

RCI9H2

Remote Communication Interface for VG9000H

Installation, maintenance and
operating instructions

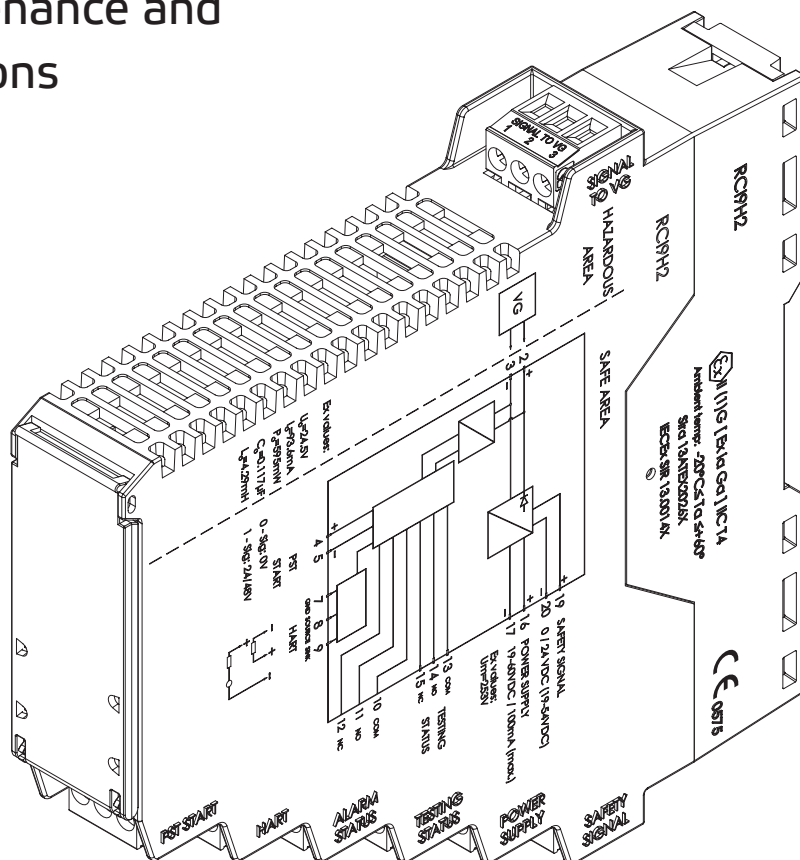


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READ THESE INSTRUCTIONS FIRST!

These instructions provide information about safe handling and operation of the valve.

If you require additional assistance, please contact the manufacturer or manufacturer's representative.

SAVE THESE INSTRUCTIONS!

Addresses and phone numbers are printed on the back cover.

1. GENERAL

This manual incorporates Installation, Maintenance and Operation Instructions for the RCI9H2.

RCI9H2 is meant to be used together with Neles™ ValvGuard™ VG9000H intelligent safety solenoid. It is needed when 24 VDC output (DO) is used in the safety system. RCI9H2 is connected between the safety system and the field device VG9000H as presented in Figure 1. The primary function of RCI9H2 is to convert safety binary input from a safety DO (Digital Output) system into a SIL 3 compatible 4-20 mA current signal. RCI9H2 also provides relay outputs for monitoring the test and alarm status of the VG9000H and a discrete input for commanding VG9000H to start a PST (Partial Stroke Test).

Additionally, RCI9H2 includes an isolated barrier and can be used in intrinsically safe application.

RCI9H2 has local interface with status relays and LED's, which can be used to indicate the status information of the VG9000H (Alarm and Test status).

RCI9H2 has two configuration switches. One switch is for to connecting RCI9H2 internal HART loop resistor (250 Ω) to HART loop and the other switch is configuring Mode A (HART secondary master) / Mode B (HART monitor) selection.

RCI9H2 is approved by TÜV Rheinland to be used in safety applications up to and including safety integrity level 3 (SIL3).

