KSR Control Units
KSR Set Point Relays
KSR Contact Protection Relays

1011-2

KSR KUEBLER

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Approvals

Germany

Physikalisch Technische Bundesanstalt PTB

Germanischer Lloyd

UK

British Approvals Service for Electrical Equipment in Flammable Atmospheres

France

Laboratoire Central des Industries Electriques

Denmark

DEMKO

Russia

Gosgortechnadzor
OGS Oil & Gas Safety

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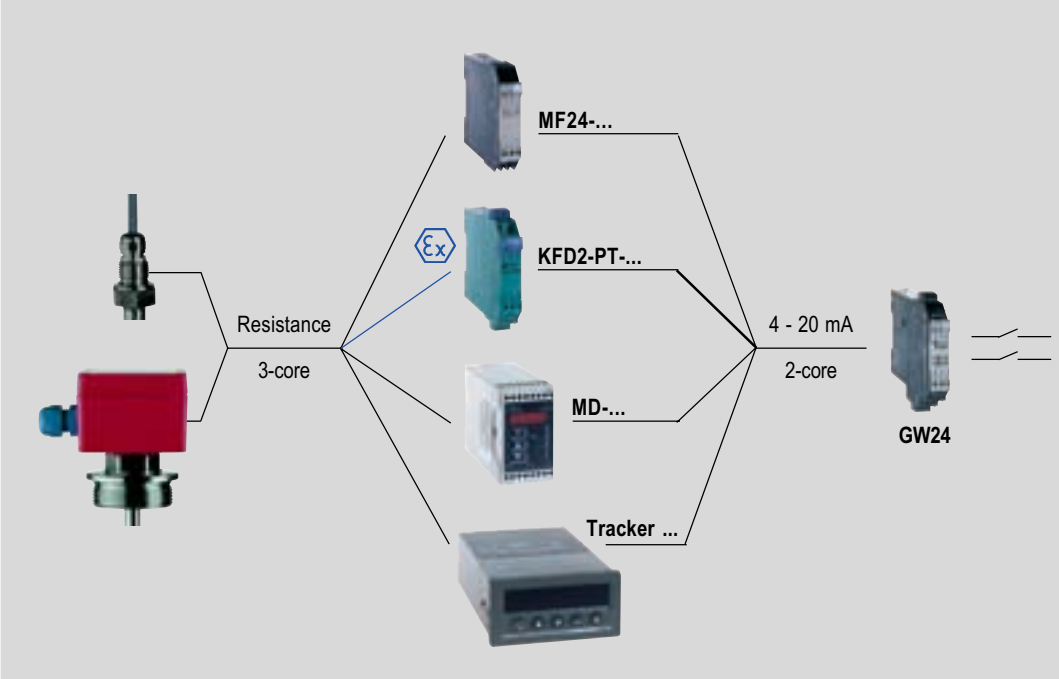
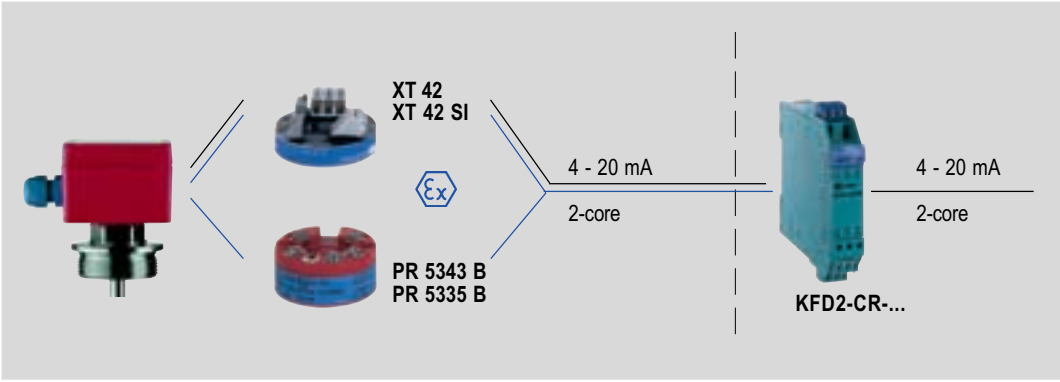
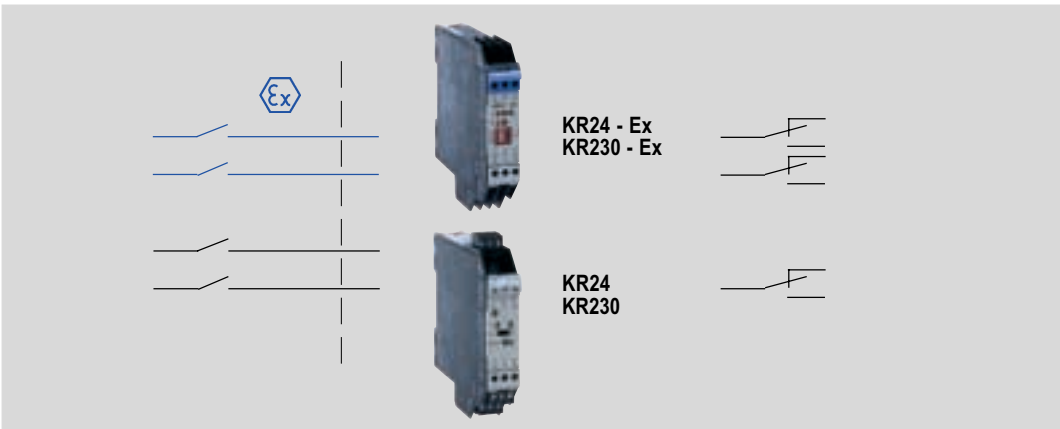


Type	MF24-... page 6 / 7	KFD2-PT-... page 6 / 7	MD-... page 10 / 11	Tracker ... page 12 / 13
Mounting	DIN-rail in cabinet			panel
Power supply	24 V DC		24 V DC 24 / 115 / 230 V AC	10 V ... 32 V AC / DC 90 V ... 265 V AC
Input	1 kOhm ... 250 kOhm Potentiometer		1 kOhm ... 100 kOhm Potentiometer	400 Ohm ... 100 kOhm Potentiometer
Output	0 mA ... 20 mA / 4 mA ... 20 mA 0 V ... 10 V / 2 V ... 10 V			
Temperature	-20°C ... +60°C		-30°C ... +70°C	+10°C ... +50°C
Ex Approval		EEx ia IIC		
Dimensions	20 x 92.5 x 115 mm		45 x 75 x 110 mm	96 x 48 x 172 mm
Features			LED-display 2 switch points	LED-display programmable 2 switch points (optional)



Type	XT 42 page 14 / 15	XT 42 SI page 14 / 15	PR 5343 B page 16 / 17	PR 5335 B page 16 / 17
Mounting	Head-mounted			
Power supply	11 V ... 30 V DC		8 V ... 35 V DC 8 V ... 28 V AC (Ex)	
Input	1 kOhm ... 100 kOhm Potentiometer		0 kOhm ... 100 kOhm Potentiometer	0 kOhm ... 7 kOhm Potentiometer
Output	4 mA ... 20 mA			
Temperature	-20°C ... +60°C	T6 max. 80°C T5 max. 95°C T4 max. 130°C	T6 max. 60°C T4 max. 85°C	
Ex Approval		EEx ia IIC		
Dimensions	OD 44 x 20 mm			
Features			programmable	programmable HART®



Type	KR24 page 22 / 23	KR24 - Ex page 20 / 21	KR230 page 22 / 23	KR230 - Ex page 20 / 21
Mounting	DIN-rail in cabinet			
Power supply	24 V DC		230 V AC	
Input	2 x switch contact			
Output	1 x switch contact	2 x switch contact	1 x switch contact	2 x switch contact
Temperature	-25°C ... +65°C	-20°C ... +60°C	-25°C ... +65°C	-20°C ... +60°C
Ex Approval		EEx ia IIC		EEx ia IIC
Dimensions	20 x 92.5 x 115 mm			

KSR Control Unit
Type MF24-... and Type KFD2-PT2-Ex1-.

