



Dimensions 48x48x80 mm (1/16 DIN)

#### Main features

- Safety high temperature alarm threshold with relay output
- Retained alarm output with manual operator acknowledge
- Dedicated frontal button for alarm reset
- Counting of high temperature alarm tripping
- Time totalisation of high temperature alarm tripping
- Operator interface with large LCD Display, customizable, with choice of colors
- Scrolling diagnostic messages, configurable, in the selected language
- Easy, guided configuration, copy/paste parameterseven with power off
- Different password levels
- Universal input configurable for thermocouples, RTDs,
- Current/voltage inputs
- Relay, logic,
- RS485 serial communication in Modbus RTU
- Removable faceplate for quick replacement
- Sampling time 60 ms

#### PROFILE

Indicators 650 L used to limit overheating in industrial processes.

In the event of alarm, the instrument latches the fault conditions until reset by the operator. Reset can be run by the operator from the front key (red R), from the digital input (optional) or serial line (optional).

As an additional feature, the instrument counts the number of times the alarm limit is exceeded and total amount of time the alarm is active.

This information can help to evaluate furnace deterioration and plan maintenance work.

The displays show the process values, plus multilingual scrolling messages for diagnostics and alarms.

Configuration and unit operation is done with the front keys.

The keys have dual-function LEDs indicating pressing of the keys. The LEDs provide feedback for pressed key and also provide guidance for permitted operations.

Initial commissioning is simplified by guided configuration text prompts that cover the commonly used base parameters accompanied by in line help messages.

With GF\_eXpress software and PC, you can program the extended configuration, create recipes and update the firmware without having to apply power to the instrument.

Thanks to the Smart Configurator function, you obtain the required configuration by answering a few simple questions.

The initial parameters can always be reset, both from the keypad and from the GF\_eXpress software.

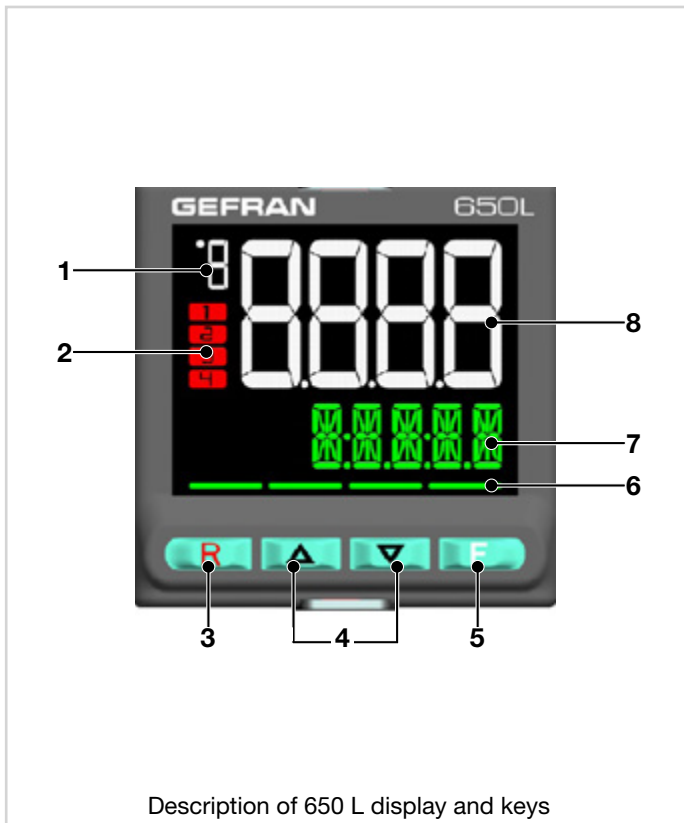
The devices offer complete diagnostics (broken or incorrect connection of sensor), operation count, settable alarm limits (useful for scheduling preventive maintenance).

A trigger meter and alarm memory reset timer are available for alarm 1.

