

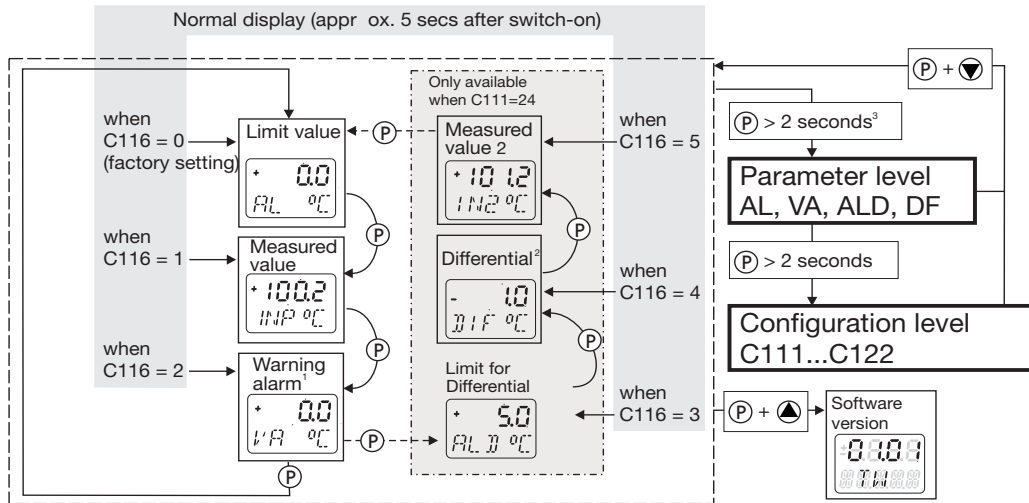


JUMO safetyM TB/TW
Temperature limiter, temperature
monitor
nach DIN EN 14597

B 701160.0
Operating Instructions

2015-03-01

Overview of operation



¹ Only available when C111* = 1 or 2

² DIF – IN2 (differential of two Pt100 sensors in 2-wire circuit)

³ Access to this level can be inhibited with the Setup program.

C111...C122 see Chapter 7 “Configuration level”

Contents

	Overview of operation	2
1	Brief description	4
1.1	Temperature monitor (TW)	4
1.2	Temperature limiter (TB)	4
1.3	Differential measurement	4
2	Identifying the instrument version	5
2.1	Service addresses	5
2.2	Scope of delivery	7
3	Mounting and removal	8
3.1	Mounting location	9
3.2	Close mounting	9
3.3	Electrical isolation	9
4	Electrical connection	10
4.1	Installation notes	10
4.2	Connection diagram	11
5	Commissioning the instrument	14
5.1	Displays and controls	14
5.2	Display after switch-on	15
5.3	Selecting and editing parameters (plausibility requirement for input values)	15
5.4	Canceling editing	16
5.5	Acknowledging alarms (for temperature limiters (TB) only)	16
6	Parameter level	18
7	Configuration level	19

7.1	C111 Analog inputs	20
7.2	C112 Setting for a double thermocouple	23
7.3	C113 Unit, decimal place	23
7.4	C114 Device function	23
7.5	C115 Switching action	24
7.6	C116 Display after switch-on	26
7.7	C117 Binary input function	26
7.8	C118 Display switch-off after timeout	27
7.9	C119 Warning alarm function	27
7.10	SCL, SCH, AL LO, AL HI, OFFS, HYST1, HYST2	28
7.11	C 120 Limit value for relay switching operations	28
7.12	C 121 Count for relay switching operations	29
7.13	C 122 Operating hours counter	29
8	Technical data	30
8.1	Analog inputs	30
8.2	Measuring circuit monitoring	32
8.3	Binary input	33
8.4	Relay- and Binary output	33
8.5	Supply	33
8.6	Test voltages to EN 60730, Part 1	34
8.7	Electrical safety	34
8.8	Environmental influences	35
8.9	Housing	35
8.10	Approvals/Marks	36
9	DIN-approved probes	37

Contents

Contents

9.1	Probes for operation in air	37
9.2	Probes for operation in water and oil	38
9.3	Probes for operation in air, water and oil	40
10	Setup program	42
10.1	Hardware and software requirements	42
10.2	Displaying the device software version	42
10.3	Activating the access code	43
10.4	Restricting the setting range for the AL limit (minimum/maximum value master)	43
11	Alarm messages	44
12	Error messages	45
13	What if...	47

1 Brief description

Temperature limiters (**TB**) and temperature monitors (**TW**) are used to monitor thermal processes in systems, to signal whenever the **measurement** exceeds or falls below an adjustable **limit value**.

This limit infringement is indicated by built-in LED K1 and the fitted relay switches the system to a safe operating state (**alarm range**).

1.1 Temperature monitor (TW)

The temperature monitor is a device which, when activated, resets automatically if the sensor temperature has fallen below or risen above set limit value AL by an amount equal to the switching differential.

⇒ Chapter 7.5 “C115 Switching action”

1.2 Temperature limiter (TB)

The temperature limiter is a device which, when activated, is locked out. It can be reset by hand or with the aid of a tool, if the sensor temperature has fallen below or risen above limit value AL by an amount equal to the switching differential.

⇒ Chapter 7.5 “C115 Switching action”

1.3 Differential measurement

The TB/TW can measure the differential of two Pt 100 resistance thermometers in a 2-wire circuit.

If the system is within the OK range, the relay is active and LED K1 shows green.

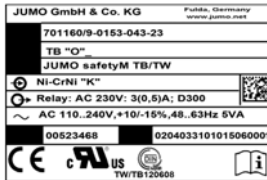
If the system leaves the OK range or infringes set limit value AL, the relay switches off and LED K1 shows red.

⇒ Chapter 7.1 “C111 Analog inputs”

2 Identifying the instrument version

The nameplate is glued to the side of the housing.

AC supply:



DC supply:



The supply voltage must correspond to the voltage given on the nameplate!



Please read these operating instructions before commissioning the instrument.

These operating instruction are valid from **instrument software version: 237.02.01** (Press +).

Keep the manual in a place which is accessible to all users at all times.

Your comments could help us to improve these operating instructions.

