INT301 / INT302®

Operating instructions
Temperature controller
from program version 1.00

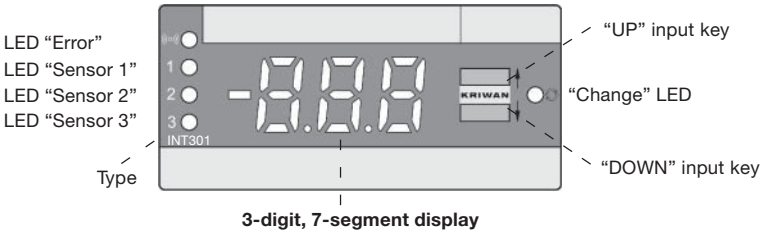
KRIWAN

1. Introduction

1.1. General information

The KRIWAN INT30x is an electronic temperature monitor with three sensor inputs and three relay outputs.
The temperature monitor functions can easily be selected with two buttons and changed as required.
The KRIWAN INT30x offers the option of monitoring either one sensor per relay or a group consisting of up to 3 sensors and analogue input.

1.2. Control panel



2. Functions

2.1. General

The temperature monitor is provided with two buttons for function selection and stored value editing. For security purposes, the functions are divided into two main groups. The first part (operation mode) is freely accessible at all times. The second part (parameter mode) can be password protected to prevent unauthorised persons from editing the system parameters.

2.2. Operation

Function selection/editing and storing values

The required abbreviated symbol (function) to be edited can be selected with the “UP” or “DOWN” keys. The value can be displayed by subsequently briefly actuating the “UP” and “DOWN” keys simultaneously. The “Change” LED lights up. The required value can be entered by actuating the “UP” or “DOWN” keys. When the value has been edited, the “Change” LED lights up. The new value can be stored by briefly actuating the “UP” and “DOWN” keys simultaneously. The display changes back to the function and the “Change” LED extinguishes.

Change between operation and parameter mode

By default the controller is in the operating level and set to “t_H - Maximum temperature” function. To access the parameter mode, the “cHE - Change to parameter mode” function must first be selected by actuating the “UP” or “DOWN” keys. The “UP” and “DOWN” keys must subsequently be actuated simultaneously briefly. To return to the operation mode, either the “Quick return function” (see below) or the “cHE - Change to operation mode” function can be used.
Note: If no key is actuated for 2 minutes, return to “t_H - Maximum temperature” takes place automatically. Edited but unstored values are erased.

Password

The password can be changed by actuating the “UP” or “DOWN” keys in the parameter mode until the abbreviated symbol “o__” appears on the display. The edit mode can be selected by briefly actuating the “UP” and “DOWN” keys and the password changed by actuating the “UP” and “DOWN” keys. The “Edit” LED lights up. The new password can be stored by briefly actuating the “UP” and “DOWN” keys simultaneously.
Note: In the setting “-1”, the parameter mode is freely accessible. In any other settings (0...999), the parameter mode is only accessible to those persons who know this number.

Quick return function

When the “UP” and “DOWN” keys are actuated simultaneously for a minimum of three seconds, the program automatically returns to the “t_H - Maximum temperature”.

