

Measurement and Sensor Systems



Set-point adjusters
and Motor-driven potentiometers



Set-point adjusters

and Motor-driven potentiometers

For **presetting of reference variables** in analogue **computing and regulating circuits**, **set-point adjusters** are used as control desk instruments in flush mounting format or **motor-driven potentiometers** are used for switch cabinet mounting.

For providing the set-point output, they contain mainly **single or multiple ganging potentiometers** with **resistance output** and with **current or voltage output** respectively, associated with a built-in signal converter.

Inductive transducer systems with current output or **optoelectronic systems with digital output** are available as well.

All types of transducer systems can be equipped with floating reversing switches for end-point limitation.

The presetting of the set-point is carried out mostly by hand with a rotary type control knob on a dial of flush mounting instruments or carried out with motor-driven potentiometers, additionally by means of set pulses with a d.c. motor or an a.c. motor (synchronous motor). **Graduation of the scale, scale angle and colour of the scale are optional according to user requirements.**

Motor-driven potentiometers are mostly used as set-point adjusters in regulating circuits. Frequently they are used as signal converter as well, for instance as

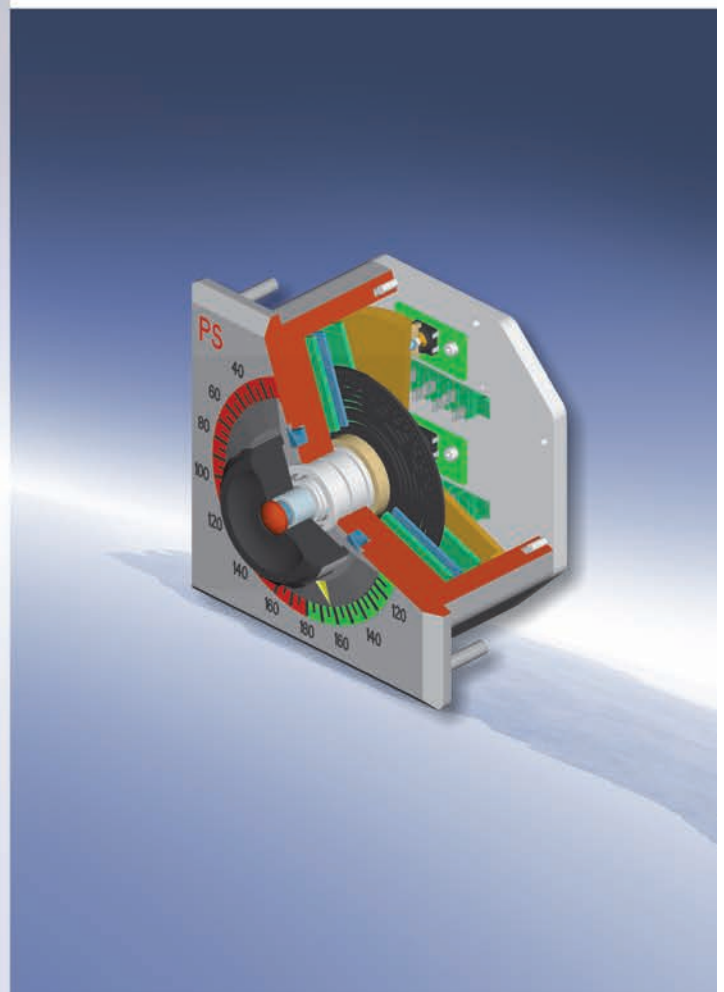
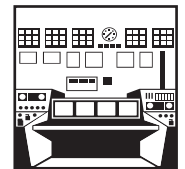
- **current/voltage-to-resistance converter**
- **measured value memory or measured value delay unit**
- **servo system in compensating circuits for analogue indicators**

Especially for servo systems, the motor-driven potentiometer of series M7-G30-PK613 serves in transformers or indicating instruments.

