

Safety Barriers



Safety barriers

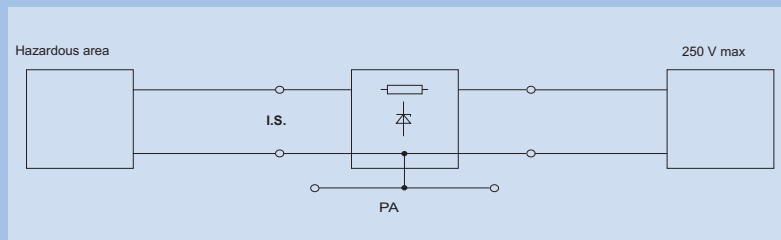
- Exchangeable back-up fuse for all safety barriers
- Snap-on mounting on rails: simultaneous connection to potential equalisation/ground
- Simple selection: application specific single and dual-channel safety barriers for standard uses of the instrumentation
- Extensive program for general applications
- Short-circuit-proof
- Certifications of all important test sites available
- EMC tested, CE marking
- Installation in Zone 2 possible



R. STAHL safety barrier types 9001, 9002 and 9004 can be used for:

- **All standard applications of instrumentation:**
 - Analog input
 - Analog output
 - Digital input
 - Digital output
 - Temperature sensor
 - Pressure sensor
 - etc.
- **General applications,** if the power consumption does not exceed the limits of the type of intrinsic safety protection

STAHl



Certifications

| | |
|-------------------|---|
| 9001 | PTB, FM, UL, CSA, SA, FTZU, SEV, BKI, PROCHEM, VNIIEF |
| 9002 | PTB, FM, UL, CSA, SA, FTZU, SEV, BKI, PROCHEM, VNIIEF |
| 9004 | PTB, FM, CSA, SA, FTZU, SEV, BKI, PROCHEM, VNIIEF |
| Marking (GENELEC) | [EEx ia] IIC/IIB |

Technical data

| | |
|----------------------------|--|
| Input circuit | corresponding to selection tables |
| Output circuit | corresponding to selection tables |
| Transfer characteristic | |
| Leakage current with U_N | 1 μ A (if nothing different is specified) |
| Temperature effect | 0,25 %/10 K |
| Short-circuit-proof | (if nothing different is specified) |
| Transmission frequency | 50 kHz (with: $I_m \leq 50$ mA) 100 kHz (with: $I_m > 50$ mA), (with resistive current limitation) 10 kHz (with electronic current limitation) |

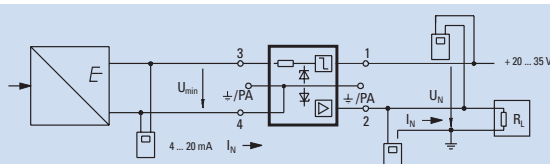
Mechanical data

| | |
|---|--|
| Dimensions | see page 2/7 |
| Casing material | Polyamide 6 GF |
| Weight | 100 g |
| Degree of protection according to IEC 529 | Terminals IP20 Housing IP40 |
| Type of connection | 4 Terminals (cage terminals): max. each 1.5 mm ² flexible or solid core 2 PA-terminals (Ex e version): each 4 mm ² flexible or solid core |

Selection table according to function

Transmitter supply barrier (Field circuit grounded) for intrinsically safe operation of 2-wire-transmitters

| Version | U_Z [V] | I_m [mA] | Ordering code |
|---|-----------|------------|--------------------|
| Analog input, intrinsically safe, for analog, SMART and HART transmitters | 28 | 91 | 9001/51-280-091-14 |
| Analog input, intrinsically safe, for analog and HART transmitters | 28 | 110 | 9001/51-280-110-14 |

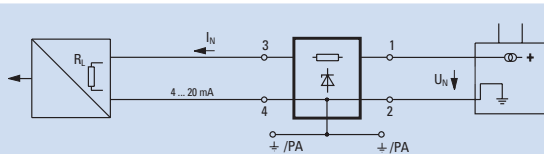


Power supply U_N
Supply voltage for transmitter
 U_{min}
Signal input/output
Load resistance R_L

| |
|---------------------------------------|
| 20 V ... 35 V DC; ≤ 50 mA |
| 9001/51-280-091-14: 14 V |
| 9001/51-280-110-14: 15 V |
| 4 ... 20 mA / 4 ... 20 mA |
| 9001/51-280-091-14: $\leq 350 \Omega$ |
| 9001/51-280-110-14: $\leq 750 \Omega$ |