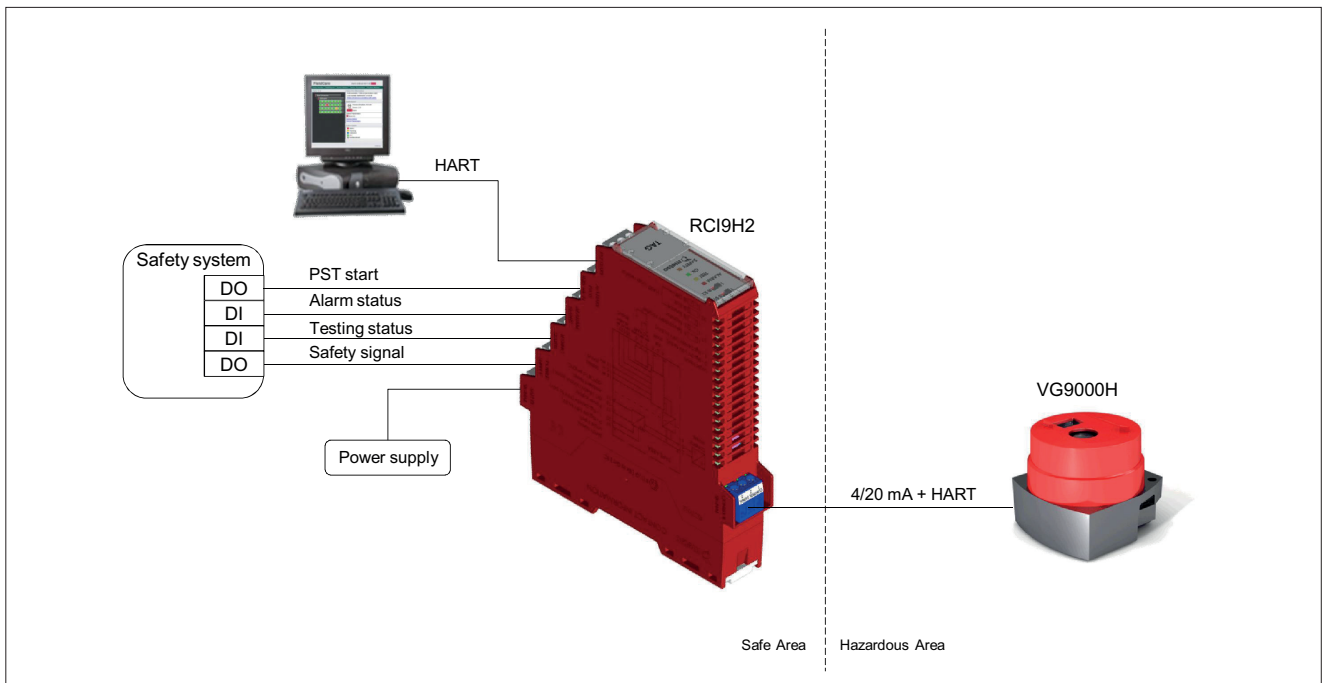


Fig. 1 RCI9H2 System Level Diagram

2. TECHNICAL SPECIFICATIONS

Safety (input) signal:

Connection:	Terminals 19+, 20-
Signal levels:	0-Signal: nominal 0 V (-3–5 V) (leakage <2 mA) 1-Signal: nominal 24/48 V (19–54 V DC)
Input Current:	26...38 mA (normal) 46.4 mA at 24 V DC (max) 47.9 mA at 48 V DC (max)
Max Voltage:	60 V DC
Polarity protection:	-60 V DC
Over Voltage Protection:	60 V DC

Output to VG9000H:

Connection:	Terminals 2+, 3-
Output current, normal mode:	0-Signal: nominal 4.2 mA, (3.8–5.6 mA) 1-Signal: nominal 20.5 mA, (18–22 mA)
Output current, loop powered mode 1 (power supply not connected):	0-Signal: nominal 0 mA 1-Signal: nominal 16.4 mA, (16–17 mA)
Output current, loop powered mode 2 (power supply connected parallel with the safety signal):	0-Signal: nominal 0 mA 1-Signal: nominal 20.5 mA, (18–22 mA)
Maximum load:	596 Ω
Response time:	Input to output <100 ms

Power Supply:

Connection:	Terminals 16+, 17-
Input voltage:	0-Signal: nominal 0 V (-3–5 V) 1-Signal: nominal 24/48 V (19–54 V DC)
Input current:	57.4 mA at 24 V DC, 30.7 mA at 48 V DC
Max Voltage:	60 V DC
Polarity protection:	-60 V DC
Over Voltage Protection:	60 V DC

HART:

Connection:	Terminals 7-, 8+ (source) Terminals 7-, 9+ (sink)
Input current:	Fixed at 11 mA, source or sink mode
Source mode:	
Output voltage	max 24 V DC
External load	max 600 Ω
Sink mode:	
Input voltage	24 V DC (nominal)
Internal load	230 Ω

PST start:

Connection:	Terminals 4+, 5-
Signal level:	0-Signal: nominal 0 V (-3–5 V) 1-Signal: nominal 24/48 V (19–54 V DC)
Signal type:	Rising edge active
Input current	4.74 mA at 24 V DC, 9.47 mA at 48 V DC
Max Voltage:	60 V DC
Polarity protection:	-60 V DC
Over Voltage Protection:	60 V DC

Testing Status:

Test Status relay OFF with Test Status LED OFF -indication	
Connection:	Terminals 13-14 open Terminals 13-15 connected
Test Status relay ON with Test Status LED ON -indication	
Connection:	Terminals 13-15 open Terminals 13-14 connected
Relay:	
Type	SPDT
Current	1A (max)
Voltage	24 V (nominal)

Alarm Status:

Alarm Status relay OFF with Alarm Status LED ON - indication	
Connection:	Terminals 10-11 open Terminals 10-12 connected
Alarm Status relay ON with Alarm Status LED OFF	
Connection:	Terminals 10-12 open Terminals 10-11 connected
Relay:	
Type	SPDT
Current	1 A (max)
Voltage	24 V (nominal)

Ambient conditions:

Ambient temperature range:	-20° to +60 °C
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Mechanical specifications:

Protection degree:	IP20
Weight:	Approx. 215 g
Dimensions:	51.5 x 136.2 x 25.2 mm
Mounting:	On 35 mm DIN mounting rail acc. to EN 60715

Data for application in connection with Ex-areas:

ATEX/IECEX:	Ex II (1) G [Ex ia Ga] IIC
cCSAus:	Canada: [Ex ia] IIC Class I, Division 1, Groups A, B, C, D U.S.: [AEx ia] IIC Class 1 Zone 0, Class I, Division 1, Groups A, B, C, D
Ex values:	Uo = 24.5 V Io = 93.6 mA Po = 595 mW Co = 0.117 μ F Lo = 4.29 mH

Approvals

Safety:	Certified by TUV Rheinland up to and including SIL3 according to IEC61508
Hazardous area:	ATEX, IECEX, cCSAus, CCC, Taiwan, SABS
Electromagnetic compatibility:	According to EN61326, EN61000-6-2, EN61000-6-4

3. RECYCLING AND DISPOSAL

Most parts can be recycled if sorted according to material. Most parts have material marking. In addition, separate recycling and disposal instructions are available from the manufacturer. Device may also be returned to the manufacturer for recycling and disposal. There will be a charge for this.

4. SAFETY PRECAUTIONS

The quoted entity parameters of Co and Lo are applicable for the distributed capacitance and inductance in cable. Where there is circuit capacitance or inductance in the connected equipment (represented by Ci and Li respectively), then these values shall not exceed 50% of the quoted Co and Lo.

5. TRANSPORTATION, RECEPTION AND STORAGE

The RCI9H2 is a sophisticated device, handle it with care.

- Check the device for any damage that may have occurred during transportation.
- Store the device preferably indoors; keep it away from rain and dust.
- Do not unpack the device until installing it.
- Keep the original packaging. Always store and transport the device in the original packaging.
- Do not drop the device.

6. INSTALLATION

6.1 Mounting

Open the two DIN rail retaining clips on the bottom of the device. Mount the device onto the DIN mounting rail. Push the retaining clips inwards to lock the device to the DIN rail.

Low heat dissipation of the device allows vertical and horizontal wall mounting without spacing.