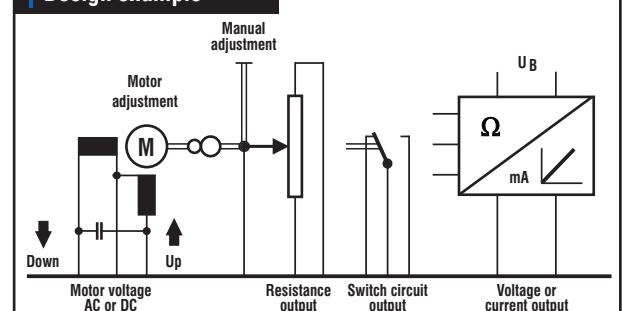
In connection with an appropriate servo-amplifier, inexpensive high precision indirect-acting measuring instruments can be realized easily for indicating purposes, for instance in

- **large-scale indicators for the display of braking force in motor vehicle operational monitoring systems**

Application range

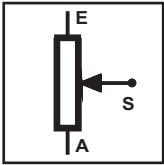


Design example



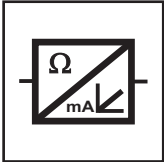
Specifications

Potentiometers ¹⁾



Series	PW309*	PW613	PW620	PW70	PW100
Angle of rotation	340°	345°	345°	345°	345°
Resistance value	max. 10 kΩ	max. 10 kΩ	max. 50 kΩ	max. 100 kΩ	max. 100 kΩ
Linearity	± 0.5%	± 0.3%	± 0.2%	± 0.2%	± 0.1%
Multiple design	two-fold	six-fold	six-fold	six-fold	six-fold

with signal converter



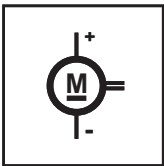
Series	PW613 Mu	PW620 Mu
Output	0 / 4 - 20 mA	0 / 4 - 20 mA or 0 - 10 V
Burden max	600 Ω	600 Ω / Load min. 2 kΩ
Supply	18 - 33 VDC	18 - 33 VDC

* only for set-point-adjusters size 48 x 48 mm

Driving motors

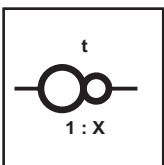


Synchronous motor type M4	
Motor voltage	24 V, 48 V, 110 V and 220 VAC
Frequency	50 or 60 cps
Rotational speed	at 50 cps 250 rpm, at 60 cps 300 rpm
Gear	designed for standard running periods 15, 30, 60, 120 sec.



DC motor, type M3 and M7 ²⁾	
Motor voltage	6 VDC, 12 or 24 VDC via voltage divider
Current consumption	6 mA approx. 30 mA
Nominal speed	approx. 3600 rpm at 6 V
Gear	designed for standard running periods 15, 30, 60, 120 sec.

Gears and control time



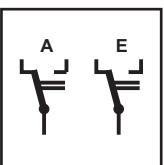
The control time for a signal to rise from 0 to 100% defines the speed increasing ratio of the gear. At set-point adjusters, the standard running periods are 15, 30, 60 or 120 sec. Other running periods are possible.

At motor-driven potentiometers of gear series G30 the standard running time is approximately 1 sec. for applications in a follow-up system³⁾.

At motor-driven potentiometers of gear series – D – the regulating time can be chosen from approx. 10 sec. to max 24 h.

Switches

Set-point adjusters contain in most cases only two switches for endpoint limitation. Starting with size 96 x 96 mm, max. 6 cam-operated switches are possible. Motor-driven potentiometers can be equipped either with two permanently adjusted limit switches or with switches arbitrarily adjustable by cam discs – up to 6 switches at maximum.



Switches		
Switching voltage	250 VAC	30 VDC
Switching current	6 A	3 A, inductive load
Switching hysteresis	< 1°	

