

# THREE-CHANNEL PEN RECORDER KR5A TYPE



## GENERAL INFORMATION

The three-channel compensatory pen recorder of KR5A type is designed for the continuous recording and measurement of slow changing d.c. current and d.c. voltage signals, temperature and resistance changes in three different measuring channels.

It co-operates directly with voltage and current sources, thermocouples (TC) and resistance thermometers (RTD).

The KR5A recorder is especially recommended to be used in systems where continuity of measured variables is required.

That recorder can be used as a signal transmitter 0...5 V or 0...20 mA (in each channel independently) which the value is proportional to the measured signal or as an event recorder (1...4 pens).

The KR5A recorder enables the record on a roll chart or on a Z-fold chart.

The KR5A recorder is fixed to the panel by two screw clips which are placed in sockets of steel. All mechanisms of the recorder are assembled on a carcass which is fastened by stop dogs to the housing.

These mechanisms are connected with a terminal plate, terminals and a plug-in connector. The housing is closed by a transparent door with a lock.

The recorder tape rewinder is driven by a synchronous motor through a multistage speed box in which we can choose the needed tape speed by shifting one toothed wheel.

The recording on the tape is performed by pens integrated with an ink pot. Recording blocks with pens, in the shape of three flat blocks, are superposed over the tape rewinder.

In the variant of recorder to event recording, in the place of the lower recording block, we install a subassembly with an event marker connected through the bus to appropriate recorder input terminals.

Pens are controlled from an external supply source.

Carriages are driven by a toothed belt from a d.c. motor coupled to a reduction gear.

The electronic measuring set consists of: range apron packs, an amplifier, a feeder cable, alarms, a bus and a plate with terminals. Range apron packs, alarms and the amplifier are connected to the bus through a plug-in connector.

While measuring temperature with a thermocouple, the range apron includes a linearizing system of its output voltage. We have also foreseen the possibility to connect a compensating system to compensate thermocouple voltage alterations resulting from the temperature alteration of the thermocouple cold junction reference temperature (A. C. J. C.).

The compensating element is a copper RT resistance fixed near recorder output terminals. While measuring temperature with a resistance thermometer, the range apron includes a system compensating the non-linearity of its characteristic. The standard output voltage from the 0...5 V range apron or the proportional current 0...20 mA signal is pull out as a retransmission signal to recorder terminals. The output voltage from the range apron is compared in the power amplifier system (W) with the voltage of the measuring potentiometer Pp. The difference of these voltages ( $\Delta U$ ), after amplifying, controls a follow-up d.c. motor coupled with the potentiometer slide and the pen.

The displacement of the potentiometer slide and the pen lasts till the moment when the output voltage from the range apron equalizes the voltage from the measuring potentiometer.

The output voltage from the range apron is compared in the alarm system (A) with the settled standard voltages (MIN., MAX.) which have a value proportional to the position of operating points on the scale. The system operates as soon as these voltages are equalized. The relay contacts (short-circuited or open) are led out to the terminal plate.

In each channel we can build in an alarm system or interchangeably led out a retransmission signal, because of utilizing the same terminals.

