Two-channel safety barriers
Series 9002

04101E00

- Wide product range for all standard applications of the automation
- Flexible and space-saving – available in single and double channel versions
- Time-saving installation thanks to simultaneous
  - snap-on mounting on rails and
  - connection to PE and earth
- Reduced stock-keeping thanks to a uniform back-up fuse

The R. STAHL INTRINSPAK safety barriers of Series 9002 can be used for various tasks in the field of automation. The wide product range and scope of different combinations offer you a large field of applications.
The safety barriers allow the intrinsically safe operation of HART transmitters, proximity sensors, potential-free contacts, temperature sensors, DMS, solenoid valves, indicators and others. Due to the compact width, space-saving and flexible installation in the switch cabinet is possible. Thanks to DIN-rail mounting and simultaneous connection of the equipotential bonding, the installation can be performed very easily.

	ATEX / IECEX					
Zone	0	1	2	20	21	22
Ex i interface	x	x	x	x	x	x
Installation in			x			x

	NEC 505 Class I			NEC 506		
Zone	0	1	2	20	21	22
Ex i interface						
Installation in			x			x

	NEC 500					
	Class I		Class II		Class III	
Division	1	2	1	2	1	2
Ex i interface	x	x	x	x	x	x
Installation in		x		x*)		x*)

*) For restrictions, see Explosion protection table

WebCode 9002A

Explosion Protection

Global (IECEx)	
Gas and dust	IECEx PTB 08.0057X Ex nA [ia Ga] IIC T4 Gc [Ex ia Da] IIIC
Europe (ATEX)	
Gas and dust	PTB 01 ATEX 2053 X Ⓔx II 3 (1) G Ex nA [ia Ga] IIC/IIB T4 Gc Ⓔx II (1) D [Ex ia Da] IIIC
Certificates	
Certificates	IECEx, ATEX, Canada (CSA), Kazakhstan (operating licence), Russia (GOST R), Serbia (SRPS), Ukraine (TR), USA (FM, UL), Belarus (operating licence)
Further parameters	
Installation	in Zone 2, Division 2 and in safe area
Further information	see respective certificate and operating instructions

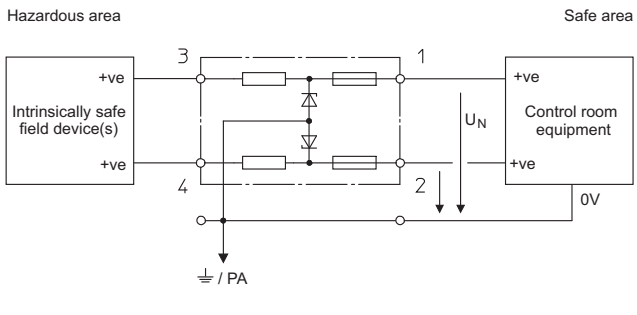
Technical Data

Electrical data	
Transmission characteristic	
Leakage current at U_N	≤ 2 µA (unless specified otherwise)
Temperature influence	≤ 0.25 % / 10 K
Transmission frequency	
In case of resistive current limiting	
I_m ≤ 50 mA	≤ 50 kHz
I_m ≥ 50 mA	≤ 100 kHz
In case of electronic current limiting	≤ 10 kHz
Ambient conditions	
Ambient temperature	-20 ... +60 °C
Storage temperature	-20 ... +75 °C
Maximum relative humidity	95 % on average, no condensation
Mechanical data	
Degree of protection	
	according to IEC 60529
Terminal support	IP20
Enclosure	IP40
Enclosure material	polyamide 6GF
Connection type	4 connection terminals (cage terminals), each maximum 1.5 mm² finely stranded / solid wire 2 PA-terminals, each maximum 4 mm² finely stranded / solid
Weight	approx 0.115 kg

Selection table

Version	Description	Type series	Page
Dual-channel barriers	• Connection to regulated power supply U_N	**9002/11**	A2/4
	• Application for 3-wire NPN, sensors with voltage output • Low nominal current	**9002/11**	A2/6
	• Application for 4/20 mA transmitters with 1-5 V input in the wiper • Incl. precision resistance of 250 Ω	**9002/11**	A2/7
	• Connection to regulated power supply U_N	**9002/00**	A2/8
	• Application for load cells • Channel for positive and negative potential in one module	**9002/10**	A2/9
	• Connection of a resistance teletransmitter is possible • High precision resistance of each channel, 20 Ω ±0.1 • Low temperature influence of < 50 ppm/K • Connection to regulated power supply U_N	**9002/22**	A2/11
	• Connection to regulated power supply U_N	**9002/22**	A2/13
	• Function: Channel 1 current supply Channel 2 evaluation barrier No safety-relevant output current I_o for channel 2 • Connection to unregulated power supply on U_N to channel 1 • Nominal current limited to 35 mA	**9002/13**	A2/14
	• Function: Channel 1 current supply Channel 2 evaluation barrier No safety-relevant output current I_o for channel 2 • Connection to regulated power supply U_N	**9002/13**	A2/16
	• Function: Channel 1 current supply Channel 2 evaluation barrier No safety-relevant output current I_o for channel 2 • Nominal current limited to 40 mA at 250 Ω load • Connection to unregulated power supply on U_N to channel 1	**9002/13**	A2/18
	• Evaluation barrier for direct current signals with max. output current I_o • Suitable for potential-free contacts and floating 4/20 mA signals • Positive potential of both channels	**9002/33**	A2/19
	• Evaluation barrier for direct current signals with max. output current I_o • Application for passive signals of 4/20 mA (transmitter with 4 conductors or more) with insulated analog input on the control system • Channel for positive and negative potential in one module	**9002/34**	A2/20
	• Connection to regulated power supply U_N • Suitable for voltage signals	**9002/77**	A2/21

Two-channel safety barriers, potential: + / +



- Connection to regulated power supply U_N
- Installation permitted in Division 2 and Zone 2

Selection table

Channel	U_N	R_{min}	R_{max}	I_{max}	Safety data							Order number
					U_o	I_o	P_o	IIC		IIB		
	V	Ω	Ω	mA	V	mA	mW	mH	µF	mH	µF	
1	9	1043	1156	7.7	12	12	40	240	1.41	850	9	**9002/11-120-024-001**
2	9	1043	1156	7.7	12	12	40	240	1.41	850	9	
1+2	- -	- -	- -	- -	12	24	70	63	1.1	230	7.1	
1	10	45	52	100	13	321	1040	0.19	1	1.6	6	**9002/11-130-360-001** *)
2	1	45	52	19	1.6	39	16	24	100	91	100	
1+2	- -	- -	- -	- -	13	360	1170	0.17	0.79	1.3	5	
1	10	953	978	10	13.7	14.5	50	160	0.79	560	5	**9002/11-137-029-001**
2	10	953	978	10	13.7	14.5	50	160	0.79	560	5	
1+2	- -	- -	- -	- -	13.7	29	100	43	0.67	160	4.18	
1	16	1423	1576	10	19.9	15	75	160	0.223	560	1.42	**9002/11-199-030-001**
2	16	1423	1576	10	19.9	15	75	160	0.223	560	1.42	
1+2	- -	- -	- -	- -	19.9	30	150	40	0.223	150	1.42	
1	22.5	321	358	62	26	87	570	2.7	0.099	15.4	0.77	**9002/11-260-138-001**
2	17.5	416	463	37	20	51	260	14	0.22	54	1.41	
1+2	- -	- -	- -	- -	26	138	850	0.81	0.087	5.1	0.67	
1	25	321	358	69	28	93	650	2	0.083	13	0.65	**9002/11-280-186-001**
2	25	321	358	69	28	93	650	2	0.083	13	0.65	
1+2	- -	- -	- -	- -	28	186	1300	- -	- -	2.8	0.551	
1	25	321	358	69	28	89	630	2.2	0.083	14	0.65	**9002/11-280-293-001**
2	6	59	68	88	9.6	180	430	0.6	3.6	5	26	
1+2	- -	- -	- -	- -	28	269	1050	- -	- -	0.56	0.62	

