

650/1250/1350 SERIES PID TEMPERATURE CONTROLLERS



GEFRAN

MUCH MORE THAN A SIMPLE CONTROLLER



Gefran's model 650 – 1250 – 1350 PID temperature controllers, in format 48 x 48, 48 x 96 and 96x96mm (1/16th, 1/8th and 1/4 DIN) are full of advanced functions.

FLEX-VIEW DISPLAY

On Gefran's new controllers, **everything can be customized**: cfaceplate color, display, operator messages, logo, and use of the bargraph (1250/1350).

Attributes, such as, character size, black/white contrast, and the combination of different message colors, guarantees excellent readability even at a distance.

EASY AND FAST SETUP

There are **three configuration methods**: from keyboard in only 7 steps, from PC with our free to download GF_eXpress configurator software , and from the Zapper portable configurator..

SETPOINT PROGRAMMER

The temperature profiles can be set in 12 steps, grouped and saved in 4 programs with trigger inputs and programmable event outputs.

PREVENTIVE MAINTENANCE

Outputs can be programmed to indicate when the actuators (relay, SSR, IR lamps) are close to the lifetime limits and maintenance is needed.

ENERGY MONITOR

The Energy Monitor function monitors the electrical consumption of the process and signals any faults.

Technical information available on



FLEX-VIEW DISPLAY

The new 650 / 1250 / 1350 controllers are highly customizable, adapting to the customer's application and integrating perfectly with the look of the machine interface.

CUSTOM LABELING

Customer can decide if they want their logo, part number, machine name or anything they choose on the faceplate.

FRAME

The models 650 – 1250 – 1350 come in standard dark grey. Other colors (standard RAL) are available depending on application needs.



MESSAGES ON DISPLAY

Made possible by the alphanumeric function, you can configure (with the GF_eXpress tool) 25 scrolling messages in 32 plain alphanumeric characters (in multiple languages).

DISPLAY

Standard combinations:
 - White – Green (650)
 - White – Green – Amber (1250/1350)
 - Other combinations on request.



CLEAR AND EASY TO READ



Up to 9 I/O



Up to 14 I/O



Up to 14 I/O

INTUITIVE

The green LEDs corresponding to the four mechanical keys (real buttons) make using these devices highly easy:

- they visually indicate the key pressed
- they guide the user to the key to press (as for acknowledge of an alarm with latch)
- they indicate inactive functions
- they signal if a key is not recognized (diagnostics)



CLEAR AND IMMEDIATE ALPHANUMERIC MESSAGES

The controllers have 300 preconfigured messages to which the user can add up to 25 custom process messages:

- Process: 25 messages with 32 configurable characters

Ex. **HI TEMPERATURE**

- Diagnostics: 10 preconfigured messages

Ex. **SENSOR BROKEN**

- Configuration: 300 Help on Line messages

Ex. **TYPE > MAIN INPUT TYPE OF PROBE**

DISPLAY BRIGHTNESS

Display brightness is easy to set for the optimum visibility in the workplace. This also extends the display's lifecycle.

BARGRAPH

Bargraph display can be easily customized to indicate many process parameters and variables.



BARGRAPH

Signals % of valve opening for motorized valve control.

UP / DOWN KEYS

You can manually set valve opening with the Up / Down keys.