## TECHNICAL DATA

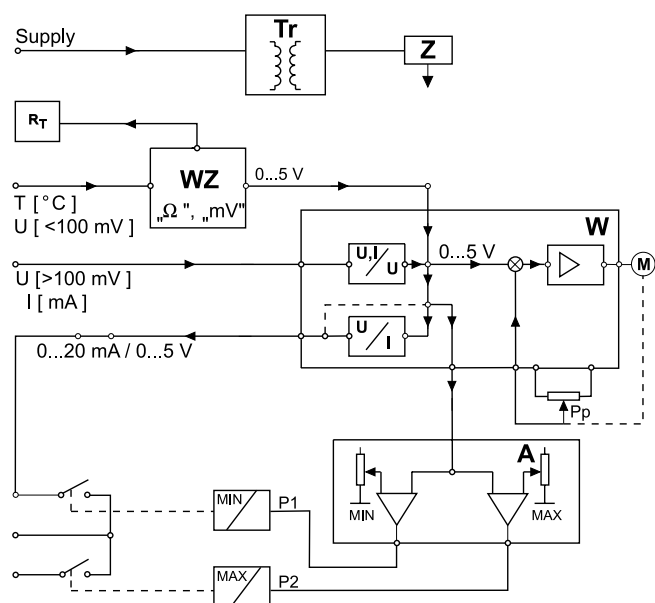
<b>Bezel recorder dimensions</b>	144 x 144 mm
<b>Recording width</b>	100 mm
<b>Measuring range:</b>	0...1 mA to 100 mA
	0...5 mV to 100 mV
Fe-CuNi	0...100°C to 900°C
NiCr-NiAl	0...150°C to 1300°C
PtRh10-Pt	0...1200°C to 1760°C
PtRh30-Pt	0...1200°C to 1800°C
Pt100 /1.3850	od 30°C to +850°C
Ni100 /1.617	od 50°C to +150°C
- with thermocouple	corresponding to $\Delta U \geq 5$ mV
- with thermometer resistance	corresponding to $\Delta R \geq 20$ $\Omega$
- resistance of line for a two-wire connection of RTD	10 $\Omega$
<b>Additional error for linearized scales</b>	$\leq 0,5\%$
<b>Quantity of measuring channels</b>	1, 2 or 3 (as per order)
<b>Length behind panel</b>	284 mm
<b>Indication accuracy class</b>	0,5
<b>Tape feed speed</b>	10, 20, 60, 120, 300, 600, 1200, 3600 mm/h or 5, 10, 20, 60, 120, 300, 600 mm/h
<b>Response time</b>	$\leq 1,5$ s
<b>Measuring system</b>	Poggendorf's potentiometric system
<b>Recording time accuracy</b>	$\leq 0,5\%$
<b>Ambient temperature range</b>	0...23...50°C

<b>Recording</b>	pen adapted for a 1000 meter running
channel 1 (lower):	red
channel 2 (middle)	blue
channel 3 (upper)	green
<b>Signalling system</b>	2 alarms per channel
<b>Dead signal zone</b>	≤ 0.5%
<b>Setting range for signalling operation threshold</b>	0...100% of the measuring range
<b>Contact loading</b>	0,5 A, 250 V (60 W, 125 VA)
<b>Retransmission signals</b>	0...5 V/1 mA or 0...20 mA/400 Ω
<b>Event marker supply</b>	12 V d.c., 0.1 A for 1 event marker
<b>Voltage supply</b>	207...230...253 V a.c.
<b>Voltage supply frequency</b>	45...50...65 Hz
<b>Working position</b>	vertical ± 10°

<b>Protection degree ensured:</b>	
- by the housing	IP65, acc. EN 60529
- by terminals	IP00, acc. EN 60529
<b>Power consumption</b>	≤ 6 VA per channel
<b>Recording tape</b>	Recording paper 16 m long. Roll tape or Z-fold tape acc. DIN 16230
<b>Operation safety</b>	<b>acc. to EN 61010-1</b>
- installation category	II
- pollution level	2
<b>ELECTROMAGNETIC COMPATIBILITY</b>	
- emission	acc. to EN 6100-6-4
- immunity	acc. to EN 6100-6-2

## OPERATION PRINCIPLE

The measurement input signals (d.c. voltage and d.c. current, alteration of thermometer resistance, thermocouple voltage, changes of potentiometric transmitter resistance) are converted in the circuits of range aprons (WZ) into d.c. voltage varying within 0...5 V.