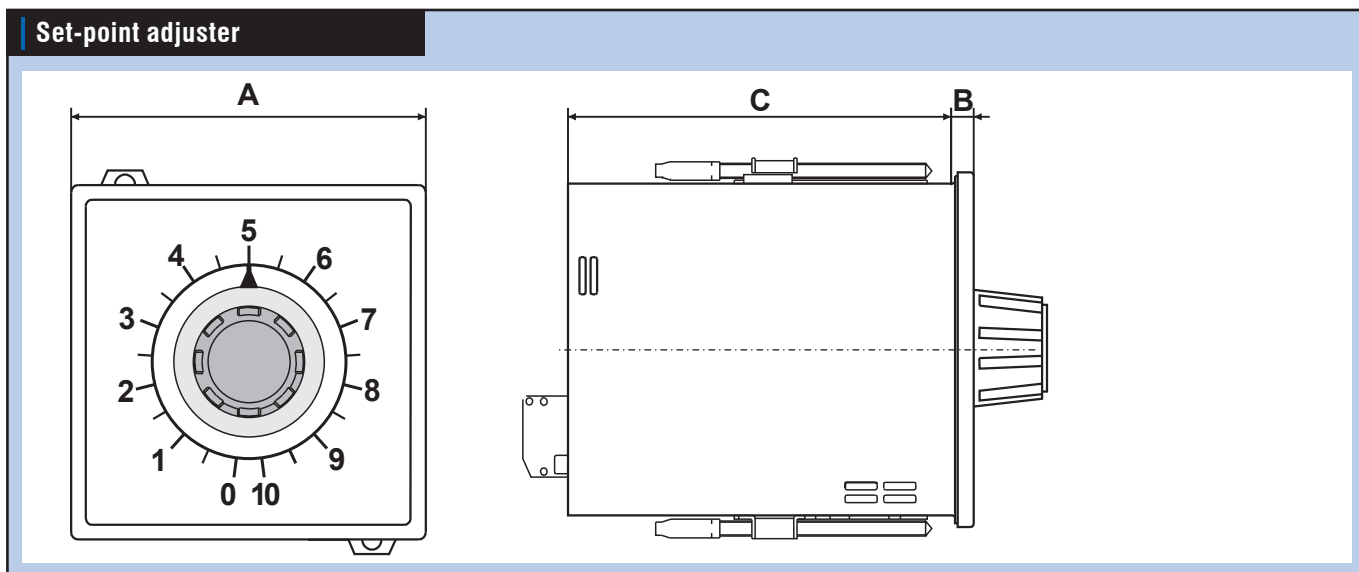
1) All potentiometers can be equipped with any resistance value, angle of rotation, taps and short circuit sections.

2) Also available with built-in controller boards for adapting the running period between 1 and 100 sec. by means of a trimming potentiometer.

3) Also available with mounted servo-amplifier for follow-up systems.

Models

of set-point adjusters



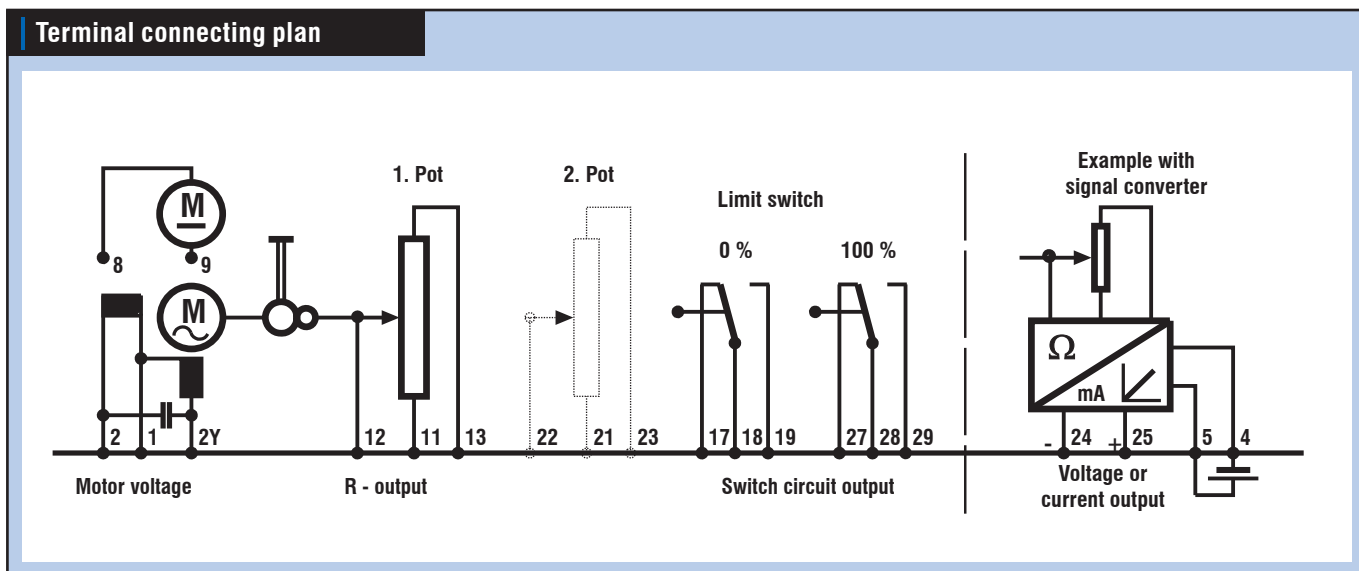
Flush mounting formats according to DIN 43 700

