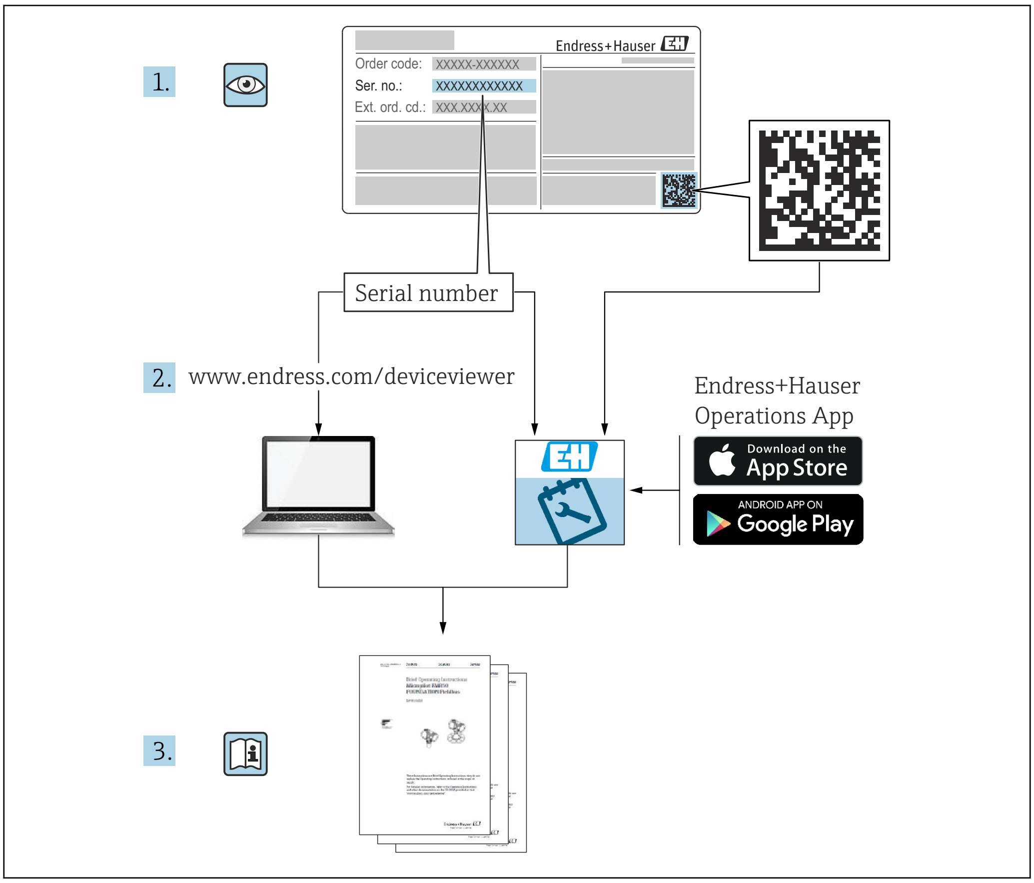
FY01034K/09/EN/02.21
71546315
2021-10-29

Functional Safety Manual
RN22, RN42

Active barrier for isolating 4 to 20 mA standard signal circuits, HART-transparent

Endress+Hauser
People for Process Automation


1.
Endress+Hauser
Order code: XXXXX-XXXXXX
Ser. no.: XXXXXXXXXXXX
Ext. ord. cd.: XXX.XXXX.XX
Serial number
2. www.endress.com/deviceviewer
Endress+Hauser
Operations App
Download on the
App Store
ANDROID APP ON
Google Play
3.

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1 Manufacturer declaration

SIL_00442_01.21

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Manufacturer Declaration

Functional Safety according to IEC 61508:2010
Supplement 1 / NE130 Form B.1

Endress+Hauser Wetzer GmbH+Co. KG Obere Wank 1, 87484 Nesselwang

declares as a manufacturer, that the following active barriers

RN22-SIL and RN42-SIL

are suitable for use in safety relevant applications up to SIL2 (HFT=0) rep. SIL3 (HFT=1) according to IEC 61508:2010.

In safety relevant applications according to IEC 61508, the instructions of the Safety Manual have to be followed.

Nesselwang, 18.11.2021
Endress+Hauser Wetzer GmbH+Co. KG

ppa.

ppa. Harald Müller
Director Technology

i.V. Robert Zeller
Head of Department R&D-Components

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1.1 Safety-related characteristic values

