

Ex separator for 4 ... 20 mA sensors

VEGA

VEGATRENN41

TREXN41

CE

CS

Ex

ambient temperature: -20...+60°C
power supply: 24...230 VAC / +15% ...-10%; 50-60Hz;
24...85 VDC / +5% ...-10%)
≤30W / ≤15VA
• Input: 4...20mA
• Output: 4...20mA
protection IP69
HMI max 1 m

Made in Germany | T7791 Schönlach

S/N: 12345678

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www.vega.com



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1 About this document

1.1 Function

This instruction provides all the information you need for mounting, connection and setup as well as important instructions for maintenance, fault rectification, the exchange of parts and the safety of the user. Please read this information before putting the instrument into operation and keep this manual accessible in the immediate vicinity of the device.

1.2 Target group

This operating instructions manual is directed to trained personnel. The contents of this manual must be made available to the qualified personnel and implemented.

1.3 Symbols used



Document ID

This symbol on the front page of this instruction refers to the Document ID. By entering the Document ID on www.vega.com you will reach the document download.



Information, note, tip: This symbol indicates helpful additional information and tips for successful work.



Note: This symbol indicates notes to prevent failures, malfunctions, damage to devices or plants.



Caution: Non-observance of the information marked with this symbol may result in personal injury.



Warning: Non-observance of the information marked with this symbol may result in serious or fatal personal injury.



Danger: Non-observance of the information marked with this symbol results in serious or fatal personal injury.



Ex applications

This symbol indicates special instructions for Ex applications.



List

The dot set in front indicates a list with no implied sequence.



Sequence of actions

Numbers set in front indicate successive steps in a procedure.



Disposal

This symbol indicates special instructions for disposal.

2 For your safety

2.1 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.

2.2 Appropriate use

VEGATRENN 141 is an [Ex ia] separator with separate power supply for connection of 4 ... 20 mA/HART sensors in two-wire version.

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.

2.3 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.

2.4 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.

2.5 Installation and operation in the USA and Canada

This information is only valid for USA and Canada. Hence the following text is only available in the English language.

Installations in the US shall comply with the relevant requirements of the National Electrical Code (ANSI/NFPA 70).

Installations in Canada shall comply with the relevant requirements of the Canadian Electrical Code.

2.6 Safety instructions for Ex areas

For applications in explosion-proof areas (Ex), only devices with corresponding Ex approval may be used. Observe the Ex-specific safety instructions. These are an integral part of the operating instructions and are enclosed with every device with Ex approval.

3 Product description

3.1 Configuration

Scope of delivery

The scope of delivery encompasses:

- VEGATRENN 141
- Documentation
 - This operating instructions manual
 - Ex-specific "*Safety instructions*" (depending on the version)
 - If necessary, further certificates

Type label

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

- Instrument type
- Information about approvals
- Technical data
- Serial number of the instrument
- QR code for device documentation
- Manufacturer information

Documents and software

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

There you can find the following information about the instrument:

- Order data
- Documentation
- Software

Alternatively, you can find all via your smartphone:

- Scan the QR-code on the type label of the device or
- Enter serial number manually in the VEGA Tools app (available free of charge in the respective stores)

3.2 Principle of operation

Application area

VEGATRENN 141 is an [Ex ia] separator with separate power supply for connection of 4 ... 20 mA/HART sensors in two-wire version. As an associated electrical device, it ensures a galvanic separation between sensor circuit and processing circuit and thus between Ex and non-Ex areas.

Functional principle

An integrated transmitter power supply powers the connected sensor. The current signal from the sensor (4 ... 20 mA) is transferred to the output linearly and galvanically separated. The instrument is HART transparent, i.e. the HART signals are transmitted bidirectionally between input and output.

3.3 Adjustment

No adjustment or configuration of VEGATRENN 141 is necessary. A parameter adjustment of the connected sensors can be carried out via the HART communication sockets behind the hinged front cover. Adjustment of the connected sensors is carried out preferably via a

Windows PC with a parameter adjustment software such as PACTware and corresponding DTM. A VEGACONNECT interface adapter or a HART modem is necessary for connecting the PC.

