

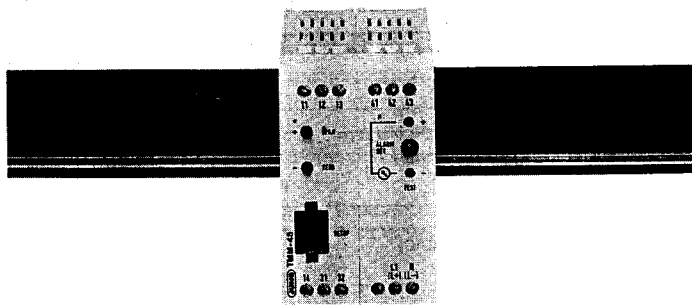


MEASUREMENT AND CONTROL

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## Programmable Transmitter for rail mounting

35 x 7.5 mm rail	EN 50 022
15 mm rail	EN 50 045
G rail	EN 50 035



**B 95.6510**

4.94/00200182

## Operating Instructions

## Type designation

**Programmable transmitter for rail mounting**  
 Dimensions 45 mm x 76 mm x 91 mm

Type TMM-45/

### Details of Codes ① - ⑤

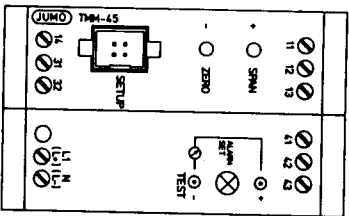
- ① **Basic type**  
 housing width 45 mm  45
- ② **Output**  
 current 0(4) - 20 mA  11  
 voltage 0 - 10 V  07
- ③ **Supply**  
 93 - 263 V a.c. 48 - 63 Hz  01  
 20 - 53 V d.c./a.c. 48 - 63 Hz  17
- ④ **Limit comparator**  
 none  00  
 Ik7 Ik8  29  
 (RS 485 interface not available)
- ⑤ **Interface**  
 none  00  
 RS 485  52  
 (Ik7, Ik8 not available)

**NOTE:**  
 All necessary settings and, where appropriate, alterations inside the unit are described in these Operating Instructions. If any difficulties should still arise during start-up you must not carry out any manipulations on the unit which are not permitted - you could endanger your rights under the instrument warranty.  
 Please contact the nearest office or the main factory.

## Notes on installation

- The choice of cable, the installation, and the electrical connection of the instrument must meet the requirements of VDE 0100 "Regulations on the Installation of Power Circuits with nominal voltages below 1000 V" or the appropriate local regulations.
  - Electrical connection and work inside the unit must only be carried out by qualified technicians.
  - The unit must be isolated on both line and neutral from the supply when there may be contact with live components during work.
  - A current limiting resistance (safety function) interrupts the supply circuit in case of a short-circuit inside the transmitter.  
 The external fuse of the supply should not be larger than 1 A (slow).  
 In order to avoid welding of the output relay contacts in case of an external short-circuit in the load circuit, the latter has to be fused according to the maximum relay current <sup>1)</sup>.
  - Prevent the formation of magnetic or electrical fields in the neighbourhood of the unit, e.g. due to transformers, radio telephones, or electrostatic discharges.
  - Do not install inductive loads (relays, solenoid valves etc.) near the unit and fit them with RC or arc suppression units or free-running diodes for interference suppression.
  - Run input, output and supply lines separately and not parallel to each other. Run out and return lines next to each other and twisted together if possible.
  - Use screened and twisted cable for sensor and interface lines. Do not run them close to current-carrying components or cables. Ground the screen only at one end at the unit.
  - Do not connect any further loads to the supply terminals of the unit.
  - The unit is not suitable for installation in areas subject to explosion hazard.
  - Connection of the unit other than in accordance with the connection diagram can lead to serious damage.
  - Do not mount several units directly above each other <sup>1)</sup>.
  - In case of a very "noisy" supply (e.g. thyristor controls) the unit should be fed through an isolating transformer.
  - Supply fluctuations are permitted only within the limits of the voltage range indicated.
- <sup>1)</sup> see Technical data