Status/alarms

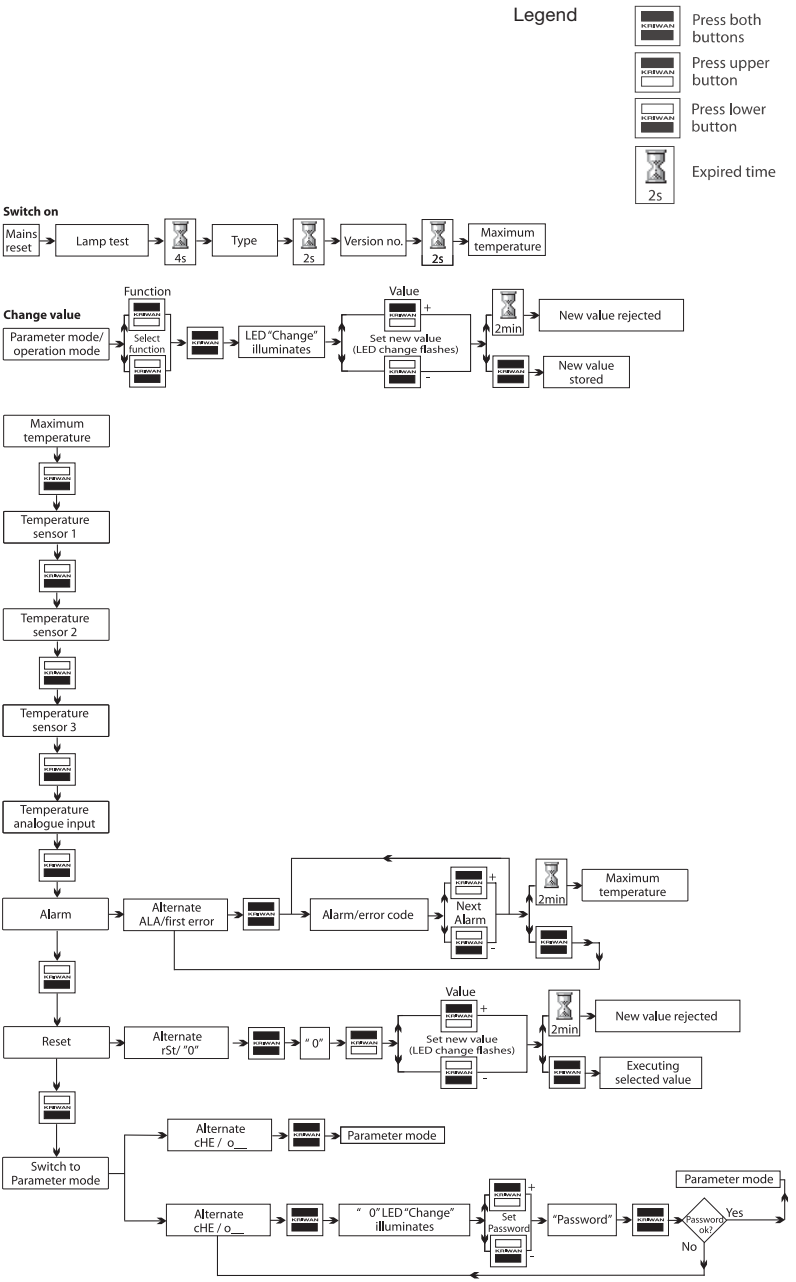
The status of the various input channels (3 sensors and an analogue input) are indicated by the 4 LED’s.

	Evaluation group (r_F =1)	**1 sensor per relay (r_F = 2)**
Sensor x LED flashes slowly	Alarm threshold of sensor x reached Relay 1 (alarm) reacts	Alarm threshold of sensor x reached **No** relay reacts
Sensor x LED flashes quickly	Trip threshold of sensor x reached Relay 2 (trip) reacts	Trip threshold of sensor x reached Relay x reacts
Sensor x LED steady[1]	Sensor short or open-circuit Relay 3 (error) reacts	Sensor short or open-circuit Relay x reacts
Error LED flashes slowly	Alarm threshold of analogue input reached Relay 1 (alarm) reacts	Alarm threshold of analogue input reached **No** relay reacts
Error LED flashes quickly	Trip threshold of analogue input reached Relay 2 (trip) reacts	Trip threshold of analogue input reached **No** relay reacts
Error LED steady[1]	Over-range analogue input or output internal fault Relay 3 (error) reacts	Over-range analogue input or output or internal fault **No** relay reacts

x = 1 to 3 referring to the respective sensor or relay

[1] = The possible fault conditions are explained in more detail under the function “ALA” (active alarm) and in Table 2.7.

2.3. Service, represented as a flowchart



2.4. The most important functions

t_H **Maximum temperature:** The maximum temperature of the 3 sensor inputs and the analogue input (if enabled), is displayed.

t_x **Temperature sensor x:** The actual temperature of sensor x is displayed.

tAI **Temperature analogue input:** The actual temperature, corresponding to the input current of the analogue input is displayed.

ALA A list of occurred alarms can be viewed. The oldest alarm is displayed first.

rSt **Reset:** Via the reset function, the following values can be reset:
rSt = 1 If the relays have locked out (rxH = -1), they are reset (if limit violation is no longer present).
The saved Min/Max values and alarms are deleted.
rSt = 2 Min/Max memories are deleted.
rSt = 3 alarms are cancelled.
When the rSt function is selected and the "Edit mode" is selected by pressing both keys, a value between 1 and 3 can be entered and the required reset carried out by pressing both keys simultaneously.

cHE **Change to parameter mode:** If the "o__ - Password" function is set to –1, the parameter mode can be selected by pressing both keys. If a number ≥ 1 and ≤ 999 is stored, the correct password must be entered in order to access the parameter mode.