EASY SET UP

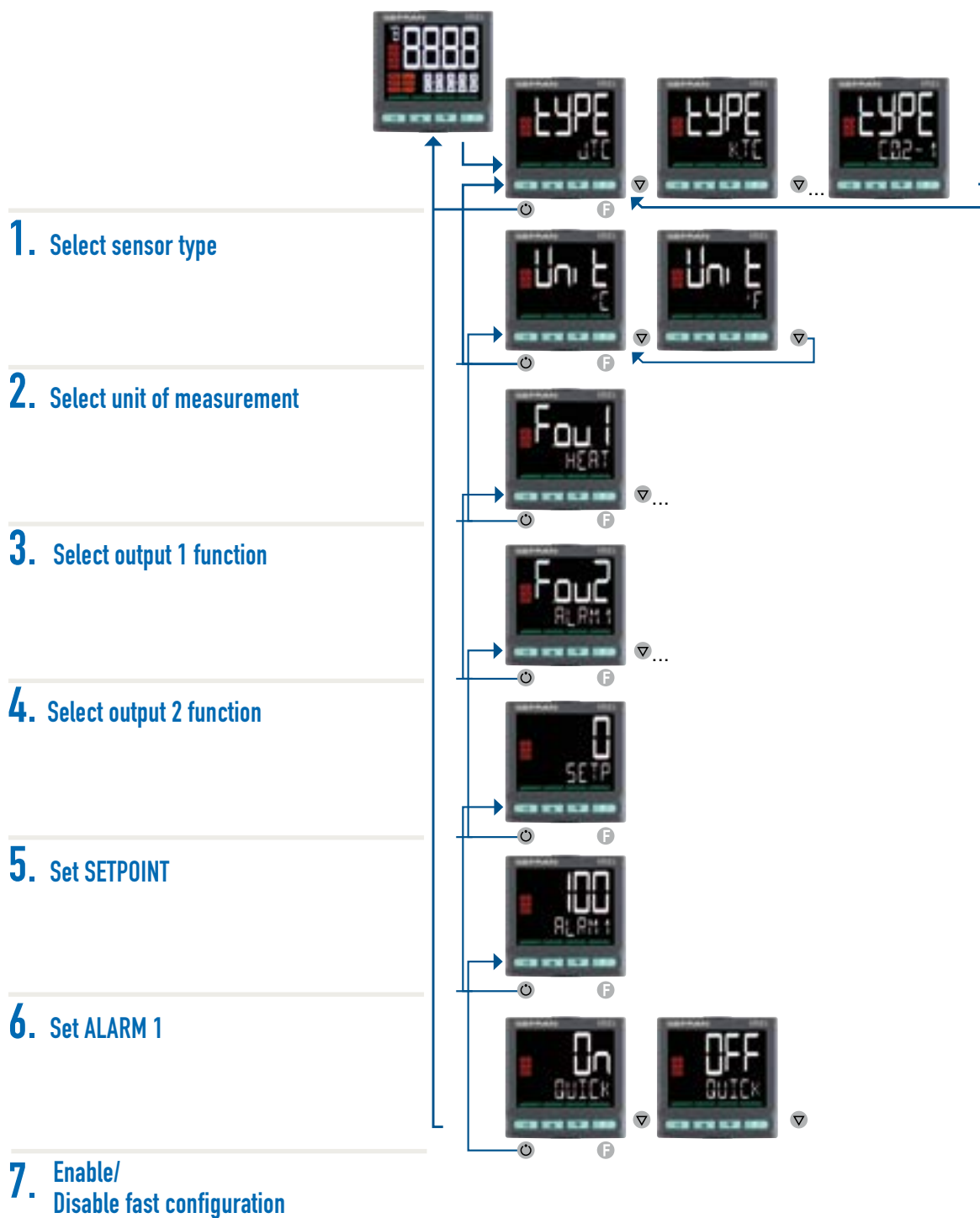
THE DEVICE CAN BE CONFIGURED FROM THE KEYBOARD IN JUST 7 EASY, PLAIN LANGUAGE STEPS

The 650 – 1250 – 1350 controllers are set up at first power-on with a simple procedure from the keyboard.

The controller can be configured in just 7 steps, in a few minutes, and without a user manual.

At first power-on, the controller displays only the parameters needed for the user to start work, based on the model ordered.

Each displayed parameter includes a scrollable Help on Line plain language message describing its meaning.



