



# Frequency Transmitter Field Circuit Ex i

Series 9146



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## 1 General Information

### 1.1 Manufacturer

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### 1.2 Information about the Manual

ID-No.:	914660330020
Publication Code:	2017-11-24-HB00-III-en-00
Hardware version:	A
Software version:	01-01

The original manual is the English edition.  
This is legally binding in all legal affairs.

### 1.3 Further Documents

- Cabinet installation guide
- Data sheet 9146
- Operating instructions 9146
- Manual for the pac-Carrier 9195

For documents in additional languages, see [www.r-stahl.com](http://www.r-stahl.com).

### 1.4 Conformity with Standards and Regulations

See certificates and EC Declaration of Conformity: [www.r-stahl.com](http://www.r-stahl.com).  
The device has IECEx approval. See IECEx homepage: <http://iecex.iec.ch/>  
Further national certificates can be downloaded via the following link:  
<https://r-stahl.com/en/global/products/support/downloads/>.

EN 2 Explanation of the Symbols

2.1 Symbols used in this Manual

Symbol	Meaning
	Tips and recommendations on the use of the device
	Danger due to explosive atmosphere




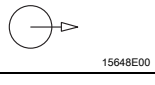

2.2 Warning Notes

Warnings must be observed under all circumstances, in order to minimize the risk due to construction and operation. The warning notes have the following structure:

- Signalling word: DANGER, WARNING, CAUTION, NOTICE
- Type and source of danger/damage
- Consequences of danger
- Taking countermeasures to avoid the danger or damage

	<b>DANGER</b>
	Danger to persons Non-compliance with the instruction results in severe or fatal injuries to persons.
	<b>WARNING</b>
	Danger to persons Non-compliance with the instruction can result in severe or fatal injuries to persons.
	<b>CAUTION</b>
	Danger to persons Non-compliance with the instruction can result in light injuries to persons.
<b>NOTICE</b>	
Avoiding material damage Non-compliance with the instruction can result in material damage to the device and / or its environment.	

## 2.3 Symbols on the Device

Symbol	Meaning
 0158 0594E00	CE marking in accordance with the current applicable directive.
 02198E00	Electrical circuit certified for hazardous areas according to the marking.
 15649E00	Input
 15648E00	Output
 11048E00	Safety instructions that must always be observed: For devices with this symbol, the corresponding data and/or the safety-relevant instructions contained in this manual must be observed!

## 3 Safety Notes

### 3.1 Storage of the Manual

- Read the manual carefully.
- Store the manual at the mounting location of the device.
- Observe applicable documents and operating instructions of the devices to be connected.

### 3.2 Personnel Qualification

Qualified specialist personnel are required to perform the tasks described in this manual. This primarily applies to work in the following areas:

- Project engineering
- Mounting/dismounting the device
- (Electrical) installation
- Commissioning
- Maintenance, repair, cleaning

Specialists who perform these tasks must have a level of knowledge that meets applicable national standards and regulations.

Additional knowledge is required for tasks in hazardous areas! R. STAHL recommends having a level of knowledge equal to that described in the following standards:

- IEC/EN 60079-14 (Electrical installations design, selection and construction)
- IEC/EN 60079-17 (Inspection and maintenance of electrical installations)
- IEC/EN 60079-19 (Equipment repair, overhaul and reclamation)

### 3.3 Safe Use

#### Before assembly

- Read and observe the safety notes in this manual.
- Ensure that the contents of this manual are fully understood by the personnel in charge.
- Use the device in accordance with its intended and approved purpose only.
- Always consult with R. STAHL Schaltgeräte GmbH if using the device under operating conditions not covered by the technical data.
- Make sure that the device is not damaged.
- We are not liable for damage caused by incorrect or unauthorised use of the device or by non-compliance with this manual.



#### For mounting and installation

- Have mounting and installation performed only by qualified and authorised persons (see "Qualification of the personnel" section).
- The device is only to be installed in zones for which it is suited based on its marking.
- During installation and operation, observe the information (characteristic values and rated operating conditions) on the rating, data and information plates located on the device.
- Before installation, make sure that the device is not damaged.
- Install the device in Zone 2 or Zone 22 or outside of hazardous areas.
- For use in Zone 2 or Zone 22, install the device in an enclosure.
- When used in Zones 2, 22, the intrinsically safe devices of Zones 1, 0, 21 and 20 can be connected to the intrinsically safe signal circuits.
- Only connect the device to equipment which does not carry voltages higher than 253 V AC (50 Hz).
- Devices of group M1 can also be connected to the Ex i electrical circuits.
- Electric circuits with the "Ex i" type of protection can no longer be operated as circuits with this protection type after being operated with circuits with other types of protection.