3.4 Packaging, transport and storage

Packaging

Your instrument was protected by packaging during transport. Its capacity to handle normal loads during transport is assured by a test based on ISO 4180.

The packaging of standard instruments consists of environment-friendly, recyclable cardboard. For special versions, PE foam or PE foil is also used. Dispose of the packaging material via specialised recycling companies.

Transport

Transport must be carried out in due consideration of the notes on the transport packaging. Nonobservance of these instructions can cause damage to the device.

Transport inspection

The delivery must be checked for completeness and possible transit damage immediately at receipt. Ascertained transit damage or concealed defects must be appropriately dealt with.

Storage

Up to the time of installation, the packages must be left closed and stored according to the orientation and storage markings on the outside.

Unless otherwise indicated, the packages must be stored only under the following conditions:

- Not in the open
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration

Storage and transport temperature

- Storage and transport temperature see chapter " *Supplement - Technical data - Ambient conditions* "
- Relative moisture 20 ... 85 %

4 Mounting

Mounting options

4.1 General instructions

VEGATRENN 141 is designed for carrier rail mounting (top hat rail 35 x 7.5 according to DIN EN 50022/60715). Due to its protection rating of IP20, the instrument is suitable for mounting in switching cabinets. It can be mounted horizontally and vertically.



Note:

When several instruments are mounted together without space in between, the ambient temperature at the installation location of the instrument must not exceed 60 °C. Around the ventilation slots there must be a distance of at least 2 cm to the next component.



VEGATRENN 141 is a corresponding, intrinsically safe equipment and must not be installed in hazardous areas of zone 0/1. A safe operation is only ensured if the operating instructions and EU type approval certificate are observed. VEGATRENN 141 must not be opened.

A distance of 50 mm to the intrinsically safe terminals must be ensured when mounting.

Ambient conditions

The instrument is suitable for standard and extended ambient conditions acc. to DIN/EN/IEC/ANSI/ISA/UL/CSA 61010-1.

Make sure that the environmental and ambient conditions specified in chapter " *Technical data* " are maintained.

5 Connecting to power supply

5.1 Preparing the connection

Safety instructions

Always keep in mind the following safety instructions:



Warning:

Connect only in the complete absence of line voltage.

- Connect only in the complete absence of line voltage
- If overvoltage surges are expected, overvoltage arresters should be installed



Note:

Install a disconnecting device for the instrument which is easy to access. The disconnecting device must be marked for the instrument (IEC/EN 61010).

Safety instructions for Ex applications



In hazardous areas you must take note of the respective regulations, conformity and type approval certificates of the sensors and power supply units.

Voltage supply

The data for power supply are specified in chapter " *Technical data*".

Connection cable

The voltage supply of VEGATRENN 141 is connected with standard cable according to the national installation standards.

Make sure that the cable used has the required temperature resistance and fire safety for max. occurring ambient temperature

The sensors are connected with standard two-wire cable without shielding. If electromagnetic interference is expected which is above the test values of EN 61326 for industrial areas, shielded cable should be used. In general, cable screening is necessary in HART multidrop mode.

Cable screening and grounding

Connect the cable shielding on both ends to ground potential. In the sensor, the shielding must be connected directly to the internal ground terminal. The ground terminal on the outside of the sensor housing must be connected to the potential equalisation (low impedance).

If potential equalisation currents are expected, the connection on the processing side must be made via a ceramic capacitor (e. g. 1 nF, 1500 V). The low-frequency potential equalisation currents are thus suppressed, but the protective effect against high frequency interference signals remains.

Connection cable for Ex applications



Take note of the corresponding installation regulations for Ex applications. In particular, make sure that no potential equalisation currents flow over the cable screen. In case of grounding on both sides this can be achieved by the use of a capacitor or a separate potential equalisation.