6.2 Dimensions

The mechanical dimensions of the device are shown in Chapter 9.

6.3 Electrical connections

NOTE:

Multi strand cables are recommended for all RCi9H2 connections.

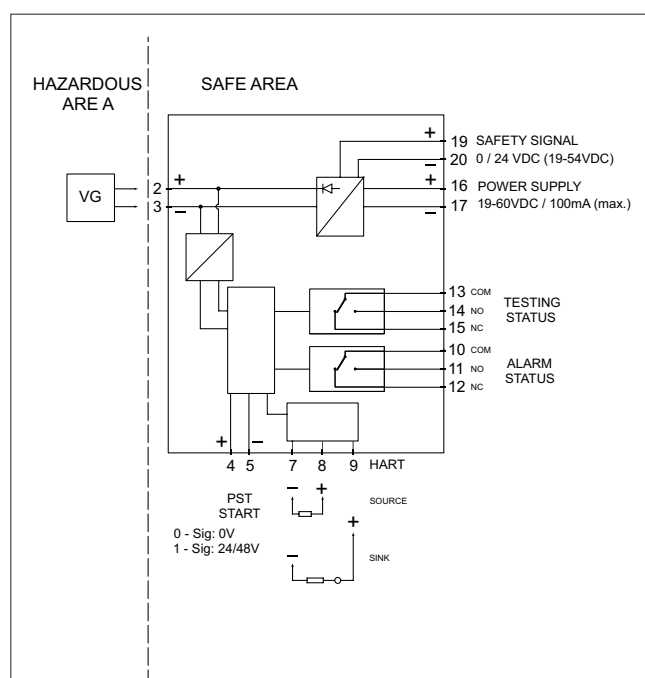


Fig. 2 Wiring connections

Safety Signal

- Connect the safety signal (19-54 V DC) from the safety system DO to terminals 19 +, 20-.
- This signal controls the input signal to VG9000H (4/20 mA).

Power Supply

- Normal mode
- Connect 24 V DC or 48 V DC power supply to terminals 16+, 17-.
- Loop powered mode 1
If power supply is disconnected, it will not affect the valve position, but the HART communication, PST input and Test & Alarm relays are not active.
- Loop powered mode 2
Power supply can also be connected in parallel with safety signal. In that case, the RCi9H2 is fully functional (i.e. HART communication, PST input and Test & Alarm relays are active) while safety signal is in "1" state (19-54 V DC).

Signal to VG

- Connect the VG9000H field wire to power supply can also be terminals 2+, 3-.
- Cable shall be one or more single-twisted pair shielded or multiple-twisted pair with overall shield. Single and multiple pair may be combined in a given network provided all current input devices associated with multiple pairs of the same cable shall be located nominally at one end of the multi-pair cable. Unshielded cable may be used if it is demonstrated that ambient noise or crosstalk does not affect communication or functions of the ValvGuard.

HART communication

- Source mode:**
Connect HART master (e.g. HART multiplexer or modem) without external power supply to terminals 7-, 8+. RCi9H2 is in current source mode and supplies the 11 mA current to the HART terminals.
HART communication loop requires a load to be present in the loop. This load can be set by the switch S1. In this case the switch S1 needs to be set to position III. In position III the HART loop resistor is coupled between terminals 7 & 8 inside the device. In position II the HART loop resistor is not coupled. Do not set the switch S1 to position I in this case.
- Sink mode:**
Connect HART master (e.g. DCS AI), which is providing power to terminals 7-, 9+. RCi9H2 is in current sink mode and does not supply the current to the HART terminals. RCi9H2 will control the loop current to the 11 mA.
HART communication loop requires a load to be present in the loop. This load can be set by the switch S1. In this case the switch S1 needs to be set to position I. In position I the HART loop resistor is coupled between terminals 7 & 9 inside the device. In position II the HART loop resistor is not coupled. Do not set the switch S1 to position III in this case.

PST Start

- Partial Stroke Test can be started remotely via RCi9H2 by providing binary signal (19-54 V DC) to terminals 4+, 5-. The rising edge of this signal commands VG9000H to start PST. VG9000H will run the manual PST test, which is programmed in it's memory. The switch S2 need to be in position I to make this input active.

