting of the sensor PIN is " **0000**". First of all you have to change the sensor PIN in the adjustment menu of the sensor, e.g. to " **1111**":
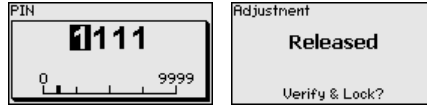
1. Go to setup via the extended operation
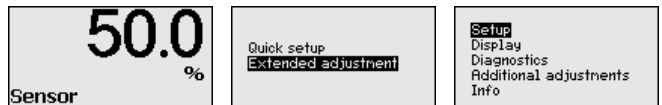
2. Lock operation by changing sensor PIN
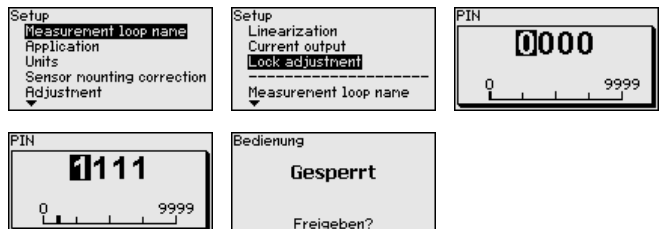
3. Enable operation again by entering the sensor PIN once more

Sensor adjustment via the display/adjustment module or PACTware/ DTM by means of VEGACONNECT is thus released again. For ac- cess (authentication) with Bluetooth, the changed PIN is still effective.

> **Note:**
> Bluetooth access can only be established if the current sensor PIN differs from the default setting " **0000**". It is possible both when the adjustment is unlocked and when it is locked.

6.2 Connecting

Preparations

Smartphone/Tablet
Start the adjustment app and select the function "Setup". The smart- phone/tablet searches automatically for Bluetooth-capable instru- ments in the area.

PC/Notebook
Start PACTware and the VEGA project assistant. Select the device search via Bluetooth and start the search function. The device auto- matically searches for Bluetooth-capable devices in the vicinity.

Connecting

The message " *Instrument search running*" is displayed. All devices found are listed in the operating window. The search is automatically continued continuously.

Select in the device list the requested device. The message " *Con- necting*" is displayed.

Authenticate

For the first connection, the operating device and the sensor must authenticate each other. After successful authentication, the next con- nection functions without authentication.

For authentication, enter in the next menu window the 4-digit sensor PIN.

6.3 Sensor parameter adjustment

The sensor parameterization is carried out via the adjustment app on the smartphone/tablet or the DTM on the PC/notebook.
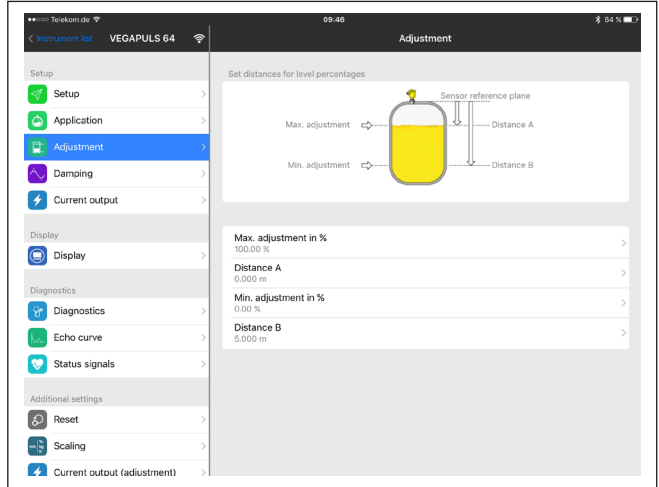
App view

Fig. 8: Example of an app view - Setup sensor adjustment

7 Supplement

7.1 Technical data

Output variable

Output

− Physical layer	Digital output signal according to standard EIA-485
− Bus specifications	Modbus Application Protocol V1.1b3, Modbus over serial line V1.02
− Data protocols	Modbus RTU, Modbus ASCII, Levelmaster
Max. transmission rate	57.6 Kbit/s

Electromechanical data - version IP66/IP67 and IP66/IP68 (0.2 bar) [1]

Options of the cable entry

− Cable entry	M20 x 1.5; ½ NPT
− Cable gland	M20 x 1.5; ½ NPT (cable ø see below table)
− Blind plug	M20 x 1.5; ½ NPT
− Closing cap	½ NPT

Material cable gland/Seal insert	Cable diameter			
	5 … 9 mm	6 … 12 mm	7 … 12 mm	10 … 14 mm
PA/NBR	√	√	–	√
Brass, nickel-plated/NBR	√	√	–	–
Stainless steel/NBR	–	–	√	–

Wire cross-section (spring-loaded terminals)

− Massive wire, stranded wire	0.2 … 2.5 mm² (AWG 24 … 14)
− Stranded wire with end sleeve	0.2 … 1.5 mm² (AWG 24 … 16)

Voltage supply

Operating voltage	8 … 30 V DC
Max. power consumption	520 mW
Reverse voltage protection	Integrated

[1] IP66/IP68 (0.2 bar), only with absolute pressure.

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