SIL_00442_01.21

Endress+Hauser
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General			
Device designation and permissible types	RN22-SIL	(Order code for "Additional approval": Option LA "SIL")	
Safety-related output signal	4…20mA		
Fault current	≤ 3,6 mA or ≥ 21,0 mA		
Process variable/function	Current transfer		
Safety function(s)	Range 4…20 mA		
Device type acc. to IEC 61508-2	☑ Type A	☐ Type B	
Operating mode	☑ Low Demand Mode	☑ High Demand	☐ Continuous Mode
Valid Hardware-Version	01.00 or higher		
Valid Software-Version	n/a		
Safety manual	FY01034K/09		
Type of evaluation (check only one box)	☑	Complete HW/SW evaluation parallel to development incl. FMEDA and change request acc. to IEC 61508-2, 3	
	☐	Evaluation of "Proven-in-use" performance for HW/SW incl. FMEDA and change request acc. to IEC 61508-2, 3	
	☐	Evaluation of HW/SW field data to verify „prior use" acc. to IEC 61511	
	☐	Evaluation by FMEDA acc. to IEC61508-2 for devices w/o software	
Evaluation through / certificate no.	TÜV SÜD Rail GmbH, Germany / Certificat no. Z10 012833 0006		
Test documents	development documents, test reports, data sheets		

SIL - Integrity			
Systematic safety integrity		☐ SIL 2 capable	☑ SIL 3 capable
Hardware safety integrity	Single channel use (HFT = 0)	☑ SIL 2 capable	☐ SIL 3 capable
	Multi-channel use (HFT ≥ 1)	☐ SIL 2 capable	☑ SIL 3 capable

FMEDA	RN22 (1oo1, HFT=0)	RN22 (1oo2, HFT=1)
Safety function	range	range
λ_{DU} 1) 2)	45 FIT	
λ_{DD} 1) 2)	0 FIT	
λ_{S} 1) 2)	359 FIT	
SFF - Safe Failure Fraction	89%	
β, β_D 3)		10%, 10%
PFD_{avg} T1 = 1 year 2) (single channel architecture)	$2.0 \cdot 10^{-4}$	$1.98 \cdot 10^{-5}$
PFD_{avg} T1 = 5 years 2) (single channel architecture)	$1.0 \cdot 10^{-3}$	$9.9 \cdot 10^{-5}$
PFH	$4.5 \cdot 10^{-8} \cdot$ 1/h	$4.5 \cdot 10^{-9} \cdot$ 1/h
PTC 4)	98 %	
MTBF 5)	216 years	
Diagnostic test interval	n/a	
Fault reaction time 6)	< 50 ms	
Process safety time	n/a	

Declaration	
☑	Our internal company quality management system ensures information on safety-related systematic faults which become evident in the future

1) FIT = Failure In Time, Number of failures per 10^9 h
2) Valid for average ambient temperature up to +40 °C (+104 °F)
For continuous operation at ambient temperature close to +60 °C (+140 °F), a factor of 2 should be applied
3) Common Cause factor β and β_D of the system, tables in Annex D of IEC 61508-6: 2010
4) PTC = Proof Test Coverage
5) MTBF = Mean time between failures, this value takes into account all failure types of the electronic components according to Siemens SN2950
6) Maximum time between error recognition and error response

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SIL_00442_01.21

Endress+Hauser
People for Process Automation

General

Device designation and permissible types	RN42-SIL (Order code for "Additional approval": Option LA "SIL")		
Safety-related output signal	4…20mA		
Fault current	≤ 3,6 mA or ≥ 21,0 mA		
Process variable/function	Current transfer		
Safety function(s)	Range 4…20 mA		
Device type acc. to IEC 61508-2	☑ Type A	☐ Type B	
Operating mode	☑ Low Demand Mode	☑ High Demand	☐ Continuous Mode
Valid Hardware-Version	01.00 or higher		
Valid Software-Version	n/a		
Safety manual	FY01034K/09		
Type of evaluation (check only one box)	☑	Complete HW/SW evaluation parallel to development incl. FMEDA and change request acc. to IEC 61508-2, 3	
	☐	Evaluation of "Proven-in-use" performance for HW/SW incl. FMEDA and change request acc. to IEC 61508-2, 3	
	☐	Evaluation of HW/SW field data to verify „prior use" acc. to IEC 61511	
	☐	Evaluation by FMEDA acc. to IEC61508-2 for devices w/o software	
Evaluation through / certificate no.	TÜV SÜD Rail GmbH, Germany / Certificat no. Z10 012833 0006		
Test documents	development documents, test reports, data sheets		

SIL - Integrity

Systematic safety integrity		☐ SIL 2 capable	☑ SIL 3 capable
Hardware safety integrity	Single channel use (HFT = 0)	☑ SIL 2 capable	☐ SIL 3 capable
	Multi-channel use (HFT ≥ 1)	☐ SIL 2 capable	☑ SIL 3 capable