#### Commissioning, maintenance, repair

- Only have commissioning and repairs performed by qualified and authorised persons (see "Personnel qualification" section).
- Before commissioning, make sure that the device is not damaged.
- Only perform maintenance work described in this manual.

### 3.4 Modifications and Alterations

	<b>DANGER</b>
	<p>Explosion hazard due to modifications and alterations to the device! Non-compliance results in severe or fatal injuries.</p> <ul style="list-style-type: none"> <li>• Do not modify or alter the device.</li> </ul>
	No liability or warranty for damage resulting from modifications and alterations.

## 4 Function and Device Design

	<b>DANGER</b>
	<p>Explosion hazard due to improper use! Non-compliance results in severe or fatal injuries.</p> <ul style="list-style-type: none"> <li>• The device may only be used according to the operating conditions described in this manual.</li> <li>• Use the device only for the intended purpose specified in this manual.</li> </ul>

### 4.1 Function

#### Application range

The frequency transmitter is used for monitoring the rpm of rotating machines or system sections in hazardous areas. The connected sensor or contact can be installed in Zones 0, 1 or Div 1, 2.. The device is permitted for use in Zones 2 and 22 as well as outside of hazardous areas.

#### Mode of operation

The frequency transmitter converts intrinsically safe binary input signals into analog signals proportional to the frequency (non-intrinsically safe). Initiators according to IEC/EN 60947-5-6 (NAMUR) or potential-free contacts / optocoupler outputs with suitable resistance wiring can be used as signal transducers. The 9146/10-11-12 variant additionally provides the function of limit value output or pulse forwarding.

## 4.2 Device Design

### Type 9146/10-11-12, 1-channel

	#	Device component	Description	
	1	Black/ green terminals	Connection terminals for the safe area	
	2	"PWR" LED, green	Auxiliary power indication	
	3	"LF1" LED, red	Indication of line fault detection	
	5	DIP switch "LF1"	Activation of line fault detection	
	6	DIP switch "ADJ1"	Manual resetting of the counter function	
	9	Blue terminals	Connection terminals for the hazardous area (intrinsically safe Ex i)	
	10	Parameterization interface	Configuration of the device by means of the "ISpac Wizard" software Type 9199	
	11	"A" / "B" LED, yellow	Indication for limit contacts	

### Type 9146/20-11-11, 2-channel

	#	Device component	Description
	1	Black terminals	Connection terminals for the safe area
	2	"PWR" LED, green	Auxiliary power indication
	3	"LF1" LED, red	Indication of line fault detection for channel 1
	4	"LF2" LED, red	Indication of line fault detection for channel 2
	5	DIP switch "LF1"	Activation of line fault detection for channel 1
	6	DIP switch "ADJ1"	Manual resetting of the counter function for channel 1
	7	DIP switch "LF2"	Activation of line fault detection for channel 2
	8	DIP switch "ADJ2"	Manual resetting of the counter function for channel 2
	9	Blue terminals	Connection terminals for the hazardous area (intrinsically safe Ex i)
	10	Parameterization interface	Configuration of the device by means of the "ISpac Wizard" software Type 9199



## 5 Technical Data

### Marking

Type designation	9146/.0-11-1.
CE marking	CE <sub>0158</sub>

### Explosion Protection

#### Global (IECEX)

Gas, dust and mining	IECEX BVS 13.0095X Ex nA nC [ia Ga] IIC T4 Gc [Ex ia Da] IIIC [Ex ia Ma] I
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#### Europe (ATEX)

Gas, dust and mining	BVS 05 ATEX E 171 X ⊕ II 3 (1) G Ex nA nC [ia Ga] IIC T4 Gc ⊕ II (1) D [Ex ia Da] IIIC ⊕ I (M1) [Ex ia Ma] I
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#### Certifications and certificates

Certificates	IECEX, ATEX, Canada (cFM), Kazakhstan (TR), Russia (TR), USA (FM), Belarus (TR)
Ship approval	DNV GL, CCS, EU RO MR

#### Safety data

Max. voltage $U_o$	10.5 V
Max. current $I_o$	23.4 mA
Max. power $P_o$	61.4 mW
Max. connectable capacitance $C_o$	
IIC	2.41 $\mu$ F
IIB/IIIC	16.8 $\mu$ F
IIA	75 $\mu$ F
I	95 $\mu$ F
Max. connectable inductance $L_o$	
IIC	63 mH
IIB/IIIC	230 mH
IIA	450 mH
I	600 mH
Internal capacitance $C_i$	negligible
Internal inductance $L_i$	negligible
Safety-related maximum voltage	253 V

