

# Safety Barriers



### Safety barriers

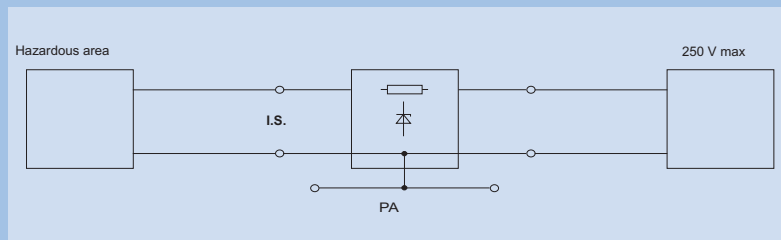
- Exchangeable back-up fuse for all safety barriers
- Snap-on mounting on rails: simultaneous connection to potential equalisation/ground
- Simple selection: application specific single and dual-channel safety barriers for standard uses of the instrumentation
- Extensive program for general applications
- 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 $\mu$ 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)

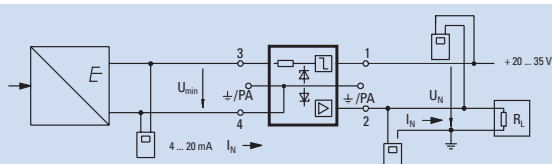
### Mechanical data

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 <sup>2</sup> flexible or solid core 2 PA-terminals (Ex e version): each 4 mm <sup>2</sup> 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

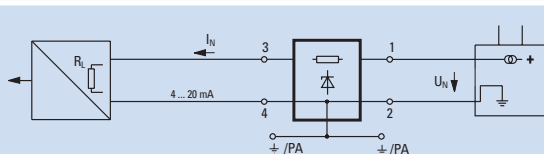


Power supply  $U_N$   
Supply voltage for transmitter  
 $U_{min}$   
Signal input/output  
Load resistance  $R_L$

20 V ... 35 V DC; $\leq 50$ 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

$\leq 24$ 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 <sub>Z</sub> [V]	I <sub>m</sub> [mA]	Ordering code
Analog output, intrinsically safe, for control valves, i/p converters, indicators	25,2	121	<b>9002/13-252-121-04</b>

Power supply U<sub>N</sub>  
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 <sub>Z</sub> [V]	I <sub>m</sub> [mA]	Ordering code
Digital input, intrinsically safe, for contacts, load to +	25,2	57	<b>9001/01-252-057-14</b>

Power supply U<sub>N</sub>  
Signal input/output  
Voltage drop through the safety barrier

20 V ... 35 V DC; ≤ 40 mA contact / I<sub>N</sub> ≤ 40 mA  
3 V

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

Version	U <sub>Z</sub> [V]	I <sub>m</sub> [mA]	Ordering code
Digital input, intrinsically safe, for contacts, load to ground	25,2	60	<b>9001/01-252-060-14</b>

Power supply U<sub>N</sub>  
Signal input/output  
Voltage drop through the safety barrier

20 V ... 35 V DC contact / I<sub>N</sub> ≤ 40 mA  
3 V

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

Version	U <sub>Z</sub> [V]	I <sub>m</sub> [mA]	Ordering code
Digital output, intrinsically safe, for solenoid valves, LED to ground	25,2	100	<b>9001/01-252-100-14</b>

Power supply U<sub>N</sub>  
Signal input/output

20 V ... 35 V DC contact to "+" / for load to ground  
U<sub>L</sub> = U<sub>N</sub> - 2 V with U<sub>N</sub> ≤ 24 V,  
U<sub>L</sub> = 22 V with U<sub>N</sub> > 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 <sub>Z</sub> [V]	I <sub>m</sub> [mA]	Ordering code
Binary output, intrinsically safe, for solenoid valves, LED to "+"	25,2	121	<b>9002/13-252-121-04</b>

Power supply U<sub>N</sub>  
Signal input/output

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

Load voltage in no-load operation

Internal resistance

U<sub>L</sub> = U<sub>N</sub> - 3 V with U<sub>N</sub> ≤ 24 V,  
U<sub>L</sub> = 21 V with U<sub>N</sub> > 24 V  
256 Ω