Phone: (06 61) 60 03-7 27

Fax: (06 61) 60 03-5 08

2.1 Service addresses

Phone support in Germany:

Phone: +49 661 6003-300 or -653 or -899

Fax: +49 661 6003-881729

E-mail: service@jumo.net

Austria:

Phone: +43 1 610610

Fax: +43 1 6106140

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Switzerland:

Phone: +41 44 928 24 44

Fax: +41 44 928 24 48

E-mail: info@jumo.ch

701160

Basic type

Temperature limiter (TB) / temperature monitor (TW)

Version

- | | |
|---|---|
| 8 | factory setting |
| 9 | configuration to customer specification |

Switching action

- | | |
|------|-----------------------------|
| 0151 | Inverse temperature monitor |
| 0152 | Direct temperature monitor |
| 0153 | Inverse temperature limiter |
| 0154 | Direct temperature limiter |

Measurement input (programmable)

- | | |
|-----|--|
| 001 | Pt100 in 3-wire circuit |
| 003 | Pt100 in 2-wire circuit |
| 005 | Pt1000 in 2-wire circuit |
| 006 | Pt1000 in 3-wire circuit |
| 024 | 2 x Pt100 for differential measurement |
| 037 | W3Re-W25Re D |
| 039 | Cu-CuNi T |
| 040 | Fe-CuNi J |
| 041 | Cu-CuNi U |
| 042 | Fe-CuNi L |
| 043 | NiCr-Ni K |
| 044 | Pt10Rh-Pt S |

	045	Pt13Rh-Pt R
	046	Pt30Rh-Pt6Rh B
	048	NiCrSi-NiSi N
	052	0 to 20 mA
	053	4 to 20 mA
	063	0 to 10 V
	071	2 to 10 V
	601	KTY11-6
<hr/>		
		Supply
	23	110 to 240 V AC +10% /-15%, 48 to 63 Hz
	25	20 to 30V AC/DC, 48 to 63Hz
701160 /	8 -	0153 -
	001 -	23

 factory setting

2.2 Scope of delivery

- JUMO safetyM TB/TW in the ordered version
- 1 Operating Instructions 701160.0



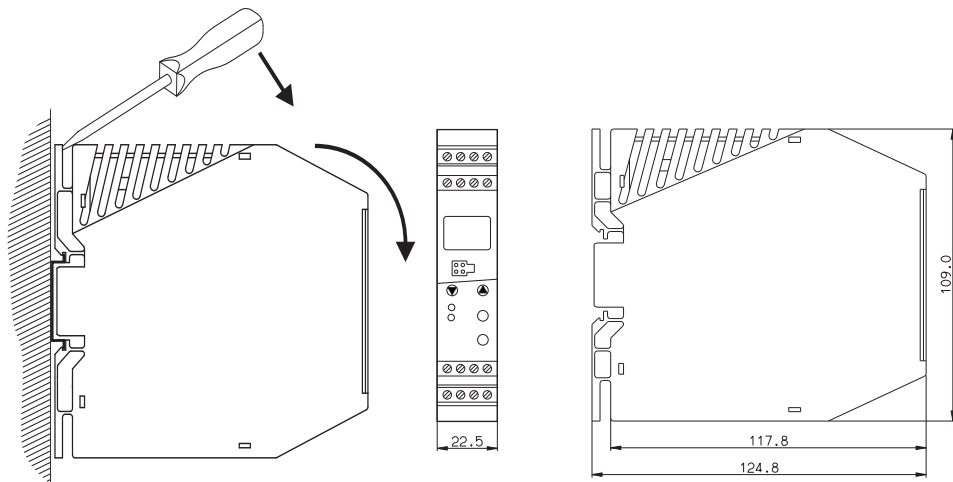
All the required settings are described in the current operating instructions.

Carrying out manipulations not described, or expressly forbidden in the operating instructions, will put your warranty at risk!

If you have any problems, please contact the nearest subsidiary or the head office.

3 Mounting and removal

The instrument is clipped onto a 35 mm DIN rail (EN 60715) from the front.



* Insert a screwdriver into the release slot, push towards the instrument and swing it downward, out of the DIN rail.

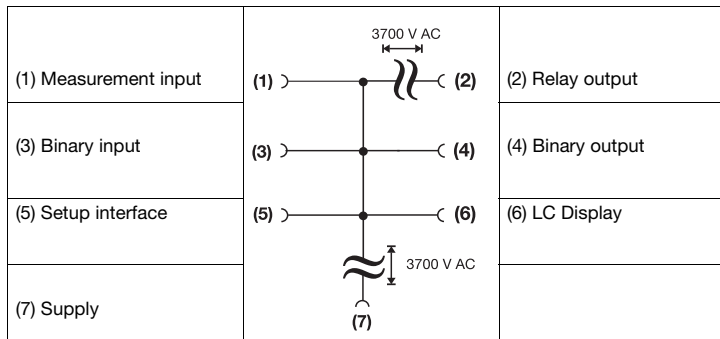
3.1 Mounting location

- ❑ Preferably vibration-free, so that screw terminals cannot work loose!
- ❑ Free from aggressive media, such as strong acids and caustic solutions and preferably free from dust and powder or other suspended matter, so that ventilation slots cannot get blocked up!

3.2 Close mounting

- ❑ Maintain at least 10 cm of space at the top, so that the release slot can be accessed with a screwdriver from above.
- ❑ Several instruments can be mounted right next to one another, without a gap.

3.3 Electrical isolation



4 Electrical connection

4.1 Installation notes



The instrument is fitted with electronic components that can be destroyed by electrostatic discharge. It is therefore important during mounting, maintenance and servicing that personnel working on the instrument have adequate electrostatic discharge protection.

- All incoming and outgoing lines without a connection to the mains supply must be laid with shielded and twisted cables. Lay the shield to ground potential on the device side.
- If possible, do not lay the input and output cables close to components or lines through which current is flowing.
- The instrument is not suitable for installation in areas with an explosion hazard.
- Do not connect any additional consumers to the screw terminals for the instrument supply.
- Both the choice of cabling material for installation and the electrical connection of the instrument must comply with the relevant local or national regulations.
- Suitable measures must be taken to protect the relay circuit.
The maximum contact rating is 230 V / 3A (resistive load).
- Electromagnetic compatibility conforms to the standards and regulations cited in the technical data.
⇒ Chapter 8 "Technical data"
- When connecting the device to an external PELV electrical circuit, the existing internal SELV electrical circuit becomes a PELV electrical circuit whereby the protection against electrical shock is provided through double/reinforced insulation and voltage limitation – but here no connection to the protective ground is required.