**Technical Data**

**Electrical data**

Auxiliary power	
Nominal voltage $U_N$	24 V DC
Voltage range	18 to 31.2 V
Residual ripple within voltage range	$\leq 3.6 V_{SS}$
Nominal current at $U_N$	
1 channel	55 mA
2 channels	75 mA
Power consumption at $U_N$	
1 channel	1.32 W
2 channels	1.8 W
Polarity reversal protection	yes
Ex i input	
Input signal	according to IEC/EN 60947-5-6 (NAMUR)
Current for ON / OFF	
ON	2.1 mA
OFF	1.2 mA
Hysteresis	0.2 mA
Open-circuit voltage	8.5 V
Short-circuit current	$\leq 8.5$ mA
Input frequency	0.001 to 20000 Hz
Impulse width / break	25 $\mu$ s
Resolution	$< 0.1$ % of measurement range
Output	
Output signal (configurable)	0/4 to 20 mA
Functional range	0 to 20.5 mA
Connectable load resistance	0 to 600 $\Omega$
Operating mode	counter, frequency by period, gate time

**Technical Data**

<b>Pulse output</b>	
Frequency range	0 to 5 kHz
Dividing ratio Input / Output	1:1 to 1:20000
Switching voltage	≤ ± 30 V
Switching current	≤ 50 mA
Parameterisation	via Software ISpac Wizard Activated impulse output allocates contact "B" (see connection diagram)
Electromagnetic compatibility	Tested in accordance with the following standards and regulations: IEC/EN 61326-1 application in industrial environments; NAMUR NE 21

**Ambient conditions**

<b>Ambient temperature</b>	
Single device	-40 to +70 °C
Group assembly	-40 to +60 °C
	The installation conditions affect the ambient temperature. Observe the "Cabinet installation guide".
Storage temperature	-40 to +80 °C
Relative humidity (no condensation)	≤ 95 %
Use at the height of	< 2000 m

**Mechanical data**

Connection		Screw terminals	Spring clamp terminals
	Single-wire connection		
	- rigid	0.2 to 2.5 mm <sup>2</sup>	0.2 to 2.5 mm <sup>2</sup>
	- flexible	0.2 to 2.5 mm <sup>2</sup>	0.2 to 2.5 mm <sup>2</sup>
	- flexible with core end sleeves (without / with plastic sleeve)	0.25 to 2.5 mm <sup>2</sup>	0.25 to 2.5 mm <sup>2</sup>
	two-wire connection		
	- rigid	0.2 to 1 mm <sup>2</sup>	–
	- flexible	0.2 to 1.5 mm <sup>2</sup>	–
	- flexible with core end sleeves	0.25 to 1 mm <sup>2</sup>	0.5 to 1 mm <sup>2</sup>

For further technical data, see [www.r-stahl.com](http://www.r-stahl.com).

## 6 Engineering

### NOTICE

Failure of the devices installed in the cabinet caused by too high ambient temperature!

Non-compliance can result in material damage.

- Install and adjust the cabinet in such a way that it is always operated within the permissible temperature range.
- Carefully observe the "Cabinet installation guide".





You can find detailed information about project engineering in the "Cabinet installation guide" (download from [www.r-stahl.com](http://www.r-stahl.com), Product documentation, subitem "Engineering").

## 7 Transport and Storage

- Transport and store the device only in the original packaging.
- Store the device in a dry place (no condensation) and vibration-free.
- Do not drop the device.

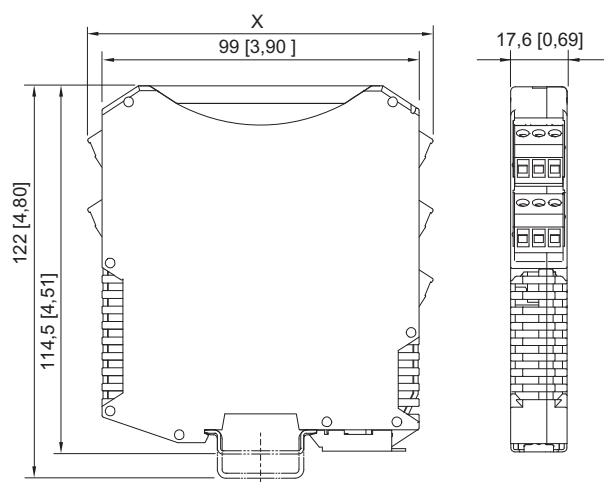
## 8 Mounting and Installation

When installed in a corresponding suitable field enclosure, the device is permitted for use in hazardous areas in Zone 2 and Zone 22 or in safe areas.