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

Version	U <sub>Z</sub> [V]	I <sub>m</sub> [mA]	Ordering code
Analog input, intrinsically safe, for thermocouples and other AC sensors	9,3	300	<b>9002/22-093-300-00</b>

Rated voltage U<sub>N</sub>  
Internal resistance  
Signal input/output

≤ 6 V<sub>SS</sub> AC  
2 x 80,5 Ω  
1:1

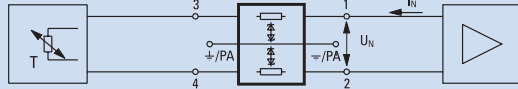
Additional information is found in list M1 "Safety barriers"



### 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 <sub>Z</sub> [V]	I <sub>m</sub> [mA]	Ordering code
Analog input, intrinsically safe, for Pt 100 in 2-wire circuit	3,2	300	<b>9002/22-032-300-11</b>

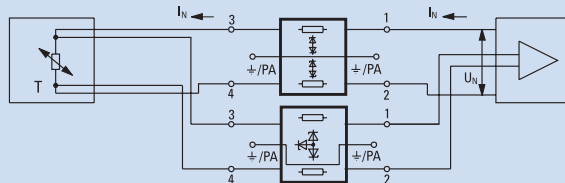


Rated voltage U<sub>N</sub>  
 Internal resistance  
 Signal input/output

≤ 1,4 V<sub>SS</sub> 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 <sub>Z</sub> [V]	I <sub>m</sub> [mA]	Ordering code
Analog input, intrinsically safe, for Pt 100 in 4-lead circuit	12,5	340	<b>9002/22-032-300-11</b> <b>9002/22-093-040-00</b>

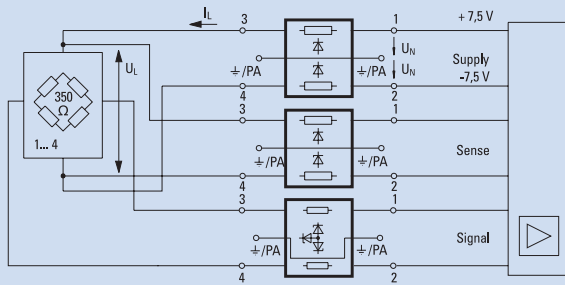


Rated voltage U<sub>N</sub>  
 Internal resistance, feed circuit  
 Internal resistance, measuring circuit  
 Signal input/output

≤ 1,4 V<sub>SS</sub> 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 <sub>Z</sub> [V]	I <sub>m</sub> [mA]	Ordering code
Analog input, intrinsically safe, for load cells with balanced supply	18,7	330	<b>9002/10-187-270-00</b> <b>9002/10-187-020-00</b> <b>9002/22-093-040-00</b>

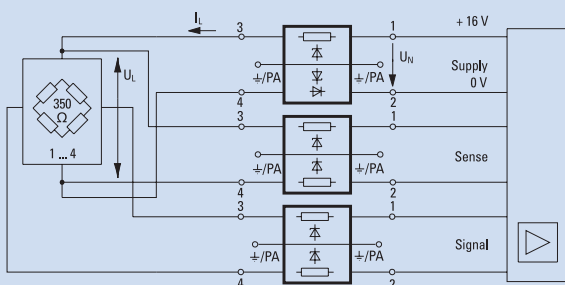


Rated voltage U<sub>N</sub>  
 Internal resistance, supply circuit  
 Internal resistance, sensing circuit  
 Internal resistance, signal circuit  
 Signal input/output

≤ ± 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 <sub>Z</sub> [V]	I <sub>m</sub> [mA]	Ordering code
Analog input, intrinsically safe, for load cells with DC supply	19,9	285	<b>9002/13-199-225-00</b> <b>9002/11-199-030-00</b> <b>9002/11-199-030-00</b>



Rated voltage U<sub>N</sub>  
 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<sub>L</sub>  
 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 <sub>N</sub> [V]	R [Ω]	U <sub>Z</sub> [V]	I <sub>m</sub> [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 <sub>N</sub> *	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 <sub>N</sub> *	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 <sub>N</sub>	19,9	0	6	9001/03-199-000-10
+	24	124+0,7V/I <sub>N</sub> *	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 <sub>N</sub>	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<sub>N max</sub> = 100 mA \*\* not short-circuit-proof