Scx **Lead compensation sensor x (oFF...24.0[4] / 65.0 Ohm):** Compensation of lead. Typical resistance values are shown in Table 2.8. The measuring channel is switched off with the setting "oFF".

SAx **Alarm threshold sensor x:** The required alarm temperature is set. Depending on whether the temperature threshold is being monitored in the positive or in the negative direction, the following selection is possible (see also parameter rxF):
rxF = 1 or 3: -50°C < SAx < Stx monitoring for overtemperature
rxF = 2 or 4: Stx < SAx < 250°C monitoring for undertemperature

Stx **Trip threshold sensor x:** The required trip temperature is set. Depending on whether the temperature threshold is being monitored in the positive or in the negative direction, the following selection is possible (see also parameter rxF):
rxF = 1 or 3: SAx < Stx < 250°C monitoring for overtemperature
rxF = 2 or 4: -50°C < Stx < SAx monitoring for undertemperature

r_F **Function:** r_F = 1: The maximum value of the 3 (4) inputs is monitored.
Relay 1: Alarm: If the alarm temperature on any channel is exceeded or dropped below, the relay switches.
Relay 2: Trip: If the trip temperature on any channel is exceeded or dropped below, the relay switches. Whether the alarm and trip thresholds are monitored for over or under temperature is selected under "r1F" and is valid for relay 1 and 2.
Relay 3: Error: In the event of an internal fault or a measuring range being exceeded, sensor open or short-circuit, this relay drops out immediately and locks out (reset only possible via parameter rSt).
r_F = 2: Each sensor is assigned a relay.
(Sensor 1 acts on relay 1, etc.)
In the event of an internal fault or a measuring range being exceeded, sensor open or short-circuit, the respective relay drops out immediately and locks out (reset only possible via parameter rSt).

rxH **Hysteresis/Interlock:** Temperature in Kelvin by which the sensor must cool down or heat up so that the alarm can be reset. In the setting "-1", the relay drops out and locks out. Reset is then only possible via the parameter rSt.

rxr **Fault alarm delay:** The time between limit violation and the reaction of relay x. If the measured value leaves the violation zone within this time, taking into account the hysteresis, no alarm is generated.

rxd **Fault alarm override:** If no limit violation is present, this time elapses before the relay signals the "good" status again (only when not locked out).

rxF Monitoring for not reaching or exceeding the limit
Selection 1: Relay drops out at temperature > operating point
Selection 2: Relay drops out at temperature < operating point
Selection 3: Relay picks up at temperature > operating point
Selection 4: Relay picks up at temperature < operating point

A_F **Analogue output: Output channel**
Selection oFF: Analogue output is disabled
Selection 1: The maximum value of all inputs appears as an analogue output signal
Selection 2: The value of sensor 1 appears as an analogue output signal

A_U **Analogue output: Lower output value**: Definition of 0mA or 4mA as output minimum value. A_U: 2 = 0mA; A_U: 1 = 4mA.

A_L **Analogue output: Lower temperature:** Temperature corresponding to minimum analogue output. (A_L and A_H are minimum 100K apart).

A_H **Analogue output: Upper temperature:** Temperature corresponding to maximum analogue output. (A_L and A_H are minimum 100K apart).

I__ **Analogue input** On/Off

I_L **Analogue input: Lower temperature:** Definition, which temperature corresponds to 4mA. (I_L and I_H are minimum 100K apart).

I_H **Analogue input: Upper temperature:** Definition, which temperature corresponds to 20mA. (A_L and A_H are minimum 100K apart).

I_A **Analogue input: Alarm temperature:**
The required alarm temperature is set. Depending on whether a temperature is to be monitored for being exceeded or not reached, the following selection is possible (see also parameter rxF):

rxF = 1 or 3: -50°C < I_A < I_t	Monitoring for overtemperature
rxF = 2 or 4: I_t < I_A < 250°C	Monitoring for undertemperature

I_t **Analogue input: Trip temperature:**
The required trip temperature is set. Depending on whether a temperature is to be monitored for being exceeded or not reached, the following selection is possible (see also parameter rxF):

rxF = 1 or 3: I_A < I_t < 250°C	Monitoring for overtemperature
rxF = 2 or 4: -50°C < I_t < I_A	Monitoring for undertemperature

H_x Maximum value sensor x since last reset (system reset or via function rSt)

L_x Minimum value sensor x since last reset (system reset or via function rSt)

H_A Maximum value analogue input since last reset (system reset or via function rSt)

L_A Minimum value analogue input since last reset (system reset or via function rSt)

oA **Device type:** Display of device type

oPn **Program version:** Display of program version

o__ **Password:** Protection against unauthorised use of the parameter mode. A value between 0 and 999 can be defined. The password is requested under the "cHE" function in the operating mode. In the setting "-1" , the parameter mode is not password protected.