FMEDA

FMEDA	RN42 (1oo1, HFT=0)	RN42 (1oo2, HFT=1)
Safety function	range	range
λ_{DU} 1) 2)	46 FIT	
λ_{DD} 1) 2)	0 FIT	
λ_{S} 1) 2)	506 FIT	
SFF - Safe Failure Fraction	92%	
β, β_D 3)		10%, 10%
PFD_{avg} T1 = 1 year 2) (single channel architecture)	$2.0 \cdot 10^{-4}$	$2.0 \cdot 10^{-5}$
PFD_{avg} T1 = 5 years 2) (single channel architecture)	$1.0 \cdot 10^{-3}$	$1.0 \cdot 10^{-4}$
PFH	$4.6 \cdot 10^{-8} \cdot$ 1/h	$4.6 \cdot 10^{-9} \cdot$ 1/h
PTC 4)	97 %	
MTBF 5)	162 years	
Diagnostic test interval	n/a	
Fault reaction time 6)	< 50 ms	
Process safety time	n/a	

Declaration

☑	Our internal company quality management system ensures information on safety-related systematic faults which become evident in the future

1) FIT = Failure In Time, Number of failures per 10^9 h
2) Valid for average ambient temperature up to +40 °C (+104 °F)
For continuous operation at ambient temperature close to +60 °C (+140 °F), a factor of 2 should be applied
3) Common Cause factor β and β_D of the system, tables in Annex D of IEC 61508-6: 2010
4) PTC = Proof Test Coverage
5) MTBF = Mean time between failures, this value takes into account all failure types of the electronic components according to Siemens SN2950
6) Maximum time between error recognition and error response

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2 About this document

2.1 Document function

This supplementary Safety Manual applies in addition to the Operating Instructions, Technical Information and ATEX Safety Instructions. The supplementary device documentation must be observed during installation, commissioning and operation. The requirements specific to the protection function are described in this safety manual.

General information on functional safety (SIL) is available at:
www.endress.com/SIL

2.2 Symbols used

2.2.1 Safety symbols

DANGER
This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.

WARNING
This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.

CAUTION
This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.

NOTICE
This symbol contains information on procedures and other facts which do not result in personal injury.

2.2.2 Symbols for certain types of information and graphics

Tip
Indicates additional information

Reference to documentation

Reference to graphic

▶
Notice or individual step to be observed

1., 2., 3.
Series of steps

↳
Result of a step

1, 2, 3, ...
Item numbers

A, B, C, ...
Views

2.3 Supplementary device documentation

For an overview of the scope of the associated Technical Documentation, refer to the following:
- *W@M Device Viewer* (www.endress.com/deviceviewer): Enter the serial number from the nameplate
- *Endress+Hauser Operations App*: Enter the serial number from the nameplate or scan the matrix code on the nameplate

The following document types are available in the Downloads section of the Endress+Hauser website (www.endress.com/downloads):

2.3.1 Further applicable documents

TI

- RN22: TI01515K
- RN42: TI01584K

BA

- RN22: BA02004K
- ORN22: BA02030O
- RN42: BA02090K
- ORN42: BA02091O

KA

- RN22: KA01449K
- ORN22: KA01459O
- RN42: KA01509K
- ORN42: KA01515O

XA

- RN22: XA02086K
- RN42: XA02442K

2.3.2 Technical Information (TI)

Planning aid
The document contains all the technical data on the device and provides an overview of the accessories and other products that can be ordered for the device.

2.3.3 Brief Operating Instructions (KA)

Guide that takes you quickly to the 1st measured value
The Brief Operating Instructions contain all the essential information from incoming acceptance to initial commissioning.

2.3.4 Operating Instructions (BA)

Your reference guide
These Operating Instructions contain all the information that is required in various phases of the life cycle of the device: from product identification, incoming acceptance and storage, to mounting, connection, operation and commissioning through to troubleshooting, maintenance and disposal.

2.3.5 Safety Instructions (XA)

Safety Instructions (XA) are supplied with the device, depending on the approval. They are an integral part of the Operating Instructions.

The nameplate indicates which Safety Instructions (XA) apply to the device.

3 Design

3.1 Permitted device types

The details pertaining to functional safety in this manual relate to the device versions listed below and are valid as of the specified firmware and hardware versions.

Unless otherwise specified, all subsequent versions can also be used for safety functions.

A modification process according to IEC 61508 is applied for any device modifications.

Any exemptions from possible combinations of features are saved in the Endress +Hauser ordering system.

Valid device versions for safety-related use:

3.1.1 Order codes

RN22 and RN42

Feature: 010 "Approval"
Version: all

Feature: 020 "Channel"
Version: all

Feature: 030 "Electrical connection"
Version: all

Feature: 590 "Additional approval"
Version: LA
The **"LA"** version must be selected for use as a safety function as per IEC 61508.

Feature: 620 "Accessory enclosed"
Version: all

Feature: 895 "Marking"
Version: all

3.2 Identification marking

SIL-certified devices are marked with the SIL logo (SIL) on the nameplate.

3.3 Safety function

The device's safety function is:
Transmission of measured values

3.3.1 Safety-related output signal

The safety-related output signal is the 4 to 20 mA signal (NE43). This must be available for all possible active and passive combinations.

The device is transparent for HART® communication in both directions and forwards the information.

HART® communication is **not** part of the safety function.