	<p style="text-align: center;"><b>DANGER</b></p> <p>Explosion hazard due to installation without field enclosure! Non-compliance results in severe or fatal injuries!</p> <ul style="list-style-type: none"> <li>• When used in Zone 2 or Zone 22, the device is to be installed in a protective enclosure or in a cabinet that offers a suitable degree of protection in accordance with IEC/EN 60079-0.</li> <li>• An enclosure with at least an IP54 protection rating is required for use in Zone 2 and in safe areas.</li> <li>• An enclosure with at least an IP64 protection rating is required for use in Zone 22.</li> </ul>
	<p style="text-align: center;"><b>DANGER</b></p> <p>Explosion hazard due to incorrect installation of the device! Non-compliance results in severe or fatal injuries.</p> <ul style="list-style-type: none"> <li>• Carry out installation strictly according to the instructions and national safety and accident prevention regulations to maintain the explosion protection.</li> <li>• Select and install the electrical device so that explosion protection is not affected due to external influences, i.e. pressure conditions, chemical, mechanical, thermal and electric impact such as vibration, humidity and corrosion (see IEC/EN 60079-14).</li> <li>• The device must only be installed by trained qualified personnel who is familiar with the relevant standards.</li> </ul>

### 8.1 Dimensions / Fastening Dimensions

Dimensional drawings (all dimensions in mm [inches]) – Subject to modifications



	Dimension X
Screw terminals	108 mm [4.25"]
Spring clamp terminals	128 mm [5.08"]

09685E00

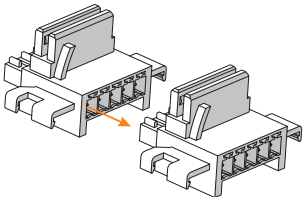
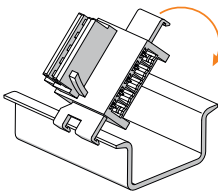
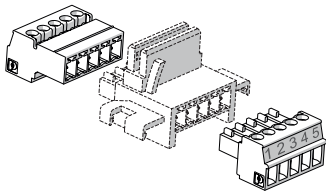
## 8.2 Mounting / Dismounting, Operating Position

### 8.2.1 Mounting / Dismounting pac-Bus

The pac-Bus is an accessory which facilitates wiring of the auxiliary power and reading out of the collective error message.

<b>i</b>	The components for the pac-Bus Type 9194 must be ordered separately.
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#### Mounting

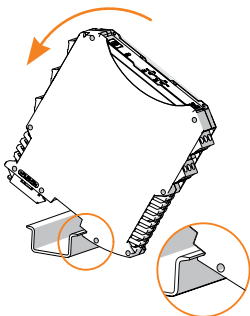
 <p style="text-align: right; font-size: small;">07392E00</p>	<ul style="list-style-type: none"> <li>• Connect the required number of pac-Bus elements.</li> </ul>
 <p style="text-align: right; font-size: small;">07391E00</p>	<ul style="list-style-type: none"> <li>• Engage the pac-Bus elements on the top hat rail.</li> </ul>
 <p style="text-align: right; font-size: small;">15551E00</p>	<ul style="list-style-type: none"> <li>• Connect the terminal set at the beginning and at the end.</li> </ul>

#### Dismounting

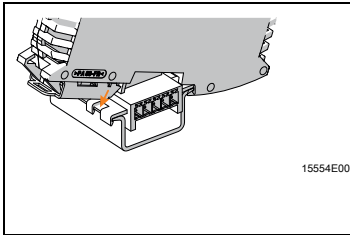
- Proceed in the reverse order to mounting.

### 8.2.2 Mounting / Dismounting of the Device on Top Hat Rail and pac-Bus

#### Mounting on top hat rail

 <p style="text-align: right; font-size: small;">06886E00</p>	<ul style="list-style-type: none"> <li>• Position the device on the top hat rail. Position the cut-out of the enclosure on the outside edge of the top hat rail.</li> <li>• Engage the device on the top hat rail.</li> <li>• When swivelling the device onto the top hat rail, make sure that it is not set at an angle.</li> </ul>
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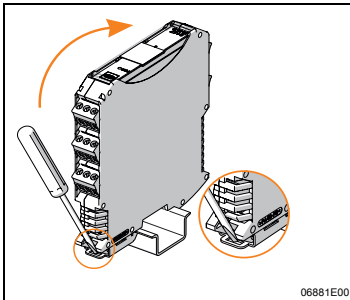
### Mounting on pac-Bus



The pac-Bus is equipped with a polarisation guide and the device with a matching slot.

- Position the device as shown in the illustration. Position the cut-out of the enclosure on the outside edge of the top hat rail.
- Engage the device on the pac-Bus.

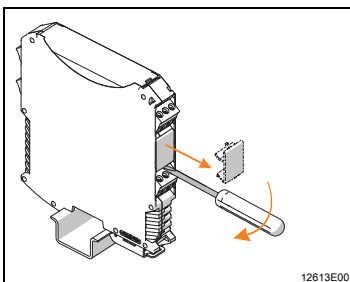
### Dismounting



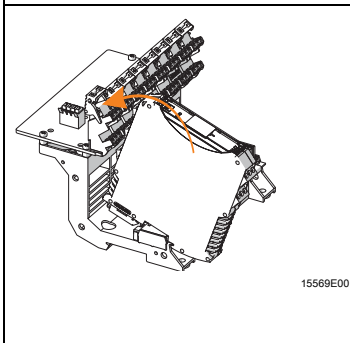
- Pull out the base bolt somewhat using a screwdriver.
- Swivel out the device.