Maintenance of the system in which the device is installed is made easier by the ability to replace the instrument at any time

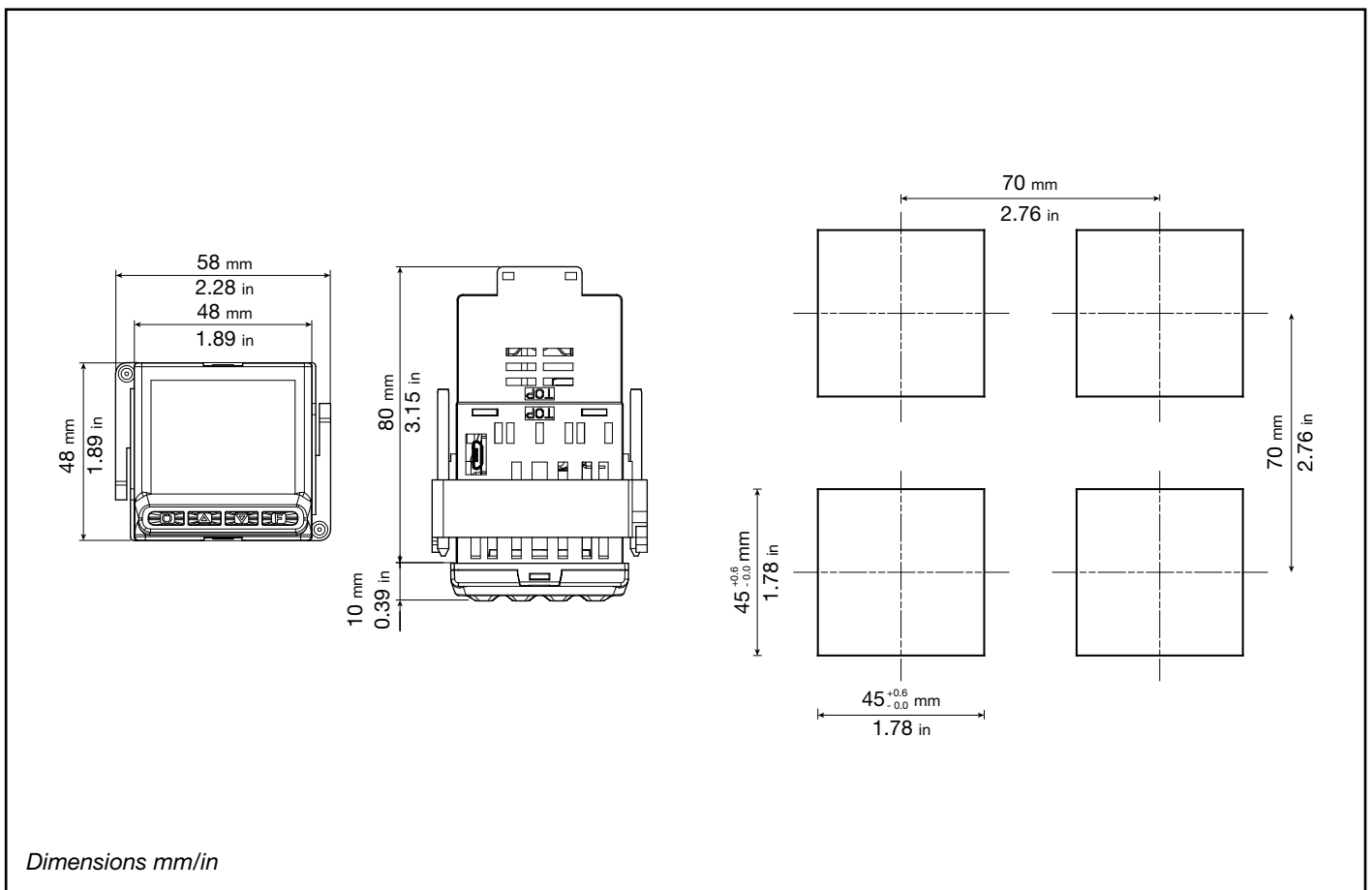
simply by removing it from the faceplate. No additional steps are needed.

