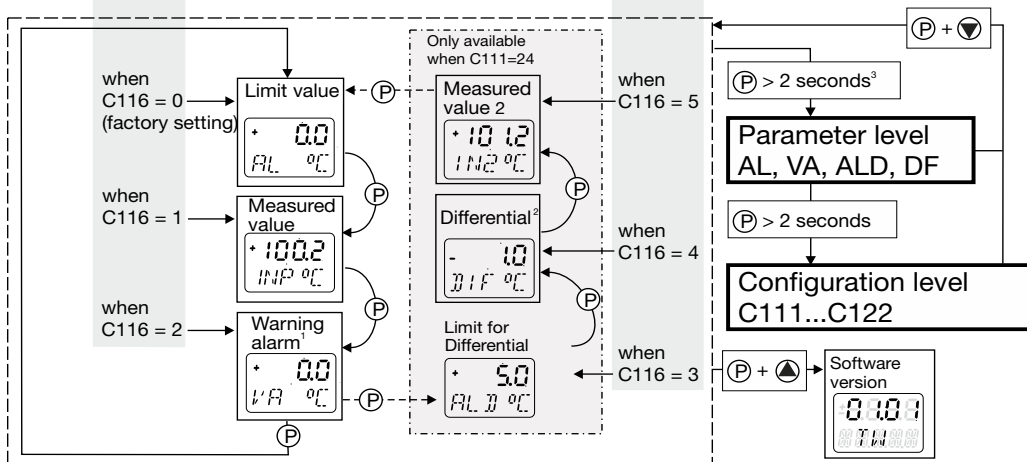EAC c ⓊL us (DIN Geprüft)

JUMO safetyM TB/TW
Temperature limiter,
temperature monitor,
acc. to DIN EN 14597

B 701160.0
Operating Manual

V3.00/2023-05-02

Overview of operation

Normal display (approx. 5 secs after switch-on)

Only available when C111=24

when C116 = 0 (factory setting) → Limit value

$+$ 0.0
AL °C

when C116 = 1 → Measured value

$+$ 100.2
INP °C

when C116 = 2 → Warning alarm[1]

$+$ 0.0
VA °C

when C116 = 5 → Measured value 2

$+$ 101.2
IN2 °C

when C116 = 4 → Differential[2]

$-$ 1.0
DIF °C

when C116 = 3 → Limit for Differential

$+$ 5.0
ALD °C

P > 2 seconds[3]

Parameter level AL, VA, ALD, DF

P > 2 seconds

Configuration level C111...C122

P + ▲ → Software version

01.01
TW...

[1] Only available when C119 = 1 or 2

[2] DIF = INP – 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

Contents

Contents

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 Pt100 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:
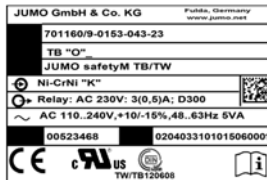
DC supply:

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

Hardware versions	Software versions
1	237.02.02
	237.03.01
11. Position of the fabrication number on the nameplate	Key combination $\text{P} + \blacktriangle$
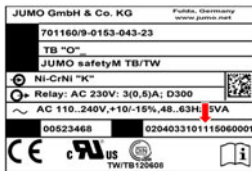
Please read this operating manual before commissioning the instrument.

This operating manual are valid from **instrument software version: 237.02.01** (Press P + $\blacktriangle$).

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

2.1 Service addresses

see last page

			Basic type	
701160			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	

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 safety**M** TB/TW in the ordered version

