

Quick setup guide

TDR sensor for continuous level and interface measurement of liquids

VEGAFLEX 86

Two-wire 4 ... 20 mA/HART SIL

Coax probe

With SIL qualification

-20 ... +250 °C



Document ID: 49742



VEGA

Contents

- 1 For your safety 3**
 - 1.1 Authorised personnel 3
 - 1.2 Appropriate use..... 3
 - 1.3 Warning about incorrect use..... 3
 - 1.4 General safety instructions 3
 - 1.5 Conformity..... 3
 - 1.6 SIL qualification according to IEC 61508..... 4
 - 1.7 NAMUR recommendations 4
 - 1.8 Environmental instructions 4
- 2 Product description 5**
 - 2.1 Configuration..... 5
- 3 Mounting 7**
 - 3.1 General instructions for use of the instrument 7
 - 3.2 Mounting instructions 7
- 4 Connecting to power supply..... 8**
 - 4.1 Connecting..... 8
 - 4.2 Wiring plan, single chamber housing..... 9
 - 4.3 Wiring plan, double chamber housing 9
- 5 Set up with the display and adjustment module 10**
 - 5.1 Insert display and adjustment module 10
 - 5.2 Parameter adjustment 11
- 6 Setup with smartphone/tablet (Bluetooth)..... 13**
 - 6.1 Preparations..... 13
 - 6.2 Connecting..... 14
 - 6.3 Sensor parameter adjustment 14
- 7 Supplement 15**
 - 7.1 Technical data 15



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 VEGAFLEX 86 - Two-wire 4 ... 20 mA/
HART - Coax probe - With SIL qualification, -20 ... +250 °C:
Document-ID 49476**

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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, qualified personnel authorised by the plant operator.

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

1.2 Appropriate use

VEGAFLEX 86 is a sensor for continuous level measurement.

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 overflow 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 operator 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 operator 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 by the user.

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 the manufacturer. Arbitrary conversions or modifications are explicitly forbidden. For safety reasons, only the accessory specified by the manufacturer 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.

Electromagnetic compatibility

Instruments in four-wire or Ex d ia version are designed for use in an industrial environment. Nevertheless, electromagnetic interference from electrical conductors and radiated emissions must be taken into account, as is usual with class A instruments according to EN 61326-1. If the instrument is used in a different environment, the electromagnetic compatibility to other instruments must be ensured by suitable measures.

1.6 SIL qualification according to IEC 61508

The Safety Integrity Level (SIL) of an electronic system is used to assess the reliability of integrated safety functions.

For detailed specification of the safety requirements, multiple SIL levels are specified according to safety standard IEC 61508. You can find detailed information in chapter "*Functional safety (SIL)*" of the operating instructions.

The instrument meets the specifications of IEC 61508: 2010 (Edition 2). It is qualified for single-channel operation up to SIL2. The instrument can be used homogeneously redundant up to SIL3 in multi-channel architecture with HFT 1.

1.7 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.

1.8 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:

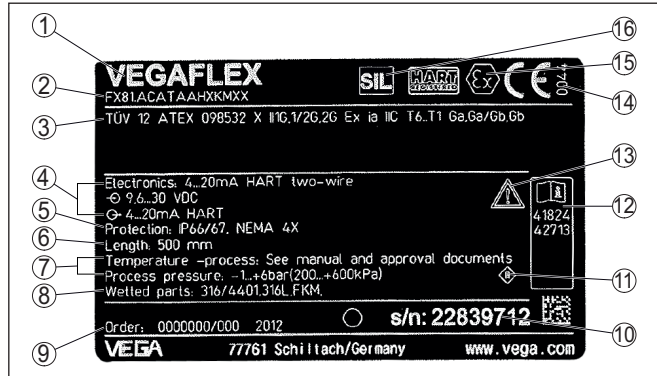


Fig. 1: Layout of the type label (example)

- 1 Instrument type
- 2 Product code
- 3 Approvals
- 4 Power supply and signal output, electronics
- 5 Protection rating
- 6 Probe length (measurement accuracy optional)
- 7 Process and ambient temperature, process pressure
- 8 Material wetted parts
- 9 Order number
- 10 Serial number of the instrument
- 11 Symbol of the device protection class
- 12 ID numbers, instrument documentation
- 13 Reminder to observe the instrument documentation
- 14 Notified authority for CE marking
- 15 Approval directives
- 16 Marking of the safety function in SIS

Serial number - Instrument search

The type label contains the serial number of the instrument. With it you can find the following instrument data on our homepage:

- Product code (HTML)
- Delivery date (HTML)
- Order-specific instrument features (HTML)
- Operating instructions and quick setup guide at the time of shipment (PDF)
- Test certificate (PDF) - optional

Move to "www.vega.com" and enter in the search field the serial number of your instrument.