Analog output 0...22 mA (Field circuit grounded) for intrinsically safe operation of control valves, i/p converters, indicators, etc.

| Version | U_Z [V] | I_m [mA] | Ordering code |
|---|-----------|------------|--------------------|
| Analog output, intrinsically safe, for control valves, i/p converters, indicators | 28 | 110 | 9001/01-280-110-10 |



Rated operating voltage U_N
Signal input/output
Voltage drop through the safety barrier

| |
|---------------------------|
| ≤ 24 V DC |
| 0 ... 22 mA / 0 ... 22 mA |
| 6,5 V |

Additional information is found in list M1 "Safety barriers"



Selection table according to function (continued)

Analog output 0 ... 22 mA (Field circuit floating) for intrinsically safe operation of control valves, i/p converters, indicators, etc.

| Version | U _Z [V] | I _m [mA] | Ordering code |
|---|--------------------|---------------------|---------------------------|
| Analog output, intrinsically safe, for control valves, i/p converters, indicators | 25,2 | 121 | 9002/13-252-121-04 |

Power supply U_N
Signal input/output
Voltage drop through the safety barrier

20 V ... 35 V DC; ≤ 22 mA
0 ... 22 mA / 0 ... 22 mA
8,7 V

Digital input load to "+" (Field circuit grounded) for intrinsically safe operation of contacts

| Version | U _Z [V] | I _m [mA] | Ordering code |
|--|--------------------|---------------------|---------------------------|
| Digital input, intrinsically safe, for contacts, load to + | 25,2 | 57 | 9001/01-252-057-14 |

Power supply U_N
Signal input/output
Voltage drop through the safety barrier

20 V ... 35 V DC; ≤ 40 mA contact / I_N ≤ 40 mA
3 V

Digital input load to ground (Field circuit grounded) for intrinsically safe operation of contacts

| Version | U _Z [V] | I _m [mA] | Ordering code |
|---|--------------------|---------------------|---------------------------|
| Digital input, intrinsically safe, for contacts, load to ground | 25,2 | 60 | 9001/01-252-060-14 |

Power supply U_N
Signal input/output
Voltage drop through the safety barrier

20 V ... 35 V DC contact / I_N ≤ 40 mA
3 V

Digital output load to ground (Field circuit grounded) for intrinsically safe operation of solenoid valves, LED's, etc.

| Version | U _Z [V] | I _m [mA] | Ordering code |
|--|--------------------|---------------------|---------------------------|
| Digital output, intrinsically safe, for solenoid valves, LED to ground | 25,2 | 100 | 9001/01-252-100-14 |

Power supply U_N
Signal input/output

20 V ... 35 V DC contact to "+" / for load to ground
U_L = U_N - 2 V with U_N ≤ 24 V,
U_L = 22 V with U_N > 24 V
258 Ω

Load voltage in no-load operation

Internal resistance

Digital output load to "+" (Field circuit floating) for intrinsically safe operation of solenoid valves, LED's, etc.

| Version | U _Z [V] | I _m [mA] | Ordering code |
|--|--------------------|---------------------|---------------------------|
| Binary output, intrinsically safe, for solenoid valves, LED to "+" | 25,2 | 121 | 9002/13-252-121-04 |

Power supply U_N
Signal input/output

20 V ... 35 V DC contact to "ground" / for load to "+"

Load voltage in no-load operation

Internal resistance

U_L = U_N - 3 V with U_N ≤ 24 V,
U_L = 21 V with U_N > 24 V
256 Ω

Analog input for temperatures (Field circuit floating) for intrinsically safe operation of thermocouples

| Version | U _Z [V] | I _m [mA] | Ordering code |
|--|--------------------|---------------------|---------------------------|
| Analog input, intrinsically safe, for thermocouples and other AC sensors | 9,3 | 300 | 9002/22-093-300-00 |

