

Selection Guide

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Ex i Power Supply

Type	Ex i																
	9143/10-065-200-10	9143/10-099-220-10	9143/10-104-220-10	9143/10-114-200-10	9143/10-124-150-10	9143/10-156-065-10	9143/10-156-160-10	9143/10-187-050-10	9143/10-244-06-10	9143/10-065-200-20	9143/10-104-220-20	9143/10-114-200-20	9143/10-124-150-20	9143/10-156-065-20	9143/10-156-160-20	9143/10-187-050-20	9143/10-244-060-20
Function																	
For the intrinsically safe operation of field devices e.g. transmitters...	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Installation																	
In Zone 2 & 22	x	x	x	x	x	x	x	x	x								
Ex i Interfaces [Zone 1 und 21]	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Number of channels	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Nominal voltage (U_N) [V]																	
4,0...5,6	x									x							
8,8...9,1		x															
8,7...9,5			x								x						
9,4...10,4				x								x					
9,5...11,8					x								x				
12,5...14,7						x	x							x	x		
14,6...17,6								x								x	
18,9...23,0									x								x
Max. Nominal current I_N																	
15 mA																	
35 mA								x								x	
40 mA									x								x
45 mA						x								x			
130 mA					x								x				
140 mA							x								x		
160 mA	x									x							
180 mA				x								x					
200 mA		x	x								x						
Power supply																	
24 V AC / DC	x	x	x	x	x	x	x	x	x								
85 V...230 V AC										x	x	x	x	x	x	x	x
Intrinsically safe output																	
[Ex ib] IIC / IIB	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Galvanic isolation																	
Between output and power supply	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Frequency Transmitter

Type	Ex i		Non-Ex i
	9146/10-11-12	9146/20-11-11	9146/10-11-62
Function			
To monitors the speed of rotating devices like fans, centrifuges, tube extruder,...	x	x	x
Installation			
In Zone 2 & 22	x	x	x
Ex i Interfaces [Zone 0 und 20]	x	x	
Number of Channels	1	2	1
Input signal			
Gem. EN 60947-5-6 (NAMUR)	x	x	x
Input frequency 0,001 Hz...20 kHz	x	x	x
Output			
0/4 mA ...20 mA	x	x	x
Limit value			
2 x NO (contact per channel)	x		x
Pulse output			
One NO selectable	x		x
Power supply			
24 V DC	x	x	x
Open-circuit and short-circuit			
Line fault detection	x	x	x
Potential free relay contact	x	x	x
Galvanic isolating			
Between input, output and power supply	x	x	x

Vibration transducer

Type	Ex i	
	9147/10-99-10s	9147/20-99-10s
Function		
for intrinsically safe operation of vibration sensors, speed and acceleration sensors.	x	x
Installation		
in Zone 2 & 22	x	x
Ex i Interfaces [Zone 0 und 20]	x	x
Number of channels	1	2
Ex i Input signal		
Input resistance 10 kΩ	x	x
Input signal I -0,5 ... -20 V	x	x
Functional range 0 ... -24 V	x	x
Output		
-0,5 ... -20 V	x	x
Power supply		
24 V DC	x	x
Galvanic isolating		
Between input, output and power supply	x	x

Transmitter Supply Unit and Isolating Repeater (AI)