HART communication

The instrument is equipped with communication sockets in the front for connection of a VEGACONNECT or another HART handheld as well as an integrated HART resistor.

If the resistance of the connected processing system is less than $230\ \Omega$, the digital adjustment signal is extremely damped or short-circuited. Digital communication with the PC is then no longer possible. With low impedance processing systems, a resistor of approx. $230\ \Omega$ must be looped into the 4 ... 20 mA cable. This resistor is already integrated in VEGATRENN 141 and can be chosen through the selection of the respective terminals.

No additional resistor is required in the sensor circuit for direct connection of a HART-Master. When connecting a VEGADIS 82, the communication resistor in the VEGADIS 82 must be deactivated.

HART multidrop mode

In HART multidrop mode, the measured values are transmitted on the same cable (bus) as the digital HART signals. An analogue 4 ... 20 mA transmission is not possible, the current is limited to 4 mA. An own, unambiguous address (address range 1-15) must be assigned to each connected sensor. In this mode, up to five sensors can be connected to one channel.



Information:

When using a HART resistor, keep in mind that there is an additional voltage loss. You can find details in chapter "Technical data".

5.2 Connection procedure

The pluggable terminals can be removed as needed to allow more convenient connection. To make the electrical connection, proceed as follows:

1. Mount the instrument as described in the previous chapter
2. Connect sensor cable to terminal 1/2, and where applicable, connect the shielding
3. Connect switched-off power supply to terminal 16/17
4. Connect processing circuit, e.g. from PLC to terminal 11/12 or 10/12 (with HART resistor), and shielding, if necessary

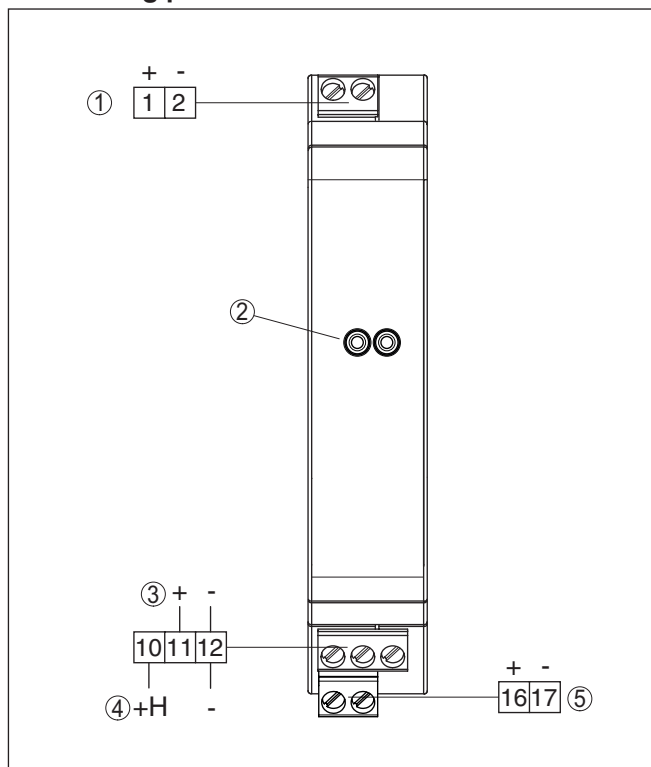
The electrical connection is finished.



Note:

If several sensors should be connected in HART multidrop mode, a respective HART address must be assigned to each sensor before connecting to VEGATRENN 141.

5.3 Wiring plan



- 1 Sensor circuit (4 ... 20 mA/HART, Ex area)
- 2 HART communication sockets for connection of a HART handheld, e.g. a VEGACONNECT
- 3 Processing circuit (4 ... 20 mA/HART, active output)
- 4 Processing circuit (4 ... 20 mA/HART, active output with looped HART resistor)
- 5 Voltage supply



Information:

The connection terminals can be detached towards the front, if necessary. This can be useful when working in tight spaces or when exchanging an instrument.