*) max. leakage current $I_{leak} \leq 10$ µA

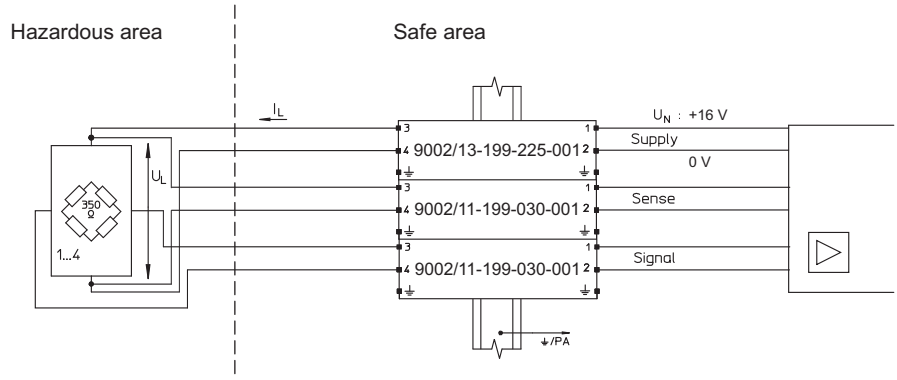
Functional data and safety-relevant maximum values

U_N	Nominal voltage	I_{max}	Maximum output current	P_o	Maximum power
R_{min}	Minimum resistance of the safety barrier	U_o	Maximum voltage	L_o	max. permissible external inductance
R_{max}	Maximum resistance of the safety barrier	I_o	Maximum current	C_o	max. permissible external capacity

Application case

Load cell (DMS) 350 Ω or 700 Ω
6 conductors + 16 V, field circuit unearthed

Schematic



09963E01

Operating data

Operating voltage	$U_N \leq +16$ V
Voltage for load cell and electric line	U_L (at $U_N = +16$ V)
Current for load cell	I_L (at $U_N = +16$ V)

Number of the load cells connected in parallel	350 Ω		700 Ω	
	U_L (V)	I_{mA} (V)	U_L (V)	I_{mA} (V)
1	10.4	30	12.1	17
2	8.3	47	10.4	30
3	6.9	60	9.5	41
4	5.9	67	8.3	47

Safety data

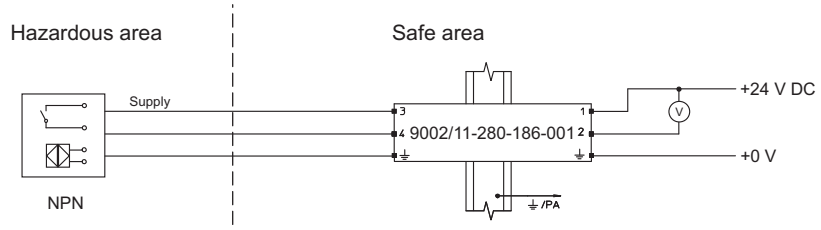
Maximum voltage	$U_o = 19.9$ V		
Maximum current	$I_o = 285$ mA		
Maximum permissible external inductance	L_o	IIC 0.2 mH	IIB 1.8 mH
Maximum permissible external capacity	C_o	IIC 0.223 µF	IIB 1.42 µF
Maximum power	$P_o = 1.42$ W		

Application note

For 4-wire circuits (without sense) the respective safety barrier might be unnecessary. The operating data remains unchanged. The safety-relevant maximum current is reduced to $I_o = 255$ mA, the maximum power to $P_o = 1.3$ W.

3-wire NPN inputs (negative switching) of proximity switches, photocells and encoders

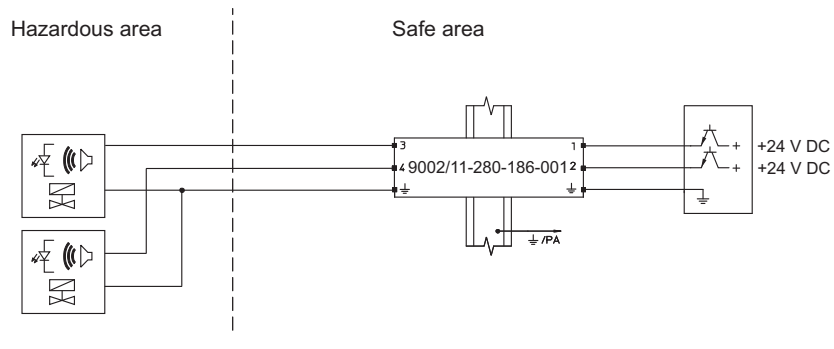
Schematic



06601E01

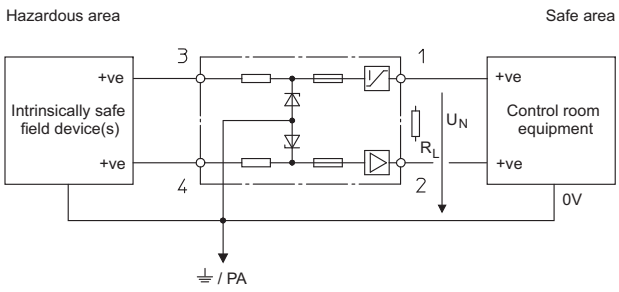
Discrete 2-wire output for solenoid valves, LEDs and signalling devices

Schematic



06606E01

Two-channel safety barriers, potential: + / +



- Application for 3-wire NPN, sensors with voltage output
- Low nominal current
- Installation permitted in Division 2 and Zone 2

Selection table

Channel	U_N	R_{min}	R_{max}	I_{max}	Safety data							Order number
					U_o	I_o	P_o	IIC		IIB		
								L_o	C_o	L_o	C_o	
	V	Ω	Ω	mA	V	mA	mW	mH	µF	mH	µF	
1	24	264	296	91	28	109	760	1.3	0.083	9	0.65	**9002/11-280-112-001**
2	24	11979	12221	2	28	3	20	50	0.083	150	0.65	
1+2	- -	- -	- -	- -	28	112	780	0.76	0.065	84	0.551	

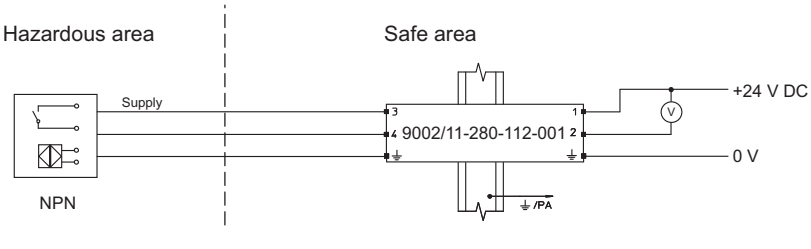
Functional data and safety-relevant maximum values

U_N	Nominal voltage	I_{max}	Maximum output current	P_o	Maximum power
R_{min}	Minimum resistance of the safety barrier	U_o	Maximum voltage	L_o	max. permissible external inductance
R_{max}	Maximum resistance of the safety barrier	I_o	Maximum current	C_o	max. permissible external capacity

Application case

3-wire NPN inputs (negative switching) of proximity switches, photocells and encoders

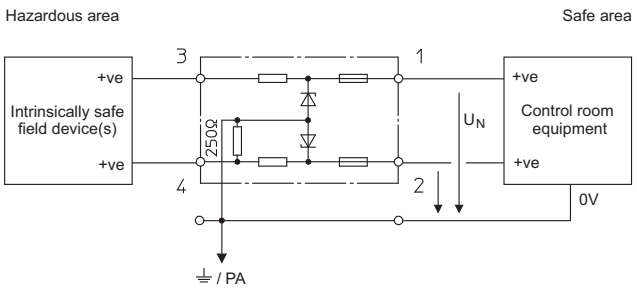
Schematic



Application note

With this barrier all loop voltages must be checked to ensure correct function.