Type	Ex i														Non-Ex i									
	9160/13-10-11	9160/13-10-10	9160/19-10-11	9160/23-10-11	9160/23-10-10	9160/13-11-11	9160/13-11-10	9160/19-11-11	9160/19-11-10	9160/23-11-11	9160/23-11-10	9162/13-11-12	9162/13-11-14	9163/13-11-11	9163/13-10-11	9163/23-11-11	9163/23-10-11	9164/13-22-08	9164/13-22-09	9160/13-11-61	9160/19-11-61	9160/23-11-61	9162/13-11-64	
Function																								
Transmitter supply unit with HART	x	x	x	x	x	x	x	x	x	x	x	x	x								x	x	x	x
Isolating repeater for 4-wire Transmitter	x	x	x	x	x	x	x	x	x	x	x	x	x								x	x	x	x
Isolating repeater for 4-wire Transmitter with HART														x	x	x	x							
to integrate 4-wire transmitters with 2 wire I/O-cards																		x	x					
Installation																								
Zone 1																		x	x					
Zone 2 und 22	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Ex i Interfaces [Zone 0 und 20]	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					
Number of channels	1	1	1	2	2	1	1	1	1	2	2	1	1	1	1	2	2	1	1	1	1	2	1	
Duplicate signal			x					x	x												x			
Input																								
Exi: 0/4 mA...20 mA with HART	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x							
Non Ex i: 0/4 mA...20 mA with HART																					x	x	x	x
4-wire MU (Ex i Anschluss)																		x						
4-wire MU (Ex e Anschluss)																			x					
Output A																								
0/4 mA...20 mA with HART						x	x	x	x	x	x	x	x	x	x	x					x	x	x	x
Passive with HART	x	x	x	x	x										x		x							
Output B																								
Passive without HART			x																					
Passive with HART				x	x																			
0/4 mA...20 mA								x	x													x		
0/4 mA...20 mA with HART										x	x												x	
Limit value contact																								
2 x NO												x	x											x
Number of wire																								
2-, 3 & 4-wire transmitter and mA sources	x	x	x	x	x	x	x	x	x	x	x	x	x								x	x	x	x
4-wire HART transmitter														x	x	x	x							
SIL 2 (IEC 61508)	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x				x	x	x	x
Power supply																								
24 V DC	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x	x	x
Open-circuit and short-circuit																								
Line fault detection	x		x	x		x	x		x		x	x	x	x	x	x	x	x			x	x	x	x
fault message contact	x		x	x		x	x		x		x	x	x	x	x	x	x				x	x	x	x
fault signal contact (LED)	x		x	x		x	x		x		x	x	x	x	x	x	x				x	x	x	x
Galvanic isolating																								
Between input, output																		x	x					
Between input, output and power supply	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x	x	x

Isolating Repeater (AO)

Type	Ex i										Non-Ex i			
	9165/16-11-11	9165/16-11-10	9165/26-11-11	9165/26-11-10	9167/11-11-00	9167/21-11-00	9167/13-11-00	9167/23-11-00	9167/14-11-00	9167/24-11-00	9165/16-11-61	9165/26-11-61	9167/13-11-50	9167/23-11-50
Function														
Isolating repeaters are used in the intrinsically safe operation of control valves, i/p-converters or indicators.....	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Installation														
In Zone 2	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Ex i Interfaces [Zone 0 und 20]	x	x	x	x	x	x	x	x	x					
Number of channels	1	1	2	2	1	2	1	2	1	2	1	2	1	2
Input														
0/4 mA...20 mA with HART	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Output														
Ex i: 0/4 mA...20 mA with HART	x	x	x	x	x	x	x	x	x					
Non Ex i: 0/4 mA...20 mA with HART										x	x	x	x	
U _o / I _o / P _o (15,7 V / 60 mA / 233 mW)					x	x								
U _o / I _o / P _o (18,8 V / 107 mA / 503 mW)									x	x				
U _o / I _o / P _o (25 V / 99 mA / 613 mW)							x	x						
U _o / I _o / P _o (25,6 V / 96 mA / 605 mW)	x	x	x	x										
Min. load resistance R_L 150 Ω	x	x	x	x										
Max. load resistance R_L														
360 Ω					x	x								
590 Ω									x	x				
800 Ω							x	x					x	x
SIL (IEC 61508)														
SIL 2	x	x	x	x							x	x		
SIL 3					x	x	x	x	x	x			x	x
Power supply														
24 V DC	x	x	x	x							x	x		
Loop power					x	x	x	x	x	x			x	x
Open-circuit and short-circuit														
Line fault detection	x	x	x	x							x	x		
fault message contact	x		x								x	x		
fault signal contact (LED)	x	x	x	x							x	x		
Galvanic isolating														
Between input and output					x	x	x	x	x	x	x	x	x	x
Between input, output and power supply	x	x	x	x										

Switching Repeater and Ex i Relay Module (DI)