6 Setup

6.1 Adjustment system

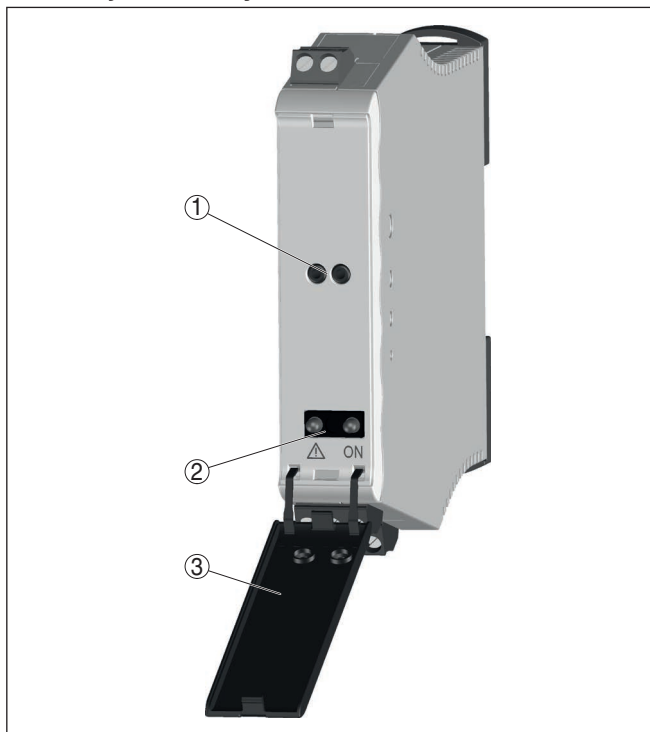


Fig. 1: Display and adjustment elements

- 1 HART communication sockets
- 2 Signal lamps (LEDs)
- 3 Hinged front cover

6.2 Adjustment elements

Control lamps

Control lamps (LED) in the front plate indicate operation and fault signal.

- Green operating control lamp lights in case of
 - Mains voltage, instrument is operating
- Red fault lamp lights in case of
 - Short-circuit on the input
 - Line break on the output
 - Too high load on the output
 - Internal faults

Front cover

The adjustment elements are located under a hinged front cover. To open it, use a small screwdriver in conjunction with the slot on the upper side of the front cover. To close it, push the cover at bottom and top firmly onto the front cover until you hear the two retaining clips snap in.

HART communication sockets

No adjustment or configuration of VEGATRENN 141 is necessary. Via the HART communication sockets, parameter adjustment of the connected HART sensors can be carried out without interrupting the measuring circuit. The resistor ($230\ \Omega$) required for this purpose is already integrated in VEGATRENN 141 (only in case of connection of terminals 10/12). The adjustment of the connected sensor is carried out via a Windows PC with a parameter adjustment software such as e.g. PACTware and corresponding DTM.

7 Diagnostics and servicing

7.1 Maintenance

Maintenance

If the device is used properly, no special maintenance is required in normal operation.

Cleaning

The cleaning helps that the type label and markings on the instrument are visible.

Take note of the following:

- Use only cleaning agents which do not corrode the housings, type label and seals
- Use only cleaning methods corresponding to the housing protection rating

7.2 Rectify faults

Reaction when malfunction occurs

The operator of the system is responsible for taking suitable measures to rectify faults.

Causes of malfunction

Maximum reliability is ensured. Nevertheless, faults can occur during operation. These may be caused by the following, e.g.:

- Voltage supply
- Interference in the cables

Fault rectification

The first measure to be taken is to check the input/output signal as well as the power supply. In many cases, the causes can be determined and faults can be quickly rectified.

Reaction after fault rectification

Depending on the reason for the fault and the measures taken, the steps described in chapter "Setup" must be carried out again or must be checked for plausibility and completeness.