## RECORDER CONNECTIONS

		Measuring signals connection					Recorder No				
Channel No	Range No	U		~ / -						b	a
		J		~ / -			CURRENT SUPPLY			b	a
		T				L	N	E	b	a	c
		R <sub>T</sub>				230 V	110 V		b	a	c
						50 Hz	50 Hz		c	c	c
		R <sub>T</sub>				ALARM			b	a	c
						MIN	MAX		c	c	c
				Z / R	Z / R		b	a	c		
	Marker						Retrans. signal 0...20 mA/400Ω 0...5 V/1mA			b	a
I									b	a	
II									c	c	
III									c	c	
	Terminal No	11	12	13	14	⊥	15	16	17	a - b - c jointer	
		21	22	23	24	⊗	25	26	27		
		31	32	33	34	⊗	35	36	37		

## MEASURING RANGES

Table 1

Range No	Range	Typ of sensor
01	0...1	mA
02	0...5	
03	0...20	
04	0...50	
05	0...100	
06	-5...0...+5	
07	-20...0...+20	
08	-50...0...+50	
09	-100...0...+100	
10	4...20	
11	0...5	mV
12	0...10	
13	0...15	
14	0...25	
15	0...40	
16	0...60	
17	0...100	
18	-5...0...+5	
19	-10...0...+10	
20	-20...0...+20	
21	-50...0...+50	
22	0...5	V
23	0...10	
24	-5...0...+5	
25	-10...0...+10	
26	0...100°C	
27	0...150°C	Fe-CuNi with automatic cold junction temperature compensation
28	0...250°C	
29	0...400°C	
30	0...600°C	
31	0...900°C	
32	0...100°C	Fe-CuNi cold junction reference temperature +50
33	0...150°C	
34	0...250°C	
35	0...400°C	
36	0...600°C	
37	0...900°C	
38	0...150°C	NiCr-NiAl with automatic cold junction temperature compensation
39	0...250°C	
40	0...400°C	
41	0...600°C	
42	0...900°C	
43	0...1300°C	
44	400...900°C	

Range No	Range	Typ of sensor	
45	0...150°C	NiCr-NiAl cold junction reference temperature +50	
46	0...250°C		
47	0...400°C		
48	0...600°C		
49	0...900°C		
50	0...1300°C		
51	400...900°C		
52	0...1200°C		PtRh10 with automatic cold junction temperature compensation
53	0...1600°C		
54	400...900°C		
55	800...1400°C		
56	1000...1600°C		
57	1200...1760°C		
58	0...1200°C	PtRh10-Pt cold junction reference temperature +50	
59	0...1600°C		
60	400...900°C		
61	800...1400°C		
62	1000...1600°C		
63	1200...1760°C		
64 <sup>1)</sup>	0...1200°C		PtRh30-PtRh6 without automatic cold junction temperature compensation
65 <sup>1)</sup>	0...1600°C		
66	800...1400°C	Pt100 /1,3850 <sup>2)</sup>	
67	1000...1600°C		
68	1200...1800°C		
69	-30...+60°C		
70			
71		Ni100 /1,617 <sup>2)</sup>	
72	0...60°C		
73	0...100°C		
74	0...150°C		
75	0...250°C		
76	0...400°C		
77	0...600°C		
78	100...200°C		
79	200...400°C		
80	300...600°C		
81	-50...100°C		
82	-50...+100°C	Ni100 /1,617 <sup>2)</sup>	
83	-30...+60°C		
84	-20...+20°C		
85	0...40°C		
86	0...60°C		
87	0...100°C		
88	0...150°C		
89			
99	custom-made range		