NOTICE

In an alarm condition

- ▶ Ensure that the equipment under control achieves or maintains a safe state.

3.3.2 Transmission of measured values

- A 4 to 20 mA measured value present at the input (incl. NE43 measuring information 3.8 to 20.5 mA) is reproduced at the output within the accuracy defined for the SIL mode.
- An error current present at the input (NE43 - < 3.5 mA or > 21 mA) is reproduced at the output within the accuracy defined for the SIL mode.

3.3.3 Redundant configuration of multiple sensors

This section provides additional information regarding the use of the device in applications with homogeneously redundant configurations, such as 1oo2 or 2oo3 architectures.

The device meets the systematic requirements for SIL 3 in homogeneously redundant applications.

The tables in Annex D of IEC 61508-6: 2010 "A methodology for quantifying the effect of hardware-related common cause failures in E/E/PE systems" must be used to determine the system's common cause factors β and β_D. The following value can be used without further assessment:

β and β_D for homogeneously redundant use: 10%

The system-specific analysis can produce other values, depending on the particular installation and the use of components, and must be assessed by the operator. The measures specified in tables D1-4 that are required for implementation must be applied.

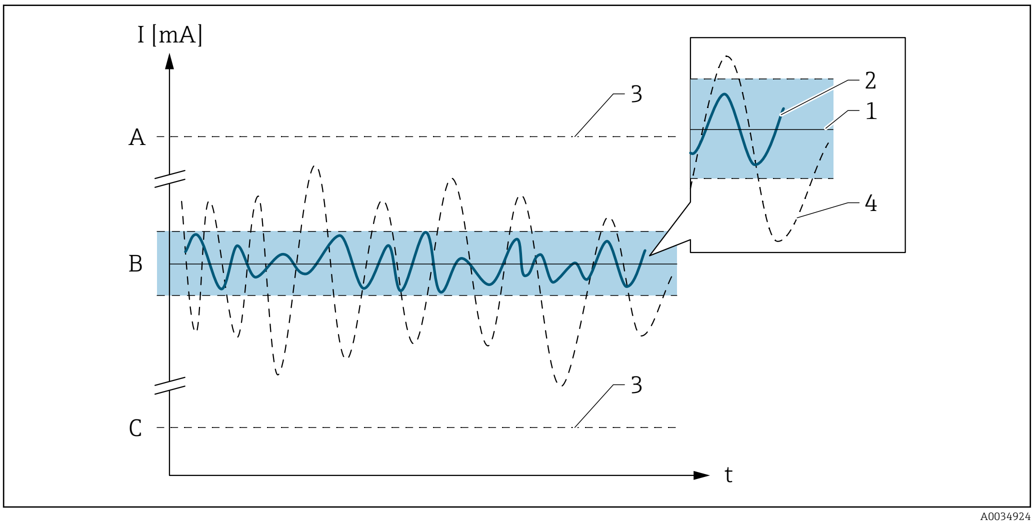
The following measures must be implemented for operation in systems with homogeneously redundant configurations with a HFT ≥ 1:

- 2-channel operation is only possible if both channels are used redundantly for a safety application. → 12
- To process and assess both channels of the safety function, the processing and evaluation units that are suitable and required for this purpose must be used.

3.4 Basic conditions for use in safety-related applications

The measuring system must be used correctly for the specific application, taking into account the installation and ambient conditions. Carefully follow instructions pertaining to critical process situations and installation conditions from the Operating Instructions. The application-specific limits must be observed. The specifications in the Operating Instructions and the Technical Information must not be exceeded.

3.4.1 Safety-related failures according to IEC / EN 61508



A HI alarm ≥ 21 mA
B SIL error range ±2%
C LO alarm ≤ 3.6 mA

No device error
- No errors present
- Implications for the safety-related output signal: none
- Impact on the measuring uncertainty:
  1 – Wtihin the specification, For detailed information, see TI/BA

λS (safe)
- Safe failure
- No impact on the safety-related output signal:
  2 – Moves within the specified SIL error range
- Output signal enters the safe state
- Impact on the measuring uncertainty:
  2 – Moves within the specified SIL error range
  3 – Has no effect

λ_{DD} (Dangerous detected)
- Dangerous failure which can be detected
- Implications for the safety-related output signal: results in a failure mode at the output signal
- Impact on the measuring uncertainty:
  3 – Has no effect

λ_{DU} (Dangerous undetected)
- Dangerous failure which cannot be detected
- Implications for the safety-related output signal: can be outside the defined error range
- Impact on the measuring uncertainty:
  4 – May be outside the specified error range

3.4.2 Restrictions for safety-related use

- The tolerance range (→ 12) is device-specific and is defined according to FMEDA (Failure Modes, Effects and Diagnostic Analysis) on delivery. The influencing factors described in the Technical Information (TI) are already included: Measuring uncertainty under reference conditions and temperature drift. The safety-related failures are classified into different categories according to IEC / EN 61508. The section describes the impact on the safety-related output signal and the measuring uncertainty.
- System response time, For detailed information, see TI/BA/KA.
- The 0 to 20 mA transmission range must not be used in safety-related applications.

