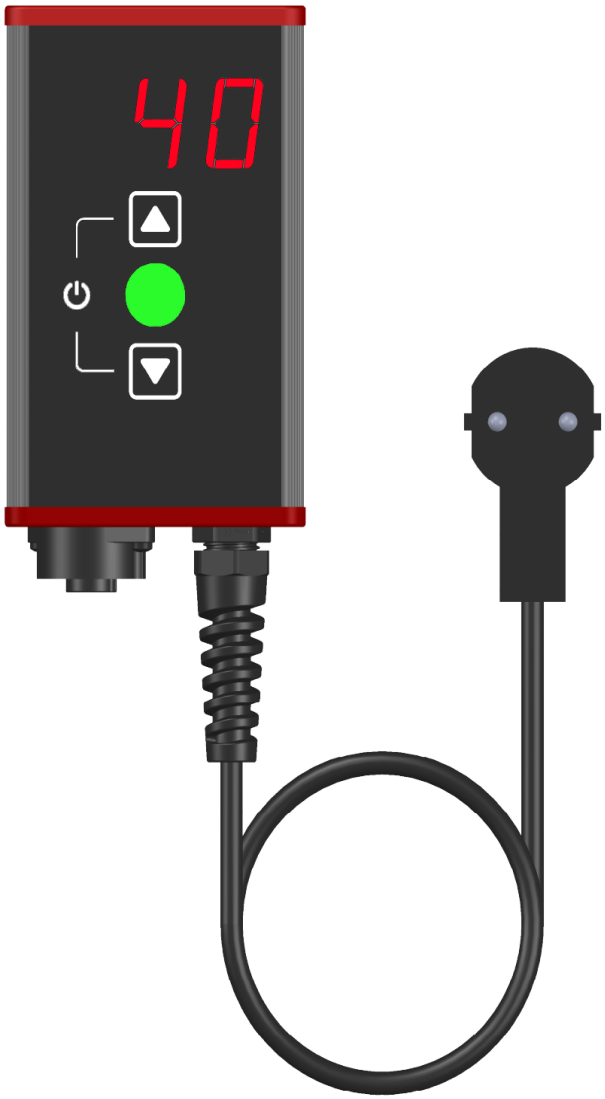
Operation Manual

Temperature Controller

Series L-400



L-430

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1 Safety information

Before putting the unit into operation, the safety information, the instructions for installation and the operating manual that is supplied with the unit must be read and observed.

Please read the safety information carefully and comply with the items stated. This is a matter of safety for personnel and equipment. The unit is predominantly designed as a temperature controller for electrical heating systems. Improper application, installation, configuration or operation of a system or that which goes against the machine's intended purpose may cause severe personal injuries and extensive property damage!

***Important:* This unit is not a safety temperature limiter according to DIN EN 60730-1**

The unit must not be installed in potentially explosive atmospheres. If a process function originating from an explosion-risk area is to be processed by the unit installed outside the explosion-risk area, all supply lines of the unit leading into the explosion-risk area must be guided via safety barriers!

The prerequisite for error-free and safe operation of the unit is its careful transport and storage, as well as correct assembly and installation. This device may only be installed, configured, parameterized and commissioned by qualified persons who are familiar with installation, commissioning and maintenance of comparable devices and with the system in which the device will be applied and who have appropriate knowledge in the field of instrumentation and control. Operating staff of the system in which the device is to be used must be instructed on operation and control of the unit by qualified persons.

Please observe and comply with:

- The contents of the present manual for installation and operation of the unit, in particular the information on installation, taking into operation, any notes in bold print and adjustment of the device to suit the overall system.
- Any and all safety information attached to the unit.
- Any and all relevant safety regulations for installation and operation of electrical systems.
- The keeping of this manual in a safe place for future use.

The regulations stated in the present manual are applicable and valid in all EU countries. For use of the device outside of an EU country, the relevant national rules and regulations must be considered.

This device has been produced and tested in accordance with DIN EN 61010 Part 1 “Safety requirements for electrical equipment for measurement” and has left our company in an error-free condition in terms of its safety and functionality.

1.1 Place of application of the unit

The unit is designed as a temperature controller-limiter for flexible application in electrical heating systems. The place of operation or installation of the temperature controller must not be close to

motors, transformers, circuit breakers or other inductive loads, it must be shock-free and vibration-free. The ambient temperature at the place of installation must be between −20 °C and 50 °C, with a relative humidity of < 90 % (noncondensing). Aggressive and corrosive gases and vapors may damage the unit.