Rated voltage U_N
Internal resistance
Signal input/output

≤ 6 V_{SS} AC
2 x 80,5 Ω
1:1

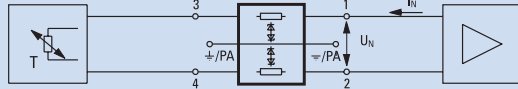
Additional information is found in list M1 "Safety barriers"



Selection table according to function (continued)

Analog input for temperatures (Field circuit floating) for intrinsically safe operation of Pt 100 in 2-wire connection

| Version | U _Z [V] | I _m [mA] | Ordering code |
|--|--------------------|---------------------|---------------------------|
| Analog input, intrinsically safe, for Pt 100 in 2-wire circuit | 3,2 | 300 | 9002/22-032-300-11 |

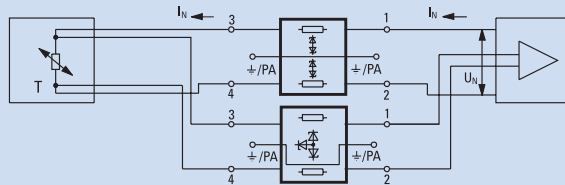


Rated voltage U_N
 Internal resistance
 Signal input/output

≤ 1,4 V_{SS} AC
 2 x 20 Ω ± 0,1 Ω
 1:1

Analog input for temperatures (Field circuit floating) for intrinsically safe operation of Pt 100 in 4-wire connection

| Version | U _Z [V] | I _m [mA] | Ordering code |
|--|--------------------|---------------------|--|
| Analog input, intrinsically safe, for Pt 100 in 4-lead circuit | 12,5 | 340 | 9002/22-032-300-11 9002/22-093-040-00 |

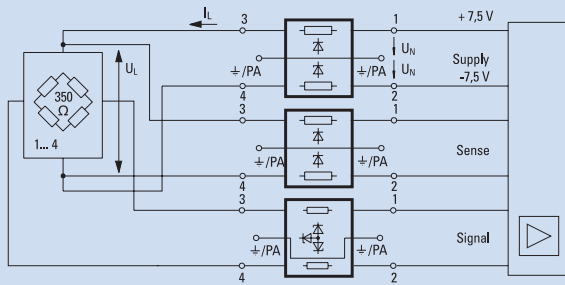


Rated voltage U_N
 Internal resistance, feed circuit
 Internal resistance, measuring circuit
 Signal input/output

≤ 1,4 V_{SS} AC
 2 x 20 Ω ± 0,1 Ω
 2 x 481 Ω
 1:1

Analog input for load cells (Field circuit floating) for intrinsically safe operation of load cells in 6-wire connection

| Version | U _Z [V] | I _m [mA] | Ordering code |
|---|--------------------|---------------------|---|
| Analog input, intrinsically safe, for load cells with balanced supply | 18,7 | 330 | 9002/10-187-270-00 9002/10-187-020-00 9002/22-093-040-00 |

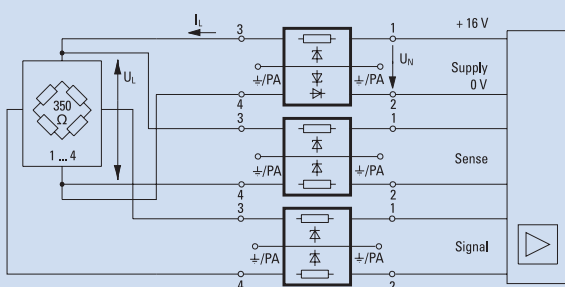


Rated voltage U_N
 Internal resistance, supply circuit
 Internal resistance, sensing circuit
 Internal resistance, signal circuit
 Signal input/output

≤ ± 7,5 V DC
 2 x 46 Ω
 2 x 482 Ω
 2 x 482 Ω
 1:1

Analog input for load cells (Field circuit floating) for intrinsically safe operation of load cells in 6-wire connection

| Version | U _Z [V] | I _m [mA] | Ordering code |
|---|--------------------|---------------------|---|
| Analog input, intrinsically safe, for load cells with DC supply | 19,9 | 285 | 9002/13-199-225-00 9002/11-199-030-00 9002/11-199-030-00 |