- When used as a signal doubler, only one of the two channels may be used for the safety-related application. There are no restrictions regarding which channel is selected. The difference between the two channels is the HART® transmission, which is filtered in one channel, and the reaction time of the current transmission. For detailed informationen, see TI/BA/KA.
- Power supply with current/power limit, For detailed information, see TI/BA/KA.
- The fault response time must meet the safety requirements.
- When installed, external temperature monitoring must be present.
- There is no voltage monitoring at the input of the device. In the two-wire mode, undervoltage monitoring must be performed by the connected device.

3.5 Dangerous undetected failures in this scenario

An incorrect output signal that deviates from the value specified in this manual but is still in the range of 4 to 20 mA, is considered a "dangerous, undetected failure".

3.6 Safety measured error

The accuracy specified for SIL is <= ± 2 % of the full scale value.

The total deviations with regard to the safety-related current output are composed of:
- A) Measured errors under reference operating conditions: according to TI
- B) Measured errors due to installation/ambient conditions: according to TI
- C) Measured errors [1] due to ambient conditions (EMC)
- D) Measured errors [2] due to random component failures

Strong, pulse-like EMC interference can result in transient (< 1 s) deviations in the output signal (≥ ±1%). For this reason, filtering with a time constant ≥ 1 s should be performed in the downstream logic unit.

3.7 Useful lifetime of electric components

The established failure rates of electrical components apply within the useful lifetime as per IEC 61508-2:2010 section 7.4.9.5 note 3.

According to DIN EN 61508-2:2011 section 7.4.9.5 (national footnote N3) appropriate measures taken by the operator can extend the useful lifetime.

4 Commissioning (installation and configuration)

4.1 Requirements for personnel

The personnel for installation, commissioning, diagnostics and maintenance must fulfill the following requirements:
- ▶ Trained, qualified specialists must have a relevant qualification for this specific function and task.
- ▶ Personnel must be authorized by the plant owner/operator.
- ▶ Be familiar with federal/national regulations.

1) ±1 % in relation to the full scale value of the safety-related current output
2) ±2.0% in relation to the span of the safety-related current output

- ▶ Before starting work: personnel must read and understand the instructions in the manual and supplementary documentation as well as the certificates (depending on the application).
- ▶ Personnel must follow instructions and comply with general policies.

The operating personnel must fulfill the following requirements:

- ▶ Personnel are instructed and authorized according to the requirements of the task by the facility's owner-operator.
- ▶ Personnel follow the instructions in this manual.

4.2 Installation

The mounting and wiring of the device and the permitted orientations are described in the Operating Instructions pertaining to the device.

Correct installation is a prerequisite for safe operation of the device.

4.3 Commissioning

The commissioning of the device is described in the Operating Instructions pertaining to the device.

Before operating the device in a safety instrumented system, perform a verification using a test sequence → 14.

4.4 Operation

The operation of the device is described in the Operating Instructions pertaining to the device.

4.5 Device configuration for safety-related applications

4.5.1 Calibrating the measuring point

The device itself cannot be calibrated. The transmission error can be adjusted when the entire measuring chain is being calibrated.

4.5.2 Device protection

Device protection is not required.

5 Operation

5.1 Device behavior during power-up

When a supply voltage is applied, a green LED indicates that the device is ready for operation.

5.2 Device behavior in safety function demand mode

The device outputs a current value to be transmitted at the output, which must be monitored and processed further in a connected logic unit.

5.3 Safe states

Safe state / output current:

- Measured value is within the SIL error range
- I ≤ 3.6 mA (low alarm)
- I ≥ 21 mA (high alarm)

6 Proof test

NOTICE

▶ The functional integrity of the device must be verified during commissioning, in the event of changes and at appropriate intervals. The time intervals must be specified by the operator.

⚠ CAUTION

The safety function is not guaranteed during a proof test

Suitable measures must be taken to guarantee process safety during the test.

▶ The safety-related output signal 4 to 20 mA must not be used for the protective system during the test.

▶ The operator specifies the testing interval and this must be taken into account when determining the probability of failure PFD_{avg} of the sensor system.

The individual proof test coverages (PTC) that can be used for calculation are specified in the "Safety-related characteristic values" → 🗎 5 section for the proof tests described below.

- The safety-related output signal 4 to 20 mA may not be used for the protective system during the test.
- The performance of a test must be documented. The template in the Appendix can be used for this purpose → 🗎 16
- The operator specifies the testing interval and this must be taken into account when determining the probability of failure PFD_{avg} of the sensor system.

If no operator-specific proof-testing requirements have been defined, the following is a possible alternative for testing the device.