Two-channel safety barriers, potential: + / +



05824E01

- Application for 4/20 mA transmitter with 1-5 V input in the wiper
- Incl. precision resistance of 250 Ω
- Installation permitted in Division 2 and Zone 2

Selection table

Channel	U_N	R_{min}	R_{max}	I_{max}	Safety data							Order number
					U_o	I_o	P_o	IIC		IIB		
								L_o	C_o	L_o	C_o	
	V	Ω	Ω	mA	V	mA	mW	mH	µF	mH	µF	
1	25	321	358	69	28	89	630	2.2	0.083	14	0.65	**9002/11-280-293-021**
2	6	59	68	88	9.6	180	430	0.6	3.6	5	26	
1+2	- -	- -	- -	- -	28	269	1050	- -	- -	0.56	0.62	

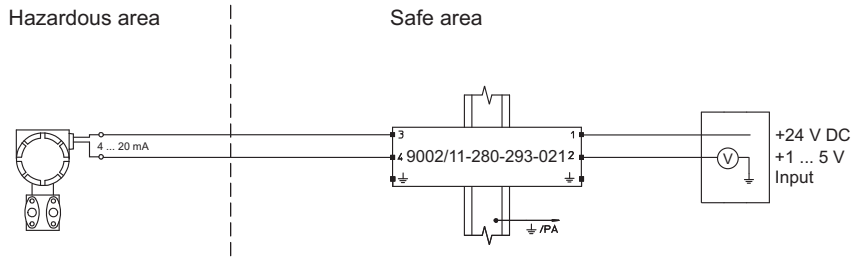
Functional data and safety-relevant maximum values

U_N	Nominal voltage	I_{max}	Maximum output current	P_o	Maximum power
R_{min}	Minimum resistance of the safety barrier	U_o	Maximum voltage	L_o	max. permissible external inductance
R_{max}	Maximum resistance of the safety barrier	I_o	Maximum current	C_o	max. permissible external capacity

Application case

2-wire, 4/20 mA transmitters - standard and HART

Schematic

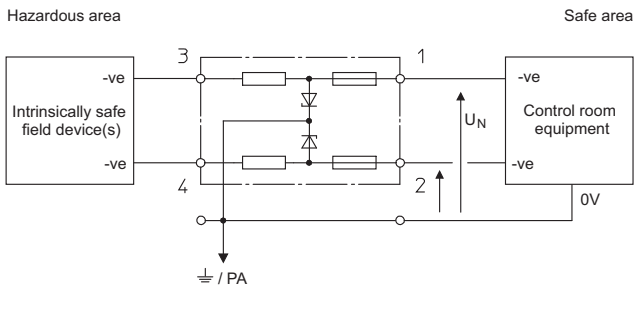


11332E01

Application note

This safety barrier is used if the automation system only accepts signals from 1 to 5 V.
This barrier contains a 250 Ω resistor to convert the signal 1 ... 5 V.

Two-channel safety barriers, potential: - / -



- Connection to regulated power supply U_N
- Installation permitted in Division 2 and Zone 2

Selection table

Channel	U_N	R_{min}	R_{max}	I_{max}	Safety data							Order number
					U_o	I_o	P_o	IIC		IIB		
								L_o	C_o	L_o	C_o	
	V	Ω	Ω	mA	V	mA	mW	mH	µF	mH	µF	
1	9	1043	1156	7.7	12	12	40	240	1.41	850	9	**9002/00-120-024-001**
2	9	1043	1156	7.7	12	12	40	240	1.41	850	9	
1+2	- -	- -	- -	- -	12	24	70	63	1.1	230	7.1	
1	22.5	321	358	62	26	87	540	2.7	0.099	15.4	0.77	**9002/00-260-138-001**
2	17.5	416	463	37	20	51	245	14	0.22	54	1.41	
1+2	- -	- -	- -	- -	26	138	785	0.81	0.087	5.1	0.67	
1	25	321	358	69	28	93	650	2	0.083	13	0.65	**9002/00-280-186-001**
2	25	321	358	69	28	93	650	2	0.083	13	0.65	
1+2	- -	- -	- -	- -	28	186	1300	- -	- -	2.8	0.551	

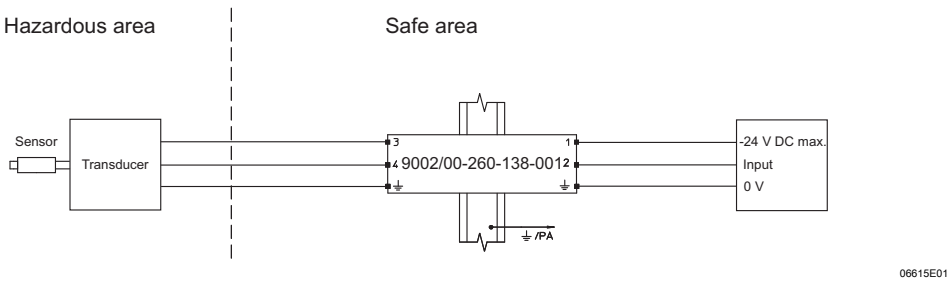
Functional data and safety-relevant maximum values

U_N	Nominal voltage	I_{max}	Maximum output current	P_o	Maximum power
R_{min}	Minimum resistance of the safety barrier	U_o	Maximum voltage	L_o	max. permissible external inductance
R_{max}	Maximum resistance of the safety barrier	I_o	Maximum current	C_o	max. permissible external capacity

Application case

Vibration sensor

Schematic



Operating data

Operating voltage	U_N = - 24V
Series resistance of the safety barrier	R = 358 Ω

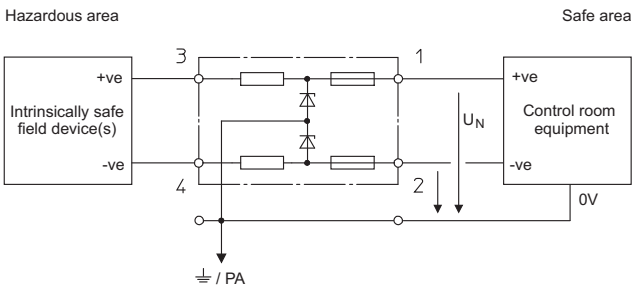
Safety data

Maximum voltage	U_o = 26 V		
Maximum current	I_o = 138 mA		
Maximum permissible external inductance	L_o	IIC 0.81 mH	IIB 5.1 mH
Maximum permissible external capacity	C_o	IIC 0.087 µF	IIB 0.67 µF
Maximum power	P_o = 850 mW		

Application note

Application of the barrier for Bentley Nevada and Metrix position transducer. This barrier has negative potential; for a positive potential, use the barrier 9002/11-260-138-001.

Two-channel safety barriers, potential: + / -



05821E01

- Application for load cells
- Channel for positive and negative potential in one module
- Installation permitted in Division 2 and Zone 2

Selection table

Channel	U_N	R_{min}	R_{max}	I_{max}	Safety data							Order number
					U_o	I_o	P_o	IIC		IIB		
								L_o	C_o	L_o	C_o	
	V	Ω	Ω	mA	V	mA	mW	mH	µF	mH	µF	
1	6	490	543	11	9.33	20	50	90	3.9	330	29	**9002/10-187-020-001**
2	6	490	543	11	9.33	20	50	90	3.9	330	29	
1+2	- -	- -	- -	- -	18.7	20	90	90	0.27	330	1.64	
1	6	42	49	122	9.33	270	630	0.23	3.9	2.2	29	**9002/10-187-270-001**
2	6	42	49	122	9.33	270	630	0.23	3.9	2.2	29	
1+2	- -	- -	- -	- -	18.7	270	1260	0.23	0.27	2.2	1.64	

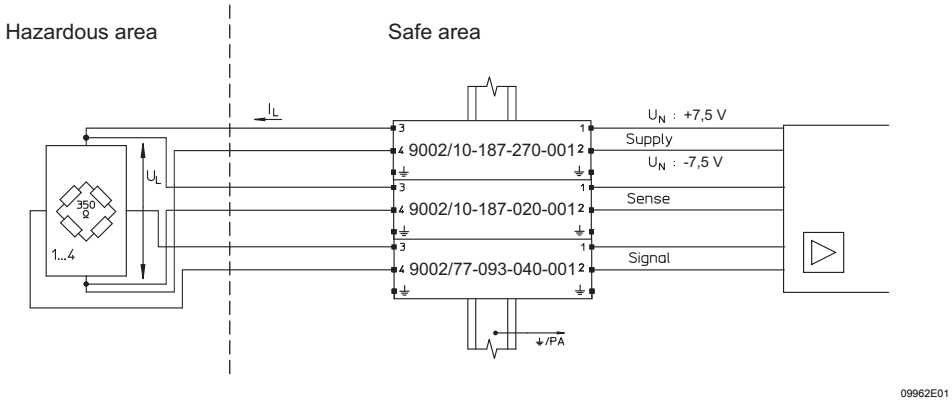
Functional data and safety-relevant maximum values