Rated voltage U_N
 Internal resistance, supply circuit
 Internal resistance, sensing circuit
 Internal resistance, signal circuit
 Signal input/output

≤ + 16 V DC
 1 x 103 Ω +2 V/I_L
 2 x 1412 Ω
 2 x 1412 Ω
 1:1

Additional information is found in list M1 "Safety barriers"



Selection table according to technical data

Single-channel safety barriers for general applications

| Polarity | U _N [V] | R [Ω] | U _Z [V] | I _m [mA] | Image no. | Ordering code |
|----------|--------------------|----------------------------|--------------------|---------------------|-----------|-----------------------|
| + | 6 | 28 | 8,3 | 442 | 1 | 9001/01-083-442-10 ** |
| + | 6 | 32 | 8,6 | 390 | 1 | 9001/01-086-390-10 ** |
| + | 6 | 70 | 8,6 | 150 | 1 | 9001/01-086-150-10 |
| + | 6 | 206 | 8,6 | 50 | 1 | 9001/01-086-050-10 |
| + | 8 | 98 | 12,6 | 150 | 1 | 9001/01-126-150-10 |
| + | 12 | 55 + 0,7V/I _N * | 15,8 | 390 | 5 | 9001/01-158-390-10 |
| + | 12 | 127 | 15,8 | 150 | 1 | 9001/01-158-150-10 |
| + | 12 | 247 | 16,8 | 75 | 1 | 9001/01-168-075-10 |
| + | 16 | 67 + 0,7V/I _N * | 19,9 | 390 | 5 | 9001/01-199-390-10 |
| + | 16 | 160 | 19,9 | 150 | 1 | 9001/01-199-150-10 |
| + | 16 | 230 | 19,9 | 100 | 1 | 9001/01-199-100-10 |
| + | 16 | 2 V / I _N | 19,9 | 0 | 6 | 9001/03-199-000-10 |
| + | 24 | 124+0,7V/I _N * | 28 | 280 | 5 | 9001/01-280-280-10 |
| + | 24 | 187 | 28 | 165 | 1 | 9001/01-280-165-10 |
| + | 24 | 302 | 28 | 100 | 1 | 9001/01-280-100-10 |
| + | 24 | 356 | 28 | 85 | 1 | 9001/01-280-085-10 |
| + | 24 | 664 | 28 | 50 | 1 | 9001/01-280-050-10 |
| + | 24 | 2 V / I _N | 28 | 0 | 6 | 9001/03-280-000-10 |
| - | 6 | 32 | 8,6 | 390 | 2 | 9001/00-086-390-10 |
| - | 24 | 302 | 28 | 100 | 2 | 9001/00-280-100-10 |
| - | 24 | 356 | 28 | 85 | 2 | 9001/00-280-085-10 |
| ~ | 0,7 | 19 | 1,6 | 150 | 3 | 9001/02-016-150-10 |
| ~ | 0,7 | 20,1 | 1,6 | 150 | 3 | 9001/02-016-150-11 |
| ~ | 0,7 | 40 | 1,6 | 50 | 3 | 9001/02-016-050-11 |
| ~ | 0,7 | 127 | 1,6 | 15 | 3 | 9001/02-016-015-10 |
| ~ | 6 | 34 | 9,3 | 390 | 3 | 9001/02-093-390-10 |
| ~ | 6 | 80 | 9,3 | 150 | 3 | 9001/02-093-150-10 |
| ~ | 6 | 338 | 9,3 | 30 | 3 | 9001/02-093-030-10 |

* I_{N max} = 100 mA ** not short-circuit-proof

Single-channel safety barriers with electronic current limitation for general applications

| Polarity | U _N [V] | R [Ω] | U _Z [V] | I _m [mA] | P _m [mW] | Image no. | Ordering code |
|----------|--------------------|---------------------------|--------------------|---------------------|---------------------|-----------|--------------------|
| + | 12 | 28 + 0,9 V/I _N | 16,8 | 50 | 840 | 4 | 9004/01-168-050-00 |
| + | 23 ... 27 | U _{Load} = 17 V | 20,6 | 50 | 1030 | 4 | 9004/51-206-050-00 |
| + | 24 | 53 + 0,9 V/I _N | 28 | 50 | 1400 | 4 | 9004/01-280-050-00 |
| + | 26 | 72 + 0,9 V/I _N | 28 | 25 | 700 | 4 | 9004/01-315-025-00 |