NOTICE

▶ If the device is in a fault state before the test commences, i.e. an alarm is output and the current output adopts the set value, the cause of the fault must first be eliminated.

Proof testing and optimization of subsystems

The NAMUR worksheet NA106 "Flexible proof testing of field devices in safety instrumented systems" describes how the test activities can be optimized for PCS protective systems with regard to interruptions in operation while maintaining the required safety integrity of the installed PCS safety instrumented systems.

Proof testing of the device can be performed as follows:
- Test sequence A: Verification of accuracy in high-alarm mode
- Test sequence B: Verification of accuracy and status in high-alarm mode

Note the following for the test sequences:
- Testing of the device without transmitter can be carried out with an appropriate simulator.
- The accuracy of the measuring device used must meet the device specification.
- If both channels of the device are used, testing must be carried out for both channels.
- In the case of the signal doubler, the channel used for the safety-related application must be checked at minimum.

6.1 Test sequence A

Preparation

1. Device identification:
Check device tag, device name, serial number and hardware version.

2. Visual inspection:
- Wiring
- Housing / housing cover
- Mechanical and electrical installation

Proof test procedure

1. Simulation of a high alarm (≥ 21 mA) at the input of the device.

2. Checking of accuracy at the output of the device.

3. A deviation from the expected accuracy means that the device has failed the proof test.

6.2 Test sequence B

Preparation

1. Device identification:
Check device tag, device name, serial number and hardware version.

2. Visual inspection:
- Wiring
- Housing / housing cover
- Mechanical and electrical installation

Proof-test procedure

1. Simulation of a measuring signal in the upper measuring range (18 to 20 mA) at the input of the device.

2. Checking of accuracy at the output of the device.

3. A deviation from the expected accuracy means that the device has failed the proof test.

4. Simulation of a high alarm (≥ 21 mA) at the input of the device.

5. Checking of status at the connected signal processing unit.

6. A deviation from the expected accuracy means that the device has failed the proof test.

6.3 Verification criterion

If one of the test criteria from the test sequences described above is not satisfied, the device may no longer be used as part of a protective system.
- The purpose of proof-testing is to detect dangerous undetected device failures (λ_{DU}).
- The impact of systematic faults on the safety function is not covered by this test and must be assessed separately.
- Systematic faults can be caused by operating conditions and the installation, for example.

7 Repair and error handling

7.1 Maintenance

Maintenance instructions and instructions regarding recalibration may be found in the Operating Instructions pertaining to the device.

Alternative monitoring measures must be taken to ensure process safety during configuration, proof-testing and maintenance work on the device.

7.2 Repair

Repair means restoring functional integrity by replacing defective components.

Only original Endress+Hauser spare parts may be used here.

The repair must be documented. This includes:
- Serial number of the device
- Date of the repair
- Type of repair
- Person who performed the repair

Components may be repaired/replaced by the customer's specialist staff if original Endress +Hauser spare parts (which can be ordered by the end customer) are used, and if the relevant installation instructions are followed.

A proof test must always be performed after every repair.

Installation Instructions are supplied with the original spare part and can also be accessed in the Download Area at www.endress.com

Send in replaced components to Endress+Hauser for fault analysis.

When returning the defective component, always enclose the "Declaration of Hazardous Material and Decontamination" with the note "Used as SIL device in a safety instrumented system.

Information on returns: http://www.endress.com/support/return-material

7.3 Modification

- **Modifications to SIL devices by the user are not permitted as they can impair the functional safety of the device**
- Modifications to SIL devices on site at the user's plant are possible following approval by the Endress+Hauser manufacturing center
- Modifications to SIL devices must be performed by staff who have been authorized to perform this work by Endress+Hauser
- Only **original spare parts** from Endress+Hauser must be used for modifications
- All modifications must be documented in the Endress+Hauser W@M Device Viewer
- All modifications require a modification nameplate or the replacement of the original nameplate.

7.4 Decommissioning

When decommissioning, the requirements according to IEC 61508-1:2010 section 7.17 must be observed.

7.5 Disposal

If required by the Directive 2012/19/EU on waste electrical and electronic equipment (WEEE), the product is marked with the depicted symbol in order to minimize the disposal of WEEE as unsorted municipal waste. Do not dispose of products bearing this marking as unsorted municipal waste. Instead, return them to Endress+Hauser for disposal under the applicable conditions.

