Isolating power supplies and output isolators

Isolating power supplies with HART

SITRANS I100

Overview

Analog input 0/4 ... 20 mA

The isolating power supplies are used for the intrinsically safe operation of 2- and 3-wire transmitters and for connecting to intrinsically safe mA sources.

The 2- and 3-wire transmitters are supplied with auxiliary power from the transmitter supply unit.

For 2-wire transmitters the isolators transfer the HART communication signal bidirectionally.

Benefits

• Active output 0/4 ... 20 mA
• Suitable for 2-, 3-wire transmitters, 2-wire HART transmitters and mA sources
• Intrinsically safe input [Ex ia] IIC
• Galvanic isolation between input, output and auxiliary power
• Open-circuit and short-circuit monitoring and messaging for input and output (can be switched off)
• Installation possible in Zone 2 and Div. 2
• Can be used up to SIL 2 (IEC 61508)

Design

The HART isolating power supply is comprised of a compact plastic enclosure (IP30) and is equipped with push-in screw terminals.

On the front are a green LED for indicating the power supply status and a red LED for signaling errors.

The auxiliary power supply can be connected individually using push-in screw terminals or jointly for up to 40 units using pac-Bus.

Technical specifications

SITRANS I100 Isolating Power Supplies with HART

<table>
<thead>
<tr>
<th>Ex i input</th>
<th>0/4 ... 20 mA with HART</th>
</tr>
</thead>
<tbody>
<tr>
<td>Functional range</td>
<td>0 ... 24 mA</td>
</tr>
<tr>
<td>Max. input current for mA sources</td>
<td>50 mA</td>
</tr>
<tr>
<td>Transmitter supply voltage</td>
<td>≥ 16 V at 20 mA (for 2-, 3-wire)</td>
</tr>
<tr>
<td>Supply voltage residual ripple</td>
<td>≤ 25 mVeff</td>
</tr>
<tr>
<td>No-load voltage</td>
<td>≤ 26 V</td>
</tr>
<tr>
<td>Short-circuit current</td>
<td>≤ 35 mA</td>
</tr>
<tr>
<td>Input resistance (AC impedance HART)</td>
<td>≈ 500 Ω</td>
</tr>
<tr>
<td>Input resistance for mA sources</td>
<td>30 Ω</td>
</tr>
<tr>
<td>Communication signal (on 2-wire transmitters)</td>
<td>Bidirectional HART transmission, 0.5 kHz ... 30 kHz</td>
</tr>
</tbody>
</table>

Output

| Output signal | 0/4 ... 20 mA with HART |
| Load resistance $R_L$ | 0 ... 600 Ω (terminal 1+/2-) |
| | 0 ... 379 Ω (terminal 3+/2-) |
| | (with internal 221 Ω resistance for HART) |
| Residual ripple | ≤ 40 μAeff |
| No-load voltage | ≤ 15.5 V |
| Communication signal | Bidirectional HART transmission, 0.5 kHz ... 30 kHz |
| Response time (10 % ... 90 %) | ≤ 25 ms |

Measuring accuracy

Accuracy, typical data expressed as % of calibrated span at $U_N$, 23 °C

| Linearity error | ≤ 0.1 % |
| Offset error | ≤ 0.1 % |
| Temperature influence | ≤ 0.1 %/10 K |
| Power supply effect within voltage range | ≤ 0.01 % |
| Load resistance effect | ≤ 0.02 % |
### Rated conditions

<table>
<thead>
<tr>
<th>Degree of protection of enclosure</th>
<th>IP30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of protection of terminals</td>
<td>IP20</td>
</tr>
</tbody>
</table>

### Ambient conditions

- **Ambient temperature**
  -20 °C to +60 °C (-4 °F to +140 °F) (see operating instructions)

- **Storage temperature**
  -40 °C to +80 °C (-40 °F to +176 °F)

