

# Operating Instructions

Double channel Ex separator for  
4 ... 20 mA/HART sensors

## VEGATRENN 142

4 ... 20 mA/HART



Document ID: 52240



# VEGA

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# 1 About this document

## 1.1 Function

This operating instructions manual provides all the information you need for mounting, connection and setup as well as important instructions for maintenance and fault rectification. 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 specialist personnel. The contents of this manual should be made available to these personnel and put into practice by them.

## 1.3 Symbols used



### Information, tip, note

This symbol indicates helpful additional information.



**Caution:** If this warning is ignored, faults or malfunctions can result.



**Warning:** If this warning is ignored, injury to persons and/or serious damage to the instrument can result.



**Danger:** If this warning is ignored, serious injury to persons and/or destruction of the instrument can result.



### Ex applications

This symbol indicates special instructions for Ex applications.



### SIL applications

This symbol indicates instructions for functional safety which must be taken into account particularly for safety-relevant applications.

- **List**

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

- **Action**

This arrow indicates a single action.

- 1 **Sequence of actions**

Numbers set in front indicate successive steps in a procedure.



### Battery disposal

This symbol indicates special information about the disposal of batteries and accumulators.

## 2 For your safety

### 2.1 Authorised personnel

All operations described in this operating instructions manual must be carried out only by trained specialist 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 142 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.

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.

### 2.3 Warning about incorrect use

Inappropriate or incorrect use of the instrument can give rise to application-specific hazards, e.g. vessel overflow or damage to system components through incorrect mounting or adjustment.

### 2.4 General safety instructions

This is a state-of-the-art instrument complying with all prevailing regulations and guidelines. 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.

During the entire duration of use, the user is obliged to determine the compliance of the necessary occupational safety measures with the current valid rules and regulations and also take note of new regulations.

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.

The safety approval markings and safety tips on the device must also be observed.

## 2.5 Safety label on the instrument

The safety approval markings and safety tips on the device must be observed.

## 2.6 CE conformity

The device fulfills the legal requirements of the applicable EC guidelines. By affixing the CE marking, we confirm successful testing of the product.

You can find the CE Certificate of Conformity in the download section of our homepage.

## 2.7 SIL conformity

This instrument fulfills the requirements of functional safety according to IEC 61508. You can find further information in the supplied Safety Manual.

## 2.8 Safety instructions for Ex areas

Please note the Ex-specific safety information for installation and operation in Ex areas. These safety instructions are part of the operating instructions manual and come with the Ex-approved instruments.

## 2.9 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 fulfill this obligation by observing the environmental instructions in this manual:

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

## 3 Product description

### 3.1 Configuration

#### Scope of delivery

The scope of delivery encompasses:

- VEGATRENN 142
- 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
- Product code
- Approvals
- Technical data
- Serial number of the instrument
- Data-Matrix-Code for smartphone app

#### Serial number

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

- Product code of the instrument (HTML)
- Delivery date (HTML)
- Order-specific instrument features (HTML)
- Operating instructions at the time of shipment (PDF)

Go to [www.vega.com](http://www.vega.com), "*VEGA Tools*" and "*Instrument search*". Enter the serial number.

Alternatively, you can access the data via your smartphone:

- Download the smartphone app "*VEGA Tools*" from the "*Apple App Store*" or the "*Google Play Store*"
- Scan the Data Matrix code on the type label of the instrument or
- Enter the serial number manually in the app

### 3.2 Principle of operation

#### Application area

The VEGATRENN 142 is a double channel [Ex ia] separator with separate power supply for connection of two 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.

#### Voltage supply

Wide range power supply with a nominal voltage of 24 ... 230 V AC 50/60 Hz or 24 ... 65 V DC.

Detailed information about the power supply can be found in chapter "*Technical data*".

### 3.3 Operation

No adjustment or configuration of VEGATRENN 142 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 converter 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 see chapter "*Supplement - Technical data - Ambient conditions*"
  - Relative humidity 20 ... 85 %

#### Storage and transport temperature

## 4 Mounting

### 4.1 Mounting instructions

VEGATRENN 142 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 IP 20, 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 142 is a corresponding, intrinsically safe equipment and must not be installed in hazardous areas. A safe operation is only ensured if the operating instructions and EG type approval certificate are observed. VEGATRENN 142 must not be opened.

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



## 5 Connecting to power supply

### 5.1 Preparing the connection

**Note safety instructions**

Always keep in mind the following safety instructions:

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

**Take note of 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 nominal range of the voltage supply can be 24 ... 230 V AC 50/60 Hz or 24 ... 65 V DC. You can find details on the voltage supply in the technical data.

**Select connection cable**

The voltage supply of VEGATRENN 142 is connected with standard cable according to the national installation standards.