24 hour service hotline

Should these measures not be successful, please call in urgent cases the VEGA service hotline under the phone no. **+49 1805 858550**.

The hotline is also available outside normal working hours, seven days a week around the clock.

Since we offer this service worldwide, the support is provided in English. The service itself is free of charge, the only costs involved are the normal call charges.

7.3 How to proceed if a repair is necessary

You can find an instrument return form as well as detailed information about the procedure in the download area of our homepage. By doing this you help us carry out the repair quickly and without having to call back for needed information.

In case of repair, proceed as follows:

- Print and fill out one form per instrument
- Clean the instrument and pack it damage-proof

- Attach the completed form and, if need be, also a safety data sheet outside on the packaging
- Ask the agency serving you to get the address for the return shipment. You can find the agency on our homepage.

8 Dismount

8.1 Dismounting steps

Take note of chapters " *Mounting*" and " *Connecting to voltage supply*" and carry out the listed steps in reverse order.

8.2 Disposal



Pass the instrument on to a specialised recycling company and do not use the municipal collecting points.

Remove any batteries in advance, if they can be removed from the device, and dispose of them separately.

If personal data is stored on the old device to be disposed of, delete it before disposal.

If you have no way to dispose of the old instrument properly, please contact us concerning return and disposal.

9 Certificates and approvals

9.1 Approvals for Ex areas

Approved versions for use in hazardous areas are available or in preparation for the device or the device series.

You can find the relevant documents on our homepage.

9.2 EU conformity

The device fulfils the legal requirements of the applicable EU directives. By affixing the CE marking, we confirm the conformity of the instrument with these directives.

The EU conformity declaration can be found on our homepage.

9.3 SIL conformity

Instruments with SIL option fulfill the requirements of functional safety according to IEC 61508. You can find further information in the supplied Safety Manual.

9.4 Environment management system

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 chapters "*Packaging, transport and storage*", "*Disposal*" of these operating instructions.

10 Supplement

10.1 Technical data

Note for approved instruments

The technical data in the respective safety instructions are valid for approved instruments (e.g. with Ex approval). In some cases, these data can differ from the data listed herein.

All approval documents can be downloaded from our homepage.

General data

Series	Module unit for mounting on carrier rails 35 x 7.5 acc. to EN 50022/60715
Weight	160 g (5.14 oz)
Housing material	Polycarbonate PC-FR
Connection terminals	
– Type of terminal	Screw terminal
– Wire cross-section	0.25 mm ² (AWG 23) ... 2.5 mm ² (AWG 12)
HART communication sockets	ø 2 mm

Voltage supply

Operating voltage	
– Nominal voltage AC	24 ... 230 V (-15 %, +10 %) 50/60 Hz
– Nominal voltage DC	24 ... 65 V (-15 %, +10 %)
Max. power consumption	3 W (15 VA)

Sensor input

Number of sensors	1 x 4 ... 20 mA/HART (5 x HART multidrop)
Input type	Active (sensor power supply by VEGATRENN 141)
Terminal voltage	21 ... 16.5 V DC at 4 ... 20 mA
Off-load voltage	24 V DC (+/- 1 V)
Short-circuit current	< 26 mA
Residual ripple	< 50 mV RMS

Processing circuit

Quantity	1 x 4 ... 20 mA/HART
Type of output	Active
Off-load voltage	< 15.5 V DC
Residual ripple of the output current	< 50 µA RMS
Current on the input in case of short-circuit	< 10 µA
Current without connected sensor	
– In the range of +20 ... +60 °C (+68 ... +140 °F)	< 50 µA
– In the range of -20 ... +20 °C (-4 ... +68 °F)	< 200 µA

Max. connectable load ¹⁾

– at 20 mA	600 Ohm
– at 22 mA	550 Ohm

Deviation

Reference conditions	Calibration temperature 25 °C (77 °F)
Linearity	< 0.1 %
Influence of the ambient temperature	
– In the range of +20 ... +60 °C (+68 ... +140 °F)	< 0.2 %
– In the range of -20 ... +20 °C (-4 ... +68 °F)	< 0.6 %
Deviation due to strong, high-frequency electromagnetic fields (EN 61326)	< 0.5 %