- **Relative humidity (no condensation)**
  ≤ 95%

### Electromagnetic compatibility

Tested under the following standards and regulations:
EN 61326-1 Use in the industrial environment

### Mechanical specifications

**Screw terminals**

<table>
<thead>
<tr>
<th>One-wire connexion</th>
<th>Rigid</th>
<th>0.2 ... 2.5 mm² (0.00031 ... 0.0039 in²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexible</td>
<td>0.2 ... 2.5 mm² (0.00031 ... 0.0039 in²)</td>
<td></td>
</tr>
<tr>
<td>Flexible with end ferrules (without/plastic ferrule)</td>
<td>0.25 ... 2.5 mm² (0.00039 ... 0.0039 in²)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Two-wire connexion</th>
<th>Rigid</th>
<th>0.2 ... 1 mm² (0.00031 ... 0.00155 in²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexible</td>
<td>0.2 ... 1.5 mm² (0.00031 ... 0.0023 in²)</td>
<td></td>
</tr>
<tr>
<td>Flexible with end ferrules</td>
<td>0.25 ... 1 mm² (0.00039 ... 0.00155 in²)</td>
<td></td>
</tr>
</tbody>
</table>

### Weight

Approx. 160 g (0.35 lb)

### Type of installation

On DIN rail according to EN 50022 (NS35/15; NS35/7.5)

### Mounting position

Vertical or horizontal

### Enclosure material

PA 6.6

### Fire protecting class (UL-94)

V0

### Auxiliary power

<table>
<thead>
<tr>
<th>Rated voltage U_N</th>
<th>24 V DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage range</td>
<td>18 ... 31.2 V</td>
</tr>
<tr>
<td>Residual ripple within voltage range</td>
<td>≤ 3.6 VSS</td>
</tr>
<tr>
<td>Rated current (U_N, 20 mA)</td>
<td>70 mA</td>
</tr>
<tr>
<td>Power loss (at U_N, R_L = 250 Ω)</td>
<td>1.7 W</td>
</tr>
<tr>
<td>Power consumption (U_N, 20 mA)</td>
<td>1.3 W</td>
</tr>
<tr>
<td>Operation indicator</td>
<td>Green &quot;PWR&quot; LED</td>
</tr>
<tr>
<td>Reverse polarity protection</td>
<td>Yes</td>
</tr>
<tr>
<td>Undervoltage monitoring</td>
<td>Yes (no faulty module/output states)</td>
</tr>
</tbody>
</table>

### Galvanic isolation

- **Test voltage according to EN 60079-11**
  - Ex i input to output | 1.5 kV AC |
  - Ex i input to auxiliary power | 1.5 kV AC |
  - Ex i input to Error contact | 1.5 kV AC |

- **Test voltage according to EN 50178**
  - Output to auxiliary power | 350 V AC |
  - Error contact to auxiliary power and output | 350 V AC |

### Certificates and approvals

**Explosion protection ATEX**

- EC type-examination certificate
  DMT 03 ATEX E 010 X

- **Degree of protection**
  II 3 (1) G Ex na nC [ia] IIC T4
  II (1) D [Ex iaD]

- **Installation**
  In Zone 2, Div. 2 and in the safe area

- **Other approvals**
  USA (FM) (available soon)
  Kanada (CSA) (available soon)
  Shipping (DNV)

### Safety specifications (CENELEC)

- **Max. voltage U_o**
  27 V

- **Max. current I_o**
  88 mA

- **Max. power P_o**
  576 mw

- **Max. connectable capacitance C_o**
  90 nF/705 nF

- **Max. connectable inductance L_o**
  2.3 mH/14 mH

- **Internal capacitance C_i and inductance L_i**
  Negligible

- **Insulation voltage U_m**
  253 V

- **When connecting mA sources:**
  - Max. output voltage U_o
  - Max. connectable voltage U_i
  - Max. connectable current I_i
  - Internal capacitance C_i and inductance L_i

- For more information and value combinations see certification.
## Isolating power supplies and output isolators