Type	Ex i																					
	9170/10-11-11	9170/11-11-13	9170/10-11-21	9170/20-10-11	9170/20-11-11	9170/21-11-13	9170/20-10-21	9170/20-11-21	9170/10-12-11	9170/10-12-21	9170/10-13-21	9170/20-12-11	9170/20-12-21	9170/11-14-11	9170/21-14-11	9170/11-14-12	9170/11-14-12-C1515*)	9170/21-14-12	9170/21-14-12-C1515*)	9172/10-11-00	9172/20-11-00	
Function																						
For intrinsically safe operation of contacts, optocoupler outputs etc.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
Relay Ex i activation / Non-Ex i contact																				x	x	
Installation																						
In Zone 2	x	x		x	x	x	x							x	x	x	x	x	x	x	x	
Ex i Interfaces [Zone 0 und 20]	x	x		x					x	x	x	x	x	x	x	x	x	x	x	x	x	
Number of channels	1	1	1	2	2	2	2	2	1	1	1	2	2	1	2	1	1	2	2	1	2	
Input intrinsically safe input																						
[Ex ia] IIC	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Output per channel																						
1 x Changeover (125 V / 1 A)		x		x			x															
1 x Changeover (250 V / 4 A)									x	x		x								x	x	
2 x Changeover (125 V / 1 A)	x	x	x																			
2 x Changeover (250 V / 4 A)											x		x									
2 x NO (125 V / 1 A)					x	x		x														
1 x Electronic (35 V/50mA)														x	x	x	x	x	x			
Transmission frequency																						
≤ 6 Hz									x	x	x	x	x									
≤ 15 Hz	x	x	x	x	x	x	x	x												x	x	
≤ 10 kHz														x	x	x	x	x	x			
SIL 2 (IEC 61508)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Power supply																						
24 V DC	x	x		x	x	x			x			x		x	x	x	x	x	x			
110 V ... 230 V			x				x	x		x	x		x									
Loop power																				x	x	
Line fault transparency (LFT)																x	x	x	x			
Open-circuit and short-circuit																						
Line fault detection	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
fault message contact	x			x	x		x		x			x		x	x	x	x	x	x			
fault signal contact (LED)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
Galvanic isolating																						
Between input and output																				x	x	
Between input, output and power supply	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			

*) only for Yokogawa ProSafe-RS I/O Modules SDV 144

Binary Output and Ex i Relay Module (DO)

Type	With power supply(9175)										Loop power (9176 & 9172)												
	9175/10-12-11	9175/20-12-11	9175/10-12-12	9175/10-14-11	9175/20-14-11	9175/10-14-12	9175/10-16-11	9175/10-16-11-C1329	9175/20-16-11	9175/20-16-11-C1329	9175/10-16-12	9176/10-12-00	9176/20-12-00	9176/10-14-00	9176/20-14-00	9176/10-15-00	9176/20-15-00	9176/10-16-00	9176/20-16-00	9176/10-17-00	9176/20-17-00	9172/11-11-00	9172/21-11-00
Function																							
Binary output for the intrinsically safe operation of Ex i solenoid valves or indicators.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
Relay for Non-Ex i Activation / Ex i Contact																						x	x
Installation																							
in Zone 2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Ex i Interface [Zone 0 und 20]	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Number of channels	1	2	1	1	2	1	1	1	2	2	1	1	2	1	2	1	2	1	2	1	2	1	2
Intrinsically safe output																							
[Ex ia] IIC	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
[Ex ib] IIC	x	x		x	x		x	x	x	x		x	x	x	x	x	x	x					
Ex i , 1 changeover (125 V / 4 A; 30 V / 4 A)																						x	x
Max. Output current (I_{A max})																							
29 mA																							
35 mA							x	x	x	x	x									x	x		
40 mA																						x	x
45 mA				x	x	x								x	x								
60 mA	x	x	x									x	x										
Parallel interconnection 58 mA																		x					
Parallel interconnection 70 mA									x	x									x				
Parallel interconnection 80 mA																						x	
Parallel interconnection 90 mA					x										x								
Parallel interconnection 120 mA		x											x										
Internal resistance R_i																							
130 Ω				x	x	x								x	x								
150 Ω	x	x	x										x	x									
460 Ω																					x	x	
250 Ω							x	x	x	x	x							x	x				
320 Ω																	x	x					
Parallel interconnection 65 Ω					x																		
Parallel interconnection 75 Ω		x																					
Parallel interconnection 125 Ω									x	x											x		
Parallel interconnection 160 Ω																	x						
Parallel interconnection 230 Ω																						x	
NO-load voltage (U_A)																							
10 V	x	x	x									x	x										
17,5 V				x	x	x								x	x								
25 V								x	x	x	x	x				x	x	x	x	x	x	x	
SIL 2 (IEC 61508)			x			x					x												x
SIL 3 (IEC 61508)	x	x		x	x		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
Power supply																							
24 V DC	x	x	x	x	x	x	x	x	x	x													
Loop power												x	x	x	x	x	x	x	x	x	x	x	x
Line fault transparent (LFT)																							
Open-circuit and short-circuit																							
Line fault detection	x	x	x	x	x	x	x	x	x	x													
fault message contact	x	x	x	x	x	x	x	x	x	x													
fault signal contact (LED)	x	x	x	x	x	x	x	x	x	x													
Galvanic isolating																							
Between input and output	x	X**)	x	x	X**)	x	x	x	X**)	X**)	x	x	x	x	x	x	x	x	x	x	x	x	x
Between input, output and power supply	x	x	X***)	x		X***)	x	x	x	x	X***)												