Size of frame	48 x 48	72 x 72	96 x 96	144 x 144
Dimension A	□ 48	□ 72	□ 96	□ 144
Panel cut-out	□ 45.5	□ 68	□ 92	□ 138
Dimension B	5	5	5	7
Dimension C*	50	50	70	55
Casing key	57	56	53	52

* Standard length

General data	
Casing	sheet steel
Bezel	plastic
Casing degree of protection	frontal IP 44, rear side IP 10
Electrical termination	terminal block
Temperature range	- 30 to +70°C
Testing voltage	550 V, 50 cps, 1 min.
EMC-Test according to	DIN EN 61 000-6-4 DIN EN 61 000-6-2
Scale colour	white*
Graduation mark colour	black*

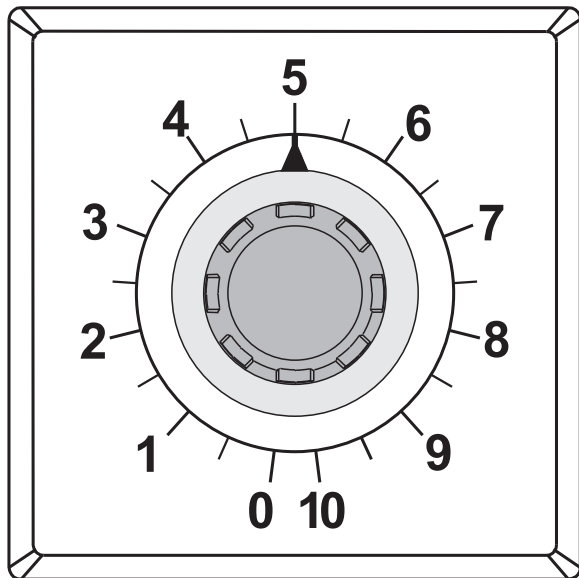
* Other colours on request



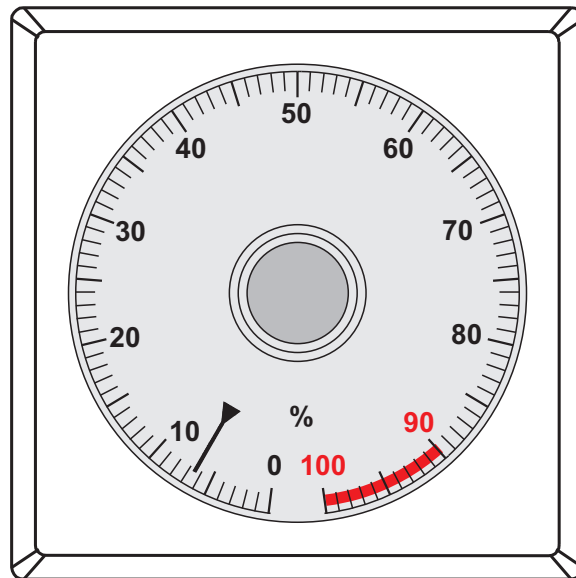
Design varieties of scales

Standard designs

Examples



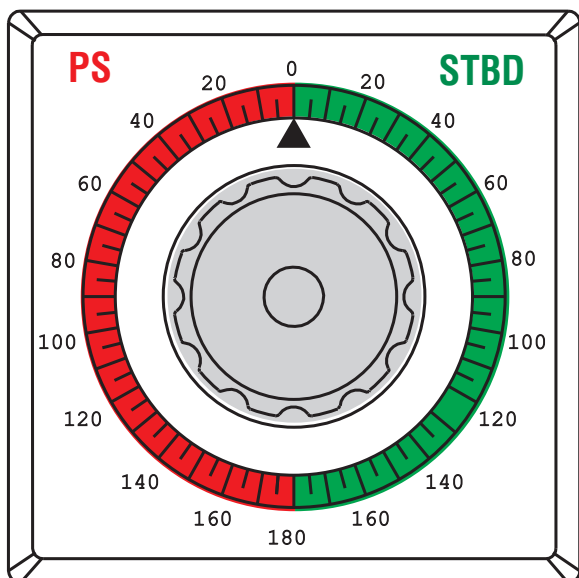
Scale C
C = scale of standard design, no sight glass