### SITRANS I100

#### Selection and Ordering data

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7NG4124-0AA00</td>
<td>SITRANS I100 Isolating Power Supply with HART For rail mounting, for supplying 2-/3-wire transmitters and for mA sources, output 0/4 ... 20 mA, with intrinsically safe input</td>
</tr>
</tbody>
</table>

**Accessories**

- **pac-Bus basic set** 7NG4998-1AA
  - With 5 single elements and 1 terminal set (beginning and end)

- **pac-Bus extension set** 7NG4998-1AB
  - With 5 single elements

- Available ex stock.

#### Dimensional drawings

**SITRANS I100 isolating power supply with HART, dimensions in mm (inch)**

#### Schematics

**SITRANS I100 isolating power supply with HART, connection diagram**

**SITRANS I100 isolating power supply with HART, output configuration**
Isolating power supplies and output isolators

Output isolators with HART

SITRANS I200

Overview

Analog output 0/4 ... 20 mA for HART

The output isolators are used for the intrinsically safe operation of valve positioners, i/p converters or indicators.

Operation of intrinsically safe HART valve positioners (e.g. SI-PART PS2 and SITRANS VP300) is also possible. The units transfer a superimposed HART communication signal bidirectionally.

Benefits

- For HART output signals 0/4 ... 20 mA
- Intrinsically safe output [Ex ia] IIC
- Galvanic isolation between input, output and auxiliary power
- Open-circuit and short-circuit monitoring and messaging (can be switched off)
- Installation possible in Zone 2 and Div. 2
- Can be used up to SIL 2 (IEC 61508)

Design

The HART output isolator is comprised of a compact plastic housing (IP30) and is equipped with push-in screw terminals.

On the front are a green LED for indicating the power supply status and a red LED for signaling errors.

The auxiliary power supply can be connected individually using push-in screw terminals or jointly for up to 40 units using pac-Bus.

Technical specifications

<table>
<thead>
<tr>
<th>SITRANS I200 output isolator with HART</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input</strong></td>
</tr>
<tr>
<td>Input signal</td>
</tr>
<tr>
<td>Functional range</td>
</tr>
<tr>
<td>Max. input current</td>
</tr>
<tr>
<td>Input resistance (changeable switch LI)</td>
</tr>
<tr>
<td>Communication signal</td>
</tr>
<tr>
<td><strong>Ex i output</strong></td>
</tr>
<tr>
<td>Output signal</td>
</tr>
<tr>
<td>Connectable load resistance</td>
</tr>
<tr>
<td>Min. load resistance for short-circuit monitoring</td>
</tr>
<tr>
<td>Residual ripple</td>
</tr>
<tr>
<td>No-load voltage</td>
</tr>
<tr>
<td>Response time (10 % ... 90 %)</td>
</tr>
</tbody>
</table>

Measuring accuracy

Accuracy, typical data expressed as % of calibrated span at UN, 23 °C

- Linearity error                      ≤ 0.1 %
- Offset error                         ≤ 0.1 %
- Temperature influence                ≤ 0.1 %/10 K
- Power supply effect within voltage range | ≤ 0.01 %
- Load resistance effect               ≤ 0.02 %

Rated conditions

- Degree of protection of enclosure     IP30
- Degree of protection of terminals    IP20
- Ambient conditions
  - Ambient temperature                 -20 °C ... +70 °C (-4 ... +158 °F) (see operating instructions)
  - Storage temperature                 -40 °C ... +80 °C (-40 °C ... +176 °F) ≤ 95 %
- Relative humidity (no condensation)  ≤ 95 %

Electromagnetic compatibility

Tested under the following standards and regulations:
EN 61326-1 Use in the industrial environment
Isolating power supplies and output isolators