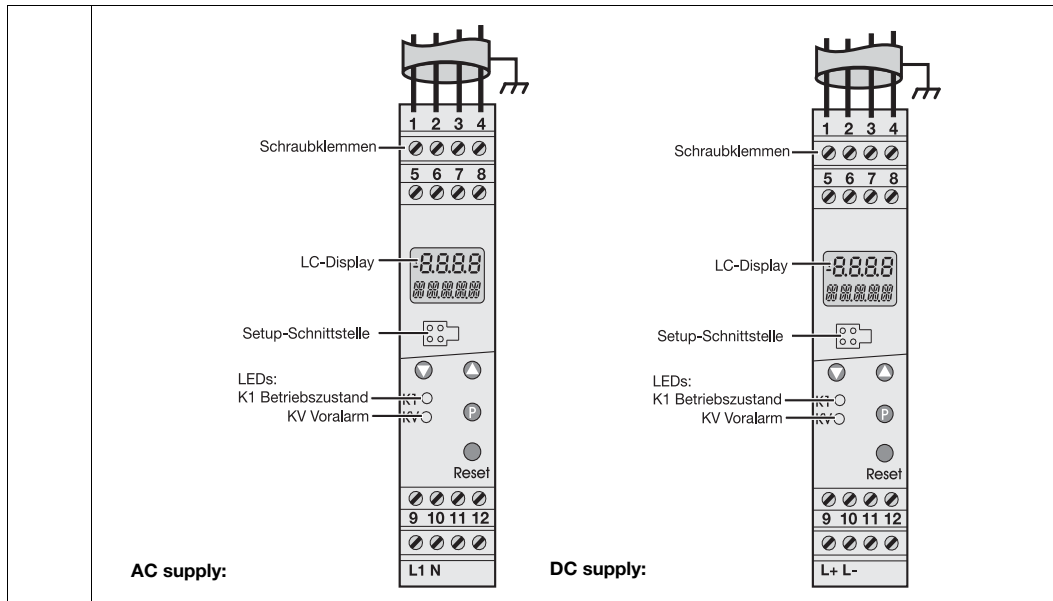
Electrical connection must only be carried out by qualified personnel.


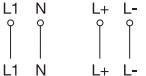
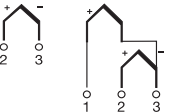












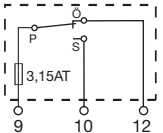
Approval to EN 14597 is only valid if the correct sensor with DIN approval is set up and connected at configuration level.

4.2 Connection diagram

Screw terminals are used for connecting strands with a cross-section of 0.2 to 2.5mm².



	Supply as on nameplate	AC L1 External conductor N Neutral conductor	DC L+ L-	
	Analog inputs	Thermocouple / double thermocouple (evaluated for temp. Limiter)		
		Resistance thermometer in 2-wire circuit (evaluated for temp. Limiter) or KTY11-6 PTC in 2-wire circuit  Lead resistance must be entered for resistance thermometers in 2-wire circuit with longer cable lengths. ⇨ Setup program: <i>edit => advanced configuration</i>		
		Resistance thermometer in 3-wire circuit (evaluated for temp. Limiter)		
		Resistance thermometers 2 x Pt100 in 2-wire circuit for differential measurement (lead compensation not possible)		

	Analog inputs	0 to 20 mA 4 to 20 mA (evaluated for temp. Limiter)	
		0(2) to 10 V	
	Binary input	for connection to floating contact	
	Binary output	24 V DC / 20 mA (short-circuit proof)	
	Relay output	Relay with safety fuse for pole contact	





5 Commissioning the instrument

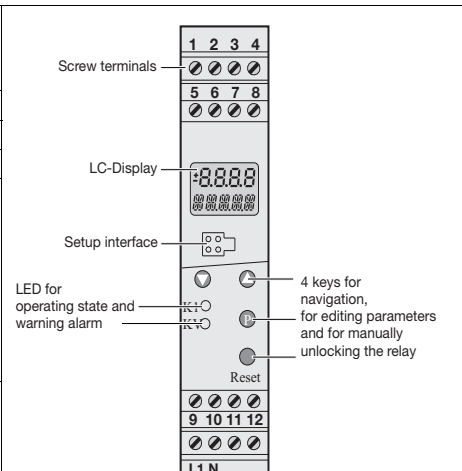
5.1 Displays and controls

* Apply the supply voltage, all segments light up four seconds long (for testing the segments).

If everything is properly connected on the instrument, it will display the limit value, measured value or warning alarm, depending on the configuration.

⇒ If an alarm or error message appears, see Chapter 11 “Alarm messages”.

LC display	4-digit, seven-segment display for numerical values above 5-digit alphanumeric display for presenting letters and unit below	
LED K1	green	OK range
	red	Alarm range
LED KV	yellow	Warning alarm active
Keys		Increase value
		Reduce value
		Programming
		Reset for manually resetting the relay
Setup interface	A PC interface and an adapter (4-pin socket) are used to connect the instrument to a PC.	








5.2 Display after switch-on

⇒ The value to be displayed is adjustable, as in Chapter 7.6 “C116 Display after switch-on”

5.3 Selecting and editing parameters (plausibility requirement for input values)

Values are displayed in the normal display.

* To edit a value, here, for example, the AL limit, perform steps 1 - 4

1	Press (P) for longer than 2 secs		1st value in the parameter level appears
2	Use (▲) to increase or (▼) to reduce		AL flashes
3	Press (P) briefly		Limit flashes for checking, both at top and bottom of display
4	Briefly press (P) to confirm. The value is stored.		Use (P) + (▼) to return to normal display or return automatically after a timeout
	At parameter level, if no key is pressed, the instrument automatically returns to normal display after 30 seconds (timeout) and the value is not stored. ⇒ see overview of operation on the first inside page of this manual		

5.4 Canceling editing

Ⓟ + ▼ will cancel editing, the original value is retained.

5.5 Acknowledging alarms (for temperature limiters (TB) only)

Requirement: C114 = 0 or C114 = 1

* Press ● (Reset) with a suitable tool

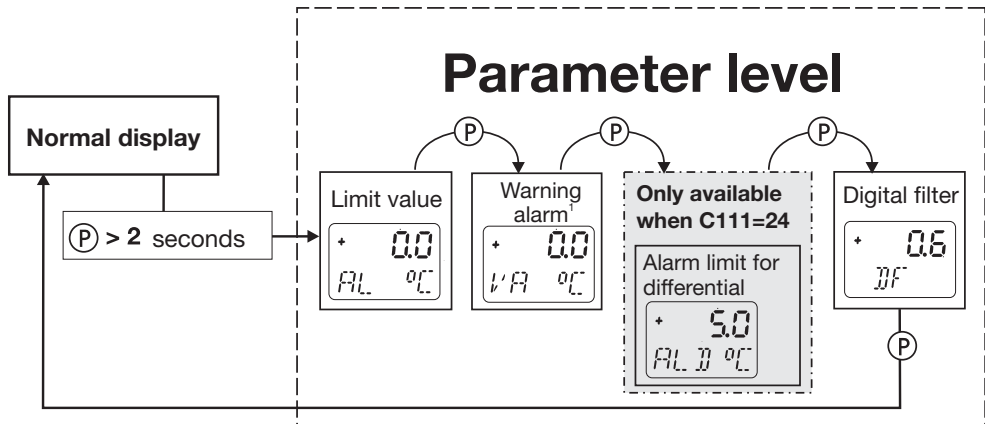
6 Parameter level

This level is where to find the parameters AL, VA, ALD and DF, which are freely accessible to operating personnel at the factory.