General Description

The control units MF24... and KFD2... convert a resistance input into a proportional analogue output.

The input is certified intrinsically safe EEx ia IIC.

The output circuit is not intrinsically safe.

Application

Input, output and power supply are galvanically isolated from each other.

The input is suitable for a 3-wire potentiometer circuit with a total resistance of 1kOhm ... 250 kOhm.

It is especially for use with KSR level sensors.

The input resistance is converted into a proportional current or voltage output.

The required output signal has to be specified at the time of order.

This output signal can be used for displays, set point relays (e.g. GW24) or PLCs.

Attention!

Range and **Zero** are not adjustable

The measuring range of the level sensor (0% and 100% position) have to be specified by customer.

Advantages

Type MF24-...
- **compact housing**
- **easy installation**
- **high accuracy (0.05 %)**
- **EMC-compatible**

Type KFD2-PT2-Ex1-. additionally
- **Input EEx ia IIC**

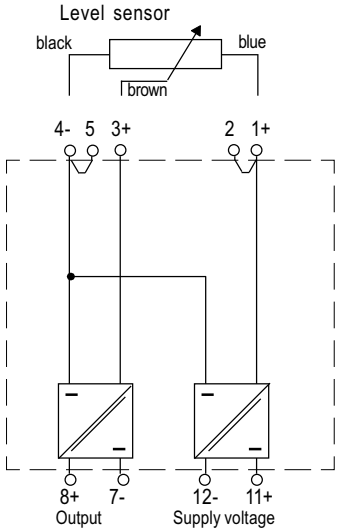
Order Information

	Analogue output
MF24-020	0...20 mA
MF24-420	4...20 mA
MF24-010	0...10 V
MF24-210	2...10 V
KFD2-PT2-Ex1-4	0...20 mA
KFD2-PT2-Ex1-5	4...20 mA
KFD2-PT2-Ex1-0	0...10 V
KFD2-PT2-Ex1-2	2...10 V

The control unit is only available for 24V DC supply voltage.

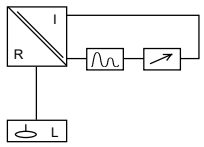
In connection with KSR power supply type SG... other supply sources are possible.

MF24-...

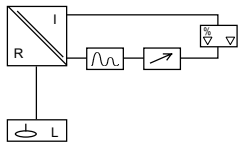


Terminals 1-2 and 4-5 are bridged by factory

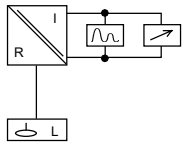
Current output
Level display with control unit



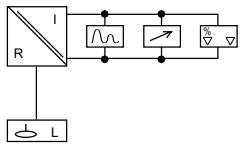
Control unit with set point relay



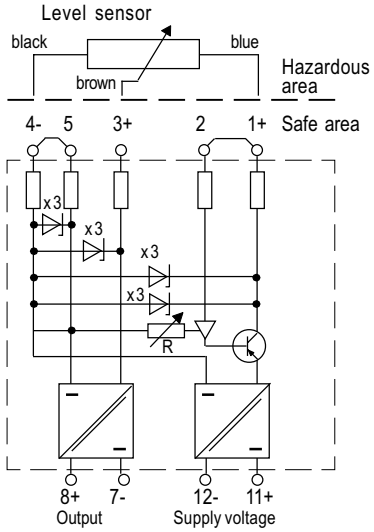
Voltage output
Level display with control unit



Control unit with set point relay

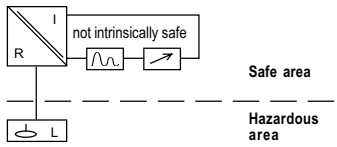


KFD2-PT2-Ex1-.

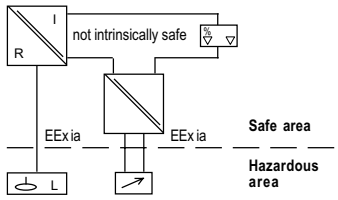


Terminals 1-2 and 4-5 to be bridged during installation

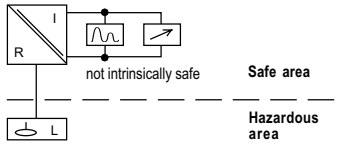
Current output
Level display with control unit



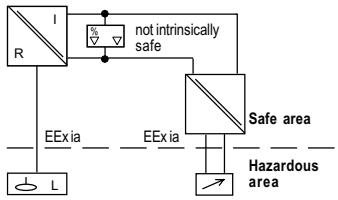
Return of the signal into hazardous area



Voltage output
Level display with control unit



Return of the signal into hazardous area



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KSR Control Unit
Type MF 24-... / KFD 2-PT 2-Ex 1-.

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Technical Data

		Type MF24-...	Type KFD2-PT2-Ex1-.
Power supply		terminal 11 (L+), 12 (L-)	or Power Rail
	Supply voltage	20 V ... 35 V DC	
	Ripple	within supply tolerance	
	Power consumption	approx. 0.6 W for voltage output approx. 1.3 W for current output	
Input	Total resistance value	1 kOhm ... 250 kOhm	
	Measurement voltage	approx. 4.7 V measured across terminals 1 and 4	
Rating acc. to Certificate of conformity			**BAS00ATEX7171X**
	max. voltage Uo		10.4 V DC
	max. current Io		31.4 mA
	max. power Po		82 mW
Permissible circuit values, Ignition protection class, category			**EEx ia**
	Explosion group		IIA / IIB / IIC
	external capacitance		79 µF / 17.4 µF / 2.53 µF
	external inductance		273 mH / 132 mH / 36 mH
Output	terminal 7-, 8+	**Range** and **Zero** not adjustable	
	Output options	0 mA ... 20 mA, 4 mA ... 20 mA, 0V ... 10 V, 2 V ... 10 V	
	Load resistance (current)	≤ 1000 Ohm	
	Output resistance (voltage)	≤ 30 Ohm	
Transfer characteristics			
	Non-linearity	≤ ±5 mV for voltage output ≤ ±10 µA for current output	
	Temperature drift	≤ 0.5 mV / °C for voltage output ≤ 1 µA / °C for current output	
	Settling time to 1 % of span	≤ 25 ms (10 to 90% step)	
	Rise time for 10 % / 90 % step	≤ 8 ms	
	Bandwidth	DC to 100 Hz (-3 dB)	
	Interference rejection	additional error when tested acc. to IEC 801-6 level 2 < 10 mV typical from 100 kHz ... 500 MHz	
Galvanic separation			
	Input - Output	yes	
	Input - Supply / Output - Supply	yes	
Environmental conditions			
	Operating temperature	-20°C ... +60°C	
	Protection class	IP 20	
Mechanical data			
	Design	modular terminal housing in Makrolon flammability class to class to UL94: V - 0	
	Mounting	clipping onto 35 mm standard rail or by screws	
	Connections	self-opening instrument terminals max. 2.5 mm²	
	Weight	approx. 120 g	

Attention! **Use shielded measurement circuit only (EMC)**

Dimensions

MF24-...
W 20 mm
H 90 / 92.5 mm
D 115 mm

KFD2-PT2-Ex1-.
W 20 mm
H 90 / 107 mm
D 115 mm

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KSR Set Point Relay
Type GW24

General Description

The set point relay monitoring trip limits in measurements using current/voltage signals. These signals can be generated by control units e.g. MF... or KFD2... .