Testing Status

- Connect testing status output to relay terminals 13, 14 (normally open) or 13, 15 (normally connected). When testing is active the relay is exited, resulting terminals 13, 14 to be connected and terminals 13, 15 to be open.
- The testing status is only available if the system is configured properly. Please see the Chapter 2 "Technical specifications" and Chapter 7 "Commissioning and operation".

Alarm Status

- Connect alarm status output to relay terminals 10, 11 (normally open) or 10, 12 (normally closed). When alarm is active the relay is NOT exited, resulting terminals 10, 11 to be open and terminals 10, 12 to be connected.
- The alarm status is only available if the system is configured properly. Please see the Chapter 2 "Technical specifications" and Chapter 7 "Commissioning and operation"

6.4 Control wiring

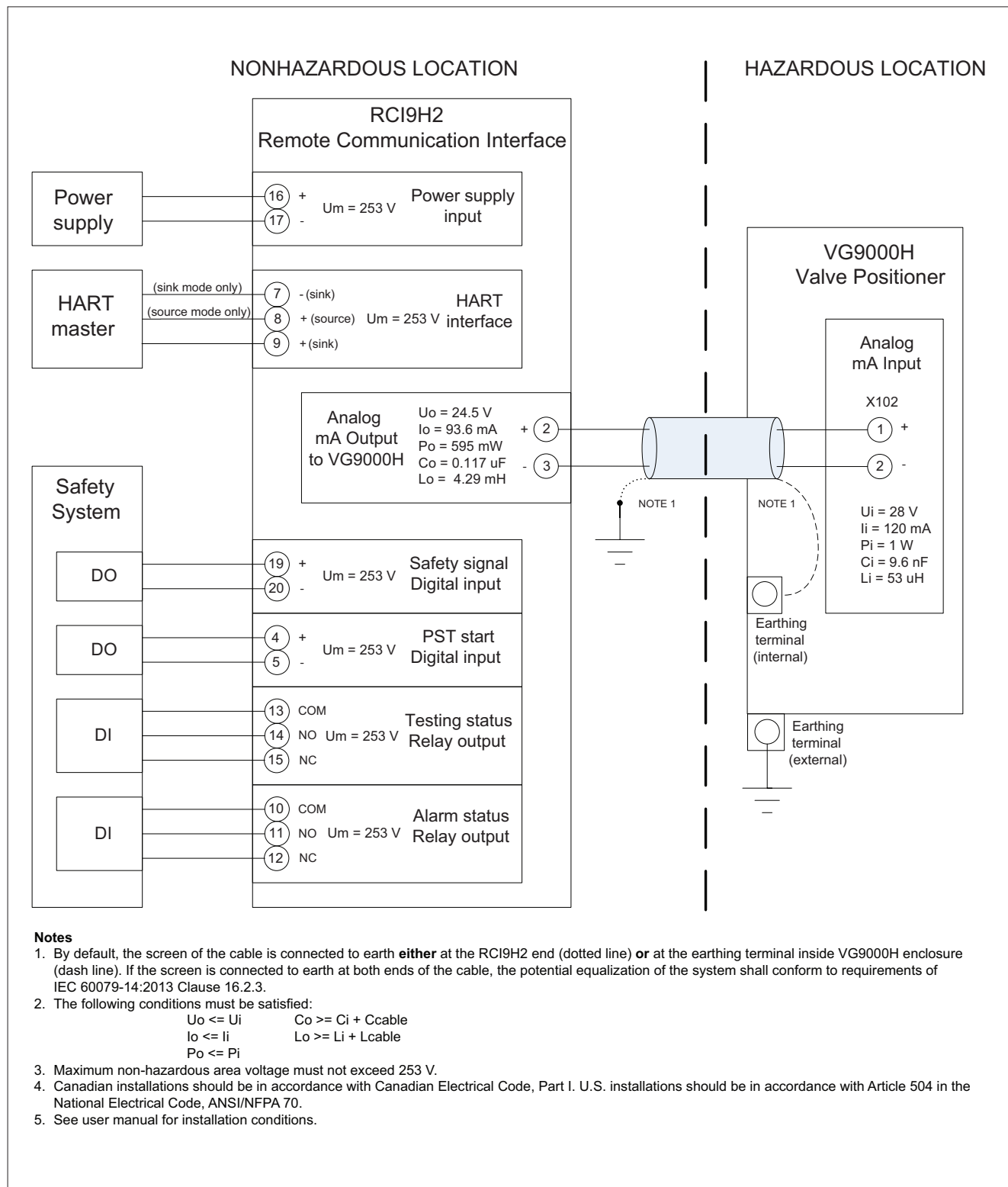


Fig. 3 Control wiring

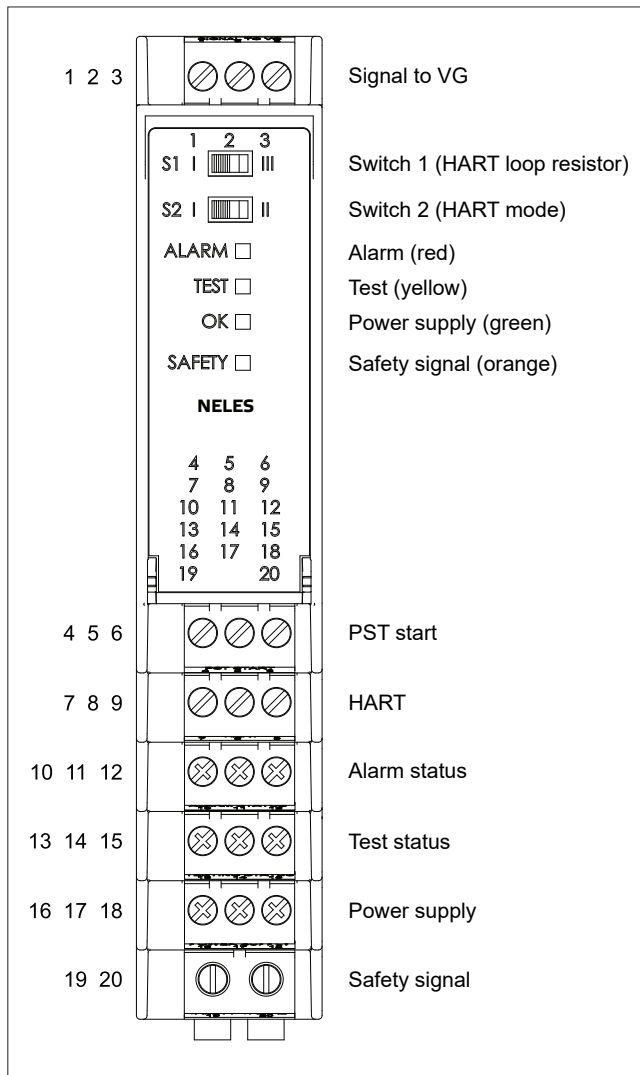


Fig. 4 Terminals, switches and LEDs

7. COMMISSIONING AND OPERATION

7.1 DIP Switches

The RCi9H2 has two DIP switches; switch 1 (S1) and switch 2 (S2).

Table 1 Switch selections

Switch S1	HART loop resistor	Mode / Terminals
I	Yes	Sink (7, 9)
II	No (factory default)	Source or sink
III	Yes	Source (7, 8)

Switch S2	HART mode
I	Secondary master (factory default)
II	Monitor

Switch S1

Switch S1 S1 is for HART loop resistor configuration. S1 configuration is explained in Chapter 6.3 "Electrical connections".

Switch S2

Switch S2 is for HART mode selection.

S2 position I, HART secondary master mode

In this mode, full RCi9H2 functionality is available. PST start input is functional and ALARM and TEST status outputs are available. HART handheld communicator cannot be used if HART primary master is present in the HART loop. In HART loop, there can be only two masters and the handheld would be the third one, which is not allowed.