* In normal display, press (P) for longer than 2 secs and AL will appear.

This level can be inhibited by the setup program.

⇒ Chapter 10.3 “Activating the access code”



¹ Only available when C119=1 or 2

7 Configuration level

All the configuration level parameters C111 - C122 are listed in the table below.

Parameters that are not required are automatically blanked out.

- * In normal display, press **(P)** for longer than 2 secs and AL will appear.
- * Press **(P)** again for longer than 2 secs and C111 will appear.

Each time you press **(P)**, you move to the next parameter.

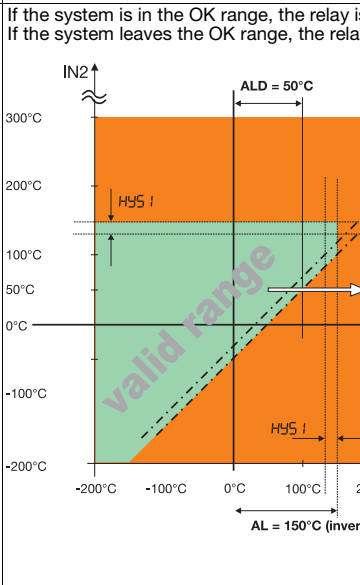
All the parameters are freely accessible at the factory, but can be inhibited via the setup program.


⇒ Chapter 10.3 “Activating the access code”

7.1 C111 Analog inputs

C 111	Analog input	Comment	Setting range for AL: (can be restricted via setup)	Limits for overrange/ underrange
001	Pt 100 EN 60751	in 3-wire circuit	-1999 to +9999°C	-205°C/ +855°C
006	Pt 1000 EN 60751	in 3-wire circuit	-1999 to +9999°C	-205°C/ +855°C
601	KTY11-6 PTC	sensor in 2-wire circuit	-1999 to +9999°C	-55°C/ +155°C
003	Pt 100 EN 60751	in 2-wire circuit	-1999 to +9999°C	-205°C/ +855°C
005	Pt 1000 EN 60751	in 2-wire circuit	-1999 to +9999°C	-205°C/ +855°C
024	2x Pt 100 DIN	<p>for differential measurement</p> <p>The TB/TW can measure the differential of two Pt 100 resistance thermometers in a 2-wire circuit. Measurement input INP (terminal 1 and 2) acquires the first temperature. The second measurement input IN2 (terminal 2 and 3) acquires the second temperature. The differential DIF = INP - IN2 is displayed and evaluated.</p> <p>Setting range for ALD: -1999 to 9999</p>	-1999 to +9999°C	-205°C/ +855°C


■ Factory setting

C 111	Analog input	Comment	Setting range for AL: (can be restricted via setup)	Limits for overrange/ underrange
		<p>If the system is in the OK range, the relay is active and LED K1 shows green. If the system leaves the OK range, the relay switches off and LED K1 shows red.</p> 	<p>All difference values within the OK range (green) are smaller than the setting for ALD=50K</p> <p>Example (refer to arrow): IN2=50°C INP increases to 101°C and leaves the OK range (INP - IN2 ≥ ALD) (101K - 50K = 51K).</p> <p>Starting at a value of INP=99 the difference value will be back in the OK range. The value of INP must drop additionally the hysteresis to be back into the OK range. INP=99</p> <p>The area between the dot and dash lines indicate the span of the hysteresis (factory setting: 1K)</p> <p>The inputs INP and IN2 are additionally monitored in regards to the limit value AL=150</p>	



	Analog input	Comment	Setting range for AL: (can be restricted via setup)	Limits for overrange/ underrange
037	W3Re-W25Re D	Thermocouple	-1999 to +9999°C	-5 to +2500°C
039	Cu-CuNi T	Thermocouple EN 60584	-1999 to +9999°C	-205 to +405°C
040	Fe-CuNi J	Thermocouple EN 60584	-1999 to +9999°C	-205 to +1205°C
041	Cu-CuNi U	Thermocouple DIN 43710	-1999 to +9999°C	-205 to +605°C
042	Fe-CuNi L	Thermocouple DIN 43710	-1999 to +9999°C	-205 to +905°C
043	NiCr-Ni K	Thermocouple EN 60584	-1999 to +9999°C	-205 to +1377°C
044	Pt10Rh-Pt S	Thermocouple EN 60584	-1999 to +9999°C	-5 to +1773°C
045	Pt13Rh-Pt R	Thermocouple EN 60584	-1999 to +9999°C	-5 to +1773°C
046	Pt30Rh-Pt6Rh B	Thermocouple EN 60584	-1999 to +9999°C	295 to 1825°C
048	NiCrSi-NiSi N	Thermocouple EN 60584	-1999 to +9999°C	-105 to +1305°C
052	0 to 20 mA		-1999 to +9999°C	0 to 21mA
053	4 to 20 mA		-1999 to +9999°C	3.6 to 21mA
063	0 to 10 V		-1999 to +9999°C	0 to 10.5 V
071	2 to 10 V		-1999 to +9999°C	1.8 to 10.5V

⇒ Chapter 10.4 “Restricting the setting range for the AL limit (minimum/maximum value master)”


7.2 C112 Setting for a double thermocouple

	Double thermocouple	Comment
0	no	sensor short circuit not detected!
1	yes	only available for C111 from 037 to 048 ⇒ Chapter 7.1 "C111 Analog inputs" Can detect a sensor short circuit

7.3 C113 Unit, decimal place

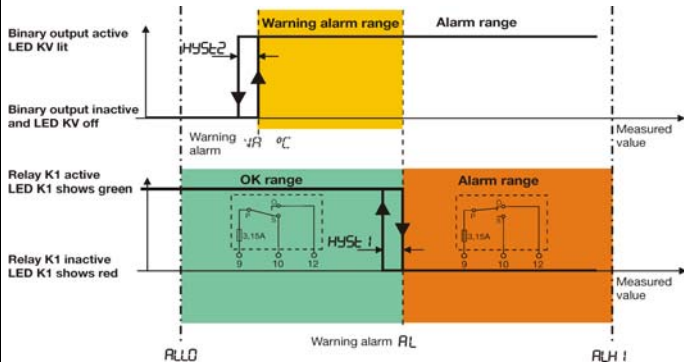
	Unit, decimal place	Comment
0	°C, no decimal place	 When the unit changes to °F, the measurement is converted. All other measurement-related values, such as AL, are unchanged!
1	°C, one decimal place	
2	°F, no decimal place	
3	°F, one decimal place	