U_N	Nominal voltage	I_{max}	Maximum output current	P_o	Maximum power
R_{min}	Minimum resistance of the safety barrier	U_o	Maximum voltage	L_o	max. permissible external inductance
R_{max}	Maximum resistance of the safety barrier	I_o	Maximum current	C_o	max. permissible external capacity

Application case

Load cell (DMS) 350 Ω or 700 Ω
6 conductors +/- 7.5 V (15 V), field circuit unearthed

Schematic



Operating data

Operating voltage	$U_N \leq$ +/- 7.5 V (15 V)
Voltage for load cell and electric line	U_L (at $U_N \leq$ +/- 7.5 V)
Current for load cell	I_L (at $U_N \leq$ +/- 7.5 V)

Number of the load cells connected in parallel	350 Ω		700 Ω	
	U_L (V)	I_{mA} (V)	U_L (V)	I_{mA} (V)
1	11.6	35	13.2	19
2	9.6	55	11.6	35
3	8	70	10.6	45
4	7	80	9.6	55

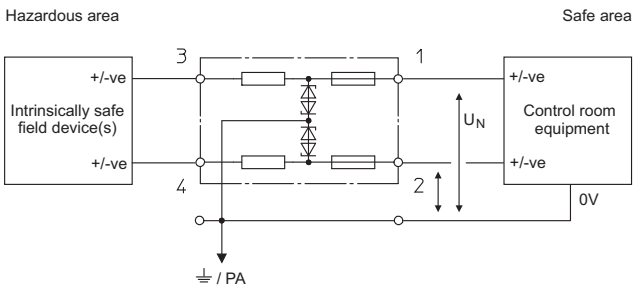
Safety data

Maximum voltage	U_o = 18.7 V		
Maximum current	I_o = 330 mA		
Maximum permissible external inductance	L_o	IIC 0.18 mH	IIB 1.45 mH
Maximum permissible external capacity	C_o	IIC 0.27 µF	IIB 1.64 µF
Maximum power	P_o = 1.45 W		

Application note

For 4-wire circuits (without sense) the respective safety barrier might be unnecessary. The operating data remains unchanged. The safety-relevant maximum current is reduced to I_o = 310 mA, the maximum power to P_o = 1.36 W.

Two-channel safety barriers, potential: ~ / ~



05835E01

- Connection of a resistance teletransmitter is possible
- High precision resistance of each channel, 20 Ω ±0.1
- Low temperature influence of < 50 ppm/K
- Connection to regulated power supply U_N
- Installation permitted in Division 2 and Zone 2

Selection table

Channel	U_N	R_{min}	R_{max}	I_{max}	Safety data							Order number
					U_o	I_o	P_o	IIC		IIB		
								L_o	C_o	L_o	C_o	
	V	Ω	Ω	mA	V	mA	mW	mH	µF	mH	µF	
1	0.7	19.9	20.1	33	1.6	150	60	1.3	100	7	1000	**9002/22-032-300-111** *)
2	0.7	19.9	20.1	33	1.6	150	60	1.3	100	7	1000	
1+2	1.4	- -	- -	- -	3.2	300	120	0.2	100	1.8	1000	

*) max. leakage current $I_{leak} \leq 10$ µA

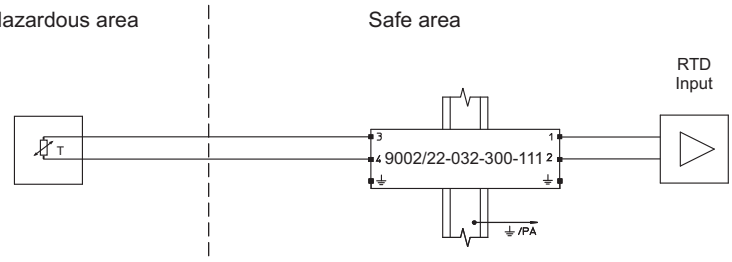
Functional data and safety-relevant maximum values

U_N	Nominal voltage	I_{max}	Maximum output current	P_o	Maximum power
R_{min}	Minimum resistance of the safety barrier	U_o	Maximum voltage	L_o	max. permissible external inductance
R_{max}	Maximum resistance of the safety barrier	I_o	Maximum current	C_o	max. permissible external capacity

Application case

Pt100, 2-wire circuit, field circuit unearthed

Schematic



09959E01

Operating data

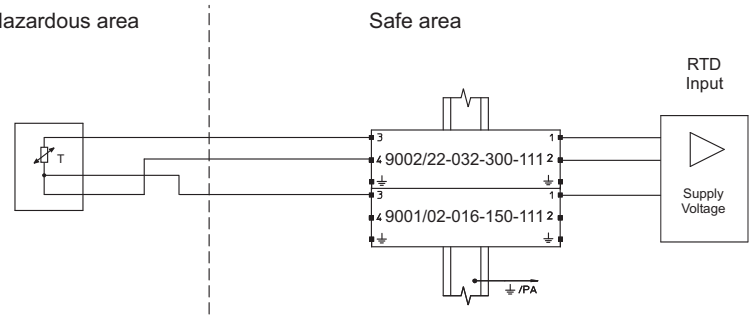
Operating voltage	$U_N \leq 1.4$ V		
Series resistance of the safety barrier	R = 2 x (20 Ω +/- 0.1 Ω)		
Measuring range	≤ 400 °C ($I_N \leq 5$ mA) ≤ 850 °C ($I_N \leq 3$ mA)		

Safety data

Maximum voltage	$U_o = 3.2$ V		
Maximum current	$I_o = 300$ mA		
Maximum permissible external inductance	L_o	IIC 0.2 mH	IIB 1.8 mH
Maximum permissible external capacity	C_o	IIC 100 µF	IIB 1000 µF

Pt100, 3-wire circuit, field circuit unearthed

Schematic



09960E01

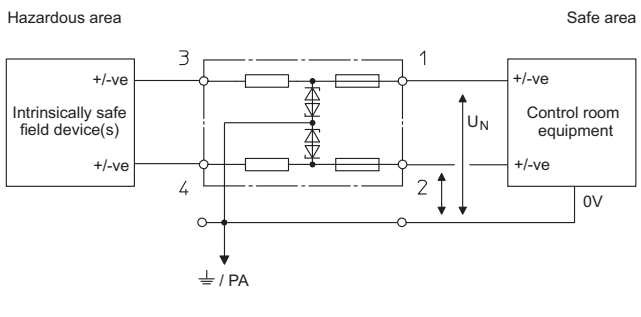
Operating data

Operating voltage	$U_N \leq 1.4$ V		
Series resistance of the safety barrier	R = 2 x (20 Ω +/- 0.1 Ω)		
Measuring range	≤ 400 °C ($I_N \leq 5$ mA) ≤ 850 °C ($I_N \leq 3$ mA)		

Safety data

Maximum voltage	$U_o = 3.2$ V		
Maximum current	$I_o = 450$ mA		
Maximum permissible external inductance	L_o	IIC 0.12 mH	IIB 0.5 mH
Maximum permissible external capacity	C_o	IIC 100 µF	IIB 1000 µF

Two-channel safety barriers, potential: ~ / ~



- Connection to regulated power supply U_N
- Installation permitted in Division 2 and Zone 2

Selection table

Channel	U_N	R_{min}	R_{max}	I_{max}	Safety data							Order number
					U_o	I_o	P_o	IIC		IIB		
								L_o	C_o	L_o	C_o	
	V	Ω	Ω	mA	V	mA	mW	mH	µF	mH	µF	
1	5.5	84	95	57	7.9	100	198	4	8.8	15	115	**9002/22-158-200-001**
2	5.5	84	95	57	7.9	100	198	4	8.8	15	115	
1+2	11	- -	- -	- -	15.8	200	395	0.5	0.478	4	2.88	
1	9	1043	1156	7.7	12	12	40	240	1.41	850	9	**9002/22-240-024-001**
2	9	1043	1156	7.7	12	12	40	240	1.41	850	9	
1+2	18	- -	- -	- -	24	24	80	41	0.125	145	0.93	
1	9	158	177	50	12	80	240	6	1.41	22	9	**9002/22-240-160-001**
2	9	158	177	50	12	80	240	6	1.41	22	9	
1+2	18	- -	- -	- -	24	160	480	0.7	0.125	4	0.93	