1.2 Instructions for installation

Please read the installation instructions carefully and comply with all conditions mentioned here during installation of the unit. In case of non-compliance with the Instructions for installation, faults or malfunctions may occur or the unit may fail to comply with the required EMC guidelines and the conditions for CE-conformity will not be fulfilled.

Before connection of the unit and before putting it into operation, please ensure that the operating voltage and the conditions for the operating voltage required by the unit correspond to the conditions on site (cf. name plate). If required, take any appropriate measures.

Please make sure that the control and load voltage on site are switched off and secured against accidental reactivation during installation of the device. The electrical connections must be made on the basis of the connection diagram and the relevant national rules and regulations. The supply lines for the device must be laid such that they are free from any tensile loads and are not exposed to risks of shearing or crushing under any circumstances.

The mains connection and the connections for the loads must each be provided by suitable cables with a cross-section of a minimum of 1.5 mm².

For sensor lines and signal lines, it is highly recommended to use shielded cables (especially if lines are long and/or running along potential sources of interference); for thermocouples, shielded compensation lines should be used likewise. Sensor lines and signal lines must be installed such that they are spatially separated from the load and control lines (high-voltage lines). If signs of incorrect switching behavior are detected the circuit must be put out of service until remedial action.

For intermediate clamping of compensation lines for thermocouples, no regular terminals may be used, since this would result in generation of additional thermocouples that may falsify the measuring results.

Connect the shield of the sensor lines and the signal lines with the signal ground as close to the unit as possible and lay a line with a diameter of minimum 1.5 mm² from this point to the PE bus bar along the shortest possible route.

Any inductive loads activated by the unit, such as contactors, valves, motors, transformers, etc. must be wired separately and interferences must be prevented using device-specific suppression devices.

For type L-430, the load circuit is fused against excess current by means of an internal miniature fuse. For 16A types the load circuit must be protected against excess current by means of a suitable external fuse.

The present manual does not contain all notes for regulations, standards, etc. that must be observed and complied with during working with the unit in connection with systems and plants. Any such

regulations, standards, etc. shall be complied with and observed by the operator of the unit with regard to specific requirements of the respective system or plant.

2 Start-up and adjustment of controller

The unit is delivered with preconfigured setup and can be used plug and play.

Power on

Carefully inspect the wiring and connections once again.

Incorrect wiring or connection of the unit may cause severe damage of the unit and the plant. On first power-on, the actual setpoint has to be checked and corrected if necessary. Otherwise damage to equipment or persons is possible!

Now, switch on the operating voltage of the unit.

Setup

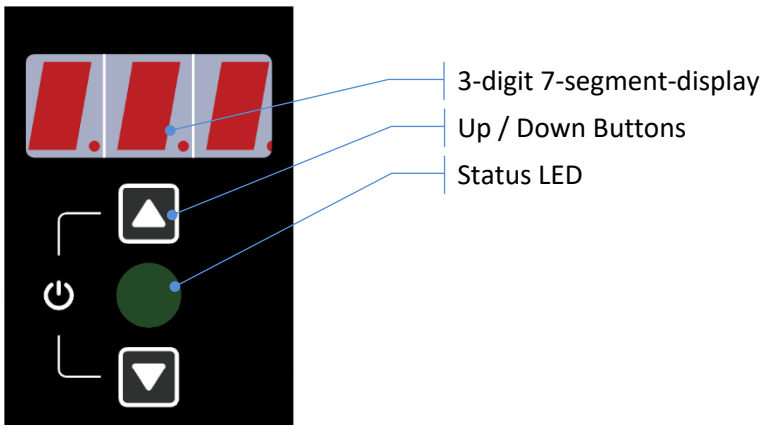
If the desired setpoint is not preconfigured, please change the setpoint to the desired value. Please refer to chapter 5.1 on page 7

3 General information

The L-400 is a compact, feature rich, easy to use FAT Temperature Controller. FAT stands for Fast-Adaptive-Tuning. A novel algorithm permanently adjusts the control parameters to the control process. This leads to precise control for a variety of heaters. The common adjustment of PID controllers or the execution of an auto tuning procedure is obsolete.
The self-optimizing controller logic leads to an efficient adaption to any closed-loop controlled pass and quickly reaching adjustment between set-point temperature and actual (temperature) value.

Many functions are pre setup and facilitate the everyday use. The optional limiter or monitor function provides the extra for safety.
The L-400 is equipped with a long-life hybrid-relay designed for low thermal losses inside the housing.
A multi-colored LED is signaling the different operating modes, easy viewable in the distance. The large segment display also allows easy readable temperature values.
Electronics are protected against overcurrent and high thermal load.