- 1 Operating Manual 701160.0

☞   All the required settings are described in the current operating manual.
Carrying out manipulations not described, or expressly forbidden in the operating manual, 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.
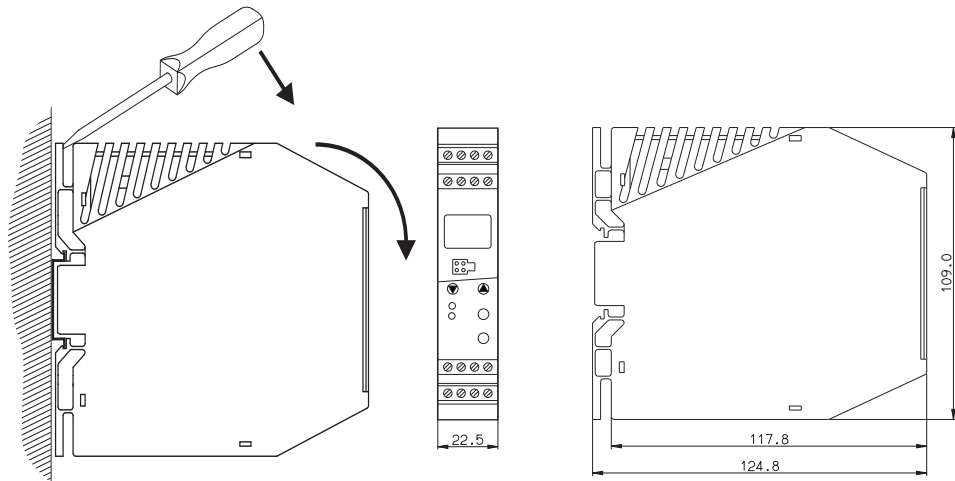
∗ Insert a screwdriver into the release slot, push towards the instrument and swing it downward, out of the DIN rail.

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

(1) Measurement input	(2) Relay output
(3) Binary input	(4) Binary output
(5) Setup interface	(6) LC Display
(7) Supply	

3700 V AC

(1) ── (2)

(3) ── (4)

(5) ── (6)

3700 V AC

(7)
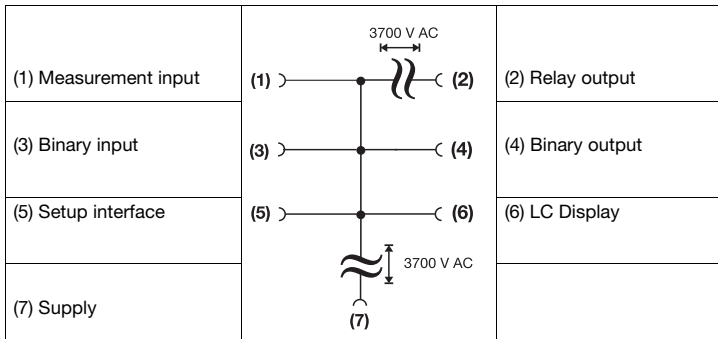
4 Electrical connection

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.
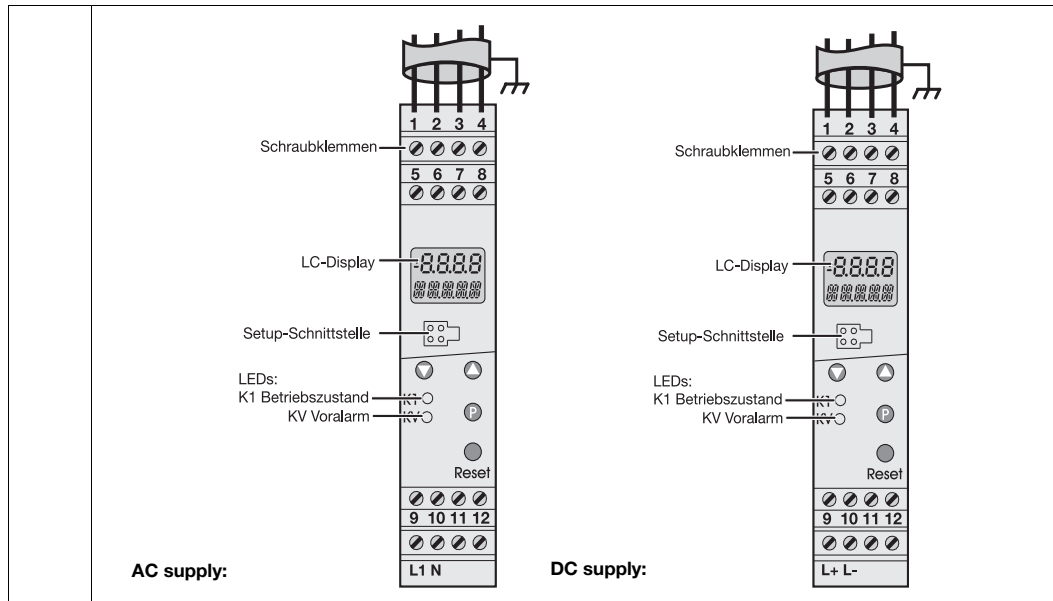
⚠ Electrical connection must only be carried out by qualified personnel.
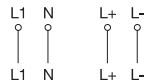
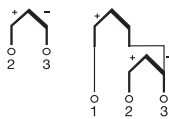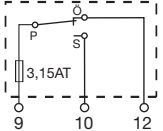☝ Approval to EN 14597 is only valid if the correct sensor with approval is set up and connected at configuration level.