Alternatively, you can access the data via your smartphone:

- Download the VEGA Tools app from the "[Apple App Store](#)" or the "[Google Play Store](#)"

- Scan the QR-code on the type label of the device or
- Enter the serial number manually in the app

3 Mounting

3.1 General instructions for use of the instrument

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.

Installation position

3.2 Mounting instructions

In vessels with conical bottom it can be advantageous to mount the device in the center of the vessel, as measurement is then possible nearly down to the lowest point of the bottom. Keep in mind that measurement all the way down to the tip of the probe may not be possible. The exact value of the min. distance (lower blocking distance) is stated in chapter " *Technical data*".

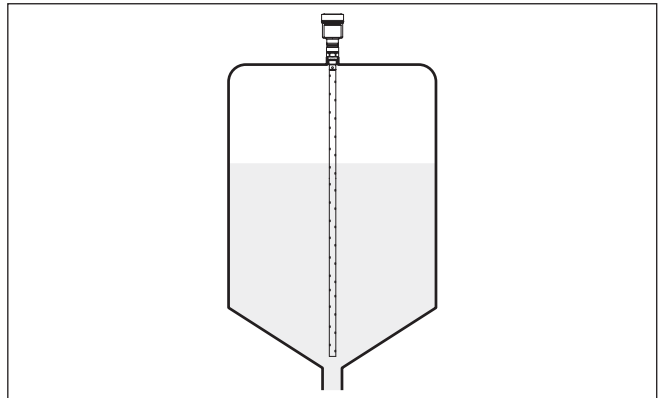


Fig. 2: Vessel with conical bottom

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.



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. 3: 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



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

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 Wiring plan, single chamber housing

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



Electronics and connection compartment

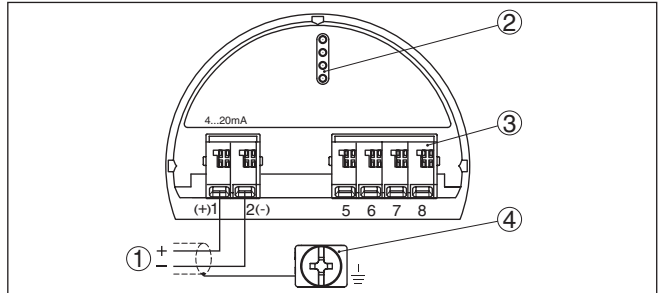


Fig. 4: Electronics and connection compartment - single chamber housing

- 1 Voltage supply, signal output
- 2 For display and adjustment module or interface adapter
- 3 For external display and adjustment unit
- 4 Ground terminal for connection of the cable screening

4.3 Wiring plan, double chamber housing

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



Connection compartment

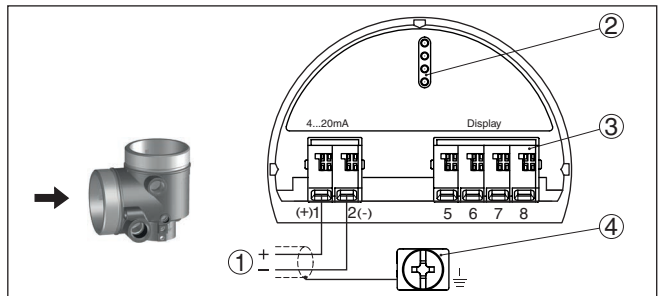


Fig. 5: Connection compartment - double chamber housing

- 1 Voltage supply, signal output
- 2 For display and adjustment module or interface adapter
- 3 For external display and adjustment unit
- 4 Ground terminal for connection of the cable screening