CONFIGURATION WITH GF_eXpress AND WITH Zapper

The 650 – 1250 – 1350 controllers can be configured from the PC and from the Zapper, a portable, battery-powered configurator with microUSB connection cable used for easy and safe copying/pasting of complete configurations.

- Copied from other controllers
- Copied from GF_eXpress

Configuration can be done with the controller powered and also not powered i.e., on controllers just removed from the package or already installed on the machine.

This function is extremely useful for OEMs and End Users who need to program multiple controllers on more than one machine.

CONFIGURATION WITH GF_eXpress

1. Copy

The parameters are copied from the PC on which the GF_eXpress configuration tool is installed directly to the controller, even if powered off.



2. Paste

With the mini USB cable, you can import the configuration to one or more controllers, even if powered off.



3. GO!

GO!

CONFIGURATION WITH Zapper

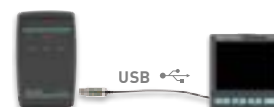
1. Copy

The parameters are copied from the PC on which the GF_eXpress configuration tool is installed or from another controller and pasted to the Zapper.



2. Paste

The Zapper connects to the controller via the microUSB connector cable to paste the configuration.



3. GO!

Click to copy the configuration to one or more controllers.



SETPOINT PROGRAMMER

The various setpoint profiles with ramps, holds, trigger inputs and event outputs can be configured directly from the device keyboard or with GF_eXpress in an easy to use by tracing the required profile.

Model 1350 (1/4 DIN) offers the widest and most complete operator interface in its category: a "dashboard" that simultaneously shows the variable, setpoint, scrolling messages with 7 segments, step number, active program, and bargraph for program step times.

SETPOINT PROGRAMMING
12 Segments with configurable ramps and hold times



START COOKING PROGRAM

PREVENTIVE MAINTENANCE AND ENERGY COUNTER

With the energy monitor function you can count and save the energy consumed by the process.

In case of deviations from average consumption, the controller signals with a physical output and configurable messages.

These functions accompany the preventive maintenance function, which monitors the life cycle of the actuators and Short Wave Infrared (SWIR) lamps.

This lets you:

- predict any potential machine breakdowns
- schedule maintenance in advance
- prevent system shutdowns
- maximize machine up time and limit costly emergency shut downs

ENERGY MONITOR

Measures and monitors system energy consumption. Monitors and signals if system exceeds expected values.



CONSUMPTION
80 KWH



PREVENTIVE MAINTENANCE

Cycle counter and alarm messages to monitor system cycles.



WARNING:
CHANGE LAMP 5

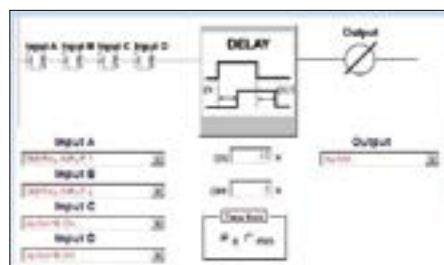
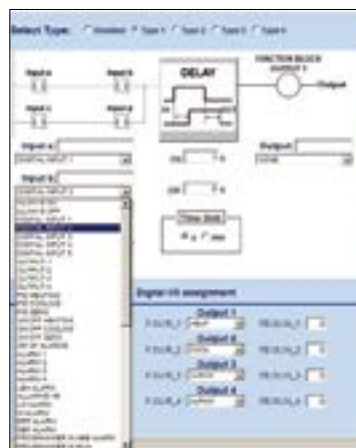


ALL-IN-ONE SOLUTION WITH LOGIC CONTROL BLOCKS

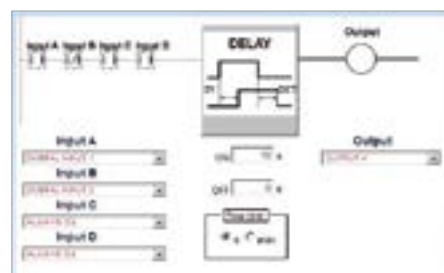
With 16 logic blocks, AND, OR, NOT, TIMER, you can create applications by associating external events from logic inputs to PID control internal states, such as setpoint states, alarms, AUTO/MAN state, etc.