## 8.2.3 Mounting / Dismounting on pac-Carrier

### Mounting

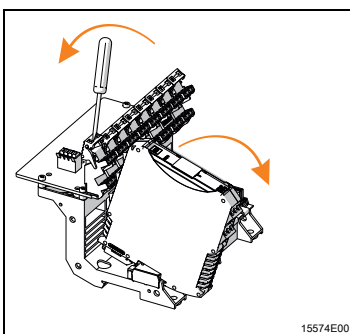


- Remove the black and green terminals.
- For single-channel devices: remove the covering in terminal slot 2 (between the black and the green terminal).



- Position the device on the pac-Carrier. Place the cut-out of the enclosure on the outside edge of the pac-Carrier.
- When pivoting the device onto the pac-Carrier, make sure that it is not set at an angle.
- Swivel in the device up to the red notch lever.
- Close red notch lever by applying diagonal pressure on the lever with the thumb until the lever engages audibly at the device.
- Ensure that the red notch lever is engaged.

### Dismounting



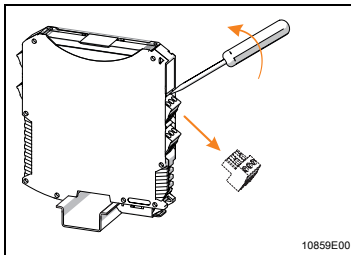
- Swivel out the notch lever using a screwdriver.
- Swivel device out of the slot.

### 8.2.4 Mounting / Dismounting pluggable Terminals

#### Mounting

- Plug the terminal into the device until the terminal engages.

#### Dismounting





- Position the screwdriver behind the terminal.
- Push out the terminal.

### 8.3 Installation

<b>i</b>	<p>Operation under difficult conditions, such as, in particular, on ships, requires additional measures to be taken for correct installation, depending on the place of use. Further information and instructions on this can be obtained from your regional sales contact on request.</p>
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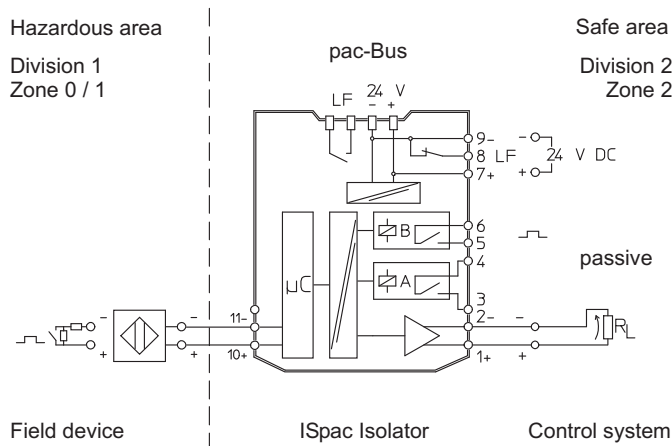
#### 8.3.1 Electrical Connections

	DANGER
	<p>Explosion hazard caused by too high voltage! Non-compliance results in severe or fatal injuries.</p> <ul style="list-style-type: none"> <li>• Connect the device only to equipment with internal voltage <math>U_m</math>: max. 253 V AC / 50 Hz.</li> <li>• Connect the device only to intrinsically safe terminals.</li> </ul>
	DANGER
	<p>Explosion hazard due to incorrect safety characteristic values of the device or connected field devices! Non-compliance results in severe or fatal injuries.</p> <ul style="list-style-type: none"> <li>• Check safety characteristic values of the device and connected field devices according to the national installation guidelines.</li> </ul>



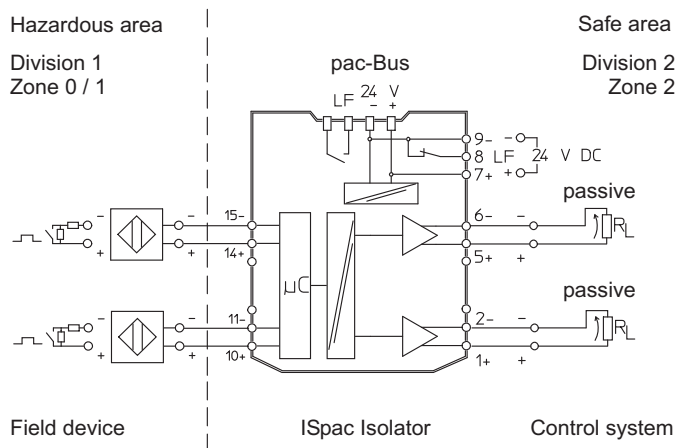
### 8.3.2 Schematic Diagrams

#### Type 9146/10-11-12 1 channel, with limit value contacts



11019E

#### Type 9146/20-11-11 2 channels

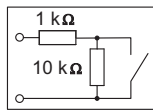


11020E

### 8.3.3 Connection of Contacts

Circuitry for line fault detection if the contacts at the input are de-energized:

Schematic



15529E

Short-circuit detection: 1 k Ω in series

Open-circuit detection: 10 k Ω parallel

	Carry out circuitry for line fault detection in the immediate proximity of the contacts.
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### 8.3.4 Connection of Supply

Type of supply	Connection
Direct supply of the device via 24 V connection	Green terminals "7+" and "9-"
Supply via pac-Bus	pac-Bus terminals "1+" and "2-"

## 9 Parameterization and Commissioning

	<b>DANGER</b>
	<p>Explosion hazard due to incorrect installation! Non-compliance results in severe or fatal injuries.</p> <ul style="list-style-type: none"> <li>• Check the device for proper installation before commissioning.</li> <li>• Comply with national regulations.</li> </ul>

Before commissioning, ensure the following:

- Installation of the device according to regulations.
- Correct connection of the cables.
- No damage at the device and connection cables.
- Tight seat of the screws at the terminals.  
Correct tightening torque: 0.5 to 0.6 Nm.

### 9.1 Replacement of the Device

- If replacing by a device with identical design, readjust the DIP switch, if necessary.

## 9.2 Parameterizations

### 9.2.1 DIP Switches "LF" and "ADJ"

The front panel of the frequency transmitter contains a 4-pole DIP switch.

	Line fault detection DIP switch "LF"		Resetting the counter function of DIP switch "ADJ" **)
	Deactivated *)	Activated	OFF-ON-OFF or ON-OFF-ON
Channel 1	OFF ON 1 <input checked="" type="checkbox"/> LF1 <input type="checkbox"/> ADJ1	OFF ON 1 <input checked="" type="checkbox"/> LF1 <input type="checkbox"/> ADJ1	OFF ON 1 <input type="checkbox"/> LF1 <input checked="" type="checkbox"/> ADJ1
Channel 2	2 <input checked="" type="checkbox"/> LF2 <input type="checkbox"/> ADJ2	2 <input checked="" type="checkbox"/> LF2 <input type="checkbox"/> ADJ2	2 <input type="checkbox"/> LF2 <input checked="" type="checkbox"/> ADJ2

\*) Default setting upon delivery, \*\*) see following chapter "Input"

The DIP switches "LF1" and "LF2" are used for activating the line fault detection (see above table) and for resetting the anti-pumping device (see chapter "Anti-pumping device"), respectively.

The DIP switches "ADJ1" and "ADJ2" allow the minimum and maximum counts of the pulse counter for channel 1 and channel 2, respectively, to be reset.

Line faults and auxiliary power failure are signalled via LED, error message contact at the module and collective error message via pac-Bus (see chapter "Schematic circuit diagrams of up to 2-channel designs").



Changing the DIP switch settings is also permitted during operation in Zone 2 and with connected intrinsically safe input signals.



The characteristics of the output signal are set by means of the "ISpac Wizard" software. It also allows the line fault detection to be completely deactivated. This setting determines the characteristics of the device, while the DIP switch is completely ineffective in this case.

### 9.2.2 Input (via "ISpac Wizard" Software)

The frequency transmitter offers different operating modes, which can be set depending on the application. The default setting is the operating mode "Frequency via period measurement".

Selection	Description
Counter (0 to 65535)	Incoming pulses are counted. The analog output signal (0/4 to 20 mA) is increased linearly until reaching the counter value. The maximum counter value can be set.
Counter overflow	If the overflow is activated, the counter will start counting again when the maximum counter value is exceeded, and the output signal (sawtooth) will follow. When the overflow is off, the counter and the analog signal will stop upon reaching the maximum value. They can be reset via the front-panel DIP switches "ADJ1 " and "ADJ2 "(OFF-ON-OFF and ON-OFF-ON, respectively)
Frequency via period measurement	For measurements in the range from 1 mHz to 1 kHz.
Frequency via events (50, 200 or 1000 ms)	For measurements in the range from 1 to 20 kHz.

### 9.2.3 Signal Processing (via "ISpac Wizard" Software)

The selection allows the frequency range to be restricted for further processing inside the module. The minimum value of the analog output corresponds to the set minimum frequency and the same is true of the maximum values.

This allows the user to define the frequency range relevant for him and set it in relation to the range of the output signal (0 to 20 mA or 4 to 20 mA).

### 9.2.4 Output (via "ISpac Wizard" Software)

Here the characteristics of the analog and pulse outputs can be configured.