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

**Cable screening and grounding**

Connect the cable screen on both ends to ground potential. In the sensor, the screen 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.

**Select 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 Ω, 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 Ω must be looped into the 4 ... 20 mA cable. This resistor is already integrated in VEGATRENN 142 and can be chosen through the selection of the respective terminals.

**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.

**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:

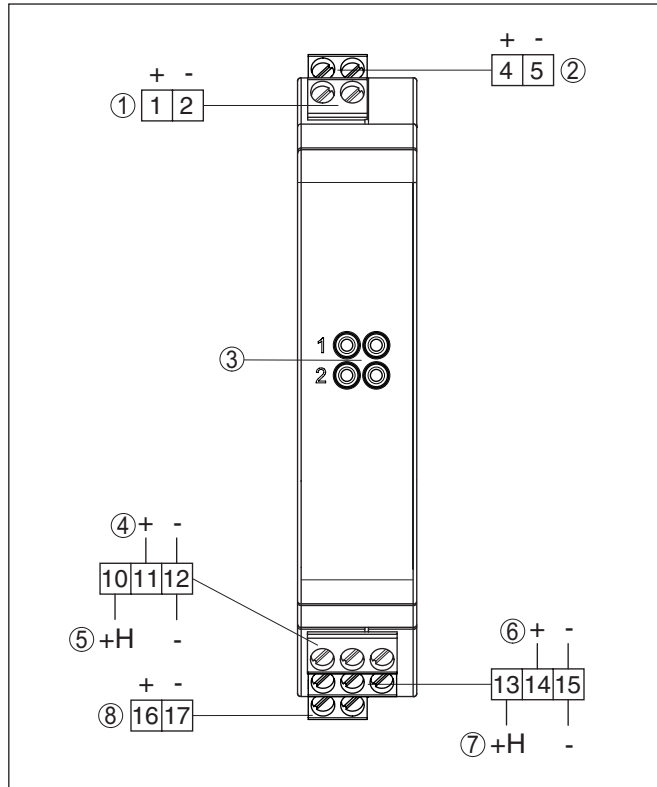
1. Mount the instrument as described in the previous chapter
2. Connect sensor cable 2 to terminal 4/5, and where applicable, connect the screen
3. Connect sensor cable 1 to terminal 1/2, and where applicable, connect the screen
4. Connect power supply (switched off) to terminal 16/17
5. Connect processing circuit 2, e.g. from PLC to terminal 14/15 or 13/15 (with HART resistor), and screen, if necessary
6. Connect processing circuit 1, e.g. from PLC to terminal 11/12 or 10/12 (with HART resistor), and screen, 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 142.

### 5.3 Wiring plan



- 1 Sensor circuit channel 1 (4 ... 20 mA/HART, Ex area)
- 2 Sensor circuit channel 2 (4 ... 20 mA/HART, Ex area)
- 3 HART communication sockets for connection of a HART handheld, e.g. a VEGACONNECT
- 4 Processing circuit channel 1 (4 ... 20 mA/HART, active output)
- 5 Processing circuit channel 1 (4 ... 20 mA/HART, active output with looped HART resistor)
- 6 Processing circuit channel 2 (4 ... 20 mA/HART, active output)
- 7 Processing circuit channel 2 (4 ... 20 mA/HART, active output with looped HART resistor)
- 8 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

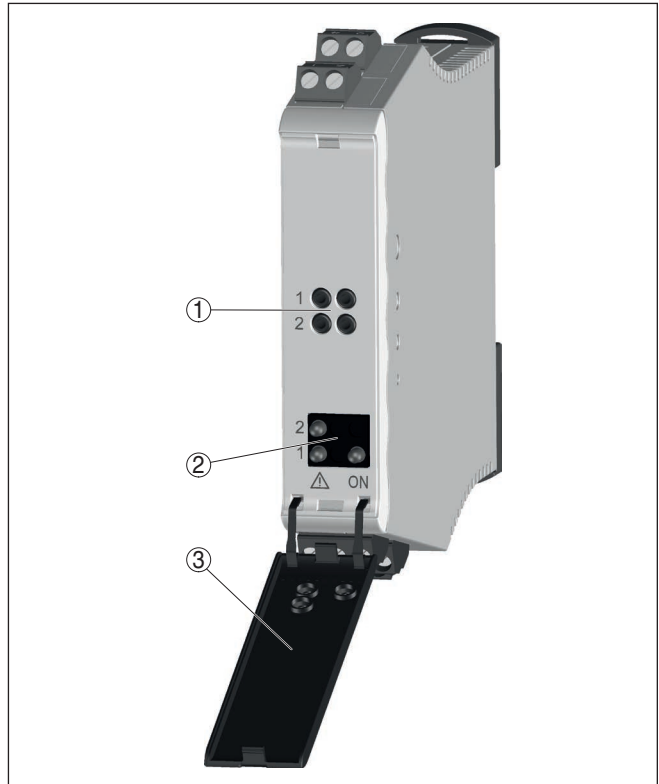


Fig. 2: Display and adjustment elements

- 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 142 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 142 (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 Maintenance and fault rectification

### 7.1 Maintenance

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

### 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.

#### 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 manned 7 days a week round-the-clock. Since we offer this service worldwide, the support is only available in the English language. The service is free, only standard call charges are incurred.