Application

The set point relay GW24 converts the current/voltage signals at the input (terminals 1, 2, 3) to a proportional internal voltage.

A comparator compares this internal voltage with two preset values. The hysteresis, the operating mode and the type of alarm (HIGH/LOW) are selectable for each set point.

The set point relay can be configured using DIP switches and potentiometers.

During configuration (switch points, hysteresis), a monitor voltage 0...10 V can be used which is available via a 2 mm test socket. This enables you to change the configuration during normal operation or even without any input signal.

Options

The KSR set point relay has the following features:

- 2 independent switch points with 2 output relays or switch point 1 triggering both relays (DIP switch S1.6 in position ON)
- Test socket for set points and measured value
- HIGH or LOW alarm selectable for each set point
- Relay mode of operation separately selectable
- Wire break monitoring facility can be disabled and directly affects the output relay status
- Hysteresis adjustable from 0% to 60% for each set point
- EMC acc. to NAMUR NE 21

Order Information

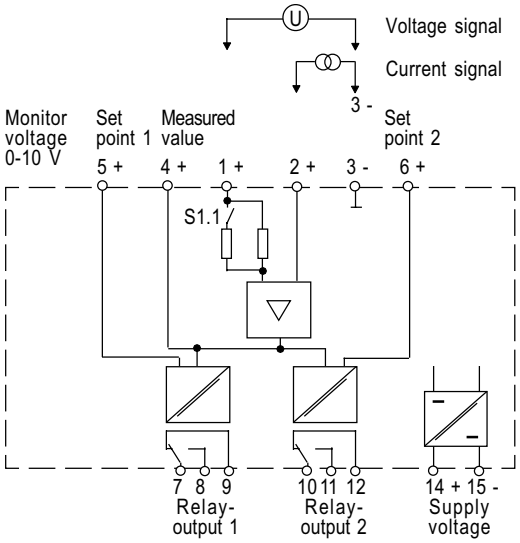
GW 24

The set point relay is only available for 24 V DC power supply.

Operation at mains voltage is possible in conjunction with a power supply unit SG... (see page 19).

Attention!

If a set point relay is used with a control unit type MF24 or KFD2..., both devices should operate on the same type of signal.



Front panel controls

LEDs

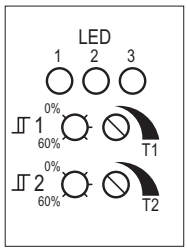
LED 1	yellow	Switching status Relay 1
LED 2	yellow	Switching status Relay 2
LED 3	green	Supply voltage

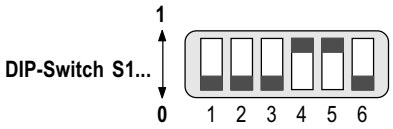
Switches

S 1	Alarm setting

Potentiometer

T 1	Set point 1
T 2	Set point 2
⎍1	Hysteresis set point 1
⎍2	Hysteresis set point 2





S1.1 Pos.“0” 0/2...10V input signal
Pos.“1” 0/1...5V input signal

S1.2 Setting HIGH/LOW alarm (Alarm 1)
Pos.“0” HIGH alarm relay 1
Pos.“1” LOW alarm relay 1

S1.3 Setting HIGH/LOW alarm (Alarm 2)
Pos.“0” HIGH alarm relay 2
Pos.“1” LOW alarm relay 2

S1.4 Condition of relay 1
Pos.“0” Relay de-energised (Alarm 1)
Pos.“1” Relay energised (Alarm 1)

S1.5 Condition of relay 2
Pos.“0” Relay de-energised (Alarm 2)
Pos.“1” Relay energised (Alarm 2)

S1.6 Pos.“0” Relay 1 independent of relay 2
Pos.“1” Set point 1 triggers both relays

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Extendable latches

Dimensions
W 20 mm
H 107 mm
D 115 mm

KSR Set Point Relay
Type GW24

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Technical Data

			Type GW 24
Power supply			
	Supply voltage	terminal 14(+), 15(-)	20 V ... 30 V DC
	Power consumption		approx. 2.25 W (typ. 1.68 W)
Input	Current	terminal 2(+), 3(-)	0 mA ... 20 mA, 4 mA ... 20 mA
	Input resistance		50 Ohm
	Voltage	terminal 1(+), 3(-)	0 V ... 10 V, 2 V ... 10 V
	Input resistance		100 kOhm
Output			
Set point 1	Relay output	terminal 7, 8, 9	7 (common), 8 (NO), 9 (NC)
Set point 2	Relay output	terminal 10, 11, 12	10 (common), 11 (NO), 12 (NC)
	Contact rating	AC	$U \leq 250$ V, $I \leq 5$ A, $P \leq 1250$ VA
	Contact rating	DC	$U \leq 125$ V, $I \leq 5$ A, $P \leq 150$ W
Transfer characteristics			
	Deviation		≤ 0.5%
	Temperature		0.01%/K of set value
	Input delay		100ms
Galvanic separation			
	Input - Output		safe isolation acc. to DIN VDE 0106 nominal isolation voltage 253 V_{eff}
	Input - Supply		functional isolation acc. to DIN EN 50178 nominal isolation voltage 50 V_{eff}
	Output - Supply		safe isolation acc. to DIN VDE 0106 nominal isolation voltage 253 V_{eff}
Applied standards			
	Galvanic separation		acc. to DIN EN 50178
	Environmental conditions		acc. to DIN IEC 721
	EMC compatibility		acc. to EN 50081-2/EN 50082-2, NAMUR NE 21
Environmental conditions			
	Operating temperature		-20°C ... +60°C
	Protection class		IP 20
Mechanical data			
	Design		Modular terminal housing in Makrolon flammability class to UL94: V - 0
	Mounting		clipping onto 35 mm standard rail or by screws
	Connections		self-opening instrument terminals max. 2.5 mm^2
	Weight		approx. 120 g

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Configuration

1. Connect voltmeter to terminals 5+, 3- (monitor voltage for set point 1) or to terminals 6+, 3- (monitor voltage for set point 2). 10V refer to 100%, 0V/2V refer to 0% of input range.

2. Adjust set point 1 with potentiometer T1 and set point 2 with T2.

3. Formula
4...20mA, 1...5V, 2...10V
8/100 x (set point in %) + 2
= monitor voltage

4. Adjust hysteresis of set point 1 with potentiometer Π1 and potentiometer Π2 for set point 2 respectively.

Example 1

For input signals 0...20 mA, 0...5 V, 0...10 V:
A monitor voltage of 10 V refers to 100% of the input range.
A monitor voltage of 0 V refers to 0% of the input range.
Input signal 0...5 V - Set point 50% (2.5 V)
A monitor voltage of 5 V refers to 50% of the input range.
Thus the voltage between terminals 5+, 3- or 6+, 3- has to be set to 5 V.

Example 2

For input signals 4...20 mA, 1...5 V, 2...10 V:
A monitor voltage of 10 V refers to 100% of the input range.
A monitor voltage of 2 V refers to 0% of the input range.
8/100 x (set point in %) + 2 = monitor voltage
Input signal 4...20 mA - Set point 50% (12 mA)
8 / 100 x 50 + 2 = 6 V (monitor voltage)
A monitor voltage of 6 V refers to 50% of the input range.
Thus the voltage between terminals 5+, 3- or 6+, 3- has to be set to 5 V.

KSR Control Units
Type MD-..

General Description

The control unit MD-... converts a resistance input into a proportional analogue output.