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

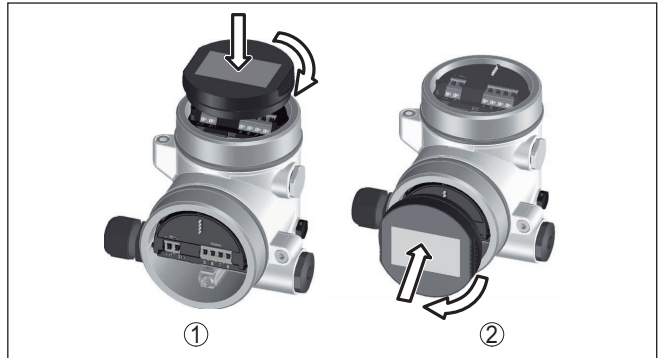


Fig. 7: Installing the display and adjustment module in the double chamber housing

- 1 In the electronics compartment
- 2 In the connection compartment



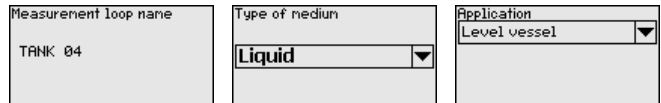
Note:

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.

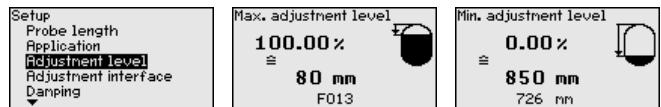
5.2 Parameter adjustment

Set parameters

1. In this menu item you can select the application. You can choose between level and interface measurement.



2. In the menu item "Medium - Dielectric constant" you can define the type of medium (medium).
3. Carry out the adjustment in the menu items "Min. adjustment" and "Max. adjustment".



4. A "Linearization" is recommended for all vessels in which the vessel volume does not increase linearly with the level - e.g. in a horizontal cylindrical or spherical tank. Activate the appropriate curve.
5. A "False signal suppression" detects, marks and saves the false signals so that they are no longer taken into account for level measurement. We generally recommend a false signal suppression.

Parameterization example The sensor measures the distance from the sensor (reference plane) to the product surface.

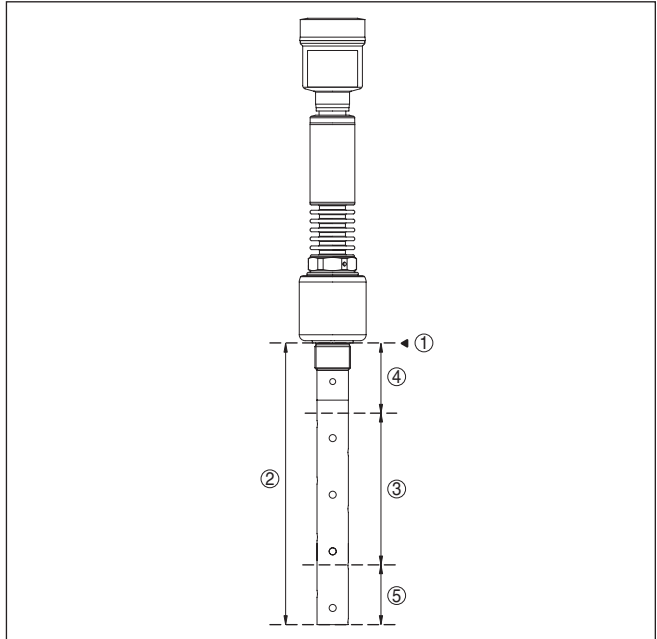


Fig. 8: Measuring ranges - VEGAFLEX 86

- 1 Reference plane
- 2 Probe length L
- 3 Measuring range (default setting refers to the measuring range in water)
- 4 Upper blocking distance (in this area no measurement is possible)
- 5 Lower blocking distance (in this area no measurement is possible)

For this adjustment, the distance is entered when the vessel is full and nearly empty. If these values are not known, an adjustment with other distances, for example, 10 % and 90 % is also possible. Starting point for these distance specifications is always the seal surface of the thread or flange.

Further steps

1. In the menu "Additional settings", menu item "Damping" you can adjust the requested damping of the output signal.
2. Select the parameter of the current output and the output characteristics in the menu item "Current output".