4 Control panel



4.1 Overview of functions

- Controller On / Off: simultaneous pressing Up Button ▲ and Down Button ▼ for about 1 second.
- Change Set-Point Temperature: Press Up ▲ or Down ▼ Button
- Failure receipt: pressing Up ▲ or Down ▼ Button to acknowledge the failure if it has been corrected

4.2 Standard display information

- Actual (temperature) value: Actual temperature measured by connected temperature sensor

4.3 Status LED

Starting procedure:

After connecting to power supply, the controller starts with a self-test: white is LED on.
After Self-test successfully completed, the LED is shortly green and then controller starts heating.
If a failure is detected an error signal will show up: see 4.4 Error detection.

Heat-up phase:

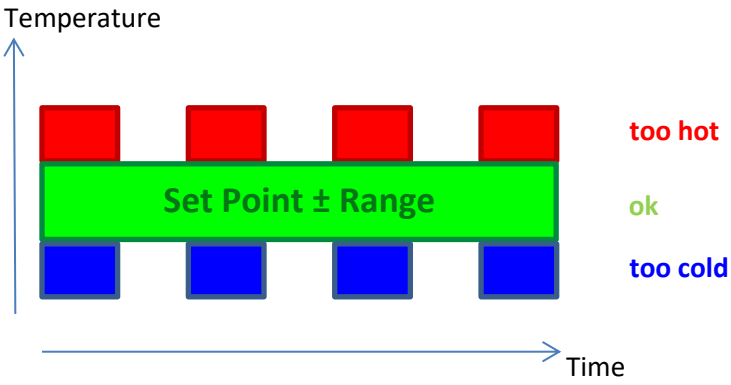
Usually, after startup, the temperature is below the set point and the signal LED flashes slowly (1 Hz) blue. This means that the heating is active and the set point is not reached yet.

Set-point temperature reached:

The Controller works at set-point temperature inside the range: green LED permanent on

Temperature monitor:

The LED remains green at set-point temperature in-between the range. Above and below this temperature range the LED starts to blink with a frequency of 1 Hz. Blue signals too low and red too high temperatures.



4.4 Error detection

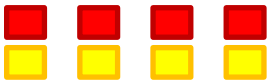
From start and during operation the controller is permanently checking the following failure:

1. PCB temperature
2. sensor break

Signal LED on failure

If any failure occurs the controller stops heating (stand-by) and the Signal LED starts fast blinking with a frequency of 4 Hz:

1. Device failure:
2. Sensor failure:



4 Hz

Display on failure

- Err <> SYS : System Error
- Err <> SEn : Sensor failure
- Err <> Hot : Device too hot

Failure notes can be reset by pressing Up ▲ Button or Down ▼ Button. If the failure note cannot be reset by this procedure, the occurring problem has to be solved and the controller reconnected to power supply to restart the controller.

Please also see chapter 8 Troubleshooting on page 10.

5 Set-up menu

5.1 Adjustment of set-point

To get from normal operation directly to set point adjustment, just press the button ▲ or ▼.
The current setpoint temperature will start blinking. Now the temperature can be adjusted with the

▲ / ▼ buttons. By pushing both ▲ and ▼ together the new temperature get set. Also after 10 sec. the new value will automatically be used.

6 Pre-order settings

The following parameters can be specified during order process to customer needs.
(Technical data see datasheets "datasheet Series L-400" or "datasheet L-430 for container heaters")

6.1 Lower / Upper limits

Limits for minimum and maximum temperature values of the set-point adjustment. This avoids accidentally wrong setting of setpoint values according to used heater. Limits can be adjusted according to selected sensor type or application specific.

6.2 Range

Current actual temperatures inside the Range are considered balanced to the set-point value, signaled by the green LED-light on. The larger the value, the lesser switching cycles are needed. By this, the Temperature can be held closer to set point or to increase lifetime of the switch (fixed default: ±3 °C).

6.3 Type of sensor

The type of sensor is customer selectable out of a variety of sensor types. (see datasheet for available types) Sensor is a fixed factory preset and can be chosen upon order.

6.4 Temperature monitor or limiter

Additional to the controller a monitor or limiter function is available. (Fixed factory default)

6.5 Temperature limiter

The limiter shuts off the heater, if the temperature limit is above the limit. The device shows a yellow flashing status LED (1 Hz) and Err <> L lm (Error Limiter). To acknowledge the error press both ▲ and ▼. The device restarts normal operation, if the temperature is below the limit with hysteresis.