Selection table according to technical data (continued)

Dual-channel safety barriers for general applications

| Polarity | U_N [V] | R [Ω] | U_Z [V] | I_m [mA] | P_m [mW] | Image no. | Order code |
|----------|---|-----------------------|-----------|------------|------------|-----------|---------------------------|
| + / + | $U_N = 20 \dots 35$ V, digital and analog output for special applications see list M1 | | | | | | 9002/13-280-100-04 |
| + / + | 22,5 / 17,5 | 340 / 440 | 26 / 20 | 87 / 51 | 570 / 260 | 7 | 9002/11-260-138-00 |
| + / + | 24 / 24 | 280 / 2 V/I_N | 28 / 28 | 93 / 0 | 650 / 0 | 9 | 9002/13-280-093-00 |
| + / + | 24 / 24 | 280 / 2 V/I_N | 28 / 28 | 110 / 0 | 770 / 0 | 9 | 9002/13-280-110-00 |
| + / + | 24 / 24 | 2 V/I_N / 2 V/I_N | 28 / 28 | 0 / 0 | 0 / 0 | 11 | 9002/33-280-000-00 |
| + / + | 25 / 25 | 340 / 340 | 28 / 28 | 93 / 93 | 650 / 650 | 7 | 9002/11-280-186-00 |
| + / - | 24 / 24 | 2 V/I_N / 2 V/I_N | 28 / 28 | 0 / 0 | 0 / 0 | - | 9002/34-280-000-00 |
| - / - | 22,5 / 17,5 | 340 / 440 | 26 / 20 | 87 / 51 | 570 / 260 | 8 | 9002/00-260-138-00 |
| ~ / ~ | 9 / 9 | 178 / 178 | 12 / 12 | 80 / 80 | 240 / 240 | 12 | 9002/22-240-160-00 |
| ~ / ~ | 12 / 12 | 118 / 118 | 15 / 15 | 150 / 150 | 560 / 560 | 10 | 9002/77-150-300-00 |
| ~ / ~ | 24 / 24 | 694 / 694 | 28 / 28 | 47 / 47 | 330 / 330 | 10 | 9002/77-280-094-00 |