Integrated HART resistor

Resistance value	232 Ω
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Indicators

LED displays	
– Status, operating voltage	LED green
– Status fault signal	LED red

Ambient conditions

Ambient temperature at the installation site of the instrument	-20 ... +60 °C (-4 ... +140 °F)
Storage and transport temperature	-40 ... +70 °C (-40 ... +158 °F)
Relative humidity	< 96 %

Mechanical environmental conditions

Vibrations (oscillations)	Class 4M4 acc. to IEC 60721-3-4 (1 g, 4 ... 200 Hz)
Impacts (mechanical shock)	Class 6M4 acc. to IEC 60721-3-6 (10 g/11 ms, 30 g/6 ms, 50 g/2.3 ms)

Electrical protective measures

Protection rating	IP20
Overvoltage category (IEC 61010-1)	
– up to 2000 m (6562 ft) above sea level	II
– up to 5000 m (16404 ft) above sea level	II - Only with connected overvoltage protection with response voltage of < 1000 V
– up to 5000 m (16404 ft) above sea level	I
Protection class	II

¹⁾ Without internal HART resistor (when connecting to terminal 11/12).

Pollution degree

2

Measures for electrical separation

Reliable separation according to VDE 0106 part 1 between all circuits

- Reference voltage 253 V
- Insulation resistance (voltage supply - output) 5.1 kV DC
- Insulation resistance (input - output) 2.55 kV DC

Approvals

Instruments with approvals can have different technical specifications depending on the version.

For that reason the associated approval documents of these instruments have to be carefully noted. They are part of the delivery or can be downloaded by entering the serial number of your instrument into the search field under www.vega.com as well as in the general download area.

10.2 Dimensions

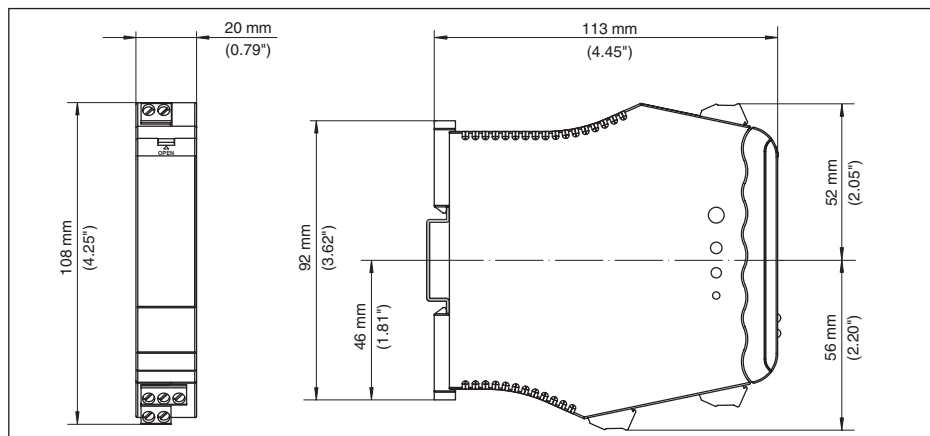


Fig. 2: Dimensions VEGATRENN 141

10.3 Industrial property rights

VEGA product lines are global protected by industrial property rights. Further information see www.vega.com.

VEGA Produktfamilien sind weltweit geschützt durch gewerbliche Schutzrechte.

Nähere Informationen unter www.vega.com.

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10.4 Trademark

All the brands as well as trade and company names used are property of their lawful proprietor/originator.

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Voltage supply 10

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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VEGA Grieshaber KG
Am Hohenstein 113
77761 Schiltach
Germany

Phone +49 7836 50-0
E-mail: info.de@vega.com
www.vega.com