#### Analog output:

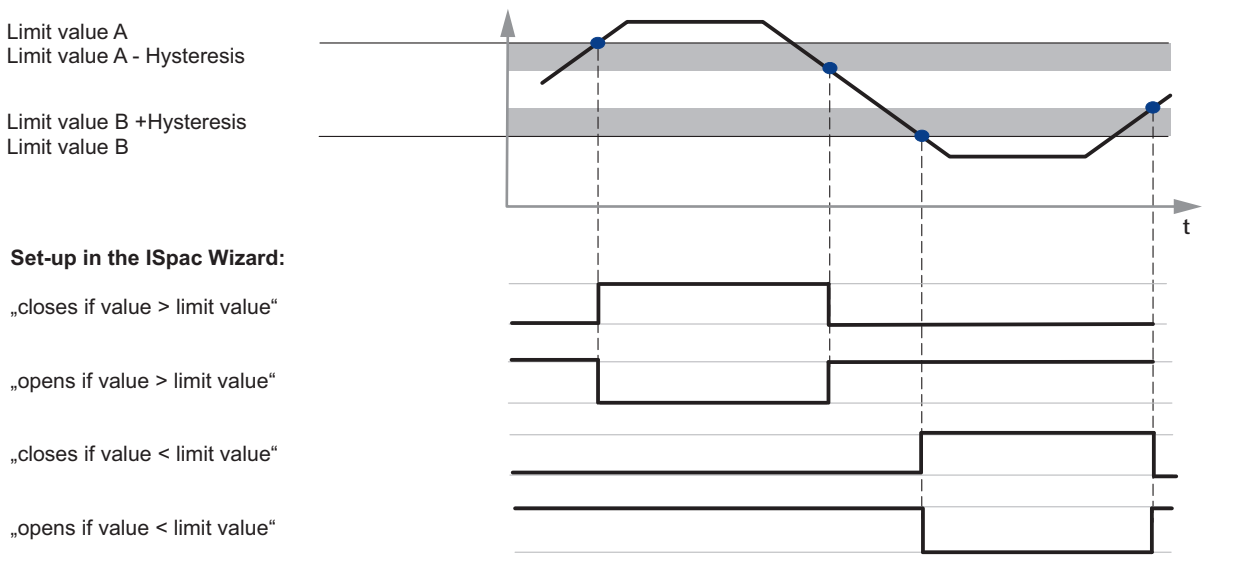
Apart from the selection whether the analog signal should adopt values between 0 to 20 mA or 4 to 20 mA, the characteristics of the output in case of error can be defined. The selections include "Output error value" (freely selectable), "Keep last value" or "Fault detection off".

#### Pulse output:

The pulse output can be activated and deactivated. In addition, a splitter ratio of between 1 and 20,000 can be entered.

### 9.2.5 Limit Value Setting (via "ISpac Wizard" Software)

The limit value function is configured by means of the "ISpac Wizard" software. The following representation shows possible adjustments of the limit value contacts for relays A and B. This is an example, other assignments also being possible.



In case of a detected line fault, the limit value relays adopt the set operating direction, for example, in case of "Off above limit value", the relays drop out. This is the recommended setting for safety-related circuits.

### 9.2.6 Anti-Pumping Device (via "ISpac Wizard" Software)

The anti-pumping device is configured using the "ISpac Wizard" software. If a limit value is reached, the anti-pumping device ensures that the limit value contact remains in working position even if the process variable that caused the response is no longer effective. This function is used to ensure that the personnel does not overlook when the value has exceeded or fallen below the limit values.

Selection	Description
"Deactivated"	Default adjustment - function is off
"Activated"	Function as described above. When the event occurs, the set operating mode ("ON" or "OFF") does not change. The anti-pumping device remains active even after power supply interruption. The anti-pumping device is only reset if the DIP switch "LF1" or "LF2" (OFF-ON-OFF or ON-OFF-ON) at the front panel is actuated. If, at the same time, an error occurs, the limit value relays switch to the ON position (example: "On above limit value" -> in case of error: ON).

### 9.2.7 Start Override

The start override ensures that the limit value settings "On below limit value" or "Off below limit value" do not activate the limit value contact even if the value has fallen below the limit value. This function allows a machine or system start without an alarm message being output.

When the anti-pumping device is active, the first edge at input ensures the start of the function. A reactivation is made possible by briefly interrupting the power supply.

## 10 Operation

### 10.1 Operation

#### Possible adjustments during operation

<b>i</b>	Changing the adjustments for the different operating modes or the line fault detection via the "ISpac Wizard" software or the DIP switches is also permitted during operation in Zone 2 and with connected intrinsically safe input signals.
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For a detailed description of the function of the DIP switches and the possible adjustments using the "ISpac Wizard" software, refer to chapter "Parameterization and commissioning".