7.4 C114 Device function

	Device function	Comment
0	Initial commissioning of TB temperature limiter	Whatever the switching state of the relay before the power failure, the TB remains locked when the power returns.
1	Temperature limiter TB	Release is only necessary if the temperature is exceeded
2	Temperature monitor TW	Automatic release

7.5 C115 Switching action

C 115	Switching action	Comment
0	inverse	<p>If limit value AL is exceeded, the fitted relay switches OFF. LED K1 shows red and the limit flashes in the display.</p> <p>The temperature limiter remains in this state, even if the measured value falls below limit AL. Only when a tool has been used to press the "Reset" key or if a switch has been operated by a relevant configuration of the binary input, does the relay switch back ON and LED K1 shows green.</p> <p>The temperature monitor automatically switches the relay back ON and LED K1 shows green, when the measured value falls below limit AL.</p>



■ Factory setting

C 115	Switching action	Comment
1	direct	<p>If the value falls below limit AL, the fitted relay switches OFF. LED K1 shows red and the limit flashes in the display.</p> <p>The temperature limiter remains in this state, even if the measured value rises above limit AL. Only when a tool has been used to press the "Reset" key or if a switch has been operated by a relevant configuration of the binary input, does the relay switch back ON and LED K1 shows green.</p> <p>The temperature monitor automatically switches the relay back ON and LED K1 shows green, when the measured value rises above limit AL.</p> <p>The diagram illustrates the switching logic for the temperature limiter and monitor. The measured value axis is marked with R_{LLO}, Limit value AL, and R_{UL1}. The 'Warning alarm range' (yellow) is defined between AL and R_{UL1}. The 'OK range' (green) is defined between AL and R_{UL1}. The relay state is shown as 'Binary output active LED KV lit' (high) and 'Binary output inactive and LED KV off' (low). The relay state is 'Relay K1 active LED K1 shows green' (high) and 'Relay K1 inactive LED K1 shows red' (low). The hysteresis values HYS_1 and HYS_2 are indicated. Two relay diagrams are shown: one for the 'Alarm range' (Relay K1 inactive, LED K1 shows red) and one for the 'OK range' (Relay K1 active, LED K1 shows green). The relay diagrams show a 3.15A relay with terminals 9, 10, and 12.</p>



If the "absolute" warning alarm has been set (C119 =1), value VA for the warning alarm must be checked when changing from inverse to direct. Once the change is made, this is less than the limit value and falls within the alarm range.

7.6 C116 Display after switch-on

C 116	Normal display	Comment
0	Limit value	Chapter "Overview of operation"
1	Measured value	
2	Warning alarm	
3	Limit for the differential	Can only be set when C111 = 24 (differential measurement) is set.
4	Differential	
5	Measured value 2	

7.7 C117 Binary input function

C 117	Binary input function	Comment
0	inactive	
1	Unlocking	The binary input has the same function as the "Reset" key
2	Keyboard inhibit	To prevent unauthorized device operation
3	Level inhibit	Configuration and parameter levels are inhibited.

■ Factory setting

7.8 C118 Display switch-off after timeout

C 118	Display switch off	Comment
0	inactive	Display is permanently switched on.
1	active	Display switches off after a timeout and re-appears, as soon as a key is pressed.

7.9 C119 Warning alarm function

The warning alarm is indicated via LED KV and is output simultaneously at the binary output. The switching action can be configured as an **absolute value** or as an **interval to the limit value (relative)**.

C 119	Warning alarm function	Comment
0	inactive	Warning alarm and LED KV switched off.
1	absolute value	Warning alarm limit fixed.
2	Interval from the limit value	The warning alarm limit varies with the value of the limit set for switching off the relay.

■ Factory setting

7.10 SCL, SCH, AL LO, AL HI, OFFS, HYST1, HYST2

	Function	Comment	Value range (factory setting in bold)
SCL	lower limit of standard signal	only when C111 set with 52, 53, 63, 71	-1999 to 0 to 9999
SCH	upper limit of standard signal	only when C111 set with 52, 53, 63, 71	-1999 to 100 to 9999
AL LO	lower limit of the setting range for limit value AL and warning alarm VA	Must fall within the measuring range of the connected sensor or standard signal! maximum adjustment: -1999 to 9999	-1999 to 9999
AL HI	upper limit of the setting range for limit value AL and warning alarm VA		-1999 to 9999
OFFS	Measurement offset	With measurement offset, a measured value can be corrected by a programmable value.	-1999 to 0 to 9999
HYS1	Limit value switching differential	0 to 100	0 to 1 to 100
HYS2	Warning alarm switching differential	0 to 100 (only when C119 = 1 or C119 = 2)	0 to 1 to 100

7.11 C 120 Limit value for relay switching operations

C 120	Meaning	Value range (factory setting in bold)
	<p>Limit-value for relay switching operations</p> <p>This is where the total number of permissible relay switching operations is set. If the limit-value for relay switching operations (C121) is higher than this Limit-value, error message 0001 is displayed immediately and the relay is de-energized.</p> <p>If "0" is set, the function is inactive.</p>	0 to 1000 to 9999

7.12 C 121 Count for relay switching operations

C 121	Meaning	Value range (factory setting in bold)
	Count for relay switching operations This is the actual counted amount of switching operations for the relay. If the limit-value set under C120 (factory setting 1000) is reached, error message 0001 is displayed and the relay is deenergized. If this error is acknowledged, counting starts again from 0.	0 to 9999

7.13 C 122 Operating hours counter

C 122	Meaning	Value range (factory setting in bold)
	Operating hours counter This indicates the number of hours the instrument is in operation. The times when the instrument was connected to the power supply are added together. This counter cannot be acknowledged and once it reaches 10,000 hours, displays hours in thousands (10t).	0 to 99999

8 Technical data

8.1 Analog inputs

Resistance thermometers

Designation	Measuring range	Accuracy ¹
Pt 100 EN 60751	-200 to +850 °C	0.1%
KTY11-6 PTC	-50 to +150 °C	1%
Pt 1000 EN 60751	-200 to +850 °C	0.1%
Connection circuit	2-wire, 3-wire circuits	
Sampling	210 ms	
Input filter	2nd order digital filter; filter constant adjustable from 0 to 100secs	
Features	2 x Pt100 for differential measurement, display can also be programmed in °F	