4.2 Connection diagram

Screw terminals are used for connecting strands with a cross-section of 0.2 to 2.5 mm^2.

AC supply: L1 N

DC supply: L+ L-

	Supply as on nameplate	**AC** L1 External conductor N Neutral conductor	**DC** L+ L-	
⊖				L1 N L+ L- ○ ○ ○ ○ L1 N 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: *edit => advanced configuration*		
		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)**	2 3 I_x + −
		0(2) to 10 V	3 4 U_x − +
	Binary input	for connection to floating contact	6 7
→⊕	**Binary output**	24 V DC / 20 mA (short-circuit proof)	7 8 U_x − +
	Relay output	Relay with safety fuse for pole contact	P S 3,15AT 9 10 12

5 Commissioning the instrument
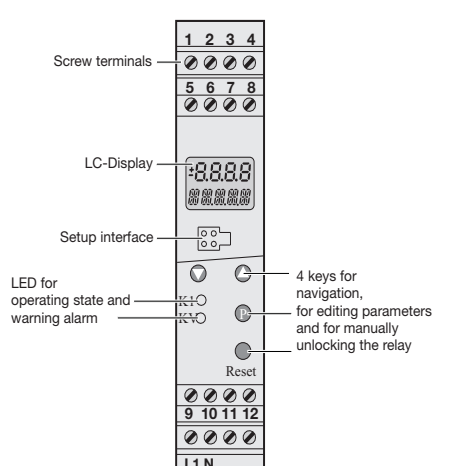
5.1 Displays and controls

✶ 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
	P	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.	

Screw terminals — 1 2 3 4

5 6 7 8

LC-Display

Setup interface

LED for operating state and warning alarm

4 keys for navigation, for editing parameters and for manually unlocking the relay

Reset

9 10 11 12

L1 N

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 ⓟ for longer than 2 secs	⁺ 0 / AL.	1st value in the parameter level appears
2	Use ⬆ to increase or ⬇ to reduce	⁺ 55 / AL	AL flashes
3	Press ⓟ briefly	55 / ⁺ 55	Limit flashes for checking, both at top and bottom of display
4	Briefly press ⓟ to confirm. The value is stored.	⁺ 55 / AL.	Use ⓟ + ⬇ 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

(P) + $(\blacktriangledown)$ 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"
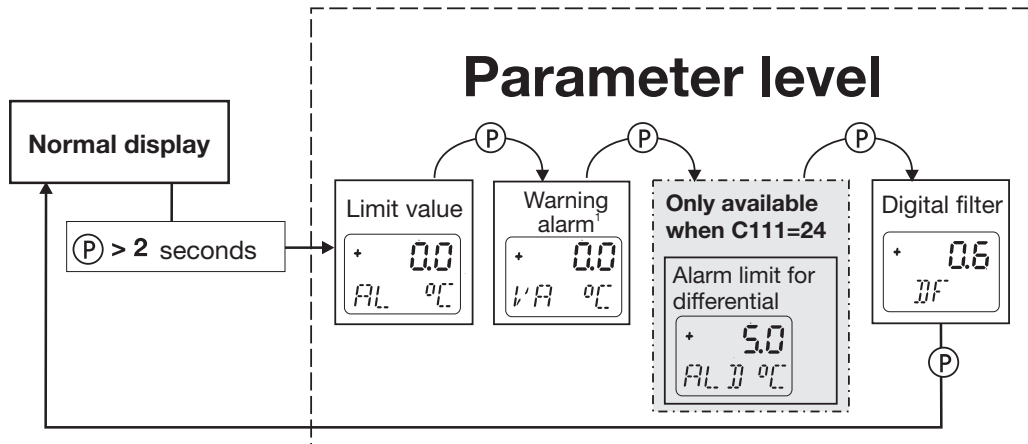
1 Only avalable when C119=1 or 2

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 ⓟ for longer than 2 secs and AL will appear.