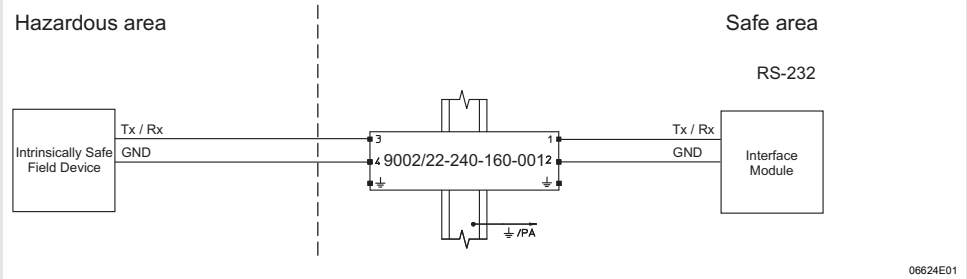
Functional data and safety-relevant maximum values

U_N	Nominal voltage	I_{max}	Maximum output current	P_o	Maximum power
R_{min}	Minimum resistance of the safety barrier	U_o	Maximum voltage	L_o	max. permissible external inductance
R_{max}	Maximum resistance of the safety barrier	I_o	Maximum current	C_o	max. permissible external capacity

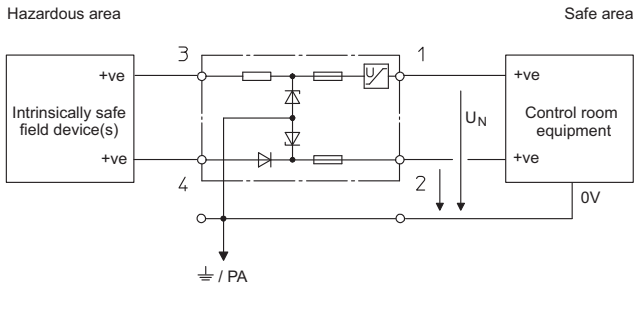
Application case

with RS 232

Schematic



Two-channel safety barriers, safety barrier potential: + / evaluation barrier potential: +



- Function:
  Channel 1 current supply
  Channel 2 evaluation barrier
  No safety-relevant output current I_o for channel 2
- Nominal current limited to 40 mA at 250 Ω load
- Connection to unregulated power supply on U_N to channel 1
- Installation permitted in Division 2 and Zone 2

Selection table

Channel	U_N	R_{min}	R_{max}	I_{max}	ΔU	Safety data							Order number
						U_o	I_o	P_o	IIC		IIB		
									L_o	C_o	L_o	C_o	
	V	Ω	Ω	mA	V	V	mA	mW	mH	µF	mH	µF	
1	20 - 35	216	243	86	- -	25.2	118	740	1.3	0.107	7.4	0.82	**9002/13-252-121-041** *)
2	22	- -	- -	- -	3.5	25.2	0	20	50	0.107	150	0.82	
1+2	- -	- -	- -	- -	- -	25.2	121	760	1.25	0.104	7.35	0.8	

*) only for channel 1: leakage current at 24 V / 35 V $I_{leak} \leq$ 1 mA / 10 mA

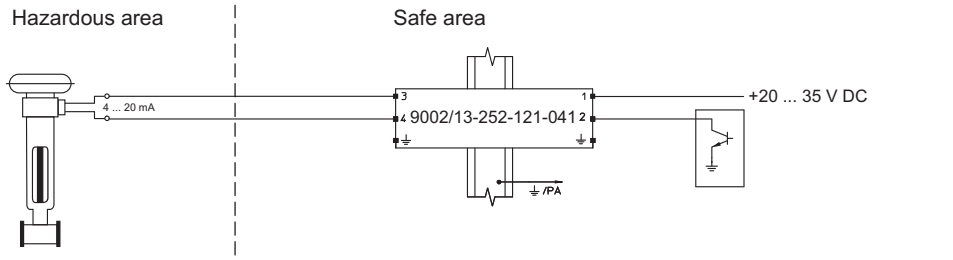
Functional data and safety-relevant maximum values

U_N	Nominal voltage	ΔU	Additional voltage drop across the safety barrier	L_o	max. permissible external inductance
R_{min}	Minimum resistance of the safety barrier	U_o	Maximum voltage	C_o	max. permissible external capacity
R_{max}	Maximum resistance of the safety barrier	I_o	Maximum current		
I_{max}	Maximum output current	P_o	Maximum power		

Application case

Analog output (current source) for I/P converter etc., field circuit unearthed

Schematic



Operating data

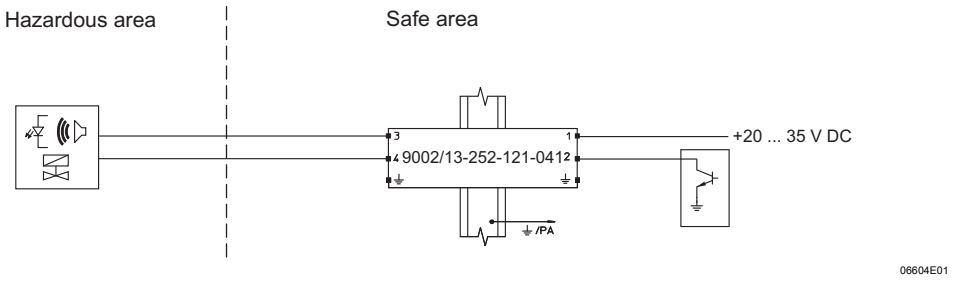
Operating voltage	U_N = + 20 ... 35 V		
Operating current	I_N = 0 ... 22 mA		
Maximum voltage drop at the safety barrier	ΔU_{max} (8.9 V		

Safety data

Maximum voltage	U_o = 25.2 V		
Maximum current	I_o = 121 mA		
Maximum permissible external inductance	L_o	IIC 1.25 mH	IIB 7.35 mH
Maximum permissible external capacity	C_o	IIC 0.104 µF	IIB 0.8 µF
Maximum power	P_o = 763 mW		

Analog output (current source) for I/P converter etc., field circuit unearthed

Schematic



Operating data

Operating voltage	U_N = + 20 ... 35 V		
Open-circuit output voltage (terminal 3 4, I_n = 0)	U_L)	U_N (24 V U_N - 3.5 V	U_N > 24 V 21 V
Operating current	$I_N = U_L / 243\ \Omega + R_L$		

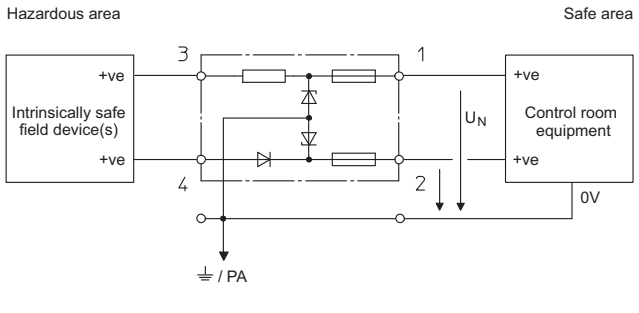
Safety data

Maximum voltage	U_o = 25.2 V		
Maximum current	I_o = 121 mA		
Maximum permissible external inductance	L_o	IIC 1.25 mH	IIB 7.35 mH
Maximum permissible external capacity	C_o	IIC 0.104 µF	IIB 0.8 µF
Maximum power	P_o = 760 mW		

Application note

This safety barrier is used if the automation system activates the analog output signal in the return (negative) line. The field device and automation system are not earthed and unregulated power supply can be used.