## DISPLAY AND KEYS



1. Temperature unit of measurement
2. ALARM status
3. Alarm reset key
4. Up/down keys: raise/lower the value of the parameter displayed on the SV or PV display.
5. F key: lets you navigate among menus and parameters. Confirms the parameter value and selects the next parameter.
6. Key pressed signals.
7. SV display: Alarm 1 limit, description of parameters, diagnostic and alarm messages. It can be used to view the alarm limit and displays the associated message in the event of alarm.
8. PV display: process variable, parameter values.

## DIMENSIONS AND DRILLING TEMPLATE



**TECHNICAL DATA**

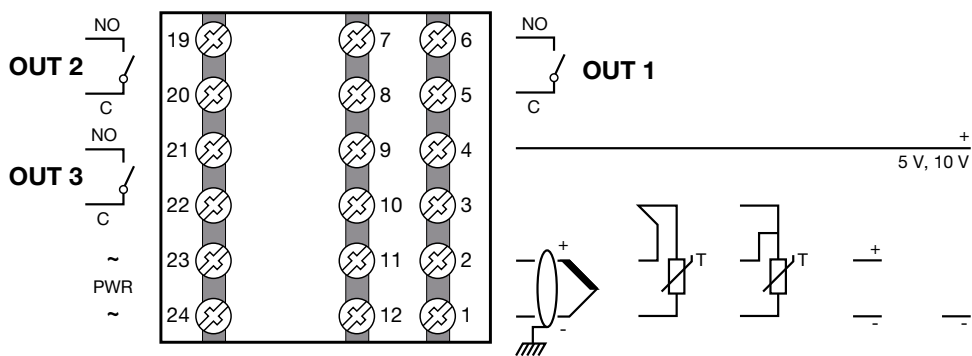
<b>OPERATOR INTERFACE</b>		<b>650 L</b>
<b>DISPLAY</b>	Type	LCD black background
	Screen area (L x H)	35x30 mm (1.38" x 1.18")
	Lighting	Backlit with LEDs, life > 40.000 hours @ 25 °C * with brightness level BACKL=0.8
	PV Display	Number of digits: 4 to 7 segments, with decimal point Digit height: 17 mm Color: white or "custom"
	SV Display	Number of digits: 5 to 14 segments, with decimal point Digit height: 7.5 mm (0.29") Color: green or "custom"
	Engineering units	Selectable, °C, °F or custom <sup>1</sup> Color: same as PV display
	Alarms state signals	Number: 4 (1, 2, 3, 4) Color: red
<b>KEYPAD</b>		Keys number: 4, silicone ( R, INC,DEC,F) Type: mechanical
<b>INPUTS</b>		<b>650 L</b>
<b>MAIN INPUT</b>	Sensor type	TC, RTD (PT100, JPT100), DC linear sensor
	Accuracy	<b>TC inputs:</b> Calibration accuracy: < +/- (0.25% of reading value in °C +0.1°C) Linearization accuracy: 0.1% of reading value Cold junction accuracy: < +/- 1.5°C a 25°C room temperature) Cold junction compensation: > 30:1 rejection to the change of the room <b>RTD input:</b> Calibration accuracy: < +/- (0.15% of reading value in °C +0.4°C) Temperature drift: < +/- (0.005% of reading value in °C +0.015°C )/°C from 25°C room temperature Linearization accuracy: 0.1% of reading value <b>Linear inputs:</b> Calibration accuracy:< 0.1% full scale Temperature drift: < +/- 0.005% full scale /°C at 25°C room temperature
	Sampling time	60 ms / 120 ms, selectable
	Digital filter	0.0...20.0 s
	Temperature unit of measurement	Degrees C / F, selectable from keypad
	Signal interval	Type: linear Scale: -1999...9999, settable decimal point
	TC (thermocouple) input	Thermocouple: J, K, R, S, T, C, D, B, E, L, L GOST, U, G, N, Pt20Rh-Pt40Rh Linearization: ITS90 or custom
	RTD (resistance thermometer) input	Resistance thermometer: PT100, JPT100 Input impedance (Ri): ≥ 30 kΩ Linearization: DIN 43760 or custom Max. line resistance: 20 Ω
DC linear input	0...60 mV                           input impedance (Ri): > 70 kΩ 0...1 V                               input impedance (Ri): > 15 kΩ 0...5 V / 0...10 V               input impedance (Ri): > 30 kΩ 0/4...20 mA                       input impedance (Ri): 50 Ω Linearization: linear or custom	
<b>DIGITAL INPUTS</b>	Type	voltage dry contact, or NPN 24 V - 4.5 mA, or PNP 12/24 V - max 3.6 mA (for detail see electrical connections)
	Isolation	500 V
	Number	1 max