6 Setup with smartphone/tablet (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".

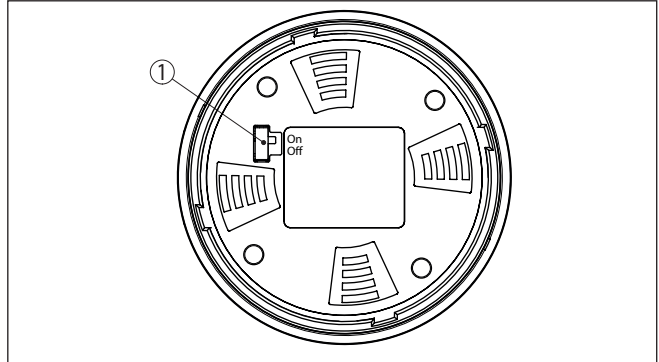


Fig. 9: Activate Bluetooth

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.

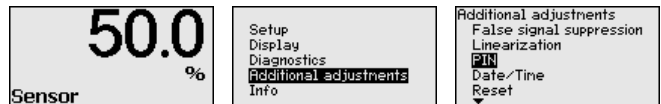
The default setting of the sensor PIN is "0000". First of all you have to change the sensor PIN in the adjustment menu of the sensor, e.g. to "1111":

1. In the adjustment menu, go to "Additional adjustments", "PIN"

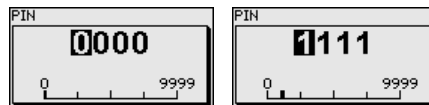


Note:

The menu item "PIN" is only displayed if in the menu "Setup", "Lock/Unlock adjustment" the adjustment is released.



2. Change sensor PIN



Note:

Bluetooth access can only be established if the current sensor PIN differs from the default setting "0000". It is possible both when the

PIN is deactivated and when it is activated (adjustment menu "Setup", "Lock/Unlock adjustment").

6.2 Connecting

Preparations

Smartphone/Tablet

Start the adjustment app and select the function "Setup". The smartphone/tablet searches automatically for Bluetooth-capable instruments 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 automatically 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 "Connecting" is displayed.

Authenticate

For the first connection, the operating device and the sensor must authenticate each other. After successful authentication, the next connection 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

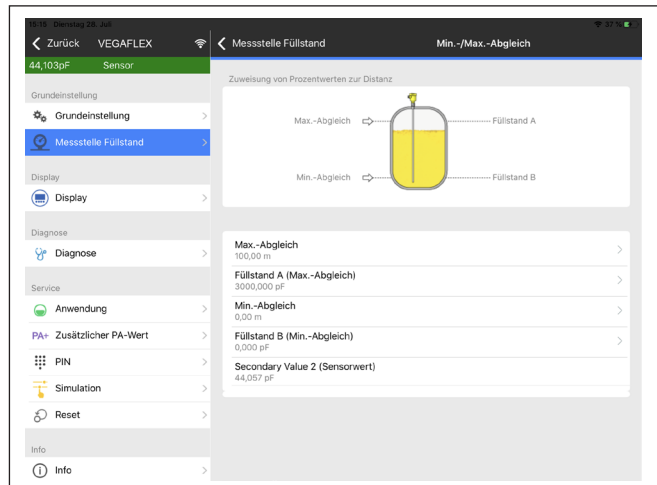


Fig. 10: Example of an app view - Setup sensor adjustment

7 Supplement

7.1 Technical data

Note for approved instruments

The technical data in the respective safety instructions which are included in delivery are valid for approved instruments (e.g. with Ex approval). These data can differ from the data listed herein, for example regarding the process conditions or the voltage supply.

All approval documents can be downloaded from our homepage.