Two-channel safety barriers, safety barrier potential: + / evaluation barrier potential: +



- Function:
  Channel 1 current supply
  Channel 2 evaluation barrier
  No safety-relevant output current I_o for channel 2
- Connection to regulated power supply U_N
- Installation permitted in Division 2 and Zone 2

Selection table

Channel	U_N	R_{min}	R_{max}	I_{max}	ΔU	Safety data							Order number
						U_o	I_o	P_o	IIC		IIB		
									L_o	C_o	L_o	C_o	
	V	Ω	Ω	mA	V	V	mA	mW	mH	µF	mH	µF	
1	16	95	108	148	- -	19.9	222	1100	0.39	0.223	3.18	1.42	**9002/13-199-225-001** *)
2	16	- -	- -	- -	2	19.9	3	15	1000	0.223	1000	1.42	
1+2	- -	- -	- -	- -	- -	19.9	225	1120	0.37	0.213	3.15	1.38	
1	24	321	358	67	- -	28	90	630	2.2	0.083	14	0.65	**9002/13-280-093-001**
2	24	- -	- -	- -	2	28	3	21	50	0.083	150	0.65	
1+2	- -	- -	- -	- -	- -	28	93	651	2	0.08	13	0.636	
1	24	269	290	82	- -	28	107	749	1.35	0.083	9.6	0.65	**9002/13-280-110-001**
2	24	- -	- -	- -	2	28	3	21	50	0.083	150	0.65	
1+2	- -	- -	- -	- -	- -	28	110	770	1.25	0.08	9	0.635	

*) only for channel 2: max. leakage current $I_{leak} \leq 10$ µA

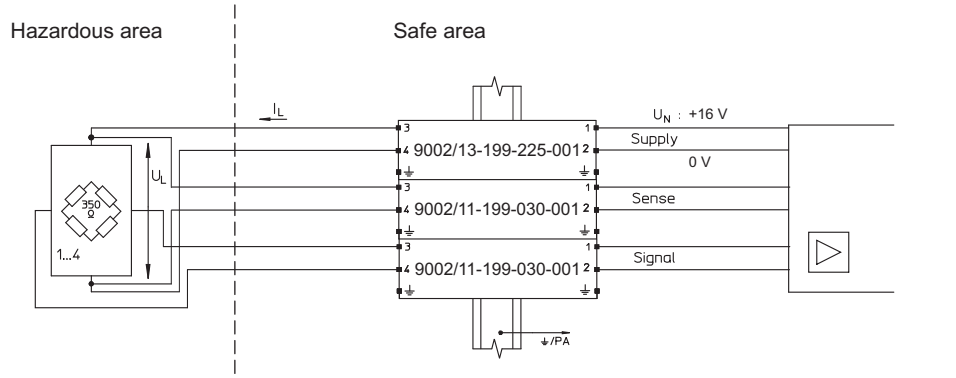
Functional data and safety-relevant maximum values

U_N	Nominal voltage	ΔU	Additional voltage drop across the safety barrier	L_o	max. permissible external inductance
R_{min}	Minimum resistance of the safety barrier	U_o	Maximum voltage	C_o	max. permissible external capacity
R_{max}	Maximum resistance of the safety barrier	I_o	Maximum current		
I_{max}	Maximum output current	P_o	Maximum power		

Application case

Load cell (DMS) 350 Ω or 700 Ω
6 conductors + 16 V, field circuit unearthed

Schematic



09963E01

Operating data

Operating voltage	$U_N \leq +16$ V
Voltage for load cell and electric line	U_L (at $U_N = +16$ V)
Current for load cell	I_L (at $U_N = +16$ V)

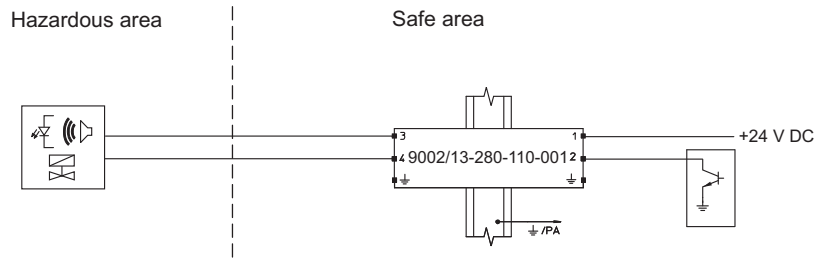
Number of the load cells connected in parallel	350 Ω		700 Ω	
	U_L (V)	I_{mA} (V)	U_L (V)	I_{mA} (V)
1	10.4	30	12.1	17
2	8.3	47	10.4	30
3	6.9	60	9.5	41
4	5.9	67	8.3	47

Safety data

Maximum voltage	$U_o = 19.9$ V		
Maximum current	$I_o = 285$ mA		
Maximum permissible external inductance	L_o	IIC 0.2 mH	IIB 1.8 mH
Maximum permissible external capacity	C_o	IIC 0.223 µF	IIB 1.42 µF
Maximum power	$P_o = 1.42$ W		
Application note	For 4-wire circuits (without sense) the respective safety barrier might be unnecessary. The operating data remains unchanged. The safety-relevant maximum current is reduced to $I_o = 255$ mA, the maximum power to $P_o = 1.3$ W.		

Discrete 2-wire output for solenoid valves, LEDs and signalling devices

Schematic



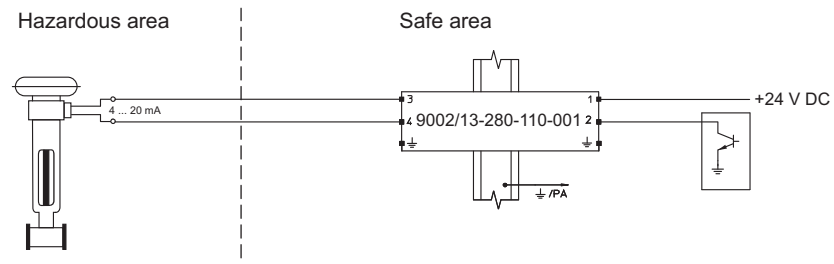
06605E01

Application note

This barrier is suitable for use with regulated power supplies and earthed return circuits. The nominal voltage is 24 V.

2-wire 4/20 mA I/P converters and control valves - standard and HART, 4/20 mA indicators

Schematic

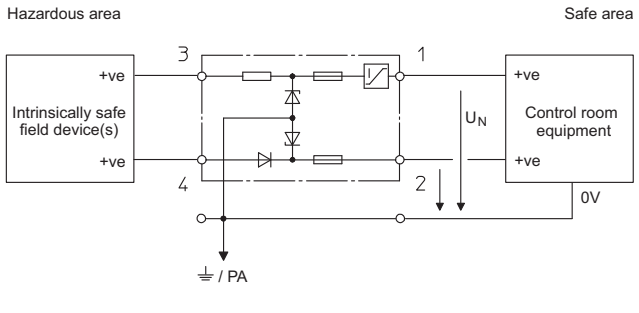


11334E01

Application note

This safety barrier is used if the automation system activates the analog output signal in the return (negative) line. The field device and automation system are not earthed and a regulated power supply must be used. At an operating current of 0 ... 22 mA, the maximum voltage drop across the barrier will be 8.4 V.

Two-channel safety barriers, safety barrier potential: + / evaluation barrier potential: +



- Function:
  Channel 1 current supply
  Channel 2 evaluation barrier
  No safety-relevant output current I_o for channel 2
- Connection to unregulated power supply on U_N to channel 1
- Nominal current limited to 35 mA
- Installation permitted in Division 2 and Zone 2

Selection table

Channel	U_N	R_{min}	R_{max}	I_{max}	ΔU	Safety data							Order number
						U_o	I_o	P_o	IIC		IIB		
									L_o	C_o	L_o	C_o	
	V	Ω	Ω	mA	V	V	mA	mW	mH	µF	mH	µF	
1	20 - 35	292	327	52	- -	28	97	679	1.8	0.083	12	0.65	**9002/13-280-100-041** *)
2	26	- -	- -	- -	3.5	28	0	21	50	0.083	150	0.65	
1+2	- -	- -	- -	- -	- -	28	100	700	1.55	0.08	11	0.635	

*) only for channel 1: leakage current < 26 V / > 26 V $I_{leak} \leq$ 1 mA / 35 mA

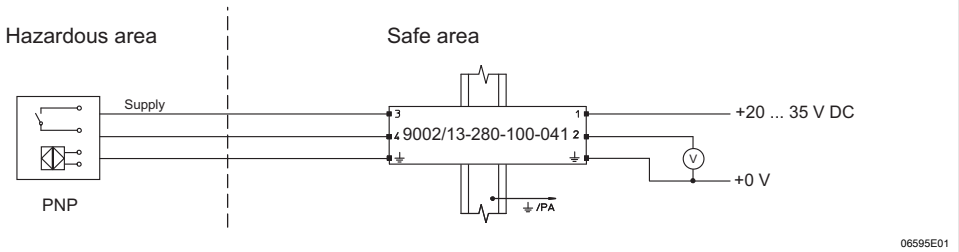
Functional data and safety-relevant maximum values