Thermocouples

Designation	Measuring range	Accuracy ¹
Fe-CuNi L DIN 43710	-200 to +900 °C	0.4%
Fe-CuNi J EN 60584	-200 to +1200 °C	0.4%
Cu-CuNi U DIN 43710	-200 to +600 °C	0.4%
Cu-CuNi T EN 60584	-200 to +400 °C	0.4%
NiCr-Ni K EN 60584	-200 to +1372 °C	0.4%

NiCrSi-NiSi N	EN 60584	-100 to +1300°C	0.4 %
Pt10Rh-Pt S	EN 60584	0 to +1768°C	0.4 %
Pt13Rh-Pt R	EN 60584	0 to +1768°C	0.4 %
Pt13Rh-Pt6Rh B	EN 60584	300 to 1820°C	0.4 %
W3Re-W25Re D		0 to +2495°C	0.4 %
Cold junction	Pt 100, internal		
Cold junction accuracy	± 1K		
Sampling	210 ms		
Input filter	2nd order digital filter; filter constant adjustable from 0 to 100secs		
Features	also programmable in °F		

1. Accuracy refers to the maximum extent of the measuring range.

DC voltage, DC current

Measuring range	Accuracy
0 to 20mA, voltage drop < 2 V 4 to 20mA, voltage drop < 2 V	0.2%
0 to 10V, input resistance > 100 kΩ 2 to 10V, input resistance > 100 kΩ	0.1%
Scaling	freely programmable within the limits
Sampling time	210 ms
Input filter	2nd order digital filter; filter constant adjustable from 0 to 100secs

8.2 Measuring circuit monitoring

	RTD temperature probe and KTY11-6	Twin thermocouples	Thermocouples	Current 0 to 20 mA, 4 to 20mA Voltage 0 to 10 V, 2 to 10 V
Overrange and underrange	is detected LEDs K1 and KV light up; "9999" flashes in the display			
Probe and lead break	is detected LEDs K1 and KV light up; "9999" flashes in the display; relay K1 is inactive.		is detected at 4 to 20mA and 2 to 10V LEDs K1 and KV light up; "9999" flashes in the display	
Probe short circuit	is detected LEDs K1 and KV light up;"9999" flashes in the display Relay K1 is inactive		is not detected Relay K1 is inactive	

8.3 Binary input

Connection	Function
1 floating contact	Configurable unlocking, keyboard inhibit, level inhibit

8.4 Relay- and Binary output

1 relay	100000 operations at a contact rating of: AC 230/24V; 3(0,5)A; $\cos\varphi=1$ ($\geq 0,6$); 50Hz DC 24V; 3(0,5; $\tau=7$ ms)A UL60730 AC230V; 3A D300; 30k AC/DC 24V; 3A minimum current: DC 24V, 100mA Contact protection circuit: safety fuse 3.15AT, installed in the pole contact arm within the instrument
1 Binary output	24 V DC / 20mA logic signal, short-circuit proof

8.5 Supply

Supply	20 to 30V AC/DC, 48 to 63Hz 110 to 240 V AC +10/-15%, 48 to 63Hz
Power consumption	5 VA

8.6 Test voltages to EN 60730, Part 1

Between input or output and supply	
- at 110 to 240 V AC supply +10% /-15%	3.7kV/50Hz
- at 20 to 30V AC/DC supply, 48 to 63 Hz	3.7kV/50Hz

8.7 Electrical safety

	Clearances / creep paths
Mains to electronic components and probe	$\geq 6 \text{ mm} / \geq 8 \text{ mm}$
Mains to the relay	$\geq 6 \text{ mm} / \geq 8 \text{ mm}$
Relay to electronic components and probe	$\geq 6 \text{ mm} / \geq 8 \text{ mm}$
Electrical safety	according to DIN EN 14597 (DIN EN 60730-2-9) Overvoltage category III, pollution degree 2
Protection type I	with internal separation to SELV current circuits

8.8 Environmental influences

Ambient temperature range	0 to +55°C
Storage temperature range	-30 to +70°C
Temperature error	$\leq \pm 0.005\% / \text{K dev. from } 23^\circ\text{C}^1$ for resistance thermometers
	$\leq \pm 0.01\% / \text{K dev. from } 23^\circ\text{C}^1$ for thermocouple, current, voltage
Climatic conditions	85 % rel. humidity, no condensation (3K3 with extended temperature range to EN 60721)
EMC	to EN 14597 and standards from the EN 61326 series of standards
Interference emission	Class B
Interference immunity	Test level for safety, control and regulating instruments (RS) to EN 14597

1.All details refer to the full scale value

8.9 Housing

Material	polyamide (PA 6.6)
Screw terminal	0.2 to 2.5mm ² screw terminal
Mounting	on 35 mm x 7.5mm DIN rail to EN 60715
Operating position	vertical
Weight	approx. 160g
Protection	IP 20 to EN 60529

8.10 Approvals/Marks

approval marks	Inspection authority	Certificate/Inspection numbers	inspection basics	valid for
DIN	DIN CERTCO	TW/TB 1206 08	DIN EN 14597	all instrument versions
c UL us	Underwriters Laboratories	20091123-E325456	UL 60730-2-9	all instrument versions

9 DIN-approved probes

9.1 Probes for operation in air

Note: Because of the high response accuracy, the use of **thermowells** (pockets) is **not admissible**.