#### Reaction after fault rectification

Depending on the reason for the fault and the measures taken, the steps described in chapter "Set up" may have to be carried out again.

### 7.3 How to proceed if a repair is necessary

You can find an instrument return form as well as detailed information of the procedure in the download area on our homepage: [www.vega.com](http://www.vega.com).

By doing this you help us carry out the repair quickly and without having to call back for needed information.

If a repair is necessary, please 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
- Please contact the agency serving you to get the address for the return shipment. You can find the agency on our home page [www.vega.com](http://www.vega.com).

## 8 Dismount

### 8.1 Dismounting steps

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

### 8.2 Disposal

The instrument consists of materials which can be recycled by specialised recycling companies. We use recyclable materials and have designed the parts to be easily separable.

#### **WEEE directive 2002/96/EG**

This instrument is not subject to the WEEE directive 2002/96/EG and the respective national laws. Pass the instrument directly on to a specialised recycling company and do not use the municipal collecting points. These may be used only for privately used products according to the WEEE directive.

Correct disposal avoids negative effects on humans and the environment and ensures recycling of useful raw materials.

Materials: see chapter "*Technical data*"

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

## 9 Supplement

### 9.1 Technical data

#### 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 <sup>2</sup> (AWG 23) ... 2.5 mm <sup>2</sup> (AWG 12)

#### Voltage supply

Operating voltage	
– Nominal voltage AC	24 ... 230 V (-15 %, +10 %) 50/60 Hz
– Nominal voltage DC	24 ... 65 V DC (-15 %, +10 %)
Max. power consumption	5 W (20 VA)

#### Sensor circuit

Number of sensors	2 x 4 ... 20 mA/HART (5 x HART multidrop per channel)
Input type	Active (sensor power supply by VEGATRENN 142)
Terminal voltage	21 ... 16.5 V with 4 ... 20 mA
Off-load voltage	24 V (+/- 1 V)
Short-circuit current	< 26 mA
Residual ripple	< 50 mV RMS

#### Processing circuit

Quantity	2 x 4 ... 20 mA/HART
Type of output	active
Off-load voltage	< 16.5 V
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	600 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 < 0.2 %  
(+68 ... +140 °F)
- In the range of -20 ... +20 °C < 0.6 %  
(-4 ... +68 °F)

Deviation due to strong, high-frequency electromagnetic fields (EN 61326) < 0.5 %

**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 %

**Electrical protective measures**

Protection rating IP 20

Overvoltage category (IEC 61010-1) II up to 5000 m (16404 ft) above sea level

Protection class II

Degree of soiling 2

**Measures for electrical separation**

Reliable separation according to VDE 0106 part 1 between all circuits

- Reference voltage 253 V AC
- Insulation resistance (voltage supply - output) 5.1 kV DC
- Insulation resistance (input - output) 5.1 kV DC
- Insulation resistance (output channel 1 - output channel 2) 1.4 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 under [www.vega.com](http://www.vega.com), "VEGA Tools" and "Instrument search" as well as in the general download area.

## 9.2 Dimensions

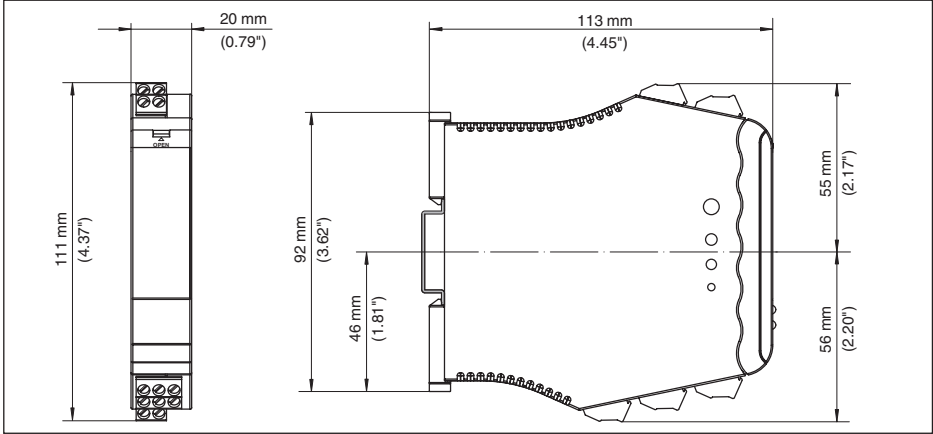


Fig. 3: Dimensions VEGATRENN 142

### 9.3 Industrial property rights

VEGA product lines are global protected by industrial property rights. Further information see [www.vega.com](http://www.vega.com).