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

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	Material seal insert	Cable diameter				
		4.5 ... 8.5 mm	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 U_B 9.6 ... 35 V DC

Operating voltage U_B with lighting switched on 16 ... 35 V DC

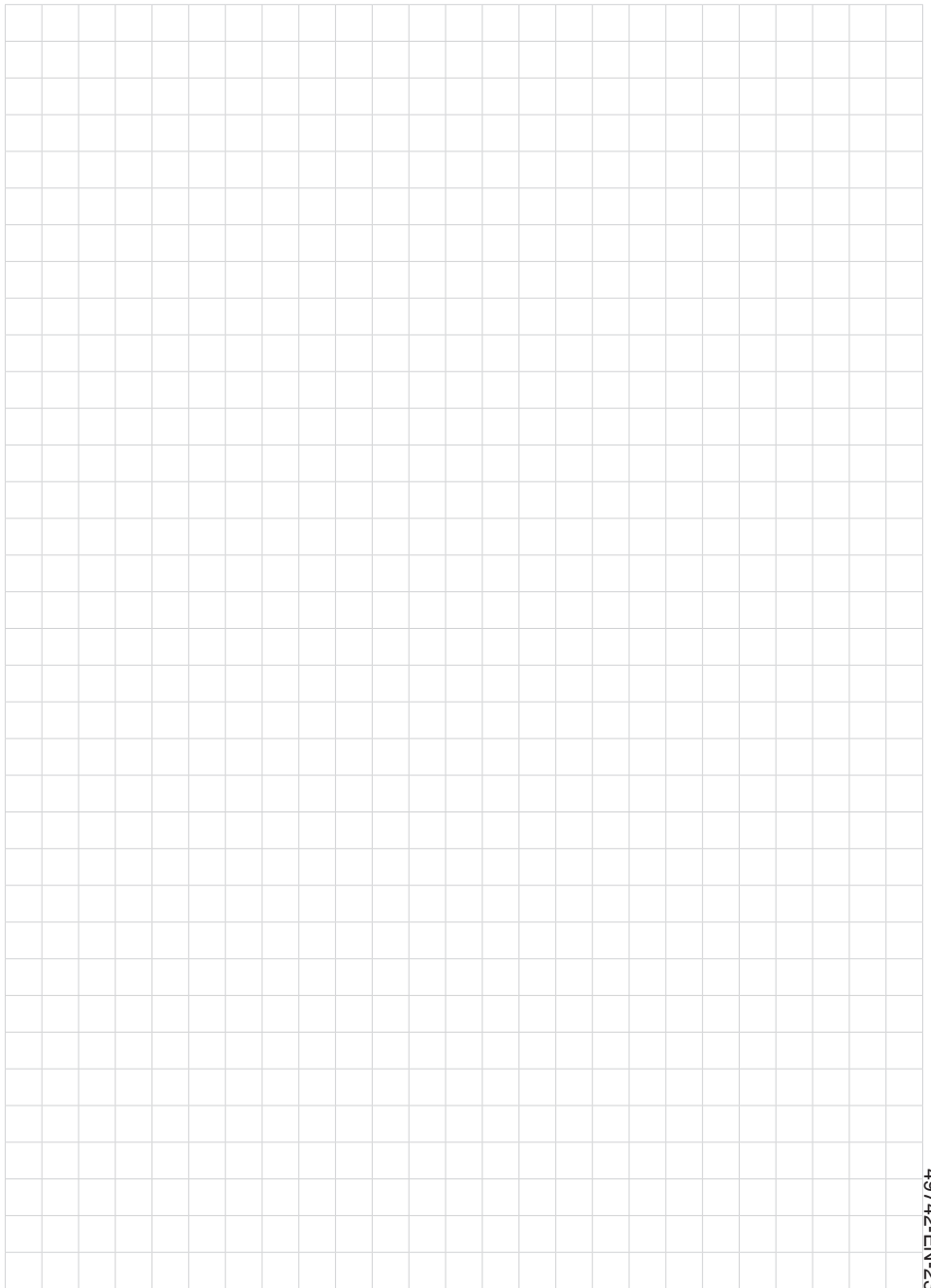
Reverse voltage protection Integrated

Permissible residual ripple

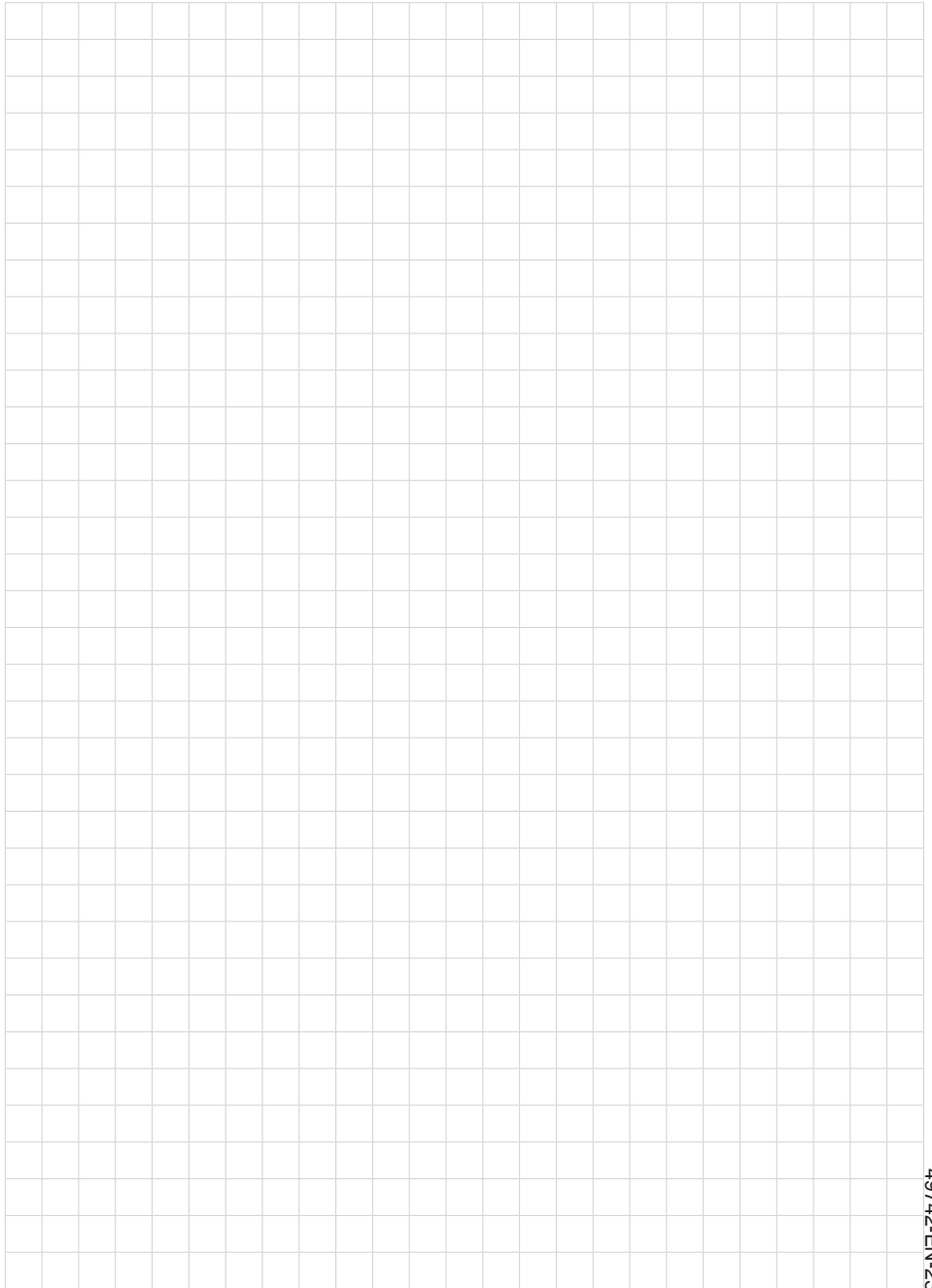
- for $9.6\text{ V} < U_B < 14\text{ V}$ $\leq 0.7 V_{\text{eff}}$ (16 ... 400 Hz)
- for $18\text{ V} < U_B < 36\text{ V}$ $\leq 1 V_{\text{eff}}$ (16 ... 400 Hz)