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

Polarity	U <sub>N</sub> [V]	R [Ω]	U <sub>Z</sub> [V]	I <sub>m</sub> [mA]	P <sub>m</sub> [mW]	Image no.	Ordering code
+	12	28 + 0,9 V/I <sub>N</sub>	16,8	50	840	4	9004/01-168-050-00
+	23 ... 27	U <sub>Load</sub> = 17 V	20,6	50	1030	4	9004/51-206-050-00
+	24	53 + 0,9 V/I <sub>N</sub>	28	50	1400	4	9004/01-280-050-00
+	26	72 + 0,9 V/I <sub>N</sub>	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]	$R$ [ $\Omega$ ]	$U_Z$ [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						<b>9002/13-280-100-04</b>
+ / +	22,5 / 17,5	340 / 440	26 / 20	87 / 51	570 / 260	7	<b>9002/11-260-138-00</b>
+ / +	24 / 24	280 / 2 $V/I_N$	28 / 28	93 / 0	650 / 0	9	<b>9002/13-280-093-00</b>
+ / +	24 / 24	280 / 2 $V/I_N$	28 / 28	110 / 0	770 / 0	9	<b>9002/13-280-110-00</b>
+ / +	24 / 24	2 $V/I_N$ / 2 $V/I_N$	28 / 28	0 / 0	0 / 0	11	<b>9002/33-280-000-00</b>
+ / +	25 / 25	340 / 340	28 / 28	93 / 93	650 / 650	7	<b>9002/11-280-186-00</b>
+ / -	24 / 24	2 $V/I_N$ / 2 $V/I_N$	28 / 28	0 / 0	0 / 0	-	<b>9002/34-280-000-00</b>
- / -	22,5 / 17,5	340 / 440	26 / 20	87 / 51	570 / 260	8	<b>9002/00-260-138-00</b>
~ / ~	9 / 9	178 / 178	12 / 12	80 / 80	240 / 240	12	<b>9002/22-240-160-00</b>
~ / ~	12 / 12	118 / 118	15 / 15	150 / 150	560 / 560	10	<b>9002/77-150-300-00</b>
~ / ~	24 / 24	694 / 694	28 / 28	47 / 47	330 / 330	10	<b>9002/77-280-094-00</b>