<b>OUTPUTS</b>		<b>650 L</b>
	Relay (R)	Number: 4 max Type of relay contact: NO Max. current: 5 A, 250 VAC Minimum load: 5 V, 10 mA Life cycle: > 100,000 operations Double isolation
	Analog retransmission (A1)	Number: 1 max 0...10 V, max 20 mA, $R_{out} > 500 \Omega$ 0...20 mA, 4...20 mA, $R_{out} < 500 \Omega$ Resolution: 12 bit Isolated from main input
<b>ALARMS</b>	Number of alarm functions	4 max, assignable to an output
	Possible configurations	Maximum, minimum, symmetric, absolute/relative, exclusion at firing, memory, reset from keypad and/or contact,
<b>CONTROL FUNCTIONS</b>		<b>650 L</b>
<b>DIAGNOSTIC</b>		Short circuit or open circuit
<b>RETENTIVE MEMORY</b>	Type	EEPROM
	Max. number of writes	1,000.000
<b>SERIAL INTERFACE</b>		<b>650 L</b>
		Type: RS485 Baudrate: 1200, 2400, 4800, 9600, 19.200, 38.400, 57.600, 115.200 bit/s Protocoll: MODBUS RTU Isolated from main input
<b>GENERAL DATA</b>		<b>650 L</b>
<b>POWER SUPPLY</b>	Operating voltage	100...240 VAC/VDC $\pm 10\%$ , 50/60 Hz (on request 20...27 VAC/VDC $\pm 10\%$ )
	Power dissipation	5 W max
	Protections	Overvoltage 300 V / 35 V
	Connection	Screw terminals and crimp connector, max. wire section 1 mm <sup>2</sup>
<b>CONNECTIONS</b>	Serial configuration port (for USB connection)	Connector: microUSB
	Inputs and outputs	Screw terminals and crimp connector, max. wire section 2,5 mm <sup>2</sup>
<b>AMBIENT CONDITIONS</b>	Use	Indoor
	Altitude	2000 m max
	Operating temperature	-10 ... +55 °C (as per IEC 68-2-14)
	Storage temperature	-20 ... +70 °C (as per IEC 68-2-14)
	Relative humidity	20...85% RH non-condensing (as per IEC 68-2-3)
<b>PROTECTION LEVEL</b>		IP 65 on front panel (as per IEC 68-2-3)
<b>ASSEMBLY</b>	Positioning	On panel, removable faceplate
	Installation regulations	Installation category: II; Pollution degree: 2 Isolation: double
<b>DIMENSIONS</b>		48 × 48 mm (1/16 DIN) (1.89" × 1.89"), Depth: 80 mm (3.15")
<b>WEIGHT</b>		0.16 kg (35 lb)
<b>CE STANDARDS</b>	EMC (electromagnetic compatibility)	Conforms to directive 2014/30/EU with reference to standard EN 61326-1 emission in industrial environment class A for models 650 LV, 1250 emission in residential environment class B for models 650 HV
	Safety LVD	conforms to directive 2014/35/EU with reference to standard EN61010-1