### Electrical connection

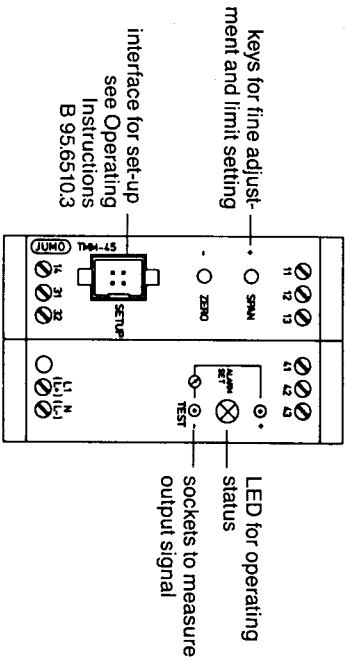


Connection for	Terminals	Diagram
Supply as on label	L1 (L+) N (L-)	
Signal input		
Current or voltage input up to 170 mV	11 + connect shunt for 12 - current input	
Current or voltage input above 170 mV	12 + connect shunt for 13 - current input	
Thermocouple with internal cold junction or constant reference temperature	11 + 12 -	
Thermocouple with external Pt100 cold junction	11 12 13 14	
Resistance thermometer in 2-wire circuit	12 13 14 $R_{line} = R_{balance}$	

### Electrical connection

Connection for	Terminals	Diagram
Resistance thermometer in 3-wire circuit	12 13 14	
Resistance thermometer in 4-wire circuit	11 12 13 14	
Resistance transmitter	11 S = slider 12 A = start 14 E = End	
Potentiometer in 2-wire circuit	12 13 14 $R_{line} = R_{balance}$	
Potentiometer in 3-wire circuit	12 13 14	
Potentiometer in 4-wire circuit	11 12 13 14	
Output		
Current or voltage	31 + for current output burden 750 Ω max. 32 - for voltage output load 2 kΩ min.	
Limit comparator	41 (O) n.c. (opening) 42 (P) common 43 (S) n.o. (closing)	
RS 485 interface	41 GND 42 A (+) transmitting and 43 B (-) receiving pair	

## Indications and controls

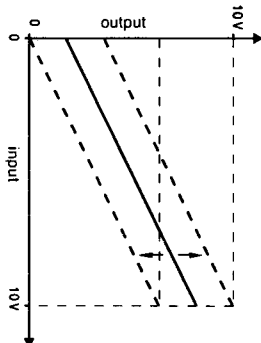


Operating status	LED alight	
	green	red
normal operation or base status	steady	-
limit comparator activated	-	steady
zero fine adjustment	flashing	-
f.s. fine adjustment	flashing	-
limit adjustment of limit comparator	-	flashing

## Zero adjustment

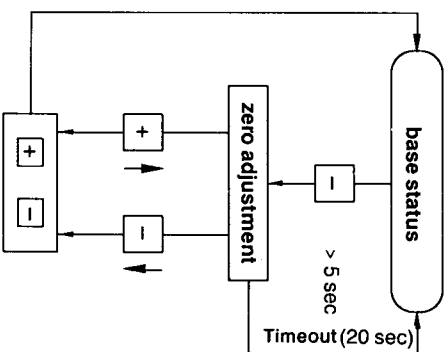
Zero adjustment produces a parallel shift of all measurements (offset) over the entire signal range. Zero adjustment is performed starting from the base status (LED green).  
Exception: if the LED is red the limit comparator is activated.

- ⊞ = adjustment up
- ⊟ = adjustment down



- press key ⊞ at least 5 sec.  
LED shows short green flashes.

- adjust zero with key ⊞ or ⊟
- press both keys ⊞ and ⊟ to enter value.



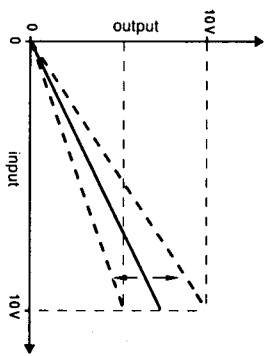
**Timeout:**  
If no key is operated for 20 sec during the adjustment mode the instrument returns to the base status

## Full-scale adjustment

The adjustment of the full-scale value produces a rotation of all measured values about the origin of the coordinate system over the entire measuring range.