Input, output and power supply are galvanically isolated.

Application

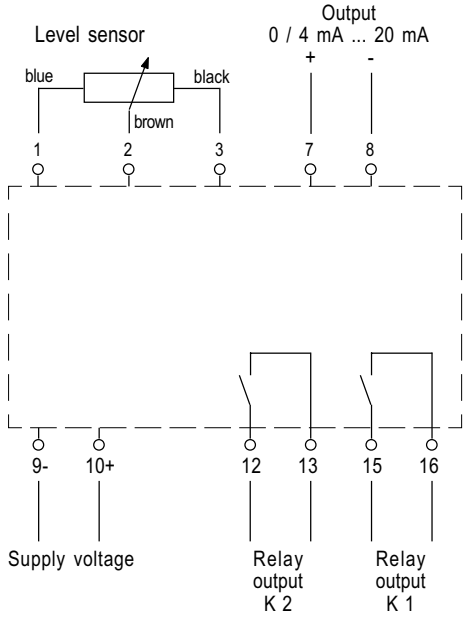
The input is suitable for a 3-wire potentiometer circuit with a resistance of 1k ... 100k.

The control unit MD-... is especially suited for use with KSR level sensors.

The input resistance is converted to a proportional current or voltage output. The required output signal has to be specified at the time of order. This output signal can be used for displays, set point relays (e.g. GW24-...) or PLCs.

2 built-in set point relays can be programmed for NC or NO output.

As an additional feature the MD-... has a 4 digit LED display that can be programmed to show any number in the range of -999 ... 9999.



Advantages

- **compact housing**
- **easy installation**
- **high accuracy (0.05 %)**
- **EMC-compatible**

Order Information

	Supply voltage
MD230-A	230 V AC
MD115-A	115 V AC
MD24-A	24 V AC
MD24-D	24 V DC

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Dimensions
W 45 mm
H 75 mm
D 100 mm

		Type MD...-..
Power supply		
Supply voltage	terminal 9(L), 10(N)	optional 24 / 115 / 230 V AC, 48 ... 62 Hz
Supply voltage	terminal 9(L+), 10(L-)	24 V DC
Power consumption		approx. 4 VA
Input		
Total resistance value	terminal 1, 3, 5	1 kOhm ... 100 kOhm
Analogue output		
Output options	terminal 7(+), 8(-)	
Output current		0 mA ... 20 mA, 4 mA ... 20 mA
Load resistance		≤ 400 Ohm
Output voltage		0 V ... 10 V, 2 V ... 10 V
Output resistance		≤ 500 Ohm
Relay output		
Relay K1	terminal 15, 16	1 NC or 1 NO, programmable
Relay K2	terminal 12, 13	1 NC or 1 NO, programmable
Hysteresis		programmable
Contact rating AC		U ≤ 250 V, I ≤ 8 A, P ≤ 500 VA
Display		4 digit display 7-segment LED, digit height 7.6 mm Range -999 ... 9999 programmable
Environmental conditions		
Operating temperature		0°C ... +50°C
Storage temperature		-30°C ... +70°C
Protection class		housing IP 40 terminal IP 20
Mechanical data		
Design		Housing ABS, flammability class to UL94 HB / 1.6
Mounting		clipping onto 35 mm standard rail or by screws
Weight		approx. 320 g

Attention! **Use shielded measurement circuit only (EMC)**

KSR Programmable Digital Display Unit Type Tracker ...

General Description

The KSR programmable digital display unit type Tracker... combines the features of a control unit and a digital display.

Analogue output and limit switches are available as options.

Input, output, and supply voltage are galvanically isolated.

Application

The input circuit is designed to accept 3-wire-potentiometer circuits with an overall resistance of 1 kOhm...100 kOhm.

The KSR programmable digital display unit type Tracker... is especially for connection to KSR level sensors.

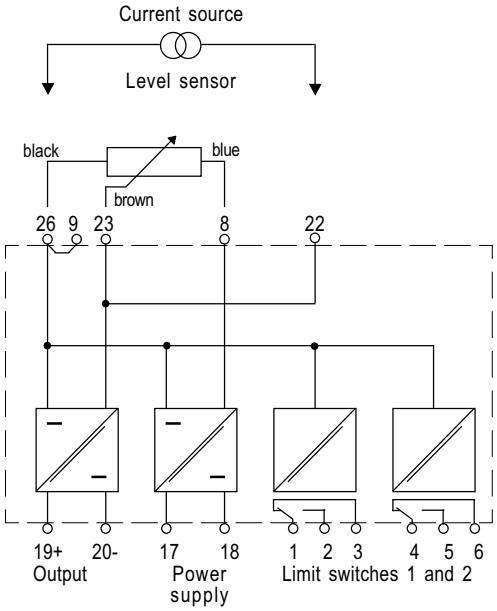
The analogue output and displayed values are programmable. Thus the device can be used to measure the contents of vessels with linear or non-linear shapes (e.g. cylindrical).

Tracker 223 and Tracker 224 convert the resistance signal into a voltage or current signal. This signal can be used for further evaluation via a PLC.

In addition, **Tracker 222 and Tracker 224** include 2 independent programmable relay outputs.

Advantages

- **compact size**
- **weather proof housing IP65 available**
- **easy installation**
- **high accuracy (0.2 % for output, 0.05 % for input)**
- **EMC-compatible**



Type code Order Information

Tracker	…	-.- R	
		1 =	Supply voltage 90...265 V AC
		2 =	Supply voltage 10...32 V AC/DC
	221 =		Display only
	222 =		Display with limit switches
	223 =		Display and analogue output
	224 =		Display, analogue output and limit switches
Tracker = Base type			

Dimensions
W 96 mm
H 48 mm
D 173 mm

KSR Programmable Digital Display Unit
Type Tracker ...

		Type Tracker...
Power supply		
Supply voltage	terminal 17(N), 18(L)	90 V ... 265 V AC (10 V ... 32 V DC or AC optional)
Power consumption		approx. 10 VA
Input		
Potentiometer (overall resistance)		400 Ohm ... 100 kOhm
Voltage		± 100 mV, ± 10 V
Current		± 20 mA
Resistance		0 Ohm ... 400 Ohm
Output (Tracker 223 and 224 only)		
Output current		0 mA ... 20 mA , 4 mA ... 20 mA
Output voltage		0 V ... 10 V, 2 V ... 10 V
Accuracy		0.2 % of FS
Resolution		0.05 % of FS, 5 mV or 0.01 mA
Temperature drift		100 ppm/°C
Sample frequency		30 Hz
Output ripple		< 10 mV or < 50 µA
Max. load		≤ 900 Ohm
Output Relays (Tracker 222 and 224 only)		programmable
Limit switch 1	terminal 1, 2, 3	1 SPDT
Limit switch 2	terminal 4, 5, 6	1 SPDT
Hysteresis		programmable
Contact rating		1 A / 250 V AC
Hysteresis		4 digits (Tracker 221 and 222) 5 digits (Tracker 223 and 224) 7-segment LED, digit height 14 mm
A/D-Converter		
Type		Dual slope integrating with auto zero
Conversion rate		10 Hz
Common Mode Rejection		> 150 dB
Series Mode Rejection		> 70 dB
Transfer characteristics		
Response on 63 % of FS		32 ms
Response on 99 % of FS		100 ms
Programming		Display and output programmable with up to 24 values
Isolation		tested up to 500 V
Environmental conditions		
Operating temperature		10°C ... +50°C
Ingress protection		Frontpanel IP 20
Mechanical data		
Mounting		Panel mounting, weather-proof housing IP 65 (NEMA 4x) available
Terminals		self-opening instrument terminals max. 2.5 mm^2
Weight		approx. 400 g

Attention! Use shielded circuit only (EMC)

KSR Head-mounted Transmitter
Type XT 42 and Type XT 42 SI

General Description

The two-wire head-mounted transmitter XT 42 and XT 42 SI convert a resistance input to a proportional analogue output.