S2 position II, HART monitor mode

In this mode, HART handheld can be used. PST input is not functional. ALARM and TEST statuses are available if VG9000H is configured to send HART burst status messages to RCi9H2. This configuration can be made via VG9000H DTM/EDD as follows:

- Set the burst mode command to 169 (Read short status).
- Set the burst mode control parameter to ON to activate the burst mode. Default is OFF.

NOTE:

When using with VG9000H HART 7 version, the RCi9H2 firmware revision shall be 4.32 or above. Otherwise VG9000H needs to be configured to HART 6. See VG9000H manual for further instructions.

7.2 LEDs

Table 2 LED message explanation

LED Name	Color	Function	Display	Reason
ALARM	Red	Indication of an alarm	ON	- VG9000H is in alarm state or - HART Communication timeout between VG9000H and RCI9H2 because of wrong configuration or failure in wiring between RCI9H2 and VG9000H or - RCI9H2 internal memory test has failed. - RCI is in monitor mode, but the burst mode is OFF in VG
			OFF	- No active alarms or errors - If alarms are active in VG, but the RCI power supply is not connected, they won't be shown in RCI.
TEST	Yellow	Indication of partial stroke test	ON	VG9000H has on-going test or test warning time has started. NOTE: Test LED / status relay is showing the test warning time with VG9000H firmware revision 1.32 and onwards when using the HART monitor mode.
			OFF	No test is running
OK	Green	Indication of presence of power supply	ON	Power supply is present, no alarm
			OFF	Power supply not present or device is faulty
			Blinking	Power supply is present and alarm is active
SAFETY	Orange	Indication of presence of safety signal	ON	Safety signal is present.
			OFF	Safety signal is not present. - Safety system DO is in "0" state or - Safety signal is not connected to terminals or - Failure in wiring