Output isolators with HART

SITRANS I200

Mechanical specification

- Screw terminals
  - One-wire connection
    - Rigid: 0.2 ... 2.5 mm² (0.00031 ... 0.0039 in²)
    - Flexible: 0.2 ... 2.5 mm² (0.00031 ... 0.0039 in²)
    - Flexible with end ferrules: 0.25 ... 2.5 mm² (0.00039 ... 0.0039 in²)
  - Two-wire connection
    - Rigid: 0.2 ... 1 mm² (0.00031 ... 0.00155 in²)
    - Flexible: 0.2 ... 1.5 mm² (0.00031 ... 0.0023 in²)
    - Flexible with end ferrules: 0.25 ... 1 mm² (0.00039 ... 0.00155 in²)

- Weight: Approx. 160 g (0.35 lb)
- Type of installation: On DIN rail according to EN 50022 (NS35/15; NS35/7.5)
- Mounting position: Vertical or horizontal
- Enclosure material: PA 6.6
- Fire protecting class (UL-94): V0

Auxiliary power

- Rated voltage $U_N$: 24 V DC
- Voltage range: 18 ... 31.2 V
- Residual ripple within voltage range: $\leq 3.6 \, V_{SS}$
- Rated current ($U_N$, 20 mA): 80 mA
- Power consumption ($U_N$, 20 mA): 1.3 W
- Power loss (at $U_N$, $R_L = 500 \, \Omega$): 1.1 W
- Operation indicator: Green "PWR" LED
- Reverse polarity protection: Yes
- Undervoltage monitoring: Yes (no faulty module/output states)

Galvanic isolation

- Test voltage according to EN 60079-11
  - Ex i output to input: 1.5 kV AC
  - Ex i output to auxiliary power: 1.5 kV AC
  - Error contact to Ex i output: 1.5 kV AC
- Test voltage according to EN 50178
  - Input to auxiliary power: 350 V AC
  - Error contact to auxiliary power and input: 350 V AC

Error detection Ex i output

- Open circuit: $> 10 \, k\Omega$
- Short-circuit: $< 15 \, \Omega$
- Input behavior: $> 6 \, k\Omega$
- Open-circuit detection only for input current: $\geq 3.6 \, mA$
- Settings (LF switch): Activated/deactivated
- Error indication: LED red "LF"
- Error messaging and power supply failure: Contact (30 V/100 mA), closed to ground in case of error
- pac-Bus, floating contact (30 V/100 mA)

Safety specifications (CENELEC)

- Max. voltage $U_o$: 25.6 V
- Max. current $I_o$: 96 mA
- Max. power $P_o$: 605 mW
- Max. connectable capacitance $C_o$ for II2/II3: 103 nF/800 nF
- Max. connectable inductance $L_o$: 1.9 mH/11 mH
- Internal capacitance $C_i$ and inductance $L_i$: Negligible
- Insulation voltage $U_m$: 253 V
- For more information and value combinations see certification.

Certificates and approvals

- Explosion protection ATEX
  - EC type-examination certificate: DMT 03 ATEX E 012 X
  - Degree of protection: II 3 (1) G Ex nA nC [ia] IIC T4 II (1) D [Ex iaD]
- Installation: In Zone 2, Div. 2 and in the safe area
- Other approvals: USA (FM) (available soon)
- Canada (CSA) (available soon)
- Shipping (DNV)

Selection and Ordering data

Order No.

SITRANS I200 output isolator with HART ➔ 7NG4131-0AA00

For rail mounting, input 0/4 ... 20 mA, output 0/4 ... 20 mA, intrinsically safe

Accessories

- pac-Bus basic set ➔ 7NG4998-1AA
  With 5 single elements and 1 terminal set (beginning and end)
- pac-Bus extension set ➔ 7NG4998-1AB
  With 5 single elements
  - Available ex stock.

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Isolating power supplies and output isolators

Output isolators with HART

**SITRANS I200**

### Dimasional drawings

SITRANS I200 output isolator with HART, dimensions in mm (inch)

### Schematics

SITRANS I200 output isolator with HART, connection diagram