Actual type designation	Old type designation	Probe type	Temperature range	Nom. length mm	Process connection
RTD temperature probe Data Sheet 90.2006					
902006/65-228-1003-1-15-500-668/000	-	1 x Pt100	-170 ... +700°C	500	
902006/65-228-1003-1-15-710-668/000	-			710	
902006/65-228-1003-1-15-1000-668/000	-			1000	
902006/65-228-1003-1-15-500-254/000	-	1 x Pt100	-170 ... +700°C	500	
902006/65-228-1003-1-15-710-254/000	-			710	
902006/65-228-1003-1-15-1000-254/000	-			1000	
902006/65-228-2003-1-15-500-668/000	90.271-F01	2 x Pt100	-170 ... +700°C	500	Stop flange, movable
902006/65-228-2003-1-15-710-668/000	90.272-F01			710	
902006/65-228-2003-1-15-1000-668/000	90.273-F01			1000	
902006/65-228-2003-1-15-500-254/000	-	2 x Pt100	-170 ... +700°C	500	movable G1/2 compression clamp
902006/65-228-2003-1-15-710-254/000	-			710	
902006/65-228-2003-1-15-1000-254/000	-			1000	
Thermocouples Data Sheet 90.1006					
901006/65-547-2043-15-500-668/000	90.019-F01	2 x NiCr-Ni, Type „K“	-35 ... +800°C	500	Stop flange, movable
901006/65-547-2043-15-710-668/000	90.020-F01			710	
901006/65-547-2043-15-1000-668/000	90.021-F01			1000	
901006/65-546-2042-15-500-668/000	90.019-F11	2 x Fe-CuNi, Type „L“	-35 ... +700°C	500	
901006/65-546-2042-15-710-668/000	90.020-F11			710	
901006/65-546-2042-15-1000-668/000	90.021-F11			1000	
901006/66-550-2043-6-500-668/000	90.023-F01	2 x NiCr-Ni, Type „K“	-35 ... +1000°C	500	
901006/66-550-2043-6-355-668/000	90.023-F02			355	
901006/66-550-2043-6-250-668/000	90.023-F03			250	
901006/66-880-1044-6-250-668/000	90.021	1 x PT10Rh-PT, Type „S“	0 ... 1300°C	250	
901006/66-880-1044-6-355-668/000	90.022			355	
901006/66-880-1044-6-500-668/000	90.023			500	
901006/66-880-2044-6-250-668/000	90-D-021	2 x PT10Rh-PT, Type „S“	0 ... 1300°C	250	Stop flange, movable
901006/66-880-2044-6-355-668/000	90-D-022			355	
901006/66-880-2044-6-500-668/000	90-D-023			500	

901006/66-953-1046-6-250-668/000	90.027	1 x PT30Rh-PT6Rh, Type „B“	600 ... 1500°C	250	
901006/66-953-1046-6-355-668/000	90.028			355	
901006/66-953-1046-6-500-668/000	90.029			500	
901006/66-953-2046-6-250-668/000	90-D-027	2 x PT30Rh-PT6Rh, Type „B“	600 ... 1500°C	250	
901006/66-953-2046-6-355-668/000	90-D-028			355	
901006/66-953-2046-6-500-668/000	90-D-029			500	

9.2 Probes for operation in water and oil

Note: Because of the high response accuracy, the use of **thermowells** (pockets) is **not admissible**.

Actual type designation	Old type designation	Probe type	Temperature range	Nom. length mm	Process connection
RTD temperature probe Data Sheet 90.2006					
90.2006/10-402-1003-1-9-100-104/000		1 x Pt100	-40 ... +400°C	100	G1/2 screw connection
90.2006/10-402-2003-1-9-100-104/000		2 x Pt100		100	
902006/54-227-2003-1-15-710-254/000	90.272-F02	2 x Pt100	-170 ... 550°C	65...670	movable G1/2 compression clamp
902006/54-227-1003-1-15-710-254/000	90.272-F03	1 x Pt100		65...670	
902006/10-226-1003-1-9-250-104/000	90.239	1 x Pt100	-170 ... 480°C	250	G1/2 screw connection
902006/10-226-2003-1-9-250-104/000	90-D-239	2 x Pt100		250	
Thermocouples Data Sheet 90.1006					
901006/54-544-2043-15-710-254/000	90.020-F02	2 x NiCr-Ni, Type „K“	-35 ... 550°C	65...670	movable G1/2 compression clamp
901006/54-544-1043-15-710-254/000	90.020-F03	1 x NiCr-Ni, Type „K“		65...670	
901006/54-544-2042-15-710-254/000	90.020-F12	2 x FeCuNi, Type „L“		65...670	
901006/54-544-1042-15-710-254/000	90.020-F13	1 x FeCuNi, Type „L“		65...670	

Note: Because of the high response accuracy, **only use thermowells** (pockets) that are **included in the scope of delivery**.

Actual type designation	Old type designation	Probe type	Temperature range	Nom. length mm	Process connection
RTD temperature probe Data Sheet 90.2006					
902006/53-505-2003-1-12-190-815/000	90D239-F03	2 x Pt100	-40 ... +400 °C	190	
902006/53-507-2003-1-12-100-815/000	90.239-F02	2 x Pt100 (arranged one below the other in protection tube)	-40 ... +480 °C	100	
902006/53-507-2003-1-12-160-815/000	90.239-F12			160	
902006/53-507-2003-1-12-190-815/000				190	
902006/53-507-2003-1-12-220-815/000	90.239-F22			220	
902006/53-507-1003-1-12-100-815/000	90.239-F01	1 x Pt100	-40 ... +480 °C	100	weld-in sleeve
902006/53-507-1003-1-12-160-815/000	90.239-F11			160	
902006/53-507-1003-1-12-220-815/000	90.239-F21			220	
902006/53-505-1003-1-12-190-815/000	90.239-F03	1 x Pt100	-40 ... +400 °C	190	
902006/53-505-3003-1-12-100-815/000	90.239-F07	3 x Pt100	-40 ... +400 °C	100	
902006/53-505-3003-1-12-160-815/000	90.239-F17			160	
902006/53-505-3003-1-12-220-815/000	90.239-F27			220	
902006/40-226-1003-1-12-220-815/000	90.280-F30	1 x Pt100	-170 ... +480°C	220	weld-in sleeve
902006/40-226-1003-1-12-160-815/000	90.280-F31			160	
902006/40-226-1003-1-12-100-815/000	90.280-F32			100	
Thermocouples Data Sheet 90.1006					
901006/53-543-1042-12-220-815/000	90.111-F01	1 x Fe-CuNi Type „L“	-35 ... 480°C	220	weld-in sleeve
901006/53-543-2042-12-220-815/000	90.111-F02	2 x Fe-CuNi Type „L“		220	

9.3 Probes for operation in air, water and oil

Note: Because of the high response accuracy, the use of **thermowells** (pockets) is **not admissible**.

Actual type designation	Old type designation	Probe type	Temperature range	Install. length mm	Process connection
RTD temperature probe Data Sheet 90.2006					
90.2006/10-390-1003-1-8-250-104/000	90.210-F95	1 x Pt100	max. 300°C	250	
Thermocouples Data Sheet 90.1006					
901006/45-551-2043-2-xxxx-11-xxxx		2 x NiCr-Ni, Type „K“	max. 1150°C	50...2000	



Sensor short circuit can only be detected with a double thermocouple.