*) only for Yokogawa ProSafe-RS I/O Modules SDV 541 **) No galvanic isolating between outputs

***) No galvanic isolating between output and power supply

Resistance Isolator and Temperature Transmitter (TI)

Type	Ex i														Non-Ex i				
	9180/10-77-11	9180/20-77-11	9180/11-77-11	9180/21-77-11	9182/10-51-11	9182/20-51-11	9182/10-59-11	9182/10-59-13	9182/10-51-13	9182/10-50-12	9182/20-50-12	9182/10-51-12	9182/10-51-14	9182/10-51-61	9182/20-51-61	9182/10-51-63	9182/10-59-63	9182/10-51-64	
Function																			
Resistance Isolator for intrinsically safe operation of Pt 100 resistance thermometer or other resistance sensors	x	x	x	x															
Temperature Transmitter for intrinsically safe operation of temperature sensors					x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Installation																			
In Zone 2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Ex i interfaces [Zone 0 und 20]	x	x	x	x	x	x	x	x	x	x	x	x	x						
Number of channels	1	2	1	2	1	2	1	1	1	1	2	1	1	1	2	1	1	1	
Sensor																			
Ex i: Pt 100 Resistance Isolator	x	x																	
Ex i: Pt 1000 Resistance Isolator			x	x															
Ex i: Most currently available sensors can be connected, thermocouples and resistance transmitters					x	x	x	x	x	x	x	x	x						
Non Ex i: Most currently available sensors can be connected, thermocouples and resistance transmitters														x	x	x	x	x	
Output																			
0/4 mA...20 mA active					x	x			x			x	x	x	x	x		x	
0/4 mA...20 mA passive							x	x									x		
Resistance value	x	x	x	x															
Measurement range																			
18 Ω ... 391 Ω	x	x																	
180 Ω ... 3910 Ω			x	x															
Limit value contact (per channel)																			
2 x NO										x	x	x	x					x	
Configuration																			
PC					x	x	x	x	x	x	x	x	x	x	x	x	x	x	
DIP-switches					x	x	x							x	x				
Power supply																			
24 V	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
SIL 2 (IEC 61508)								x	x				x			x	x	x	
Open-circuit and short-circuit																			
Line fault detection	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
fault message contact	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
fault signal contact (LED)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Galvanic isolating																			
Between input, output and power supply	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	

Fieldbus Isolating Repeater

Type	Ex i						Non- Ex i	
	9185/11-35-10	9185/11-45-10	9185/11-46-10	9186/12-11-11	9186/15-12-11	9186/25-12-11	9185/12-45-10	9185/12-46-10
Function								
Fieldbus Isolating Repeater	x	x					x	
Fieldbus (Bridge)			x					x
Fibre Optic Isolating Repeater				x	x	x		
Number of channels	1	1	1	2	2	1	1	1
Interface								
Profibus DP / Modbus RTU		x	x				x	x
Ex i Profibus DP / Modbus RTU	x							
Installation in								
Zone 1				x				
Zone 2, 22	x	x	x	x	x	x	x	x
Ex i interface [Zone 1 und 21]	x	x	x					
LWL interface [Zone 0 und 20]				x	x	x		
RS 485 interface [Zone 1 und 21]				x				
Transmission speed								
1,2 kbit/s...1,5 Mbit/s	x	x		x			x	
9,6 kbit...1,5 Mbit/s			x		x	x		x
Interface field area								
RS 485 IS	x	x		x				
Ex op is					x	x		
RS 485							x	
RS 422							x	x
RS 422 Ex i		x	x					
Interface safe area								
RS 485 (X2)	x	x			x	x	x	
RS 422 (X2)	x	x					x	
RS 232 (X1)	x	x	x				x	x
Ex op is				x				
Profibus-DP (X2)			x					x
Network structure								
Line structure				x	x	x		
Point-to-Point Structure				x		x		
Ring structure				x	x	x		
Hilfsenergie 24 V UC	x	x	x	x	x	x	x	x
Line fault detection	x	x		x	x	x	x	
Galvanic isolating								
Between input, output and power supply	x	x	x	x	x	x	x	x