✱ Press ⓟ again for longer than 2 secs and C111 will appear.

Each time you press ⓟ, you move to the next parameter.
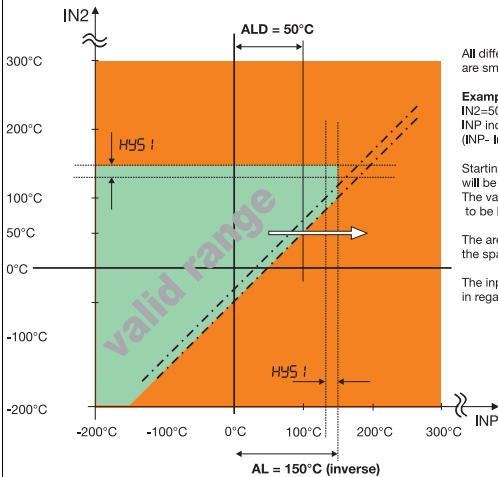
All the parameters are freely accessible at the factory, but can be inhibited via the setup program.

⇨ 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	Pt100 EN 60751	in 3-wire circuit	-1999 to +9999°C	-205°C/ +855°C
006	Pt1000 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	Pt100 EN 60751	in 2-wire circuit	-1999 to +9999°C	-205°C/ +855°C
005	Pt1000 EN 60751	in 2-wire circuit	-1999 to +9999°C	-205°C/ +855°C
024	2x Pt100 DIN	for differential measurement	-1999 to +9999°C	-205°C/ +855°C
		The TB/TW can measure the differential of two Pt100 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. Setting range for ALD: -1999 to 9999		

■ Factory setting

$\mathsf{C\ 111}$	Analog input	Comment	Setting range for AL: (can be restricted via setup)	Limits for overrange/ underrange

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.

All difference values within the OK range (green) are smaller than the setting for ALD=50K.

Example (refer to arrow):
IN2=50°C
INP increases to 101°C and leaves the OK range (INP- In2 ≥ ALD) (101K-50K=51K).

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

The area between the dot and dash lines indicate the span of the hysteresis (factory setting: 1K)

The inputs INP and IN2 are additionally monitored in regards to the limit value AL=150

$\mathcal{L}\,1\,1\,1$	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)"

■Factory setting

7.2 C112 Setting for a double thermocouple

Only available for C111 from 037 to 048
⇨ Chapter 7.1 "C111 Analog inputs"

$\mathsf{C}\ \mathsf{1}\ \mathsf{1}\ \mathsf{2}$	Double thermocouple	Comment
0	no	Sensor short circuit **not** detected!
1	yes	Can detect a sensor short circuit.

7.3 C113 Unit, decimal place

$\mathsf{C}\ \mathsf{1}\ \mathsf{1}\ \mathsf{3}$	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
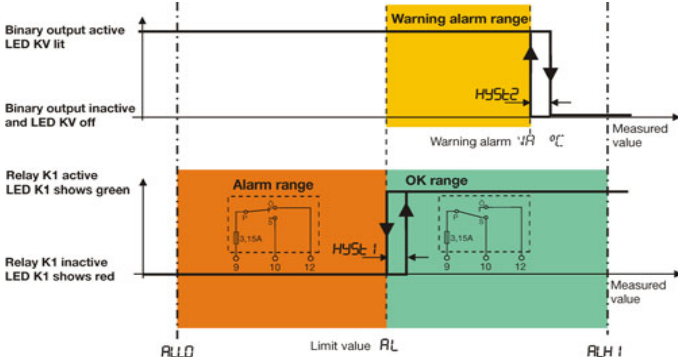
$\mathsf{C}\ \mathsf{1}\ \mathsf{1}\ \mathsf{4}$	Device function	Comment
0	**Initial commissioning of TB** temperature limiter	Whatever the switching state of the relay before the power failure, the TB remains locked when the power returns.
1	Temperature limiter **TB**	Release is only necessary if the temperature is exceeded
2	Temperature monitor **TW**	Automatic release