Application

The input is suitable for a potentiometer circuit with a resistance of 1kOhm - 100 kOhm.

The two-wire head-mounted transmitter XT 42 and XT 42 SI is especially suited for use with KSR level sensors.

A 4 mA ... 20 mA output signal is generated as proportional equivalent of the measured resistance ratio.

Advantages

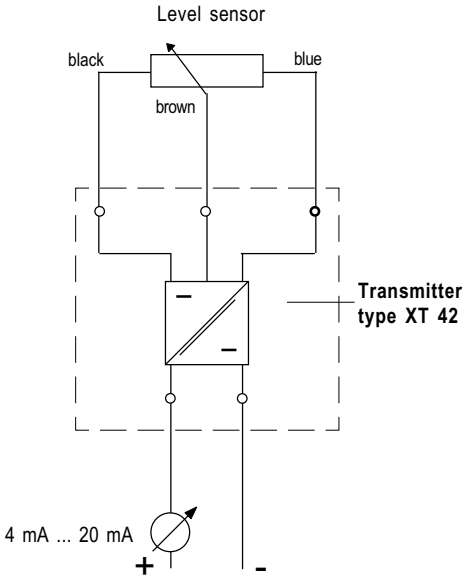
Type XT 42
- **low installation costs**
- **low space requirement in the control room**
- **clear signal in the field**
- **signal transmission over large distances**

Type XT 42 SI additionally
- **suitable for use in hazardous areas**
- **suitable for use with KSR level sensor type NMG125 and MG**

Dimensions
OD 44 mm
H 20 mm

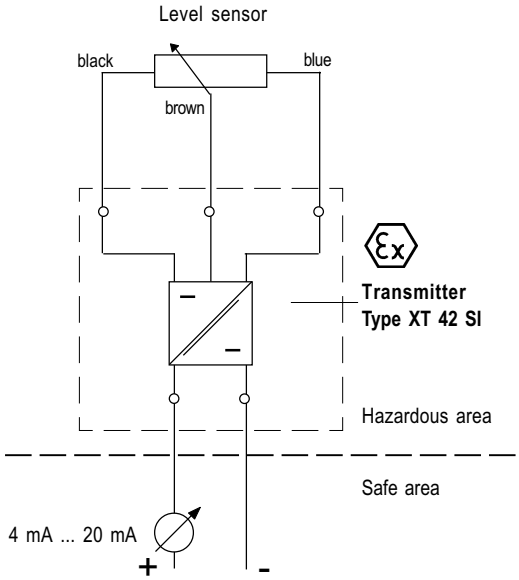
Connections
1 blue
2 brown
3 black

Type XT 42 (Code = TS)



Current repeater (active) or supply from PLC

Type XT 42 SI (Code = TE)



Current repeater (active) (e.g. type KFD 2-CR-Ex.30 200) or supply from PLC

KSR Head-mounted Transmitter
Type XT 42 and Type XT 42 SI

KSR KUEBLER

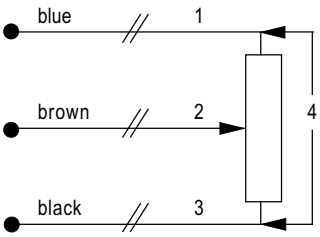
Technical Data

	Type XT 42	Type XT 42 SI
Power supply		
Supply voltage terminal +, -	11 V ... 30 V DC	
Output circuit (Supply circuit)		with ignition protection class EEx ia IIC only for use in certified intrinsically safe circuits with following ratings: U_O = 30 V DC
Output signal	4 mA ... 20 mA	
Max. resistance load	1000 Ohm at U_B = 30 V DC 700 Ohm at U_B = 24 V DC 50 Ohm at U_B = 12 V DC	
Adjustment range ZERO	± 5 %	
Adjustment range SPAN	75 % ... 100 % of total resistance	
Accuracy 0.15 %		
Input circuit (Measuring circuit)	3-wire potentiometer circuit	
		ignition protection class **EEx ia IIC T4 - T6**
Measuring range	1 kOhm … 100 kOhm of total resistance	
Certificate of conformity		Ⓔx II 1G EEx ia IIC T4 - T6 LCIE 02 ATEX 6073 X LCIE 02 ATEX 0002 U
Environmental conditions		
Ambient temperature	-20°C ... +60°C	T6 max. 80°C T5 max. 95°C T4 max. 130°C
Protection class	IP 20	
Mechanical data		
Design	completely sealed with Epoxy resin	
Mounting	mounting in the terminal box of KSR level sensor	
Weight	approx. 40 g	

Attention! Use shielded circuit only (EMC)

1011-2

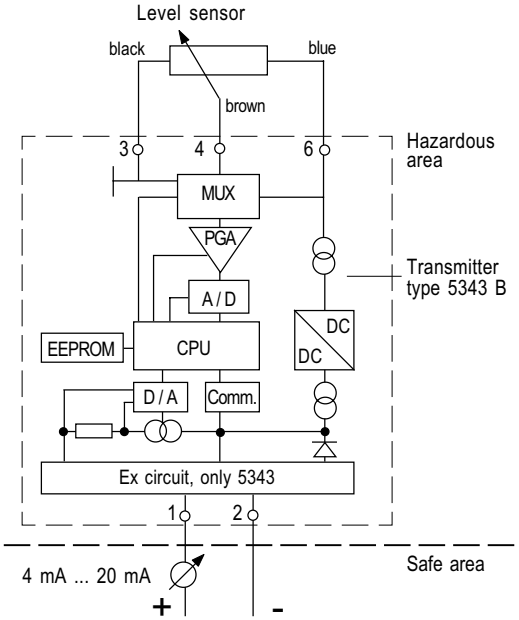
Wire breakage



Error	Description	Output signal
1	Cable blue interrupted	I ≅ 20 mA
2	Cable brown interrupted	I ≅ 25 mA
3	Cable black interrupted	I ≤ 4 mA
4	Sensor not connected	I ≅ 25 mA

KSR Head-mounted Transmitter Type 5343 B and Type 5335 B

5343 B (Code = TA)



Current repeater (active) (e.g. type KFD 2-CR-Ex.30 200) or intrinsically safe supply by PLC

The two-wire head-mounted transmitter 5343 B converts a resistance input to a proportional analogue output.

By using a PC with communication interface Looplink 5905 it is possible to program any linearisation function. Thus, the transmitter is suitable to determine the contents of free tank shapes (e.g. horizontal cylinders).

The communications interface is approved for hazardous area and galvanic isolated. This protects the PC and works as a barrier between safe and hazardous area.

Communication is bi-directional, so that any data can be read and written from and to the transmitter.

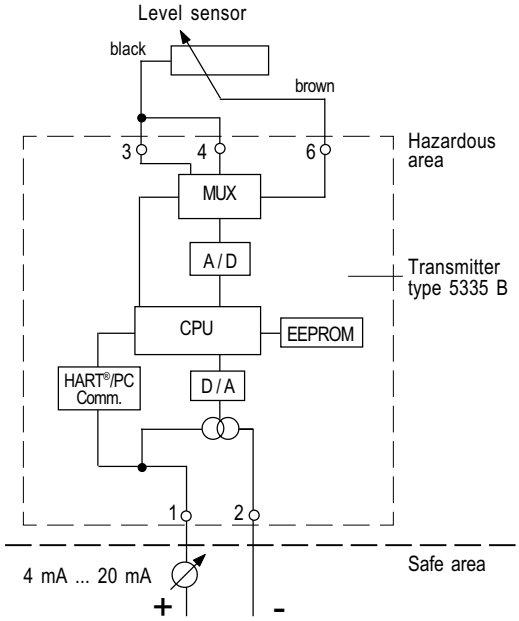
Application

The input is suitable for a potentiometer circuit with a resistance of up to 10 kOhm.