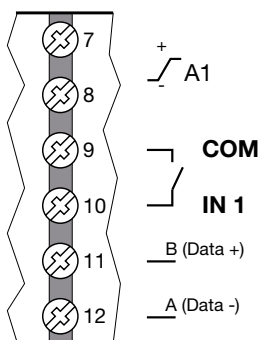
**ACCESSORIES**

<b>Code</b>	<b>Description</b>
<b>F060800</b>	Cable for programming with PC, USB-TTL 3 V with USB – microUSB connectors, length 1.8 m
<b>F043958</b>	“GF_eXpress” software CD
<b>F060909</b>	Configuration kit for new instruments GF_eXK-3-0-0
<b>51968</b>	Rubber gasket 48×48 for display
<b>51292</b>	Rubber gasket 48×48 for panel
<b>51250</b>	Fastening clip (model 650 L)
<b>51294</b>	Finger safe cover (model 650 L)
<b>51454</b>	18 replacement terminals (model 650 L)

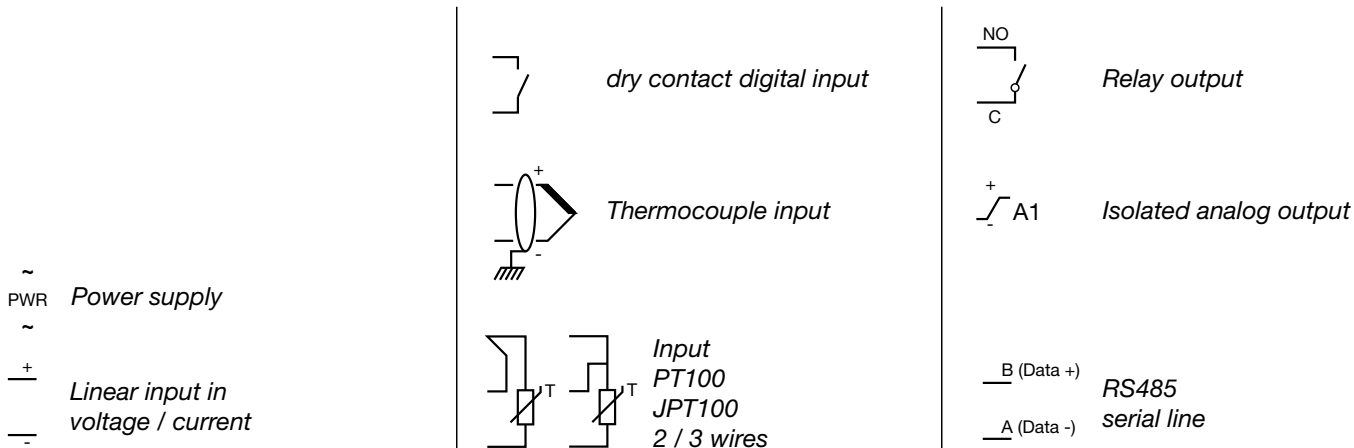
**CONNECTION DIAGRAM**



**OPTIONS**



**LEGEND**



**⚠ ATTENTION:** For correct installation, read the warnings in the instruction manual.

## ORDER METHODS

### Power supply 100...240 VAC/VDC

Code F	Model	Valves	Programmer	Inputs			Outputs					RS485	Logic functions	Total Number of Outputs	
				Digital	CT	SPR	Relay	Triac	Logic	Analog I	Analog V/I				
F068633	650L-R-RR0-00000-1-G						3								3 outputs
F068635	650L-R-RR0-01011-1-G			1			3				1	•			4 outputs

### Power supply 20...27 VAC/VDC

Code F	Model	Valves	Programmer	Inputs			Outputs					RS485	Logic functions	Total Number of Outputs	
				Digital	CT	SPR	Relay	Triac	Logic	Analog I	Analog V/I				
F068634	650L-R-RR0-00000-0-G						3		1						3 outputs
F069116	650L-R-RR0-01011-0-G			1			3				1	•			4 outputs

Please contact GEFRA for information on additional model codes.

<b>FM</b>	FM approvals project NO: 0003054712
<b>UL</b>	Conformity C/UL/US File no. E216851
<b>CE</b>	EMC (electromagnetic compatibility): conforms to directive 2014/30/EU with reference to standard EN 61326-1 emission in industrial environment class A for models 650 LV emission in residential environment class B for models 650 HV Safety LVD: conforms to directive 2014/35/EU with reference to standard EN61010-1