7.5　C115 Switching action

$C115$	Switching action	Comment
0	inverse	If limit value AL is exceeded, the fitted relay switches OFF. LED K1 shows red and the limit flashes in the display. 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. The **temperature monitor** automatically switches the relay back ON and LED K1 shows green, when the measured value falls below limit AL.
■ Factory setting		
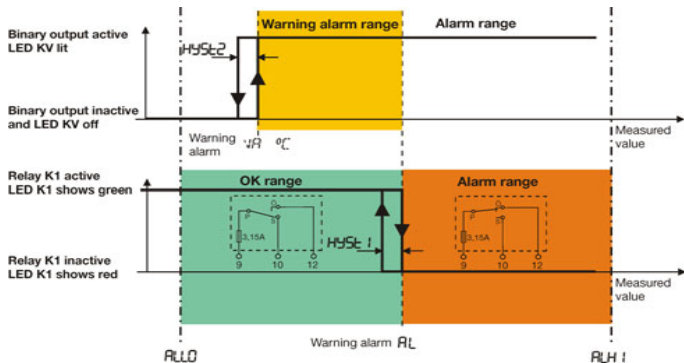
$C\ 115$	Switching action	Comment
1	direct	If the value falls below limit AL, the fitted relay switches OFF. LED K1 shows red and the limit flashes in the display. The **temperature limiter** remains in this state, even if the measured value rises above limit AL. Only when a tool has been used to press 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. The **temperature monitor** automatically switches the relay back ON and LED K1 shows green, when the measured value rises above limit AL.

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

$C118$	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)**.

$C119$	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, HYS1, HYS2

	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**)
	Limit-value for relay switching operations 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. If "0" is set, the function is inactive.	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	**0** to 9999
	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.	

7.13 C 122 Operating hours counter

$C\ 122$	Meaning	Value range (factory setting in **bold**)
	1 hours counter	**0** to 99999
	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).	

8   Technical data

8.1   Analog inputs

Resistance thermometers

Designation		Measuring range	Accuracy[1]
Pt100	EN 60751	-200 to +850°C	0.1%
KTY11-6	PTC	-50 to +150 °C	1%
Pt1000	EN 60751	-200 to +850°C	0.1%
Connection circuit		2-wire, 3-wire circuits	
Sampling rate		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		Pt100, internal	
Cold junction accuracy		± 1 K	
Sampling rate		210 ms, 420 ms for double thermocouples (C112=1)	
Input filter		2nd order digital filter; filter constant adjustable from 0 to 100 secs	
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 20 mA, voltage drop < 2 V 4 to 20 mA, voltage drop < 2 V	0.2 %
0 to 10 V, input resistance > 100 kΩ 2 to 10 V, input resistance > 100 kΩ	0.1 %
Scaling	freely programmable within the limits
Sampling rate	210 ms
Input filter	2nd order digital filter; filter constant adjustable from 0 to 100 secs

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 Relay K1 is inactive
Probe short circuit	is detected LEDs K1 and KV light up;"9999" flashes in the display Relay K1 is inactive		is **not** detected	

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; τ=7ms)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%	3.7 kV/50 Hz
- at 20 to 30V AC/DC supply, 48 to 63 Hz	3.7 kV/50 Hz

8.7   Electrical safety

	Clearances / creep paths
Mains to electronic components and probe	≥ 6 mm / ≥ 8 mm
Mains to the relay	≥ 6 mm / ≥ 8 mm
Relay to electronic components and probe	≥ 6 mm / ≥ 8 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	$\leq \pm 0.005\%$ / K dev. from 23°C[1] for resistance thermometers
	$\leq \pm 0.01\%$ / K dev. from 23°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 35mm 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	20190411-E325456	UL 60730-2-9	all instrument versions
EAC	ООО "Meridian"	ЕАЭС N RU Д-DE.MHO6.B.09101/20	TP TC 004/2011 TP TC 020/2011	all instrument versions

8.11 Note for suitable probes

The probes in data sheet 901006, 902006 and probes with JUMO manufacturer's declaration can be connected.
The installation instructions for probes must be observed.

8.12 Probes for the operating medium air

Note: Due to the response accuracy, use **is only permitted without pockets** (thermowells).