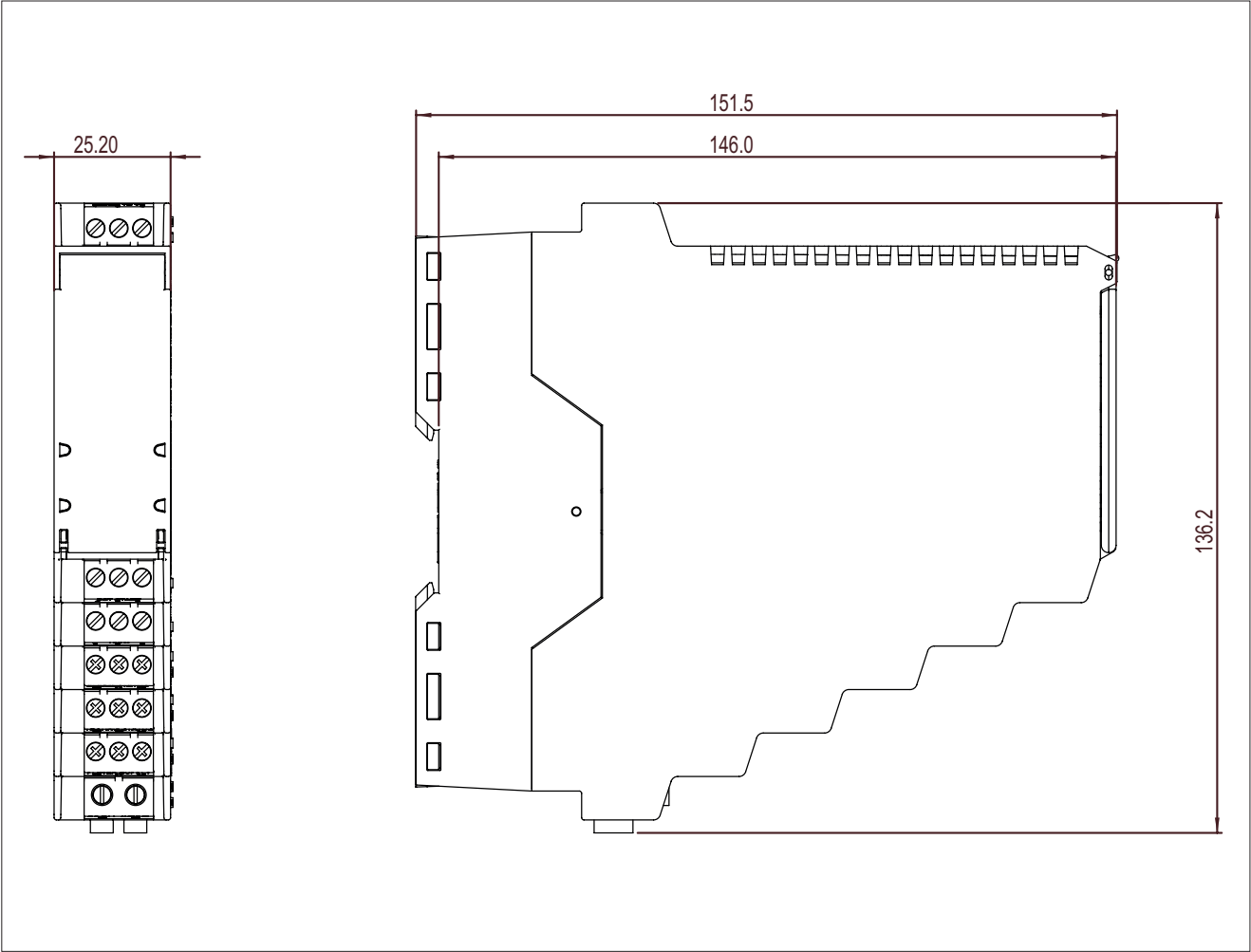
8. MAINTENANCE

If RCI9H2 unit becomes faulty, the complete unit needs to be replaced with a new unit.

Replace the unit by following these instructions.

1. Note that the replacement of the RCI9H2 will disconnect VG9000H from operation and the valve will move to fail-safe position.
2. Pull out the wire terminals by help of a small flat screwdriver. Make sure that you are able to reconnect the terminals in the same order.
3. Pull the DIN rail retaining clips outwards using a flat screwdriver.
4. Take RCI9H2 off the DIN rail and replace with a new one.
5. Push the DIN rail retaining clips inwards to lock the unit to the DIN rail.
6. Push wire terminals back to the RCI9H2. Make sure that you reconnect the terminals in the correct positions.
7. No special tools needed for maintenance.

9. DIMENSIONS



10. EU DECLARATION OF CONFORMITY



EU DECLARATION OF CONFORMITY

Manufacturer:
Neles Finland Oy
01301 Vantaa
Finland

Product: **Remote communication interface RCI9H2**

Approvals:

Approval	EC Type examination Certificate
Ex II (1) G [Ex ia Ga] IIC	Sira 13ATEX2026X

As the products within our sole responsibility of design and manufacture may be used as parts or components in machinery and are not alone performing functions as described in Article 6(2) in the Machinery Directive (2006/42/EC), we declare that our product(s) to which this Declaration of Conformity relates must NOT be put into service until the relevant machinery into which it is to be incorporated has been declared in conformity with the provisions of the Machinery Directive. The product above is manufactured in compliance with the applicable European directives and technical specifications/standards. Protection from e.g. static electricity caused by the process or connected equipment must be considered by the user (EN 60079-14 §6). The product do not possess any residual risk according to hazard analyses made under the applicable directives providing that the procedures stated by the Installation, Operation and Maintenance manual are followed and the product is used under conditions mentioned in the technical specifications.

Applicable directives:

EMC 2004/108/EC Electrical
ATEX 2014/34/EU Approved and Ex marked types

ATEX Notified Body for Quality Assurance:

ISO 9001:2015 DNV-GL 73538-2010-AQ-FIN-FINAS
ATEX 2014/34/EU Annex IV Presafe 2460 Presafe 18 ATEX 91983Q Issue 1

ATEX Notified Bodies for EC Type Examination Certificate:

SIRA (Notified body number 0518)
Sira Certification Service
CSA Group, Unit 6, Hawarden Industrial Park
Hawarden, Deeside, CHs 3US, England

Det Norske Veritas AS (Presafe Notified Body number 2460)

Veritasveien 1
1322 Høvik, Oslo
Norway

Vantaa 3rd November 2022

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