U_N	Nominal voltage	ΔU	Additional voltage drop across the safety barrier	L_o	max. permissible externa l inductance
R_{min}	Minimum resistance of the safety barrier	U_o	Maximum voltage	C_o	max. permissible external capacity
R_{max}	Maximum resistance of the safety barrier	I_o	Maximum current		
I_{max}	Maximum output current	P_o	Maximum power		

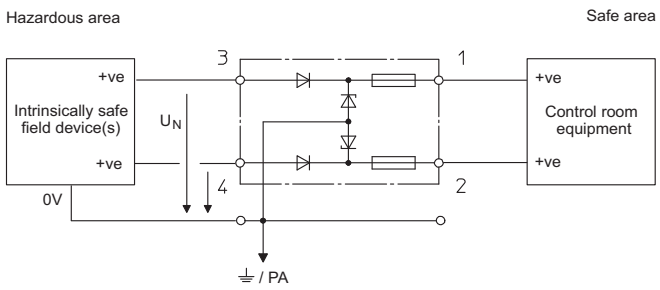
Application case

3-wire PNP inputs (positive switching) of proximity switches, photocells and encoders

Schematic



Two-channel safety barriers, evaluation barrier potential: + / evaluation barrier potential: +



05829E01

- Evaluation barrier for direct current signals with max. output current I_o
- Suitable for potential-free contacts and floating 4/20 mA signals
- Positive potential of both channels
- Installation permitted in Division 2 and Zone 2

A2

Selection table

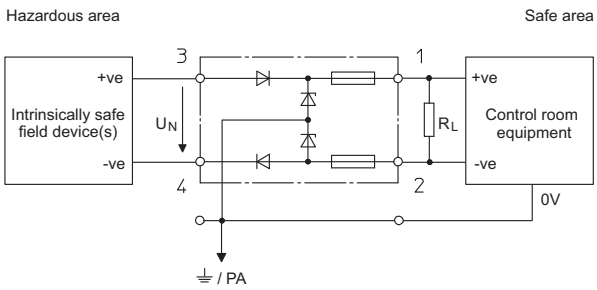
Channel	U_N	I_{max}	ΔU	Safety data						Order number
				U_o	I_o	IIC		IIB		
						L_o	C_o	L_o	C_o	
	V	mA	V	V	mA	mH	µF	mH	µF	
1	25.5	60	3.5 *)	28	0	1000	0.083	1000	0.65	**9002/33-280-000-001**
2	25.5	60	3.5 *)	28	0	1000	0.083	1000	0.65	
1+2	- -	- -	- -	28	0	1000	0.083	1000	0.65	

*) 2.5 V to 20 mA

Functional data and safety-relevant maximum values

U_N	Nominal voltage	U_o	Maximum voltage	C_o	max. permissible external capacity
I_{max}	Maximum output current	I_o	Maximum current		
ΔU	Additional voltage drop across the safety barrier	L_o	max. permissible external inductance		

Two-channel safety barriers, evaluation barrier potential: + / evaluation barrier potential: -



- Evaluation barrier for direct current signals with max. output current I_o
- Application for passive signals of 4/20 mA (transmitter with 4 conductors or more) with insulated analog input on the control system
- Channel for positive and negative potential in one module
- Installation permitted in Division 2 and Zone 2

Selection table

Channel	U_N	I_{max}	ΔU	Safety data						Order number
				U_o	I_o	IIC		IIB		
						L_o	C_o	L_o	C_o	
	V	mA	V	V	mA	mH	µF	mH	µF	
1	+ 16	100	3.5 *)	28	0	1000	0.22	1000	1.14	**9002/34-280-000-001**
2	- 5	100	3.5 *)	8	0	1000	8.4	1000	100	
1+2	21	- -	- -	28	0	1000	0.083	1000	0.65	

*) 2.5 V to 20 mA

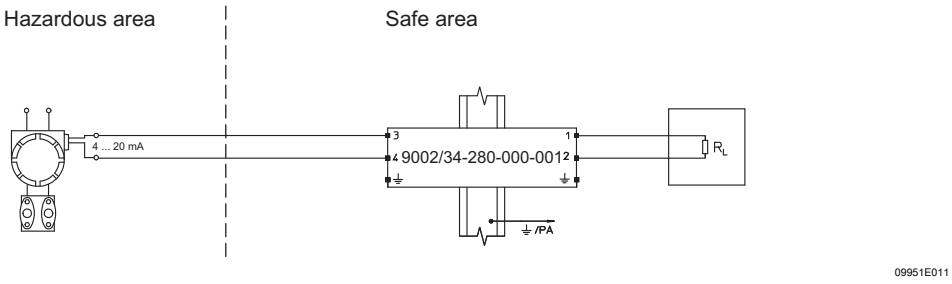
Functional data and safety-relevant maximum values

U_N	Nominal voltage	U_o	Maximum voltage	C_o	max. permissible external capacity
I_{max}	Maximum output current	I_o	Maximum current		
ΔU	Additional voltage drop across the safety barrier	L_o	max. permissible external inductance		

Application case

Vibration sensor

Schematic



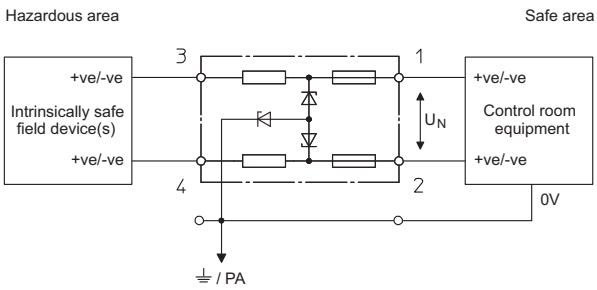
Operating data

Operating current	I_N = 0 ... 22 mA
Load	R_L ≤750 Ω
Maximum voltage drop at the safety barrier	Δ U_{max} ≤ 3.5 V

Safety data

Maximum voltage	U_o = 28 V		
Maximum current	I_o = 0 mA		
Maximum permissible external inductance	The inductance is determined depending on the maximum current of the transmitter		
Maximum permissible external capacity	C_o	IIC 0.083 µF	IIB 0.65 µF
Maximum power	P_o = 0 mW		
Application note	A potential-free input is required for the circuit. If the input is earthed, (R_L to /PA), the safety barrier 9001/03-280-000-001 can be used.		

Two-channel safety barriers, star barrier / star barrier



05836E01

- Connection to regulated power supply U_N
- Suitable for voltage signals
- Installation permitted in Division 2 and Zone 2
- AC version

Selection table

Channel	U_N	R_{min}	R_{max}	Safety data							Order number
				U_o	I_o	P_o	IIC		IIB		
							L_o	C_o	L_o	C_o	
	V	Ω	Ω	V	mA	mW	mH	µF	mH	µF	
1		492	545	9.3	20	50	90	4.1	330	31	**9002/77-093-040-001**
2		492	545	9.3	20	50	90	4.1	330	31	
1+2	6	- -	- -	9.3	40	90	23	4.1	87	31	
1		71	82.1	9.3	150	350	1.3	4.1	7	31	**9002/77-093-300-001**
2		71	82.1	9.3	150	350	1.3	4.1	7	31	
1+2	6	- -	- -	9.3	300	700	0.2	4.1	1.8	31	
1		60	69.2	10	200	500	0.5	3	4	20.2	**9002/77-100-400-001**
2		60	69.2	10	200	500	0.5	3	4	20.2	
1+2	6	- -	- -	10	400	1000	0.15	3	0.8	20.2	
1		111	126	15	150	560	1.3	0.58	7	3.55	**9002/77-150-300-001**
2		111	126	15	150	560	1.3	0.58	7	3.55	
1+2	12	- -	- -	15	300	1130	0.2	0.58	1.8	3.55	
1		321	358	22	73	400	7	0.165	26	1.14	**9002/77-220-146-001** *)
2		321	358	22	73	400	7	0.165	26	1.14	
1+2	18	- -	- -	22	146	800	1.4	0.165	7.4	1.14	
1		159	180	22	148	810	1.35	0.165	7.2	1.14	**9002/77-220-296-001** *)
2		159	180	22	148	810	1.35	0.165	7.2	1.14	
1+2	18	- -	- -	22	296	1630	0.24	0.165	1.84	1.14	
1		657	730	28	47	330	10.1	0.083	30	0.65	**9002/77-280-094-001**
2		657	730	28	47	330	10.1	0.083	30	0.65	
1+2	24	- -	- -	28	94	660	1.96	0.083	12.5	0.65	