1) Version without linearization

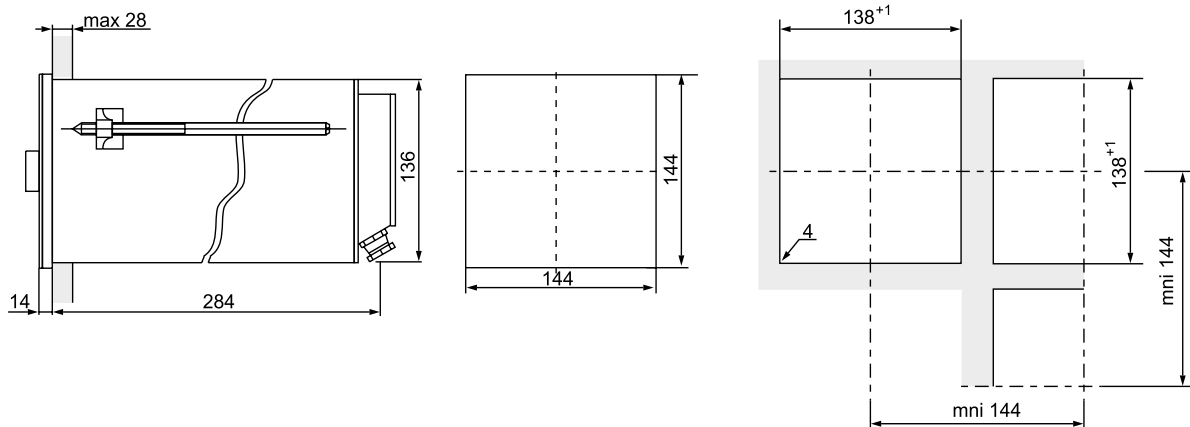
2) As a standard the recorder is adapted to the 4-wire connection of the resistance thermometer. A two-wire connection is also possible after agreement

Sensor characteristics:

TC - acc. to EN 60584-1

RTD - acc. to EN 60751

## OVERALL AND ASSEMBLY DIMENSIONS



## EXECUTIONS CODES AND ORDERING

Table 2

COMPENSATORY RECORDER - KR5A	XX	XX	XX	X	X	X	X	X	X
<b>I channel range number (lower pen)<sup>1)</sup>:</b>									
Measuring range (instead of XX, write a two digit range, as per table <sup>2)</sup> .....	XX								
Non-catalogue range .....	99								
Execution with event markers.....	00								
<b>II channel range number (middle pen):</b>									
Measuring range (instead of XX, write a 2-digit range as per table <sup>2)</sup> .....	XX								
Non-catalogue range .....	99								
<b>III channel range number (upper pen):</b>									
Measuring range (instead of XX, write a 2- digit range as per table <sup>2)</sup> .....	XX								
Non-catalogue range .....	99								
<b>Alarms:</b>									
Execution without alarms.....									0
Execution with normally short-circuiting contacts relays .....									1
Execution with normally open contact relays.....									2
<b>Retransmission signals:</b>									
Without a retransmission signal.....									0
With a retransmission signal 0...20 mA <sup>2)</sup> .....									1
With a retransmission signal 0...5 V <sup>2)</sup> .....									2
<b>Event markers:</b>									
Execution without markers .....									0
Execution with 2 markers <sup>3)</sup> .....									1
Execution with 4 markers <sup>3)</sup> .....									2
<b>Universal tape rewinder:</b>									
For roll and Z-fold tape, 16 m long .....									1
<b>Scale description:</b>									
Execution conform to a catalogue range. Linearized scale <sup>4)</sup> .....									1
Execution conform to a catalogue range. Drawn scale .....									2
Execution with description 0...100% .....									3
Execution with blank scale .....									4
Custom-made execution of the scale .....									9
<b>Acceptance tests:</b>									
Without a quality inspection certificate .....									8
With an extra quality inspection certificate .....									7
Accordinging user's agreement <sup>5)</sup> .....									X

1) The lower pen is not assembled in the channel I for an execution with an event marker.

2) For KR5A without alarms.

3) For two channel KR5A recorders.

4) Concerns temperature ranges.

5) The manufacturer establishes the code number.

### EXAMPLE OF ORDER KR5A 00 40 76 1 0 2 1 1 8 means:

The execution of a KR5A recorder with:

- 00 - event markers in the channel I,
- 40 - measuring range: 0...400°C NiCr-NiAl with ACJC, channel II,
- 76 - measuring range: 0...400°C Pt100/1.3850 in the channel III,
- 1 - with 2 alarms and normally short-circuiting contact relays per channel,
- 0 - without a retransmission signal,
- 2 - with 4 event markers,
- 1 - with a universal tape rewinder,
- 1 - with a linearized scale conform with the catalogue range,
- 8 - without a quality inspection certificate.