2.5. General list of functions and settings

	Function	Display	Unit	min	max	Default	Current Setting
Operation mode	Maximum temperature	t_H	°C				
	Temperature sensor 1	t_1	°C				
	Temperature sensor 2	t_2	°C				
	Temperature sensor 3	t_3	°C				
	Temperature analogue input	tAI	°C				
	Active alarm (table alarm)	ALA					
	Reset	rSt		0	3	0	
	Change to parameter mode	cHE		0	999		
Parametermode	**Sensor 1**						
	Lead compensation sensor 1	Sc1	Ω	oFF	(24.0[4]) 65.0	0	
	Alarm threshold sensor 1	SA1[2]	°C	-50	St1	200	
	Trip threshold sensor 1	St1[2]	°C	SA1	250	250	
	Sensor 2						
	Lead compensation sensor 2	Sc2	Ω	oFF	(24.0[4]) 65.0	0	
	Alarm threshold sensor 2	SA2[2]	°C	-50	St2	200	
	Trip threshold sensor 2	St2[2]	°C	SA2	250	250	
	Sensor 3						
	Lead compensation sensor 3	Sc3	Ω	oFF	(24.0[4]) 65.0	0	
	Alarm threshold sensor 3	SA3[2]	°C	-50	St3	200	
	Trip threshold sensor 3	St3[2]	°C	SA3	250	250	
	Function	r_F		1	2	1	
	Relay 1						
	Hysteresis (-1 = lockout)	r1H	K	-1	50	10	
	Fault alarm delay	r1r	s	0	60	0	
	Fault alarm override	r1d	s	0	999	0	
	Monitoring for under or overtemperature	r1F[3]		1	4	1	
	Relay 2						
	Hysteresis (-1 = lockout)	r2H	K	-1	50	10	
	Fault alarm delay	r2r	s	0	60	0	
	Fault alarm override	r2d	s	0	999	0	
	Monitoring for under or overtemperature	r2F[3]		1	4	1	
	Relay 3						
	Hysteresis (-1 = lockout)	r3H	K	-1	50	10	
	Fault alarm delay	r3r	s	0	60	0	
	Fault alarm override	r3d	s	0	999	0	
	Monitoring for under or overtemperature	r3F[3]		1	4	1	
	Analogue output						
	Output channel (sensor 1 or maximum value of all active inputs)	A_F		oFF	2	oFF	
	Lower output value (2 = 0mA / 1 = 4mA)	A_U	1	2	1		
	Lower temperature	A_L	°C	-50	A_H -100K	-50	
	Upper temperature	A_H	°C	A_L +100K	250	250	
	Analogue input						
	On/Off	I__		on	oFF	oFF	
	Lower temperature	I_L	°C	-50	I_H -100K	-50	
	Upper temperature	I_H	°C	I_L +100K	250	250	
	Alarm temperature	I_A	°C	-50	I_t	200	
	Trip temperature	I_t	°C	I_A	250	250	
	Max. / Min. value						
	Maximum value sensor 1	H_1	°C				
	Minimum value sensor 1	L_1	°C				
	Maximum value sensor 2	H_2	°C				
	Minimum value sensor 2	L_2	°C				
	Maximum value sensor 3	H_3	°C				
	Minimum value sensor 3	L_3	°C				
	Maximum value analogue input	H_A	°C				
	Minimum value analogue input	L_A	°C				
	Options						
	Device type 1=Pt100; 10=Pt1000	oA				xx	
	Program version	oPn				x.xx	
	Password	o__		-1	999	-1	
	Change to operation mode	cHE					

[2] The setting limits and default values depend on the parameter rxF - monitoring for over or undertemperature and apply to the setting rxF =1 or rxF = 3.