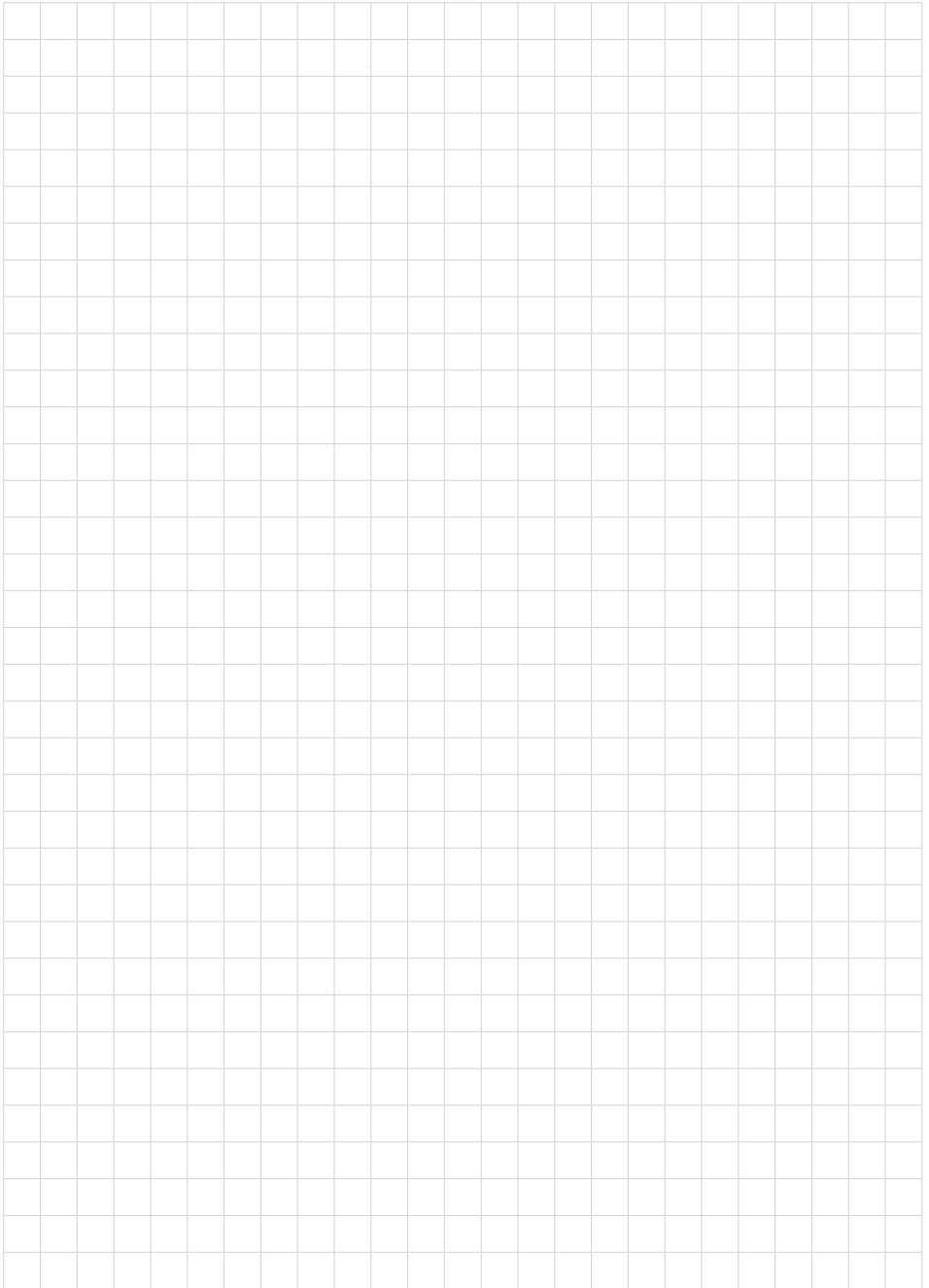
Load resistor

- Calculation $(U_B - U_{\text{min}})/0.022\text{ A}$
- Example - with $U_B = 24\text{ V DC}$ $(24\text{ V} - 9.6\text{ V})/0.022\text{ A} = 655\ \Omega$



A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.



A large grid of 20 columns and 30 rows for taking notes. The grid is composed of thin grey lines forming a uniform pattern of squares across the page.

Printing date:

VEGA

All statements concerning scope of delivery, application, practical use and operating conditions of the sensors and processing systems correspond to the information available at the time of printing.

Subject to change without prior notice

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