8 Appendix

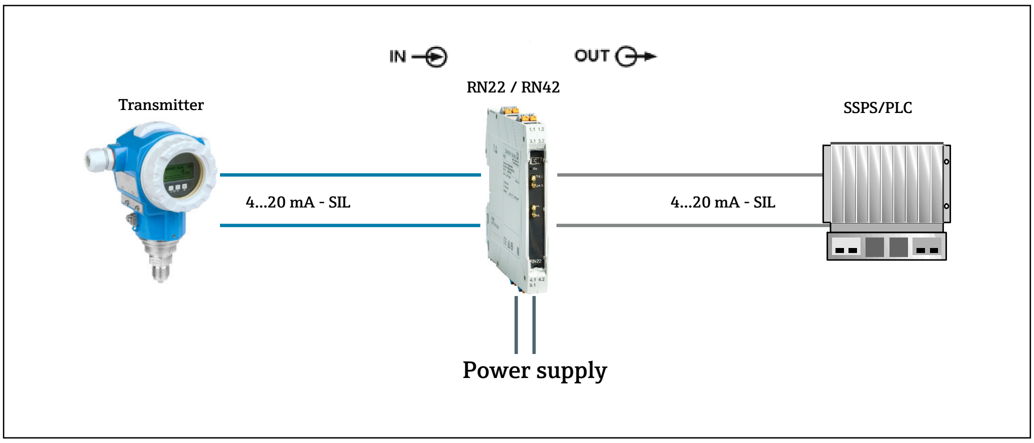
8.1 Structure of the measuring system

The active barriers perform several functions. In addition to the galvanic signal isolation and proportional transmission of the analog 4 to 20 mA signals, connected sensors can be supplied with power if required. The device is HART-transparent (not part of the safety function).

The following examples show typical safety applications for the device. Each application is explained briefly and described in a schematic diagram.

8.1.1 SIL2 application with RN22 or RN42 single-channel device

- The transmitter supplies a current signal to the input of the RN22/RN42 that is proportional to the measuring signal.
- The RN22/RN42 supplies a current output signal to a signal processing unit that is proportional to the input signal.
- This application can be used in safety-oriented applications up to SIL2.



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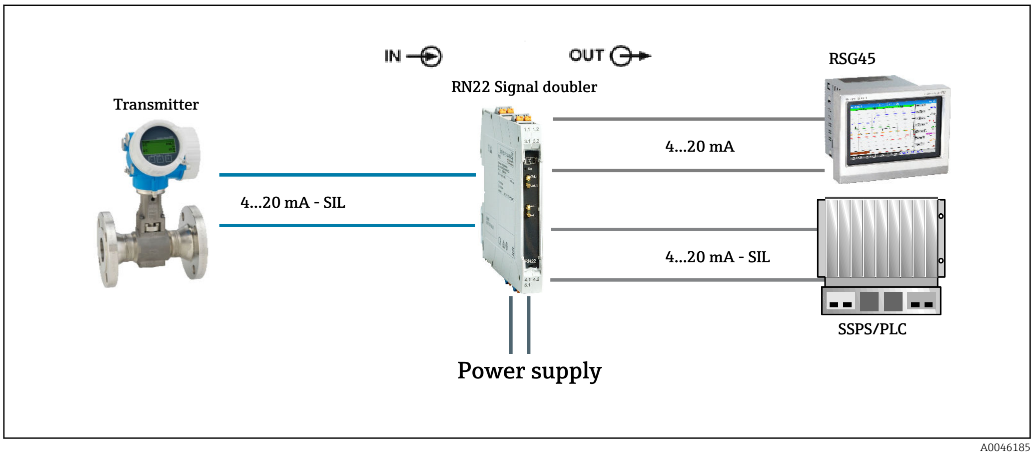
1 *SIL2 application with RN22 or RN42 single-channel active barrier, using the example of a pressure measurement*

8.1.2 SIL2 application with RN22 - signal doubler

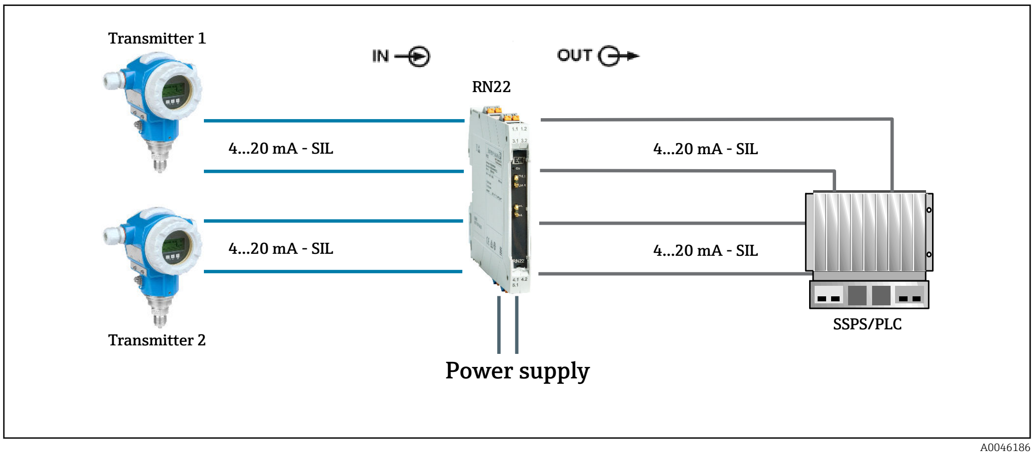
- The transmitter supplies a current signal to the input of the RN22 that is proportional to the measuring signal.
- The RN22 supplies two current output signals that are proportional to the input signal. These outputs can be analyzed separately.
- This application can be used in safety-oriented applciations up to SIL2, in which case only one of the two outputs can be used for the safety-related application.