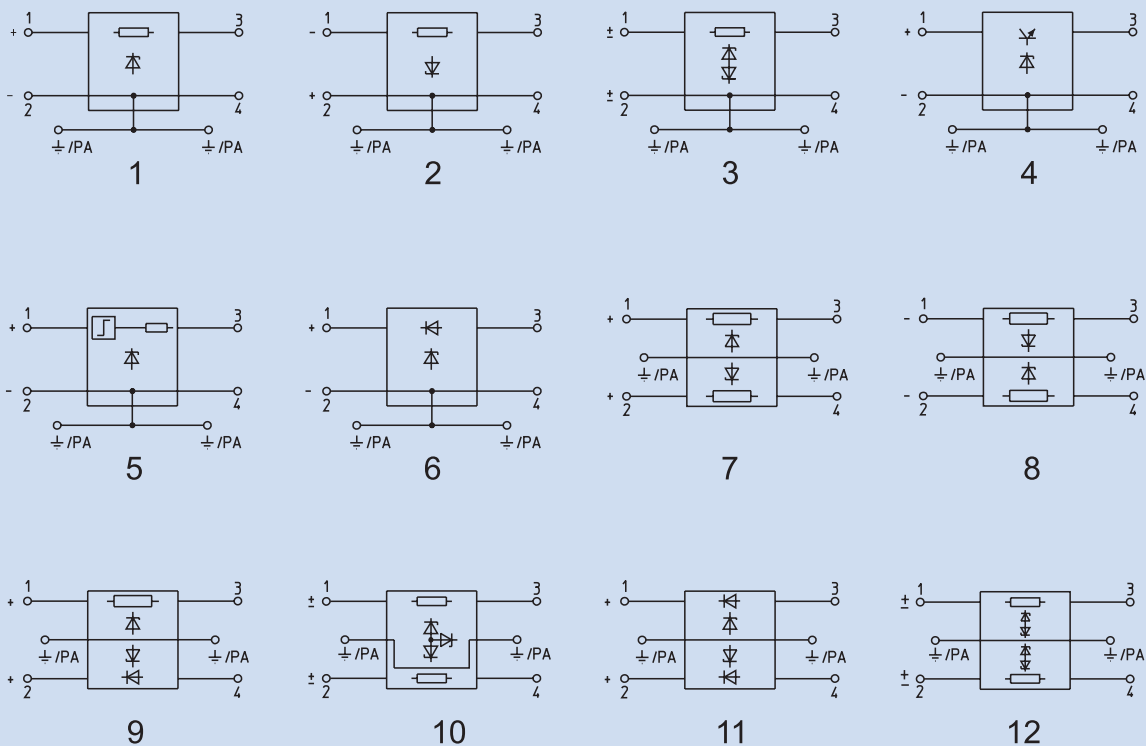
Safe maximum values

$U_Z$  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

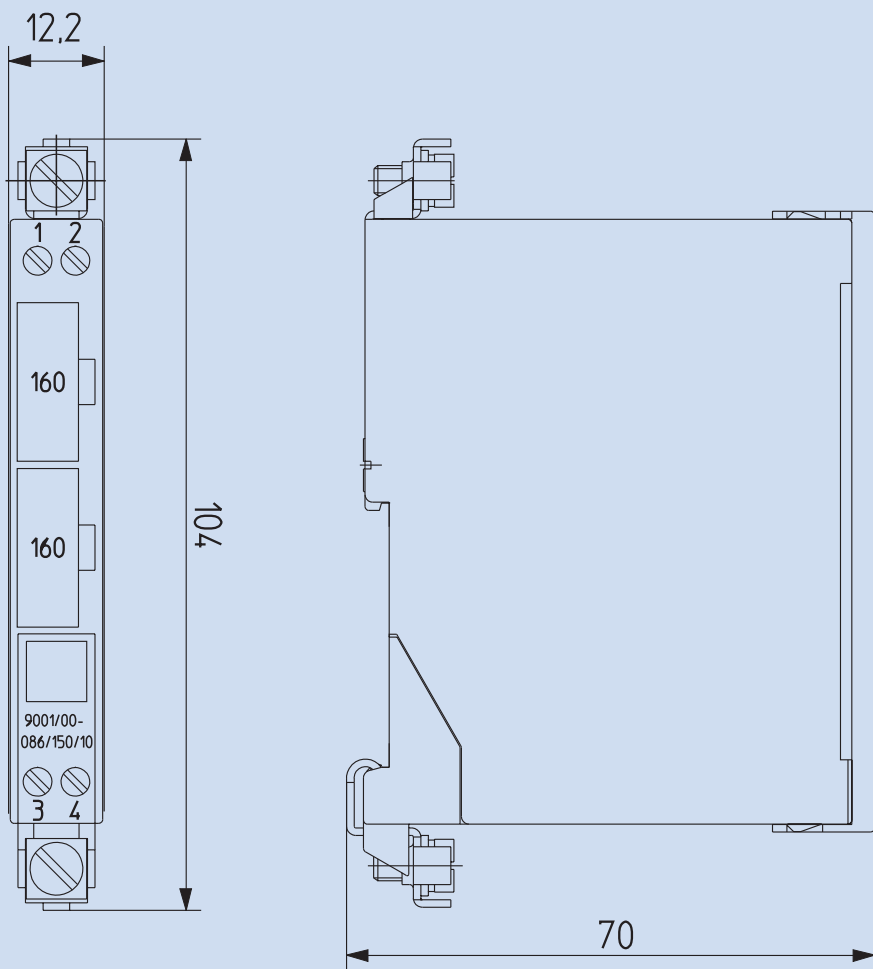
Block diagrams of the safety barriers



Additional information is found in list M1 "Safety barriers"



Dimensions (all dimensions in mm)



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