6.6 Temperature monitor

The monitor shuts off the heater, if the temperature is above the limit. The status LED starts slow yellow flashing (1 Hz). If the temperature is again below the limit with hysteresis (see 6.8 Hysteresis), then the controller returns automatically to normal operation.

6.7 Limit temperature

The limit temperature depends on the used heater and the heated material. The purpose is to protect the heater or the heated material against over temperature. The value is preconfigured application or customer specific. (Fixed factory default)

6.8 Hysteresis

The hysteresis is preset to ±5 K. The device stops heating control if the temperature is above the limit + 5 K. And restarts heating control if below limit – 5 K. (Fixed factory default)

6.9 Unit

Selection between degree Celsius and degree Fahrenheit. (Fixed factory default)

6.10 Power-on option

This defines the behavior of the controller after connecting to mains supply (fixed factory default). Possible options are:

- Always power on: Controller starts up every time mains supply gets connected.
- Stay off: Controller stays off after mains supply gets connected. Controller must be switched on manually by pressing the keys ▲ and ▼ simultaneously.
- Last state: Controller changes to the last state before power loss.

6.11 Stop after error

If this option is set to “yes” (fixed factory default), the controller remains stopped after each error and shows the error permanently. Heating is deactivated.

If this option is set to “no”, the controller waits till the error condition is solved and automatically continues operation.

7 Controller On / Off

The controller switches automatically on with the power supply connected.
By simultaneously pressing ▲ and ▼ the controller goes to standby or can be powered on again.
During Standby the device shows OFF in the display.

7.1 Display during power up

During the start sequence first the firmware version is shown. Then follows the setpoint SEt and limit value L in with the value and the configured unit.

8 Troubleshooting

Error:	Actions:
Display stays off	• Check power supply • press ▲ and ▼ together for a few seconds to power on. • Disconnect and reconnect controller from mains supply. • Contact Service.
Message Err SEn	• Check wiring for short circuit or wire breaks, check connection in Terminal / Plug. • Check resistance value of Sensor. • Replace Sensor.
Message Err Hot	• Press ▲ or ▼ to acknowledge error or disconnect controller from mains supply and let cool down. Then reconnect. • Check correct connection in terminals for mains supply and heater connection. • Provide better air circulation. • Check current in Heater circuit.
Message Err SYS	• Disconnect and reconnect controller from mains supply. • Message still appears? Contact service. • Message does not appear? Check all settings and readjust if necessary.
Message Err HEr	• Check wiring of Heater for damages. • Check Heater, if heat circuit is broken. • Test Controller with different heater, if possible. • If Error is still present, internal switch is broken, please contact service.

Service mail: service@winkler.eu

9 Repair and maintenance

If the controller is damaged, please return the controller to us with an error description.

Maintenance intervals and Maintenance directives according to DGVU Rule 3 apply.

If the device is dirty, turn power off, and clean it with a damp cloth. Heavy dirt may be cleaned with a non-abrasive, solvent-free cleaning agent.

10 Disassembly and disposal

The device may only be disassembled when it is switched off, disconnected from the mains and secured!

Electronic devices are recyclables and do not belong in the household waste! Dispose of the product at the end of its service life in accordance with applicable legislation.

11 EU-Declaration of conformity

EU-DECLARATION OF CONFORMITY

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CE RoHS

Manufacturer:	Winkler AG Englerstr. 24 69126 Heidelberg	
Contact:	Tel.:+49 6221 3646-0 Fax.: +49 6221 3646-40 sales@winkler.eu www.winkler.eu	
Product group:	Temperature controllers	
Series / item:	**Series L-400 / WRL4...**	
Directives:	Directive 2014/35/EU	Low Voltage Directive
	Directive 2014/30/EU	Electromagnetic Compatibility
	Directive 2011/65/EU	restriction of the use of certain hazardous substances in electrical and electronic equipment
	Directive 2017/2102/EU	amending Directive 2011/65/EU

We hereby declare that in planning and manufacturing of this product the basic safety and health requirements of the EU Directives mentioned above have been observed.

Further rules and technical specifications applied:

EMC requirements:	EN 61326-1:2013
Emission:	EN 61000-6-4:2019
Immunity:	EN 61000-6-2:2019
Safety requirements:	EN 61010-1:2020

Any modification to the product without our consent will make this declaration invalid.

Heidelberg, August 6th, 2020

Winkler AG

CEO A. Zenner