Actual type designation	Probe type	Temperature range	Nom. length mm	Process connection
RTD temperature probe Data Sheet 902006				
902006/65-228-1003-1-15-500-668/000	1 x Pt100	-170 ... +700°C	500	Stop flange movable
902006/65-228-1003-1-15-710-668/000			710	
902006/65-228-1003-1-15-1000-668/000			1000	
902006/55-228-1003-1-15-500-254/000	1 x Pt100	-170 ... +700°C	500	movable G1/2 compression clamp
902006/55-228-1003-1-15-710-254/000			710	
902006/55-228-1003-1-15-1000-254/000			1000	

902006/65-228-2003-1-15-500-668/000	2 x Pt100	-170 ... +700°C	500	Stop flange movable
902006/65-228-2003-1-15-710-668/000			710	
902006/65-228-2003-1-15-1000-668/000			1000	
902006/55-228-2003-1-15-500-254/000	2 x Pt100	-170 ... +700°C	500	movable G1/2 compression clamp
902006/55-228-2003-1-15-710-254/000			710	
902006/55-228-2003-1-15-1000-254/000			1000	
Thermocouples Data Sheet 901006				
901006/65-547-2043-15-500-668/000	2 x NiCr-Ni, Typ „K"	-35 ... +800°C	500	Stop flange movable
901006/65-547-2043-15-710-668/000			710	
901006/65-547-2043-15-1000-668/000			1000	
901006/65-546-2042-15-500-668/000	2 x Fe-CuNi, Typ „L"	-35 ... +700°C	500	Stop flange movable
901006/65-546-2042-15-710-668/000			710	
901006/65-546-2042-15-1000-668/000			1000	
901006/66-550-2043-6-500-668/000	2 x NiCr-Ni, Typ „K"	-35 ... +1000°C	500	Stop flange movable
901006/66-550-2043-6-355-668/000			355	
901006/66-550-2043-6-250-668/000			250	
901006/66-880-1044-6-250-668/000	1 x PT10Rh-PT, Typ „S"	0 ... 1300°C	250	Stop flange movable
901006/66-880-1044-6-355-668/000			355	
901006/66-880-1044-6-500-668/000			500	
901006/66-880-2044-6-250-668/000	2 x PT10Rh-PT, Typ „S"	0 ... 1300°C	250	Stop flange movable
901006/66-880-2044-6-355-668/000			355	
901006/66-880-2044-6-500-668/000			500	

901006/66-953-1046-6-250-668/000	1 x PT30Rh-PT6Rh, Typ „B"	600 ... 1500°C	250	Stop flange movable
901006/66-953-1046-6-355-668/000			355	
901006/66-953-1046-6-500-668/000			500	
901006/66-953-2046-6-250-668/000	2 x PT30Rh-PT6Rh, Typ „B"	600 ... 1500°C	250	Stop flange movable
901006/66-953-2046-6-355-668/000			355	
901006/66-953-2046-6-500-668/000			500	

8.13   Probes for water and oil

Note: Due to the response accuracy, use **is only permitted without pockets** (thermowells).

Actual type designation	Probe type	Temperature range	Nom. length mm	Process connection
RTD temperature probe Data Sheet 902006				
902006/54-227-2003-1-15-710-254/000	2 x Pt100	-170 ... 550°C	65...670	movable G1/2 compression clamp
902006/54-227-1003-1-15-710-254/000	1 x Pt100		65...670	
902006/10-226-1003-1-9-250-104/000	1 x Pt100	-170 ... 480°C	250	G1/2 compression clamp
902006/10-226-2003-1-9-250-104/000	2 x Pt100		250	
902006/10-402-1003-1-9-100-104/000	1 x Pt100	-40 ... +400°C	100	G1/2 compression clamp
902006/10-402-2003-1-9-100-104/000	2 x Pt100		100	G1/2 compression clamp
902006/10-402-1003-1-9-150-104/000	1 x Pt100		150	G1/2 compression clamp
902006/10-402-2003-1-9-150-104/000	2 x Pt100		150	G1/2 compression clamp
902006/10-402-1003-1-9-200-104/000	1 x Pt100		200	G1/2 compression clamp
902006/10-402-2003-1-9-200-104/000	2 x Pt100		200	G1/2 compression clamp
Thermocouples Data Sheet 901006				
901006/54-544-2043-15-710-254/000	2 x NiCr-Ni, Typ „K"	-35 ... 550°C	65...670	movable G1/2 compression clamp
901006/54-544-1043-15-710-254/000	1 x NiCr-Ni, Typ „K"		65...670	
901006/54-544-2042-15-710-254/000	2 x FeCuNi, Typ „L"		65...670	
901006/54-544-1042-15-710-254/000	1 x FeCuNi, Typ „L"		65...670	

Note:
Due to the response accuracy, use **is only permitted with thermowells** (immersion sleeves) **supplied by the factory**.