Benefits:

- Simplifies the control system by integrating multiple hardware components in a single device.
- Maintains the advantages of single-loop PID control and adds simple PLC functionality.



Example of application function block for Chiller



Example of application function block for laboratory ovens



LINE



BFC

		650	1250	1350
OPERATOR INTERFACE				
DISPLAY	Type	LCD sfondo nero		
	Screen area (L x H)	35 x 30 mm	37x 68 mm	83x68 mm
	Lighting	Backlit with LEDs, life > 40,000 hours @ 25 °C		
	PV display	Number of digits: 4 to 7 segments, with decimal point Digit height: 17 mm; Color: white or "custom"		Number of digits: 4 to 7 segments, with decimal point. Digit height: 23 mm; Color: white or "custom"
	SV display	Number of digits: 5 to 14 segments, with decimal point. Digit height: 7.5 mm; Color: green or "custom"	Number of digits: 4 to 7 segments, with decimal point. Digit height: 14 mm; Color: green or "custom"	Number of digits: 4 to 7 segments, with decimal point. Digit height: 11 mm; Color: green or "custom"
	F display		Number of digits: 5 to 14 segments, with decimal point. Digit height: 9 mm; Color: amber or "custom"	Number of digits: 7 to 14 segments, with decimal point. Digit height: 9 mm; Color: amber or "custom"
	Unit of measurement	Selectable, °C, °F or custom 1; Color: same as PV display		
	Controller state signals	Number: 6 (RUN, MAN, _/-, REM, SP1/2), Color: amber		
	Output state signals	Number: 4 (1, 2, 3, 4) Color: red		
	Bargraph indicator, configurable		Type: graphic bargraph,11 segments Power indication: 0...100% or -100...100% Current indication: 0...100% f.s. Valve position indication: 0...100%	
KEYPAD		Number of keys: 4 silicon (Man/Auto, INC, DEC, F), Type: mechanical		Number of keys: 6 silicon (Man/Auto, L/R, *, INC, DEC, F)
INPUTS				
MAIN INPUT	Sensor type	TC, RTD (PT100, JPT100), IR ES1B, DC linear sensor		
	Accuracy	TC inputs: 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 temperature RTD input: Calibration accuracy: < +/- (0,15% of reading value in °C +1°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 Linear inputs: 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; 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		
AUXILIARY INPUT	Remote setpoint	0...1 V, 0...10 V, 0/4...20 mA		
	Scale	0...1 V input impedance (Ri): > 15 kΩ 0...10 V input impedance (Ri): > 10 kΩ 0/4...20 mA input impedance (Ri): 50 Ω		
	Accuracy	0,1% f.s. ±1 digit @25 °C		
CT INPUT (ammeter)	Type	Isolated via external transformer		
	Accuracy	Number: 2 max - Max. capacity: x / 50 mA AC - Line frequency: 50/60 Hz - Input impedance (Ri): 10 Ω ±2% f.s. ±1 digit @25 °C		
DIGITAL INPUTS	Number	3 max	5 max	
	Type	voltage-free contact, or NPN 24 V - 4,5 mA, or PNP 12/24 V - max 3,6 mA.		
	Isolation	500 V		
OUTPUTS				
ALARMS	Relay (R)	Number: 4 max Type of relay contact: NO Max. current: 5 A, 250 VAC / 30 VDC,	Number: 4 max Type of relay contact: NO Max. current: 5 A, 250 VAC / 30 VDC, cosφ = 1	
		Minimum load: 5 V, 10 mA - Life cycle: > 100.000 operations - Double isolation		
	Logic (D)	Number: 2 max - Type: for solid-state relays - Voltage: 24 V ±10% (min 10 V @20 mA) - Isolated from main input		
	Triac (long life relè) (T)	Number: 1 max Load: resistive Voltage: 75...264 VAC Current max: 1 A Isolation 3 kV; snubber circuit integrated zero crossing switching	Number: 1 max Load: resistive Voltage: 12...240 VAC Current max: 2 A Isolation 2,5 kV zero crossing switching	