[3] rxF = 1 : Relay drops out at temperature > trip or alarm temperature
2 : Relay drops out at temperature < trip or alarm temperature
3 : Relay picks up at temperature > trip or alarm temperature
4 : Relay picks up at temperature < trip or alarm temperature

[4] For devices with program version 1.00 the maximum lead compensation is 24Ω.

2.6. Reset table (rSt)

1 Release, min/max values and reset alarms
2 only reset min/max values
3 only reset alarms

2.7. Table Alarm / error

S1_	Short-circuit sensor 1	EEt	EEPROM write error
S1¯	Open-circuit sensor 1	EPr	Internal fault (EPROM)
S2_	Short-circuit sensor 2	EEP	Internal fault (EEPROM)
S2¯	Open-circuit sensor 2	EEr	EEPROM read error
S3_	Short-circuit sensor 3	no	No Alarm
S3¯	Open-circuit sensor 3	Ao¯	Analogue output over-range upwards
In	Short-circuit or open-circuit analogue input	Ao_	Analogue output over-range downwards

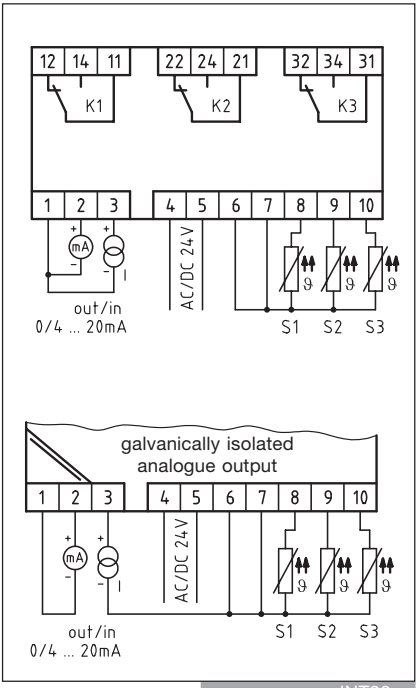
2.8. Typical lead resistance for device adjustment

Cable cross-section / mm²	Lead resistance / Ω (total - there and back)			
	1m distance	10m distance	100m distance	1000m distance
0.14	0.25	2.5		
0.25	0.14	1.4	13.8	
0.50	0.07	0.7	6.9	
0.75	0.05	0.5	4.6	
1.00	0.03	0.3	3.4	
1.50	0.02	0.2	2.3	23

Ordering information

INT301 Temperature controller for Pt100 sensors	**20 A 501**
INT301 Temperature controller for Pt100 sensors, galvanically isolated analogue output	**20 A 501 S21**
INT302 Temperature controller for Pt1000 sensors	**20 A 502**
INT302 Temperature controller for Pt1000 sensors, galvanically isolated analogue output	**20 A 502 S21**
Transformer AC 50/60Hz 230V 3VA	**CD4200153F**

3. Connection diagram



INT30x

The KRIWAN INT30x is used for temperature monitoring in various applications. It offers the option of monitoring one sensor per relay or a group consisting of up to 3 sensors and an analogue input. The required alarm and trip thresholds can be set individually for each measuring channel. One analogue output and one analogue input is available per device. The device is also available with galvanically isolated analogue output.

Technical data

Supply voltage	AC/DC 24V ± 10% 3VA
Ambient temperature range	-20...+60°C
Relay	3 changeover contacts; AC 250V, 6A ohmic, 3A ind., 300VA ind.
Measuring range	-50...+250°C
Mechanical service life	approx. 1 million switching cycles
Protection class	front mounted: IP65
acc. to EN 60529	housing: IP20
Mounting	front panel installation
Interface	(optional)
Analogue output	0(4)...20mA, burden ≤ 500Ω, active
Analogue input	4...20mA, passive
Temperature sensor	Pt100 or Pt1000 acc. to EN 60751
Weight	approx. 130g

Analogue input and output specification

Accuracy of resolution	< 0.1mA
Accuracy	± 0.3mA

Sensor input specification

Accuracy of resolution	1K
Accuracy	± 1% of measuring range

Dimensions, mounting

Front panel installation, housing dimensions	74 x 34 x 85mm
Cut-out dimensions	71 x 29mm
Screw terminals	≤ 2.5mm^2

Subject to technical modifications without notice

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KRIWAN Industrie-Elektronik GmbH
Allmand 11 • D-74670 Forchtenberg
phone: ++49-79 47-822-0 • fax: ++49-79 47-12 88
e-mail: info@kriwan.com • home: www.kriwan.com

KRIWAN