The head-mounted transmitter 5343 B is especially suited for use with KSR level sensors.

Dimensions
OD 44 mm
H 20 mm

5335 B (Code = TD)



Current repeater (active) (e.g. type KFD 2-CR-Ex.30 200) or intrinsically safe supply by PLC

The two-wire head-mounted transmitter 5335 B converts a resistance input to a proportional analogue output.

HART®-Programming

The head-mounted transmitter 5335 B can be used in conjunction with control systems utilising HART®-communication. The transmitter can be configured, read and controlled via HART®-communication. This kind of communication uses a sinus wave superimposed onto the analogue signal. The analogue signal will not be altered by the sinus wave. Using a standard HART®-terminal together with a specific DDL, all parameters of the transmitter can be changed. In addition, the configuration program PReset can be used on a standard DOS-PC to control the configuration of the transmitter via a HART®-modem.

Configuration with PC and Loop Link 5905 (non-HART®)

By using a PC with communication interface Looplink 5905 it is possible to program the control unit on-line, even in hazardous areas, or before commissioning.

Application

The input is suitable for a potentiometer circuit with a resistance of up to 7 kOhm.

The head-mounted transmitter 5335 B is especially suited for use with KSR level sensors.

KSR Head-mounted Transmitter
Type 5343 B and Type 5335 B

KSR KUEBLER

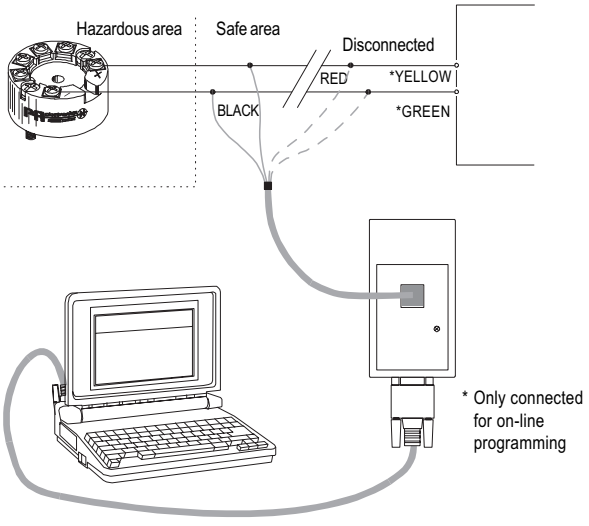
Technical Data

		Type 5343 B	Type 5335 B
Power supply			
	Supply voltage terminal 1(+), 2(-)	Standard 8 V ... 35V DC Hazardous area 8 V ... 28V DC	
Output circuit (Supply circuit)		with ignition protection class EEx ia IIC only for use in certified intrinsically safe circuits with following ratings: U_i = 28 V DC, I_i = 120 mA, P_i = 0.84 W	
	Output signal	4 mA ... 20 mA	
	Max. resistance load	870 Ohm at U_B = 28 V DC 695 Ohm at U_B = 24 V DC 175 Ohm at U_B = 12 V DC	
Input circuit (Measuring circuit)		3-wire	2-wire
		potentiometer circuit for hazardous area EEx ia IIC T4 / T6	
	Measuring range	0 … 100 kOhm	0 … 7 kOhm
Certificate of conformity		II 1G EEx ia IIC T4 / T6	
		DEMKO 99	
		ATEX 127088	ATEX 126965
Environmental conditions			
	Ambient temperature	T4 max. 85°C T6 max. 60°C	
	Protection class	IP 20	
Mechanical data			
	Design	completely sealed with Epoxy resin	
	Mounting	mounting in the terminal box of KSR level sensor	
	Weight	approx. 50 g	

Attention! Use shielded circuit only (EMC)

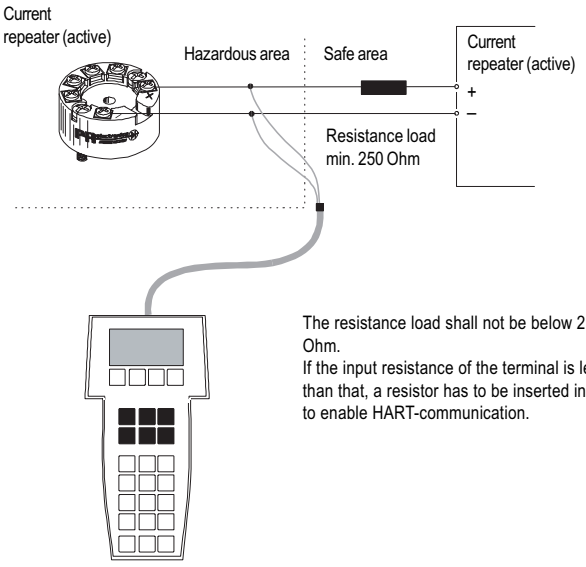
Programming

Type 5343 B



* Only connected for on-line programming

Type 5335 B



The resistance load shall not be below 250 Ohm.
If the input resistance of the terminal is less than that, a resistor has to be inserted in series to enable HART-communication.

1011-2

KSR Current Repeater (active)
Type KFD2-CR-Ex1.30 200

General Description

The current repeater (active) is used for two-wire head-mounted transmitters in intrinsically safe circuits.

It provides the transmitter with the necessary power.

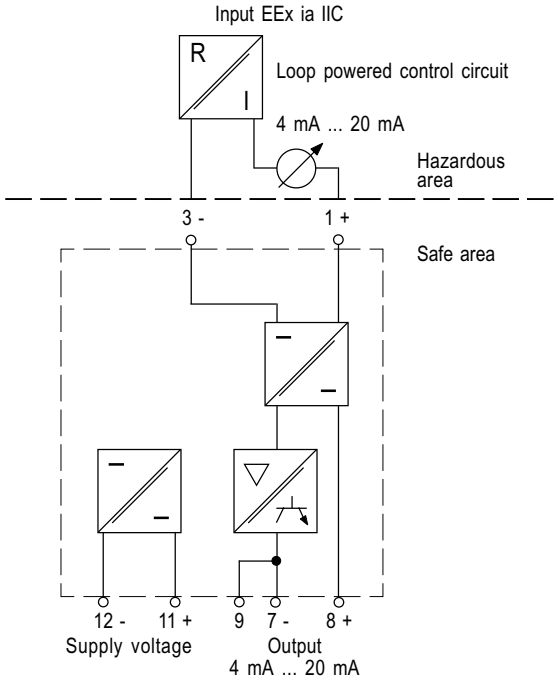
Supply voltage and input are galvanically isolated from each other.

Within the supply voltage range the open-circuit voltage at terminals 1 and 3 is 25 V.