		650	1250	1350
ALARMS	Continuous (C)	Number: 1 max Current: 4...20mA $R_{out} < 500 \Omega$ Resolution: 12 bit Isolated from main input		
	Analog retransmission (A1)	Number: 1 max Signal: 10V, 0/4...20mA 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		
	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, LBA, HB, HBB Hold Back Band if enabled with Programmer function		
CONTROL FUNCTIONS				
CONTROL	Type	Single loop		
	Control	PID, ON/OFF, single action heat or cool, double action heat/cool		
	Control output	Continuous or ON/OFF Cycle time: constant or optimized (BF)		
	Control output for motorized valves	OPEN/CLOSE for floating motorized valve on Relay, Solid-state, Triac outputs		
SETPOINT PROGRAMMER	Number of programs	Max 4, Start / Stop / Reset / Skip via digital inputs and/or outputs from logic operations Output state: Run / Hold / Ready / End		
	Number of steps	Max 12, each with own setpoint, ramp time and hold time; Times settable in HH:MM or MM:SS Max 4 consents, configurable for ramp and for hold Max 4 events, configurable in ramp and in hold		
MULTIPLE SETPOINTS	Number of setpoint	Max 4, selectable from digital input Each setpoint change is subject to set ramp, different for up and down ramp		
LOGIC ¹ OPERATIONS	Function blocks	Max 16, with 4 input variables per block. The result can act on the state of the controller, of the programmer on alarms and outputs. Each function contains an incorporated timer block timer.		
TIMER FUNCTION	Modes	START / STOP STABILIZATION (timer is on when PV enters a band set around setpoint; at end of count you can activate an output, shut down SW or change SP1/SP2) FIRING (timed activation of control after power on)		
ENERGY COUNTER		Calculation done on nominal line voltage and nominal load power or on rms current measured on load via CT		
DIAGNOSTIC		Short circuit or open circuit (LBA alarm) Interrupted or partially interrupted load (HB alarm) Short circuit of control output (SSR alarm)		
RETENTIVE MEMORY	Type	EEPROM		
	Max. number of writes	1.000.000		
SERIAL INTERFACE				
		Type: RS485 Baudrate: 1200, 2400, 4800, 9600, 19.200, 38.400, 57.600, 115.200 bit/s Protocol: MODBUS RTU Isolated from main input		
GENERAL DATA				
POWER SUPPLY	Operating voltage	100...240 VAC/VDC $\pm 10\%$, 50/60 Hz (on request 20...27 VAC/VDC $\pm 10\%$)		
	Power dissipation	5 W max	10 W max	10 W max
	Protections	Overvoltage 300 V / 35 V		
	Connection	Screw terminals and crimp connector, max. wire section 1 mm ²		
CONNECTIONS	Serial configuration port (for USB connection)	Connector: microUSB		
	Inputs and outputs	Screw terminals and crimp connector, max. wire section 2,5 mm ²		
AMBIENT CONDITIONS	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)		
PROTECTION LEVEL		IP 65 on front panel (as per IEC 68-2-3)		
ASSEMBLY	Positioning	On panel, removable faceplate		
	Installation regulations	Installation category: II; Pollution degree: 2, Isolation: double		
DIMENSIONS		48X48 mm [1/16 DIN], Depth.: 80 mm	48X96 mm [1/8 DIN] Depth.: 80 mm	96X96 mm [1/4 DIN] Depth.: 80 mm
WEIGHT		0,16 kg	0,24 kg	0,24 kg
CE STANDARDS	EMC (electromagnetic compatibility)	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		
	UL	Conformity C/UL/US File no. E216851		
	EAC	Conformity TC N° RUД-IT.AJ32.b.01762		
	FM	FM approvals project NO: 0003054712		