Actual type designation	Probe type	Temperature range	Nom. length mm	Process connection
RTD temperature probe Data Sheet 902006				
902006/53-505-2003-1-12-190-815/000	2 x Pt100	-40 ... +400 °C	190	welding sleeve
902006/53-507-2003-1-12-100-815/000	2 x Pt100	-40 ... +480 °C	100	welding sleeve
902006/53-507-2003-1-12-160-815/000			160	
902006/53-507-2003-1-12-190-815/000			190	
902006/53-507-2003-1-12-220-815/000			220	
902006/53-507-1003-1-12-100-815/000	1 x Pt100	-40 ... +480 °C	100	welding sleeve
902006/53-507-1003-1-12-160-815/000			160	
902006/53-507-1003-1-12-220-815/000			220	
902006/53-505-1003-1-12-190-815/000	1 x Pt100	-40 ... +400 °C	190	welding sleeve
902006/53-505-3003-1-12-100-815/000	3 x Pt100	-40 ... +400 °C	100	welding sleeve
902006/53-505-3003-1-12-160-815/000			160	
902006/53-505-3003-1-12-220-815/000			220	
902006/40-226-1003-1-12-220-815/000	1 x Pt100	-170 ... +480°C	220	welding sleeve
902006/40-226-1003-1-12-160-815/000			160	
902006/40-226-1003-1-12-100-815/000			100	

Thermocouples Data Sheet 901006				
901006/53-543-1042-12-220-815/000	1 x Fe-CuNi Typ „L"	-35 ... 480°C	220	welding sleeve
901006/53-543-2042-12-220-815/000	2 x Fe-CuNi Typ „L"		220	

8.14 Probes for water, oil and air

Note: Due to the response accuracy, use **is only permitted without pockets** (thermowells).

Actual type designation	Probe type	Temperature range	Install. length mm	Process connection
RTD temperature probe Data Sheet 902006				
902006/10-390-1003-1-8-250-104/000	1 x Pt100	max. 300°C	250	G1/2 compression clamp
902006/47-380-ME-Tol.Class-5,3-50-LE-XXX	1 x Pt100/500/1000 in 2-, 3- und 4-wire circuit	-50 ... 200°C	50	none
Thermocouples Data Sheet 901006				connection line AL in mm
901006/45-551-2043-2-EL-11-AL/000	2 x NiCr-Ni, Typ „K"	max. 1150°C	50...2000	1000...20000

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

9 Certificates

DIN CERTCO
Gesellschaft für Konformitätsbewertung mbH

CERTIFICATE

Certificate holder
JUMO GmbH & Co. KG
Moritz-Juchheim-Str. 1
36039 Fulda
GERMANY

Product
Temperature control and limiting devices for heat generating systems

Type, Model
Jumo safetyM TB/TW 701160

Testing basis
DIN EN 14597:2015-02
Certification scheme 'Temperature control and limiting devices for heat generating systems' (2009-01)

Mark of conformity

Registration No.
TW/TB1206

Valid until
2027-10-31

Right of use
This certificate entitles the holder to use the mark of conformity shown above in conjunction with the specified registration number.

See annex for further information.