At 20 mA load voltage decreases to 17.6 V

Technical Details

- **single channel**
- **input EEx ia IIC**
- **24 V DC supply voltage**



KFD2-CR-Ex1.30 200

Technical Data

Power supply					
Supply voltage	terminal 11(+), 12(-)	20 V .... 35 V DC			
Ripple		within supply tolerance			
Power consumption		approx. 1.6 W			
Input	terminal 1(+), 3(-)	intrinsically safe			
Voltage at 20 mA		17.6 V DC			
Ratings acc. to Certificate of conformity		**BAS00ATEX 7164X**			
Max. voltage	U_O	26 V DC			
Max. current	I_O	93 mA			
Max. power	P_O	0.6 W			
Permissible circuit values					
Ignition protection class, category		**EEx ia**			
Explosion group		IIA	IIB	IIC	
Max. external capacitance		2.6 µF	0.74 µF	0.99 µF	
Max. external inductance		36 mH	17 mH	4.3 mH	
Output	terminal 7(-), 8(+)	not intrinsically safe			
Output signal		4 mA ... 20 mA			
Voltage		20 V DC			
Load resistance		≤ 1 kOhm			
Ripple		< 20 μA_{PP}			
Transfer characteristics					
Calibrated accuracy at 293 K (20°C)		≤ ±10 µA incl. non-linearities and load resistance changes			
Temperature drift		≤ ±0.2 µA / K within range 273 K ... 333 K			
		≤ 1 µA within range 253 K ... 273 K			
Rise time		≤ 50 µs; load resistance = 250 Ohm			
Galvanic separation					
Input - Output / Input - Supply		acc. to DIN EN 50020			
Output - Supply		yes			
Environmental conditions					
Operating temperature		-20°C ... +60°C			
Protection class		IP 20			
Mechanical data					
Design		Modular terminal housing in Makrolon flammability class to UL94: V - 0			
Mounting		clipping onto 35 mm standard rail or by screws			
Connections		self-opening instrument terminals max. 2.5 mm^2			
Weight		approx. 100 g			

1011-2

KSR Power Supply
Type SG...

General Description

KSR power supplies type SG... operate within the range of 100 V ... 130 V AC or 200 V ... 260 V AC respectively.

The output generates a stabilised voltage of 26 V DC.

The output voltage is fully regulated and will remain within the specified tolerance for any permissible combination of supply voltage and load current.

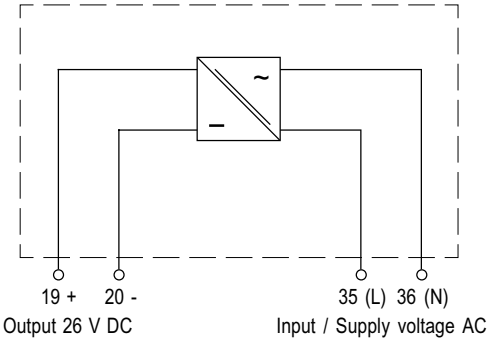
The unit can be used to supply KSR control units type MF24... and type KFD2-PT-Ex1- as well as set point relays type GW24.

Output current

600 mA at 20 °C (15.6 W)
450 mA at 50 °C (11.7 W)

Order Information

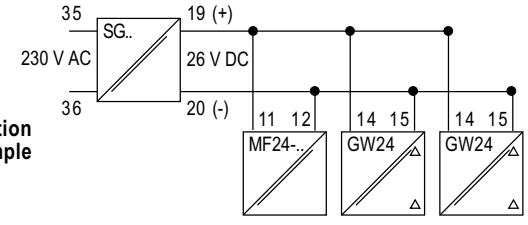
	Supply voltage
SG230	230 V AC
SG115	115 V AC



Technical Data

		Type SG115	Type SG230
Power supply			
Supply voltage	terminal 35(L), 36(N)	100 V .... 130 V AC	200 V .... 260 V AC
Frequency range		47 Hz .... 66 Hz	47 Hz .... 66 Hz
Input fuse rating		1 A	0.5 A
Output	terminal 19(+), 20(-)		
Voltage		26 V ± 200 m V, W_{PP} < 1 %	
Current		600 mA (15.6 W) at 20°C, linear descent to 450 mA (11.7 W) at 50°C	
Output fuse rating		1 A	
Environmental conditions			
Operating temperature		-20°C ... +60°C	
Protection class		IP 20	
Mechanical data			
Design		Modular terminal housing in Makrolon flammability class to UL94: V - 0	
Mounting		clipping onto 35 mm standard rail or by screws	
Connections		self-opening instrument terminals max. 2.5 mm^2	
Weight		approx. 770 g	

Application example



To avoid overloading the KSR power supply type SG... the power consumption of individual control units and set point relays should be taken into account when several of these units are connected to a single power supply:

MF24-020 and KFD2-PT2-Ex1-4	:	1.3 W
MF24-420 and KFD2-PT2-Ex1-5	:	1.3 W
MF24-010 and KFD2-PT2-Ex1-0	:	0.6 W
MF24-210 and KFD2-PT2-Ex1-2	:	0.6 W
GW24	:	2.25 W

KSR Contact Protection Relay
Type KR230-Ex and KR24-Ex

General Description

The contact protection relays KR230-Ex and KR24-Ex transmit binary signals out of the hazardous area.

The input circuits are suitable for sensors according to NAMUR DIN EN 60947-5-6 or mechanical contacts.

Inputs are safely separated from outputs and supply voltage according to DIN EN 50020.

Outputs, and supply voltage are galvanically isolated from each other in accordance with DIN EN 50178 for a nominal isolation voltage of 253 V AC.

Wire break monitoring

The output is switched off if the current in the control circuit falls below 0.1 mA (response level for wire break monitoring).

Technical Details

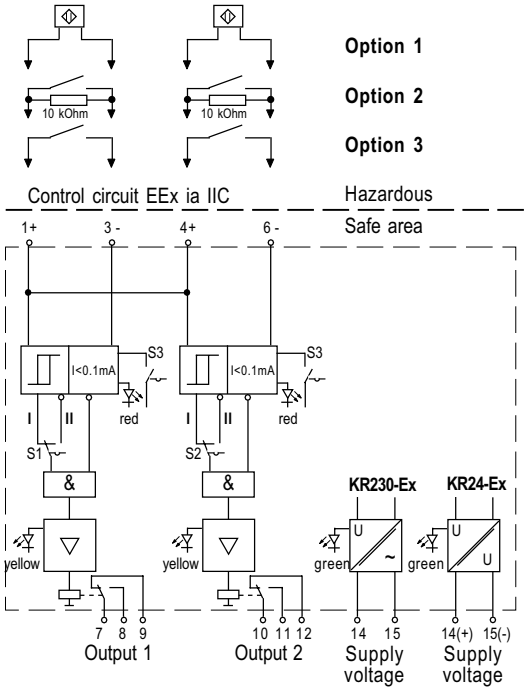
- **dual channel**
- **1 output relay per channel, volt-free**
- **switching status indication via yellow LED**
- **reversible operation mode**
- **wire break monitoring via red LED**
- **control circuit EEx ia IIC**

Input Circuit

Option 1
Sensor connected
with wire break monitoring
DIP switch 3 in pos. " I " (OFF)

Option 2
Mechanical contact connected
with wire break monitoring
DIP switch 3 in pos. " I " (OFF)

Option 3
Mechanical contact connected
without wire break monitoring
DIP switch 3 in pos. " II " (ON)



Selection of operating mode

Detail front panel	Input	Output
① ② ③ √ ⑤ S1 S2 S3 ON I II	1 - Signal	Relay energised
	0 - Signal	Relay de-energised
① ② ③ √ ⑤ S1 S2 S3 ON I II	0 - Signal	Relay energised
	1 - Signal	Relay de-energised

Front panel controls

LEDs

1 ① ② ③	1 yellow	Relay output channel 1
2 √ ⑤	2 red	Wire break monitoring channel 1
	3 green	Supply voltage
	4 yellow	Relay output channel 2
	5 red	Wire break monitoring channel 2