10 Setup program

This program and the interface with adapter can be supplied as accessories. They offer the user the following advantages:

- easy and convenient parameterization and archiving from a PC
- simple duplication of parameters for instruments of the same type

10.1 Hardware and software requirements

- PC Pentium III or above
- 128 MB RAM, 16 MB free space on hard disk
- CD-ROM drive
- free USB interface, Mouse
- Microsoft¹ Windows 2000/XP
- * Connect USB cable of interface to the PC
- * Connect PC interface with USB/TTL converter to the instrument via the adapter (4-pin socket)

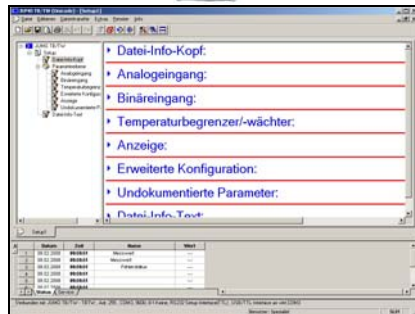
10.2 Displaying the device software version

- * Press the **P** and **▲** keys simultaneously, holding them down

This version is also recognized by the setup program and shown under *Info* ⇒ *Info through Setup*.

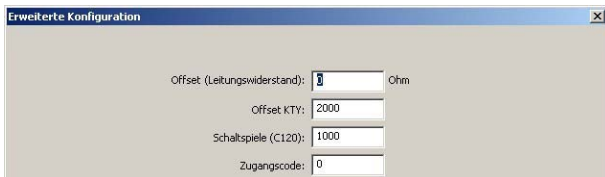
The software versions of the instrument and the Setup program must be compatible, otherwise an error message will appear!

1. Microsoft is a registered trademark of Microsoft Corporation



10.3 Activating the access code

The factory setting is for no level inhibit to be active in the instrument.
The access code can only be activated by the Setup program.



Offset (Leitungswiderstand):	0	Ohm
Offset KTY:	2000	
Schaltspiele (C120):	1000	
Zugangscode:	0	



- * In the Setup program, enter a different value to "0" for the access code and transfer it to the instrument
Now the parameter level and the configuration level on the device are only accessible with the correct access code.
- * Press **P** for 2 seconds (parameter level) "Code" appears in the lower display
- * Set the access code with the **▲** and **▼** keys
- * Acknowledge with **P**

10.4 Restricting the setting range for the AL limit (minimum/maximum value master)

It may be necessary, for security reasons, to restrict the setting range of the AL limit for operating personnel. This is done with the minimum/maximum value master in the Setup program.

The factory setting for AL is adjustable in the range -1999 to 9999.


- * new minimum/maximum value master entered
- * transfer setup data to the instrument




Sensordimensionierung (C11):	Pt 100	Dreileiterschaltung	(DIN EN 60751)
Einstellbereich Grenzwert/Voralarm (nur Setup):			
Minimalwert Master:	0		
Maximalwert Master:	100		

11 Alarm messages

The following alarm messages can be shown in alternation with the temperature display:





Alarm display	Cause	Remedy
9999 flashes 	Gone above measured value The measured value is too large, is outside the range, or a probe has broken.	<ul style="list-style-type: none"> * Check probe and connecting cable for damage or short-circuit ⇒ Chapter 4.2 “Connection diagram”
	Gone below measured value The measured value is too small, is outside the range, or a probe short-circuit has occurred.	<ul style="list-style-type: none"> * Check that the correct probe has been set or connected ⇒ Chapter 7.1 “C111 Analog inputs”

12 Error messages

Error display (code)	Cause	Remedy
	The total number of relay switching operations has been reached.	<ul style="list-style-type: none">* Increase the total number of relay switching operations ⇒ Chapter 7.11 “C 120 Limit value for relay switching operations”* Acknowledge with the Reset key ⇒ Chapter 7.12 “C 121 Count for relay switching operations”
0002	Terminal temperature is outside the -10 to 80°C range	<ul style="list-style-type: none">* Check the ambient temperature* Acknowledge with the Reset key If that does not help, send the instrument in
0003	Reference voltage The measured value is above 999 or below -999 and is thus outside the 3-digit display range.	- A/D converter error <ul style="list-style-type: none">* Acknowledge with the Reset key If that does not help, send the instrument in
0004	Calibration constant	The instrument must be returned to JUMO for repair. <ul style="list-style-type: none">* Send the instrument in ⇒ Chapter 2.1 “Service addresses”
0005	Configuration data Value cannot be displayed (too large or too small)	
0006	reserved	-
0007	reserved	-

0008	reserved	-	
0009	Calibration data checksum	The instrument must be returned to JUMO for repair. * Send the instrument in ⇒ Chapter 2.1 "Service addresses"	
0010	Configuration data checksum		
0011	Register error		
0012	RAM error		
0013	ROM error		
0014	Program run error occurred		
0015	Watchdog Reset occurred		
0016	Overvoltage Secondary voltage too high		* Check mains voltage level

13 What if...

Description	Cause	Remedy
<p>This appears on the display:</p> 	<p>The Setup program is transferring data. The monitoring function switches off briefly during data transmission and the instrument re-starts.</p>	<ul style="list-style-type: none"> - Wait for data transmission
<p>The measurement in the upper display flashes.</p> 	<p>The instrument is in the alarm range The measured value flashes in the display and depending on which switching action is set (direct or inverse), is above or below the limit.</p> <ul style="list-style-type: none"> - Measured value too high or too low - Temperature values too far apart during differential measurement 	<ul style="list-style-type: none"> * Press  twice and check the limit value. * Discover the reason why the limit value was infringed (above or below the limit) * Correct the limit value, if necessary * Reduce hysteresis if too great, as it may be too far into the OK range. <p>⇒ Chapter 7.5 “C115 Switching action”</p>
<p>LED K1 shows red, although the measurement is in the OK range</p>	<p>The instrument is set up as a temperature limiter (TB). Even if the measured value returns to the OK range after going overrange, the relay of a temperature monitor does not reset automatically. It must be unlocked manually.</p>	<ul style="list-style-type: none"> * Press  (Reset) with a suitable tool and unlock the relay manually.

Description	Cause	Remedy
Relay contact between terminals 9, 10 or 9, 12 does not switch.	- The fitted safety fuse in the pole arm 9 is faulty.	<ul style="list-style-type: none"> * Measure terminals 9 and 10 of the relay with a continuity tester when LED K1 shows green. * Measure terminals 9 and 12 of the relay with a continuity tester when LED K1 is off * The instrument must be returned to JUMO for repair. ⇨ Chapter 2.1 "Service addresses"
Double LED lit (green and red simultaneously)	- Internal system error	- Switch the supply off and then back on again If this does not help, the instrument must be returned to JUMO for repair. ⇨ Chapter 2.1 "Service addresses"



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