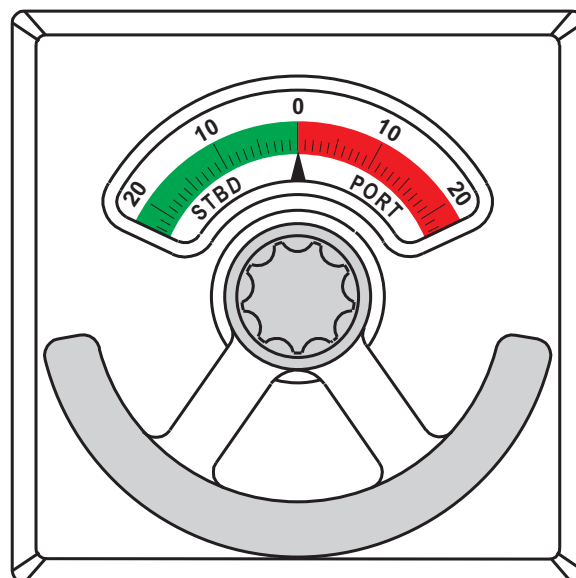
Scale B
B = scale + pointer disk, covered by a sight glass

Designs for marine applications

Examples



for instance rudder angle selection
–with rotary type control knob
Other marine design varieties
–course selector

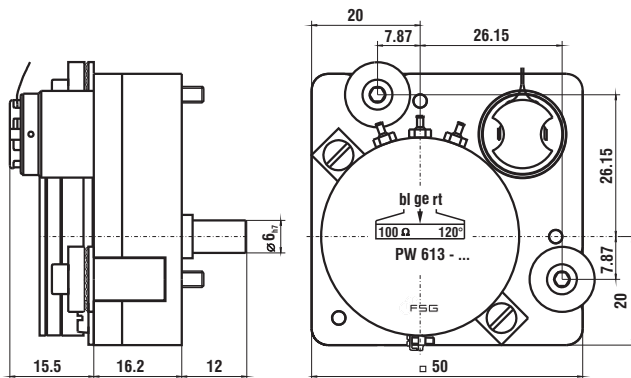


for instance rudder angle selection
–with hand wheel
Other marine design varieties
–engine room telegraph

Models

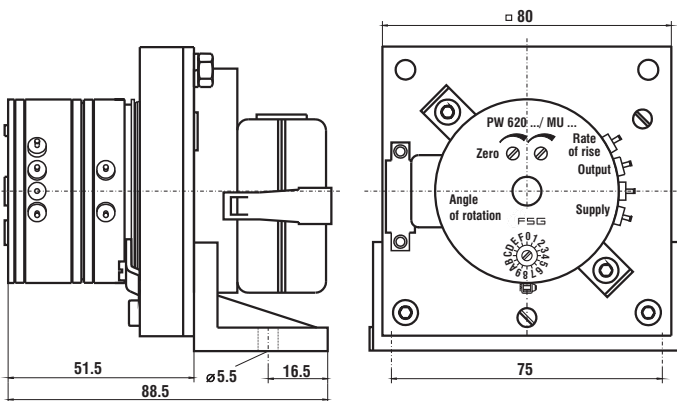
of motor-driven potentiometers

M 7 – G 30 – PW 613



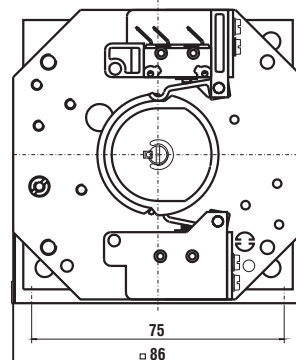
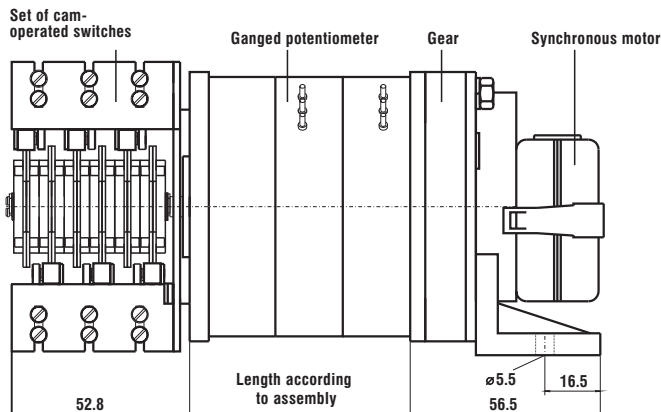
This series is used only as servo system in a bridge circuit or compensating circuit