Switch

S1	Operating mode channel 1
S2	Operating mode channel 2
S3	Wire break monitoring

Dimensions
W 20 mm
H 105 mm
D 115 mm

1011-2

KSR Contact Protection Relay
Type KR230-Ex and KR24-Ex

		KR230-Ex	KR24-Ex
Power supply			
	Supply voltage terminal 14 (+), 15 (-)	207 ... 253 V AC, 45 ... 65 Hz	20 V ... 30 V DC
	Power consumption	≤ 1.3 W	≤ 1.3 W
	Max. safe voltage	253 V AC	125 V DC, 253 V AC
	Ripple		≤ 10%
	Current consumption		≤ 50 mA
Input	terminal 1+, 3-, 4+, 6-	intrinsically safe, acc.to DIN EN 60947-5-6 (NAMUR)	
	Open-circuit voltage U_{AO}	approx. 8 V DC	
	Short-circuit current I_{AK}	approx. 8 mA	
	Switch point Is within range	1.2 mA ... 2.1 mA	
	Switching hysteresis I_H	approx. 0.2 mA	
	Input pulse length	⊕ 20 ms	
	Input pulse interval	⊕ 20 ms	
	Wire break monitoring	Break I ≤ 0.1 mA, Short-circuit I > 6 mA	
Maximum ratings acc. to certificate of conformity			
	Approval number	**PTB 02 ATEX 2073**	**PTB 02 ATEX 2072**
	Ignition protection class, category	**⟨Ex⟩ II (1) G D EEx ia IIC**	**⟨Ex⟩ II (1) G D EEx ia IIC**
	Max. voltage U_O	10.6 V	10.5 V
	Max. current I_O	19.1 mA	13 mA
	Max. power P_O	51 mW	34 mW
Permissible circuit values			
	Ignition protection class, category	**EEx ia and EEx ib**	**EEx ia and EEx ib**
	Explosion group	IIA / IIB / IIC	IIA / IIB / IIC
	Max. external capacitance	72 µF / 16.2 µF / 2.32 µF	75 µF / 16.8 µF / 2.41 µF
	Max. external inductance	780 mH / 390 mH / 97 mH	1000 mH / 840 mH / 210 mH
Output	terminal 7, 8, 9, 10, 11, 12	not intrinsically safe, 1 changeover relay (SPDT) volt-free	
	Contact rating AC	253 V / 2 A / cos φ > 0.7	
	Contact rating DC	40 V / 2 A / resistance load	
	Mechanical service life	10^7 switching cycles	
	Energise delay	approx. 20 ms	
	De-energise delay	approx. 20 ms	
Transfer characteristics			
	Switching frequency	≤ 10 Hz	
Galvanic separation			
	Input - Output / Input - Supply	safe galvanic isolation to EN 50020, 375 V_{PP}	
	Output - Supply	safe isolation to IEC 61140, nominal isolation voltage 253 V_{eff}	
	Output - Output	basic isolation to DIN EN 50178, nominal isolation voltage 253 V_{eff}	
Environmental conditions			
	Operating temperature	-20°C ... +60°C	
	Protection class	IP 20	
Mechanical data			
	Design	Modular terminal housing in Makrolon flammability class to UL94: V - 0	
	Mounting	clipping onto 35 mm standard rail or by screws	
	Connections	self-opening instrument terminals max. 2.5 mm^2	
	Weight	approx. 150 g	

KSR Contact Protection Relay Type KR230 and KR24

General Description

KSR contact protection relays type KR230 and KR24 use a control circuit with a protective low voltage acc. to VDE 0100 part 410 and transmit binary signals from a switching element e.g. magnetic float switches (catalogue 1003) and magnetic switches (catalogue 1008 and catalogue 1015).

The AC control circuit is voltage and temperature compensated and thus guarantees a stable switching behaviour. A 2-point control can be set up using the built-in latching contact.

The built-in relays can be used to trigger contactors or other circuitry without the danger of damaging the switching elements (reed contacts) by current peaks.

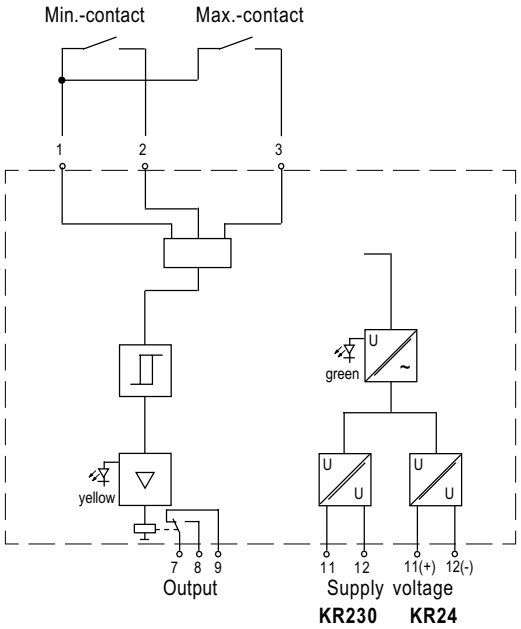
Inputs, outputs and supply voltage are galvanically isolated from each other in accordance with DIN EN 50178 for a nominal isolation voltage of 253 V AC.

High Alarm

The output relay is energised when the switch point is reached.

Low Alarm

The output relay is energised immediately when the supply voltage is connected. It is de-energised when the switch point is reached.



Technical Details

- **control circuit acc. to VDE 0100 part 410**
- **2-point control possible**
- **High / Low Alarm selectable**

Selection of operating mode

Detail front panel	Input	Output
S1 ① ② I II	1 - Signal Terminal 1 Terminal 3	Relay energised
S1 ① ② I II	0 - Signal Terminal 1 Terminal 3	Relay de-energised
S1 ① ② I II	0 - Signal Terminal 1 Terminal 3	Relay energised
S1 ① ② I II	1 - Signal Terminal 1 Terminal 3	Relay de-energised

Front panel controls

		LED's	
1	① OUT ② PWR	1 yellow 2 green	Relay output Supply voltage
S1	I II	**Switch S1**	

Dimensions
W 20 mm
H 105 mm
D 115 mm

1011-2

KSR Contact Protection Relay
Type KR230 and KR24

		KR230	KR24
Power supply			
Supply voltage	terminal 11(+), 12(-)	230 V AC, 48 Hz ... 62 Hz	24 V DC
Power consumption		≤ 0.8 W	≤ 0.8 W
Input / Current circuit	terminal 1, 2 and 3	1 common, 2 min-contact, 3 max-contact	
Max. voltage		10 V AC (approx. 1 Hz)	
Max. current		5 mA	
Min - Max - Control		terminal 1, 2 and 3	
On - Off - Control		terminal 1 and 3	
Output	terminal 7, 8 and 9	1 relay output (SPDT) volt free	
Contact rating AC		250 V / 2 A / cos φ > 0.7	
Contact rating DC		40 V / 2 A / resistance load	
Energise delay		approx. 1 s	
De-energise delay		approx. 1 s	
Switch S1		I open circuit current II closed circuit current	
Transfer characteristics			
Switching frequency		≤ 10 Hz	
Galvanic separation			
Supply - Output		safe galvanic isolation	
Supply - Input		acc. to DIN 106	
Input - Output		nominal isolation voltage 253 V_{eff}	
Environmental conditions			
Operating temperature		-25°C ... +65°C	
Protection class		IP 20	
Mechanical data			
Design		Modular terminal housing in Makrolon flammability class to UL94: V - 0	
Mounting		clipping onto 35 mm standard rail or by screws	
Connections		self-opening instrument terminals max. 2.5 mm^2	
Weight		approx. 110 g	

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01/03 1.000 WRB / ST
Printed in Germany
Subject to technical alterations