### 10.2 Indications

The corresponding LEDs on the device indicate the operating state of the device (see also the "Function and device design" section).

LED	Colour	LED "ON"	LED "OFF"
"PWR" LED	green	Device is supplied with auxiliary power	Device is not in operation, power supply not available
"LF1" LED	red	Line fault in signal of channel 1	No line fault in signal of channel 1
"LF2" LED	red	Line fault in signal of channel 2	No line fault in signal of channel 2
"A" LED	yellow	Limiting value A exceeded or undershot. Limit contact has switched.	Limiting value A not exceeded or undershot. Limit contact is in the rest position.
"B" LED	yellow	Limiting value B exceeded or undershot. Limit contact has switched.	Limiting value B not exceeded or undershot. Limit contact is in the rest position.

## 10.3 Troubleshooting

Observe the following troubleshooting plan for troubleshooting:

Error	Cause of error	Troubleshooting
"PWR" LED is off	<ul style="list-style-type: none"> <li>Auxiliary power failure</li> <li>Defective device fuse</li> <li>Polarity reversal of the auxiliary power source</li> </ul>	<ul style="list-style-type: none"> <li>Check the polarity of the auxiliary power source.</li> <li>Check the wiring of the auxiliary power source.</li> <li>If the fuse is defective, have the device repaired.</li> </ul>
"PWR" LED flashes permanently	Defective device	Send the device for repair
Faulty output signals	<ul style="list-style-type: none"> <li>Incorrect connection of the sensor</li> <li>Incorrect setting of the DIP switch</li> <li>The device has been programmed via PC, but the DIP switches are not in the "OFF" position</li> </ul>	<ul style="list-style-type: none"> <li>Check the connections</li> <li>Adjust the DIP switch correctly</li> </ul>
LED "LF1"/"LF2" lit	<ul style="list-style-type: none"> <li>Incorrect connection of the switching element</li> <li>Switching element does not function according to NAMUR.</li> </ul>	<ul style="list-style-type: none"> <li>Ensure correct wiring of the switching element.</li> <li>Connect the de-energized contacts to additional resistors accordingly.</li> </ul>
LED "LF1"/"LF2" flashing	Outside of measuring range	Configure the measuring range accordingly

If the error cannot be eliminated using the mentioned procedures:

- Contact R. STAHL Schaltgeräte GmbH.

For fast processing, have the following information ready:

- Type and serial number of the device
- Purchase information
- Error description
- Intended use (in particular input / output wiring)

## 11 Maintenance, Overhaul, Repair

### 11.1 Maintenance


- Consult the relevant national regulations to determine the type and extent of inspections.
- Adapt inspection intervals to the operating conditions.

During maintenance of the device, check at least:


- whether the clamping screws holding the electric lines are securely seated,
- whether the device enclosure and / or protective enclosure have cracks or other visible signs of damage,
- whether the permissible ambient temperatures are observed,
- whether the device is used according to its designated use.

## 11.2 Overhaul

The device does not require regular maintenance.

	Observe the relevant national regulations in the country of use.
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## 11.3 Repair

	<b>DANGER</b>
	Explosion hazard due to improper repair! Non-compliance results in severe or fatal injuries. <ul style="list-style-type: none"><li>• Repair work on the devices must be performed only by R. STAHL Schaltgeräte GmbH.</li></ul>

## 11.4 Returning the Device

- Only return or package the devices after consulting R. STAHL! Contact the responsible representative from R. STAHL.

R. STAHL's customer service is available to handle returns if repair or service is required.

- Contact customer service personally.

or

- Go to the [www.r-stahl.com](http://www.r-stahl.com) website.
- Under "Support" > "RMA form", select "Request RMA slip".
- Fill out the form and send it.  
Confirmation will be sent. R. STAHL's customer service will contact you.  
You will receive an RMA slip after speaking with customer service.
- Send the device along with the RMA slip in the packaging to R. STAHL Schaltgeräte GmbH (refer to Section 1.1 for the address).



## 12 Cleaning

- To avoid electrostatic charging, the devices located in potentially explosive areas may only be cleaned using a damp cloth.
- When cleaning with a damp cloth, use water or mild, non-abrasive, non-scratching cleaning agents.
- Do not use aggressive detergents or solvents.

## 13 Disposal

- Observe national and local regulations and statutory regulation regarding disposal.
- Separate materials when sending it for recycling.
- Ensure environmentally friendly disposal of all components according to the statutory regulations.

## 14 Accessories and Spare Parts

### *NOTICE*

Malfunction or damage to the device due to the use of non-original components.

Non-compliance can result in material damage.

- Use only original accessories and spare parts from R. STAHL Schaltgeräte GmbH.



For accessories and spare parts, see data sheet on our homepage [www.r-stahl.com](http://www.r-stahl.com).