M 4 – D – PW 620 MU



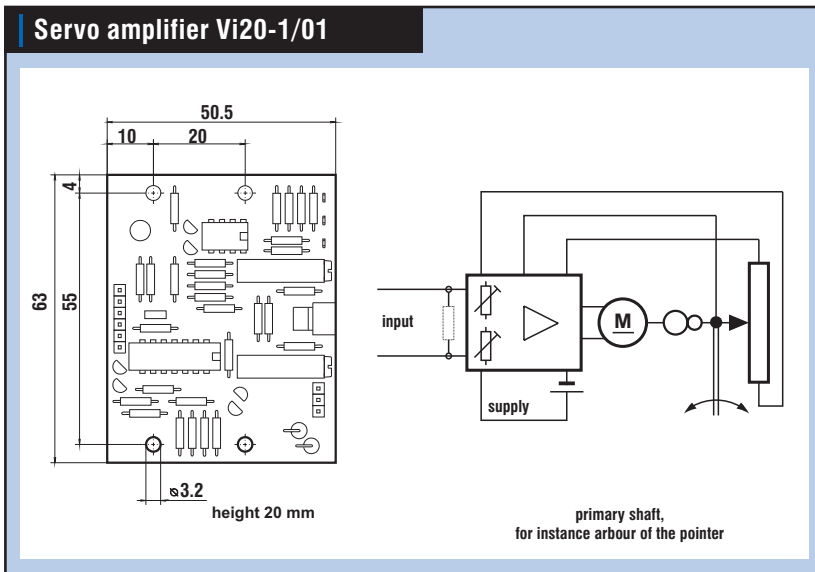
Standard series with resistance, voltage or current output

M 4 – D – PW 70 M... / 6SEN



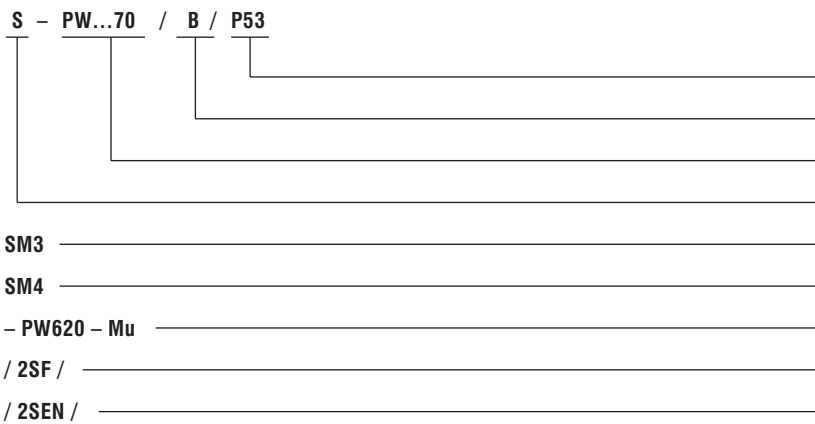
Standard series with single-gang or ganged potentiometer with adjustable cam-operated limit switches

Accessories

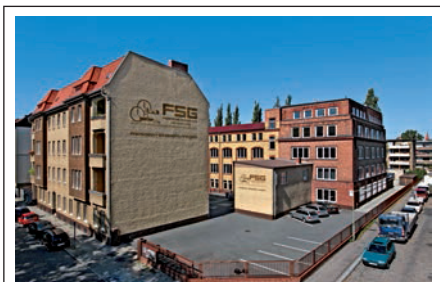


Technical data	Servo amplifier
Model	printed circuit board
Type	V-i20-1/01
Running period	–
Input	for instance 0 - 20 mA, Ri 50Ω, for instance 0 - 10 V, Ri 10 kΩ/V
Output	appropriate for motor-driven potentiometer
Supply	20 - 30 VDC, 40 mA
Notice	input and supply have to be electrically isolated

Types – explanations



- Casing key
- Scale type
- Potentiometer type
- Set-point adjuster (hand control)
- Set-point adjuster with DC-Motor
- Set-point adjuster with AC-Motor
- Potentiometer with current output
- Two permanently adjusted limit switches
- Two cam-operated limit switches



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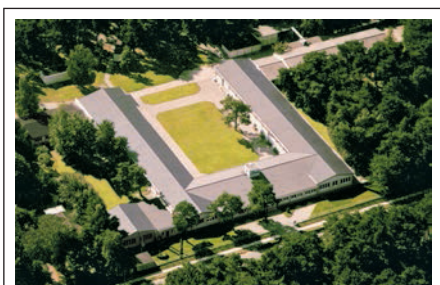
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