*) Ambient temperature - 20 ... + 50 °C

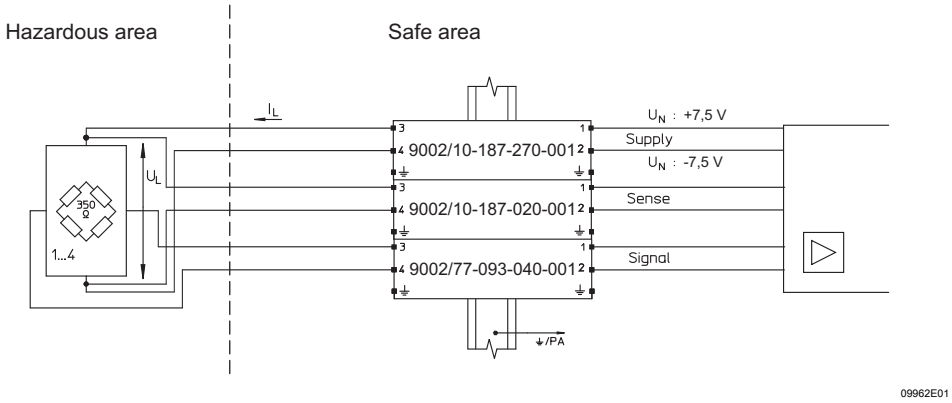
Functional data and safety-relevant maximum values

U_N	Nominal voltage	U_o	Maximum voltage	L_o	max. permissible external inductance
R_{min}	Minimum resistance of the safety barrier	I_o	Maximum current	C_o	max. permissible external capacity
R_{max}	Maximum resistance of the safety barrier	P_o	Maximum power		

Application case

Load cell (DMS) 350 Ω or 700 Ω
6 conductors +/- 7.5 V (15 V), field circuit unearthed

Schematic



09962E01

Operating data

Operating voltage	$U_N \leq$ +/- 7.5 V (15 V)
Voltage for load cell and electric line	U_L (at $U_N \leq$ +/- 7.5 V)
Current for load cell	I_L (at $U_N \leq$ +/- 7.5 V)

Number of the load cells connected in parallel	350 Ω		700 Ω	
	U_L (V)	I_{mA} (V)	U_L (V)	I_{mA} (V)
1	11.6	35	13.2	19
2	9.6	55	11.6	35
3	8	70	10.6	45
4	7	80	9.6	55

Safety data

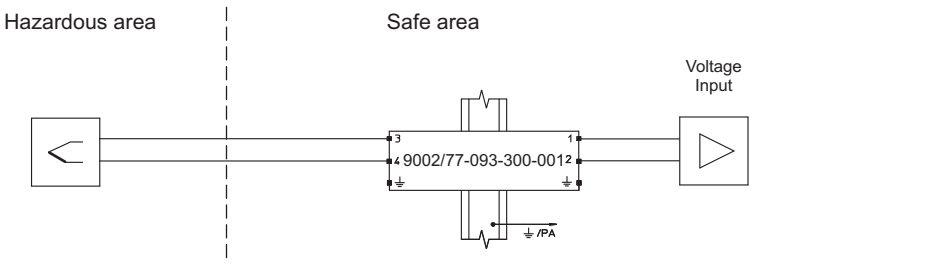
Maximum voltage	U_o = 18.7 V		
Maximum current	I_o = 330 mA		
Maximum permissible external inductance	L_o	IIC 0.18 mH	IIB 1.45 mH
Maximum permissible external capacity	C_o	IIC 0.27 µF	IIB 1.64 µF
Maximum power	P_o = 1.42 W		

Application note

For 4-wire circuits (without sense) the respective safety barrier might be unnecessary. The operating data remains unchanged. The safety-relevant maximum current is reduced to I_o = 310 mA, the maximum power to P_o = 1.36 W.

Vibration sensor

Schematic



09958E01

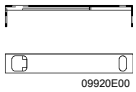
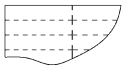
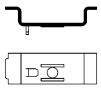
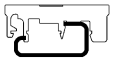
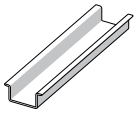
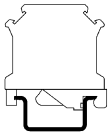
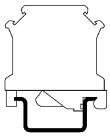
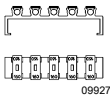
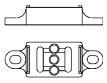
Operating data

Maximum series resistance of the safety barrier	R_{max} = 2 x 82.1 Ω
Sensor voltage	U ≤ +/- 4 V_{eff} / 6 V_{pp}

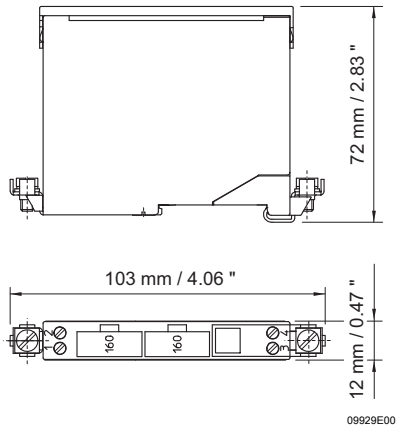
Safety data

Maximum voltage	U_o = 9.3 V		
Maximum current	I_o = 300 mA		
Maximum permissible external inductance	L_o	IIC 0.2 mH	IIB 1.8 mH
Maximum permissible external capacity	C_o	IIC 4.1 µF	IIB 31 µF

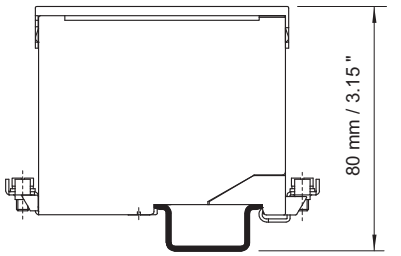
Accessories and Spare Parts

Designation	Figure	Description	Art. no.	Weight kg
Back-up fuse	 09919E00	for all safety barriers of Series 9001, 9002 and 9004 Packaging unit: 5 pieces	**158964**	0.008
Label carrier	 09920E00		**158977**	0.002
Labelling sheet	 09921E00	perforated, for automatic inscription Format: DIN A4	**158973**	0.005
Adapter	 09922E00		**158826**	0.006
Clamping base, moulded material	 09924E00		**165283**	0.004
DIN rail	 03856E00	NS 35 / 15 (available by the metre)	**103714**	1.410
Protective conductor terminal	 09926E00	USLKG 5 (clamping range ≤ 4 mm²)	**112760**	0.012
Earthing terminal	 09926E00	USLKG 6 N (clamping range ≤ 6 mm²)	**112599**	0.030
Fuse holder	 09927E00		**158834**	0.020
Insulation and fastening material	 09928E00	for mounting rail NS 35/15	**158828**	0.023

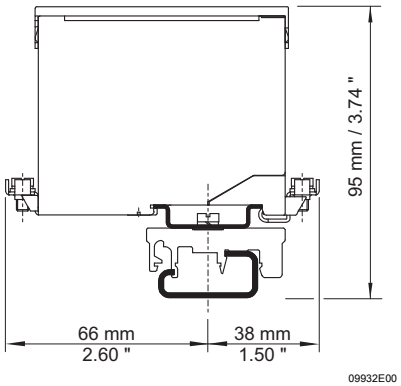
Dimensional drawings (all dimensions in mm / inches) - subject to modifications



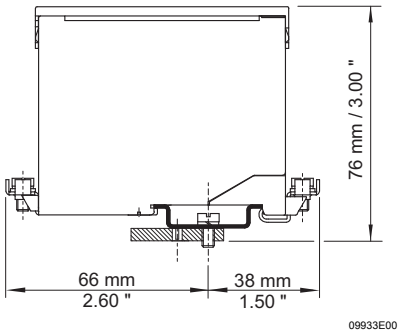
Safety barrier 9001, 9002, 9004



Safety barrier 9001, 9002, 9004
mounted on the mounting rail LV 35/15
EN 50 022



Safety barrier 9001, 9002, 9004
mounted on the mounting rail LV 32
EN 50 035 with adaptor and clamping base made of moulded material



Safety barrier 9001, 9002, 9004
mounted on
mounting plate with adaptor

We reserve the right to make alterations to the technical data, dimensions, weights, designs and products available without notice. The illustrations cannot be considered binding.