ORDER METHODS 650

POWER SUPPLY 100...240 VAC

Code F	Model	Valves	Programmer	Inputs			Outputs					Logic functions	Total Number of Outputs
				Digital	CT	Remote SP	Relay	Triac	Logic	Analog I	Analog V/I		
F060558	650-D-R00-00000-1-G						1		1				2 outputs
F059574	650-R-R00-00000-1-G						2						
F060566	650-D-R00-00120-1-G			2	1		1		1				
F060562	650-D-RR0-00000-1-G						2		1				3 outputs
F065788	650-R-RR0-00000-1-G						3						
F065789	650-R-TR0-00000-1-G						2	1					
F065790	650-D-RR0-00030-1-G			3			2		1				
F060567	650-D-RR0-00200-1-G				2		2		1				
F060564	650-C-RR0-00000-1-G						2			1			
F060573	650-D-R00-01030-1-G			3			1		1		1		
F065791	650-R-R00-01030-1-G			3			2				1		
F060574	650-R-RR0-00101-1-G				1		3					•	
F060563	650-D-RRR-00000-1-G						3		1				4 outputs
F065792	650-R-RRR-00000-1-G						4						
F060575	650-D-RRR-00220-1LFG			2	2		3		1			•	
F060576	650-D-RRR-00031-1LFG			3			3		1			• •	
F065793	650-D-RRR-00201-1LFG				2		3		1			• •	
F065794	650-D-RR0-01011-1LFG			1			2		1		1	• •	
F060577	650-C-RR0-10030-1LFG			3		1	3			1		•	
F060578	650V-R-RRR-00000-1-G	•					4						
F060561	650V-R-RRR-00030-1-G	•		3			4						
F060565	650P-D-RRR-00000-1-G		•				3		1				
F060560	650P-D-RRR-00030-1LFG		•	3			3		1			•	
F060579	650-D-RRR-01030-1LFG			3			3		1		1	•	5 outputs

POWER SUPPLY 20...27 VAC/VDC

Code F	Model	Valves	Programmer	Inputs			Outputs					RS485	Logic functions	Total Number of Outputs
				Digital	CT	Remote SP	Relay	Triac	Logic	Analog I	Analog V/I			
F065795	650-D-R00-00000-0-G						1		1					2 outputs
F065796	650-R-R00-00000-0-G						2							
F065797	650-D-R00-00120-0-G			2	1		1		1					
F065798	650-D-RR0-00000-0-G						2		1					3 outputs
F065799	650-R-RR0-00000-0-G						3							
F065800	650-R-TR0-00000-0-G						2	1						
F065801	650-D-RR0-00030-0-G			3			2		1					
F065802	650-D-RR0-00200-0-G				2		2		1					
F065803	650-C-RR0-00000-0-G						2			1				
F065804	650-D-R00-01030-0-G			3			1		1		1			3 outputs
F065805	650-R-R00-01030-0-G			3			2				1			
F065806	650-R-RR0-00101-0-G				1		3					•		
F065807	650-D-RRR-00000-0-G						3		1					4 outputs
F065808	650-R-RRR-00000-0-G						4							
F065809	650-D-RRR-00220-0LFG			2	2		3		1				•	
F065810	650-D-RRR-00031-0LFG			3			3		1			•	•	
F065811	650-D-RRR-00201-0LFG				2		3		1			•	•	
F065812	650-D-RR0-01011-0LFG			1			2		1		1	•	•	
F065813	650-C-RRR-10030-0LFG			3		1	3			1			•	
F065818	650V-RRRR-00000-0-G	•					4							
F065819	650V-RRRR-00030-0-G	•		3			4							
F065820	650P-D-RRR-00000-0-G		•				3		1					
F065821	650P-D-RRR-00030-0LFG		•	3			3		1				•	
F065822	650-D-RRR-01030-0LFG			3			3		1		1		•	5 outputs

Please contact GEFRA for information on available codes.