Full-scale adjustment is performed starting from the base status (LED green).

Exception: if the LED is red the limit comparator is activated.

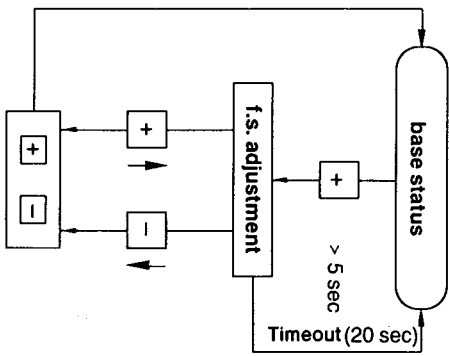


⊞ = adjustment up  
⊞ = adjustment down

- press key ⊞ at least 5 sec.  
LED shows short green flashes.

- adjust full-scale value with key ⊞ or ⊞

- press both keys ⊞ and ⊞ to enter value.



**Timeout:**  
If no key is operated for 20 sec during the adjustment mode the instrument returns to the base status

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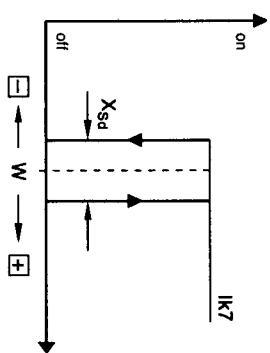
## Limit adjustment

If the unit is fitted with the limit comparator option, the limit value which is input in the setup program can be adjusted starting from the base status (LED green).

Exception: if the LED is red the limit comparator is activated.

The limit value is output at the sockets on the front.

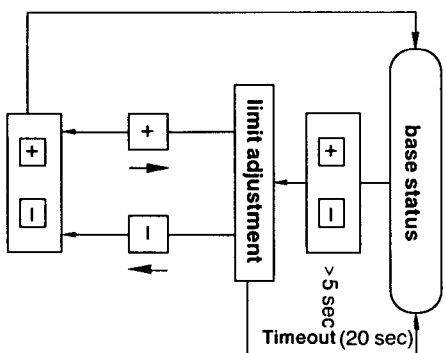
⊞ = adjustment up  
⊞ = adjustment down



- press keys ⊞ and ⊞ simultaneously more than 5 sec.  
LED short red flashes.

- adjust limit with the key ⊞ or ⊞

- press both keys ⊞ and ⊞ to enter value.



**Timeout:**  
If no key is operated for 20 sec during the adjustment mode the instrument returns to the base status

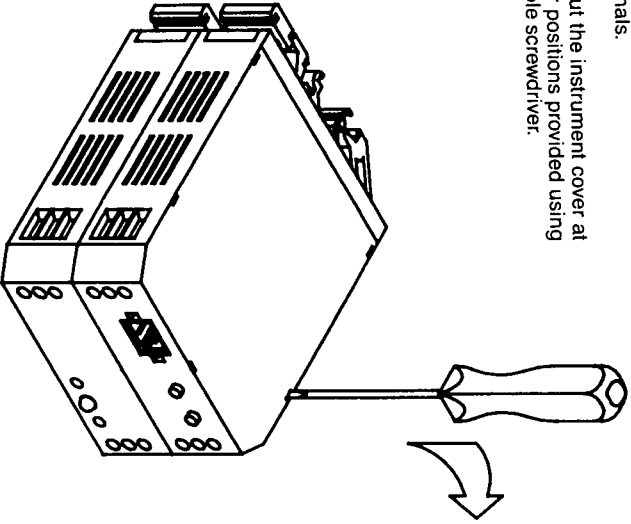
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## Change output signal

The output signal can be changed internally at solder links from current to voltage and vice versa.

**Note:**  
If solder links are altered the instrument has to be re-configured using the setup program since this operation changes not only the physical parameter but also the range of the output signals.