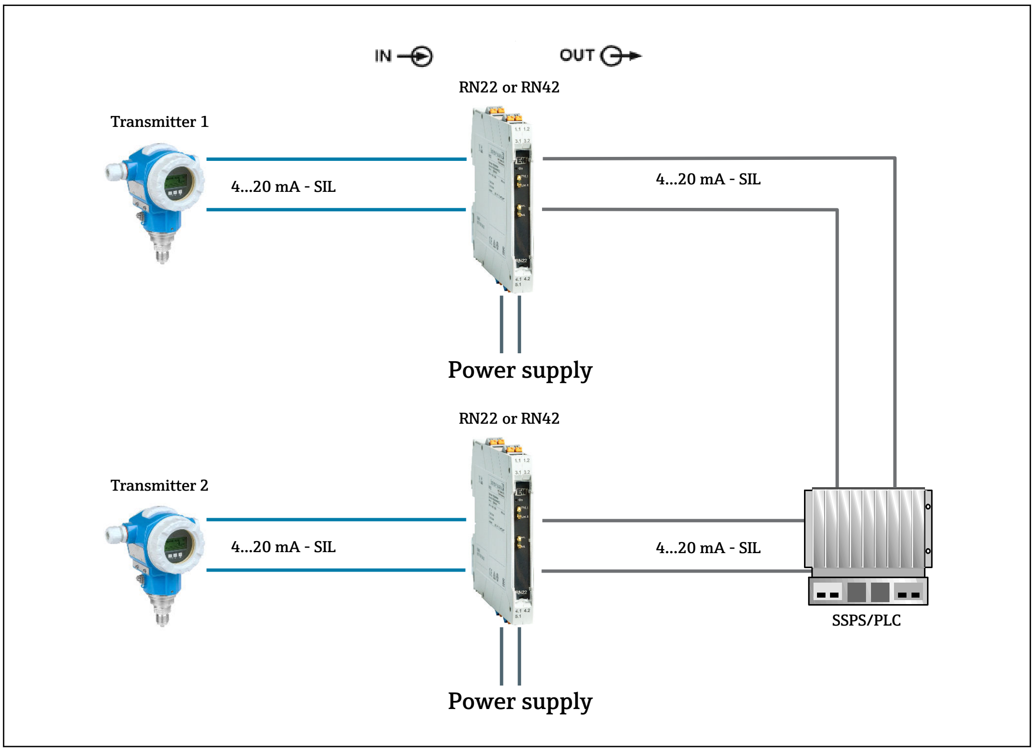
2 SIL2 application with RN22 signal doubler, using the example of a pressure measurement

8.1.3 SIL2/3 application with RN22 – two-channel or 2 x single-channel RN22/RN42

- The transmitters supply a current signal to the inputs of the RN22/RN42 that is proportional to the measuring signal.
- The RN22/RN42 devices supply a current output signal to the connected signal processing units that is proportional to the input signal.
- This application can be used in safety-oriented applications up to SIL2.
- When using homogenous redundancy, it can be used up to SIL3.



3 SIL2/3 application with RN22 two-channel active barrier, using the example of a pressure measurement



4 *SIL2/3 application with two RN22 or RN42 single-channel active barriers, using the example of a pressure measurement*

8.2 Commissioning or proof test report

8.2.1 Test report – Page 1

Company / contact person	**/**
Tester	

Device information	
Plant	Measuring point/TAG no.:
Device type / Order code	
Serial number	Hardware version

Verification information
Date/time
Performed by

Verification result		
Overall result	☐ Pass	☐ Fail

Comment:

Date | Signature of customer | Signature Tester

8.2.2 Test report – Page 2

Type of safety function
☐ Safe measurement

Proof test
☐ Test sequence A ☐ Test sequence B

This report is based on the specifications in the Functional Safety Manual: FY01034K

Proof test report			
Test step	Set point	Actual value	Passed
1. Input: high alarm (≥21 mA)			☐ Pass ☐ Fail
2. Output: high alarm, accuracy complies with technical data			☐ Pass ☐ Fail ☐Not applicable
3. Output: high alarm, status corresponds to "high alarm" at signal processing unit			☐ Pass ☐ Fail ☐Not applicable
4. Input: current value between 18 to 20 mA			☐ Pass ☐ Fail ☐Not applicable
5. Output: measured value, accuracy complies with technical data			☐ Pass ☐ Fail ☐Not applicable

Comment:

8.3 Version history

Version of manual	Changes	Valid from hardware version	Reference to NE53 customer information
FY01034K/09/EN/01.21	First version	01.00.zz	FY01034K/09/EN/01.21

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