ORDER METHODS 1250/1350

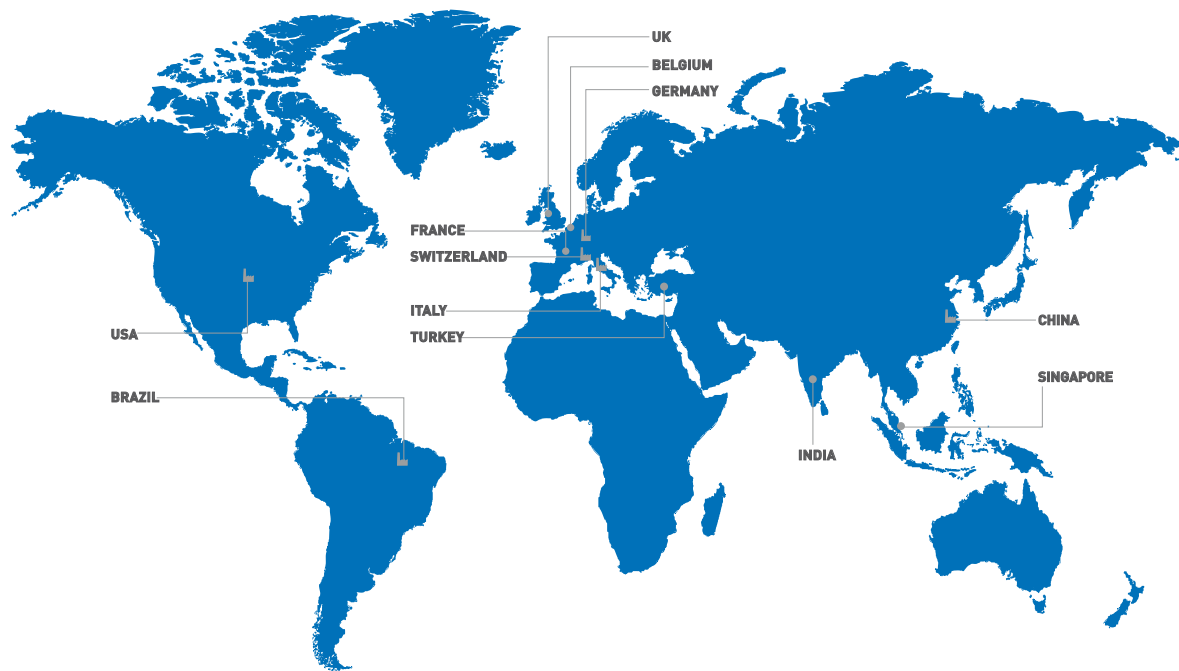
POWER SUPPLY 100...240 VAC

1250 Code F	1350 Code F	Model	Valves	Programmer	Inputs			Outputs					Logic functions	Total Number of Outputs
					Digital	CT	Remote SP	Relay	Triac	Logic	Analog I	Analog V/I	RS485	
F060836	F061830	1250/1350-D-R00-00000-1-G						1		1				2 outputs
F060837	F061831	1250/1350-R-R00-00000-1-G						2						
F060838	F061832	1250/1350-D-R00-00150-1-G			5	1		1		1				
F060839	F061833	1250/1350-D-RR0-00000-1-G						2		1				3 outputs
F060840	F061834	1250/1350-R-RR0-00000-1-G						3						
F060841	F061835	1250/1350-D-RR0-00050-1-G			5			2		1				
F060842	F061836	1250/1350-D-RR0-00200-1-G				2		2		1				
F060843	F061837	1250/1350-C-RR0-00000-1-G						2			1			
F060844	F061838	1250/1350-D-R00-01050-1-G			5			1		1		1		
F060845	F061839	1250/1350-R-R00-01050-1-G			5			2				1		
F060846	F061840	1250/1350-R-RR0-00101-1-G				1		3					•	4 outputs
F060847	F061841	1250/1350-D-RRR-00000-1-G						3		1				
F060848	F061842	1250/1350-R-RRR-00000-1-G						4						
F060884	F061843	1250/1350-R-RRT-00000-1-G						3	1					
F060849	F061844	1250/1350-D-RRR-00250-1LFG			5	2		3		1			•	
F060850	F061845	1250/1350-D-RRR-00051-1LFG			5			3		1			•	
F060851	F061846	1250/1350-C-DRR-00051-1LFG			5			2		1	1		•	
F060852	F061847	1250/1350-D-RRR-00201-1LFG				2		3		1			•	
F060853	F061848	1250/1350-C-RRR-10050-1LFG			5		1	3			1		•	
F060854	F061849	1250/1350V-R-RRR-00000-1-G	•					4						
F060855	F061850	1250/1350V-R-RRR-00050-1-G	•		5			4						5 outputs
F060856	F061851	1250/1350P-D-RRR-00000-1-G	•					3		1				
F060857	F061852	1250/1350P-D-RRR-00050-1LFG	•		5			3		1			•	