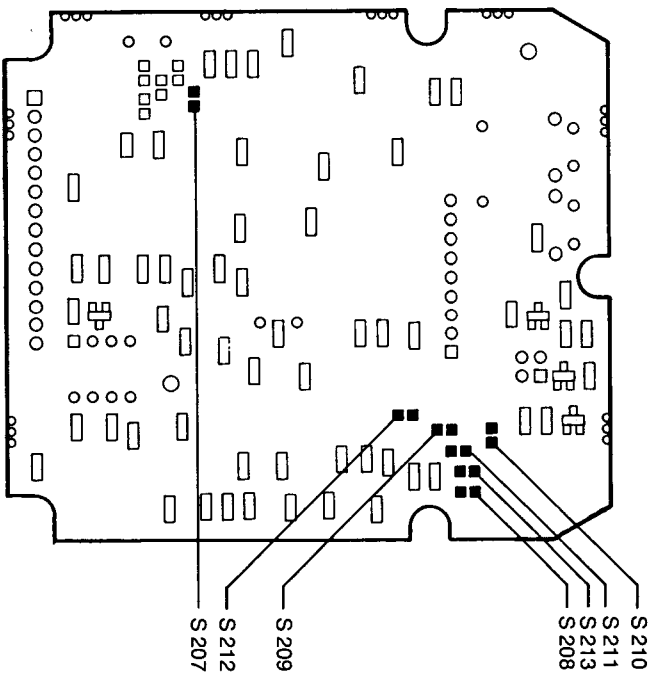
– Lever out the instrument cover at the four positions, provided using a suitable screwdriver.



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## Change output signal

### Component layout



Solder links	S 207	S 208	S 209	S 210	S 211	S 212	S 213
Output 0(4)...20 mA	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
0...10 V	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

link open

link closed

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## Technical data

### Linearisation to customer specification

Up to 61 calibration points (value pairs) can be programmed in the setup program.  
Interpolation: linear, square-law, cube-law.

### Measuring accuracy

Resistance thermometer range	2/3-wire	4-wire
-200 + 100°C	± 0.4°C	± 0.4°C
-200 + 850°C	± 0.8°C	± 0.5°C

### Transfer characteristic

linear for current, voltage, resistance transmitter, potentiometer; linear with temperature when used with temperature sensors.

**Linearity error**  
0.05% of range

**Action on under-range and over-range by 1% of range**  
(probe break, probe short-circuit)

output	positive	negative
4 - 20 mA	22 mA min.	-0.3 mA
0 - 20 mA	22 mA min.	-0.3 mA
0 - 10 V	11 V min.	-0.15 V

**Ambient temperature error**  
0.05% of range per 10°C

**Isolation**  
input isolated from output.  
Max. isolation voltage 50 V a.c./d.c.

**Sampling rate**  
at least 10 measurements/sec  
Built-in second-order digital filter;  
filter constant programmable up to 100 sec.

## Technical data

### Permitted storage temperature range

-10 to +70°C

### Operating temperature range

-10 to +60°C

### Climatic conditions

Class JUF to DIN 40 040, relative humidity 75% max. annual mean, no condensation

### Operating position

unrestricted

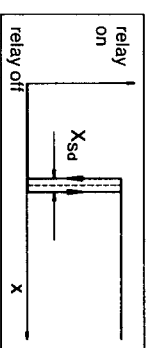
### Protection

IP20 to DIN 40 050

### Weight

220 g

### Limit comparator Ik7



The relay is energised when the signal  $x$  is above the adjustable limit value.

### Limit comparator Ik8

as Ik7 but relay function reversed

### Relay contact rating

3 A 660 W at 220 V a.c. 50 Hz  
200 x 10<sup>3</sup> switching cycles (resistive load)

### Switching differential Xsd

1% of span

### Output

4 - 20 mA, 0 - 20 mA or 0 - 10 V  
Output signal can be inverted.

Burden for current output: 0 - 750 Ω

Burden for voltage output: 2 KΩ min

burden error: 0.05%

supply voltage error: 0.02%

over the permitted voltage range

### Supply

93 - 263 V a.c. 48 - 63 Hz or

20 - 53 V d.c./a.c. 48 - 63 Hz

### Housing

polycarbonate

### Interface

The RS485 permits read-out of measured value and configuration data.

### EMC test

The unit has been tested for compatibility according to VDE 0843 Part 4, or Environmental Class 4.