VEGA Produktfamilien sind weltweit geschützt durch gewerbliche Schutzrechte.

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进一步信息请参见网站[www.vega.com](http://www.vega.com)。

### 9.4 Trademark

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

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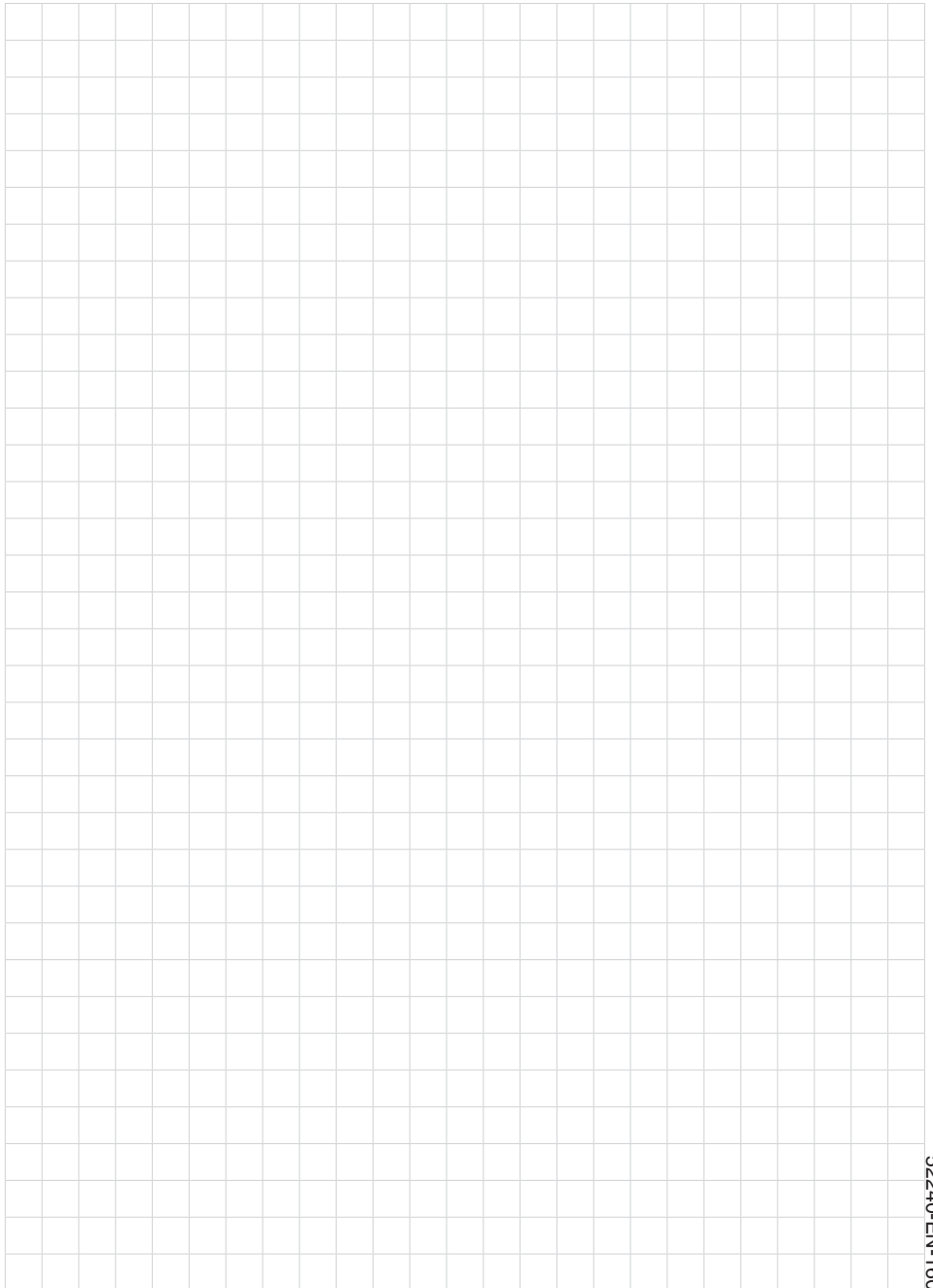
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WEEE directive 15







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# 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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