2022-11-25
Dipl.-Phys. Carlo Seiler
Head of Certification Body

DIN CERTCO Gesellschaft für Konformitätsbewertung mbH · Alboinstraße 56 · D-12103 Berlin · www.dincertco.de

DIN CERTCO
Gesellschaft für Konformitätsbewertung mbH

ANNEX

Certificate TW/TB1206 dated 2022-11-25

Technical Data See technical data sheet to the above mentioned registration number
at www.dincerto.tuv.com

Testing laboratory/ TÜV SÜD Industrie Service GmbH
Inspection body Prüflabor für Kälte-,
Klima- u. Wärmetechnik
Ridlerstr. 65
80339 München
GERMANY

Test report(s) C-T 1389-00/08 dated 2008-08-26
C-T 1389-01/08 dated 2008-09-29
C-T 1389-01/09 dated 2009-11-23
C-T 1389-02/11 dated 2011-02-15
C-T 1389-03/13 dated 2013-06-18
C-T 1389-04/15 dated 2015-01-30
C-T 1389-06/18 dated 2018-08-07
C-T 1389-07/22 dated 2022-10-17

	产品中有害物质的名称及含量 China EEP Hazardous Substances Information					
产品组别 Product group: 701160						
部件名称 Component Name						
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
外壳 Housing (Gehäuse)	○	○	○	○	○	○
过程连接 Process connection (Prozessanschluss)	○	○	○	○	○	○
螺母 Nuts (Mutter)	○	○	○	○	○	○
螺栓 Screw (Schraube)	○	○	○	○	○	○

本表格依据SJ/T 11364的规定编制。
This table is prepared in accordance with the provisions SJ/T 11364.
○：表示该有害物质在该部件所有均质材料中的含量均在GB/T 26572规定的限量要求以下。
Indicate the hazardous substances in all homogeneous materials' for the part is below the limit of the GB/T 26572.

×：表示该有害物质至少在该部件的某一均质材料中的含量超出GB/T 26572规定的限量要求。
Indicate the hazardous substances in at least one homogeneous materials' of the part is exceeded the limit of the GB/T 26572.

10 Setup program

10.1 Hardware and software requirements

The hardware and software requirements are adapted by JUMO to the respective market developments. The current status can be found on the JUMO website (www.jumo.net).

10.2 Displaying the device software version

❋ Press the $\textcircled{P}$ and $\textcircled{\blacktriangle}$ keys simultaneously, holding them down

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.

✳ 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 ⓟ for 2 seconds (parameter level) "Code" appears in the lower display
✳ Set the access code with the ⬆ and ⬇ keys
✳ Acknowledge with ⓟ

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
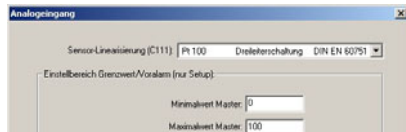
11 Alarm messages

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.	✱ Check probe and connecting cable for damage or short-circuit ⇨ Chapter 4.2 "Connection diagram" ✱ Check that the correct probe has been set or connected ⇨ Chapter 7.1 "C111 Analog inputs"
	Gone below measured value The measured value is too small, is outside the range, or a probe short-circuit has occurred.	

12 Error messages

Error display (code)	Cause	Remedy
⁺ᴮᴮᴮᴮ ᴮᴮ.ᴮᴮ.ᴮᴮ.ᴮᴮ	**The total number of relay switching operations has been reached.**	✱ 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	✱ 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 ✱ 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. ✱ 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.
0010	**Configuration data checksum**	$\ast$ Send the instrument in $\Rightarrow$ Chapter 2.1 "Service addresses"
0011	**Register error**	
0012	**RAM error**	
0013	**ROM error**	
0014	**Program run error occurred**	
0015	**Watchdog Reset occurred**	
0016	**Overvoltage** Secondary voltage too high	$\ast$ Check mains voltage level

13   What if...

Description	Cause	Remedy

This appears on the display:
 	
 `- - - -`
 `SETUP`
	The Setup program is transferring data.
	 The monitoring function switches off briefly during data transmission and the instrument re-starts.
		- Wait for data transmission

The measurement in the upper display flashes. `+` **88** `INP °C`	**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. - Measured value too high or too low - Temperature values too far apart during differential measurement	✱ Press (P) twice and check the limit value. ✱ Discover the reason why the limit value was 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. ⇨ Chapter 7.5 "C115 Switching action"
LED K1 shows red, although the measurement is in the OK range	**The instrument is set up as a temperature li-miter (TB).** Even if the measured value returns to the OK ran-ge after going overrange, the relay of a tempera-ture monitor does not reset auto-matically. It must be unlocked manually.	✱ 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.	✱ 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"