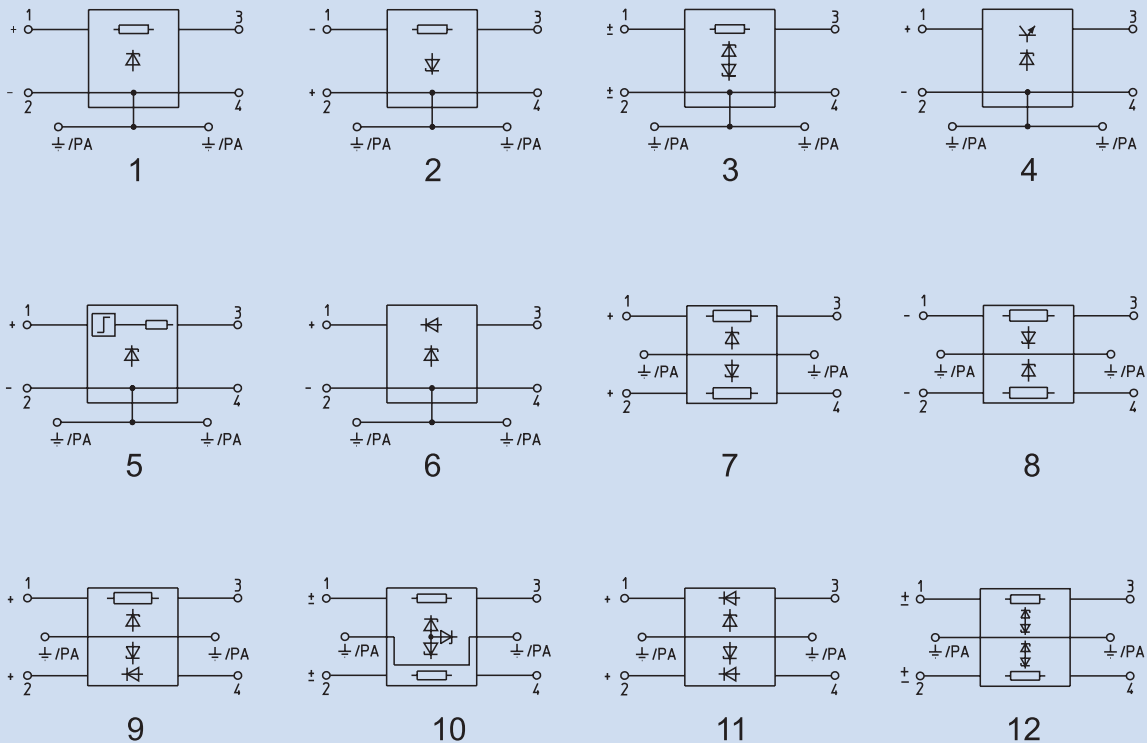
Safe maximum values

| | |
|-------|-------------------------------|
| U_Z | Maximum output voltage |
| I_m | Maximum short-circuit current |
| P_m | Maximum output power |

Functional technical values

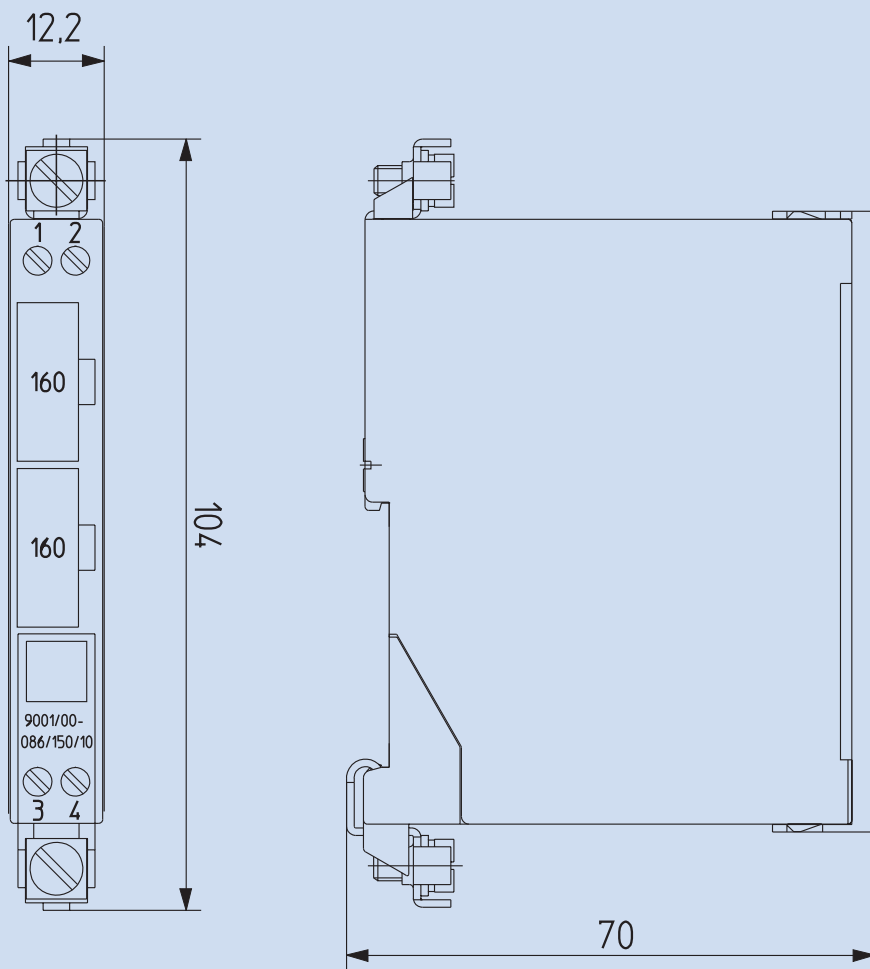
| | |
|-------|-------------------------|
| U_N | Rated operating voltage |
| I_N | Rated current |
| R | End to end resistance |

Block diagrams of the safety barriers



Additional information is found in list M1 "Safety barriers"

Dimensions (all dimensions in mm)



STAHL