F060858	F061853	1250/1350-D-RRR-01050-1LFG			5			3		1		1	•	

POWER SUPPLY 20...27 VAC/VDC

1250 Code F	1350 Code F	Model	Valves	Programmer	Inputs			Outputs					Logic functions	Total Number of Outputs
					Digital	CT	Remote SP	Relay	Triac	Logic	Analog I	Analog V/I		
F060861	F061854	1250/1350-D-R00-00000-0-G						1		1				2 outputs
F060862	F061855	1250/1350-R-R00-00000-0-G						2						
F060863	F061856	1250/1350-D-R00-00150-0-G			5	1		1		1				
F060864	F061857	1250/1350-D-RR0-00000-0-G						2		1				3 outputs
F060865	F061858	1250/1350-R-RR0-00000-0-G						3						
F060866	F061859	1250/1350-D-RR0-00050-0-G			5			2		1				
F060867	F061860	1250/1350-D-RR0-00200-0-G				2		2		1				
F060868	F061861	1250/1350-C-RR0-00000-0-G						2			1			
F060869	F061862	1250/1350-D-R00-01050-0-G			5			1		1		1		
F060870	F061863	1250/1350-R-R00-01050-0-G			5			2				1		
F060871	F061864	1250/1350-R-RR0-00101-0-G				1		3				•		4 outputs
F060872	F061865	1250/1350-D-RRR-00000-0-G						3		1				
F060873	F061866	1250/1350-R-RRR-00000-0-G						4						
F060885	F061867	1250/1350-R-RRT-00000-0-G						3	1					
F060874	F061868	1250/1350-D-RRR-00250-0LFG			5	2		3		1			•	
F060875	F061869	1250/1350-D-RRR-00051-0LFG			5			3		1			• •	
F060876	F061870	1250/1350-C-DRR-00051-0LFG			5			2		1	1		• •	
F060877	F061871	1250/1350-D-RRR-00201-0LFG				2		3		1			• •	
F060878	F061872	1250/1350-C-RRR-10050-0LFG			5		1	3			1		•	
F060879	F061873	1250/1350V-R-RRR-00000-0-G	•					4						
F060880	F061874	1250/1350V-R-RRR-00050-0-G	•		5			4						5 outputs
F060881	F061875	1250/1350P-D-RRR-00000-0-G		•				3		1				
F060882	F061876	1250/1350P-D-RRR-00050-0LFG		•	5			3		1			•	
F060883	F061877	1250/1350-D-RRR-01050-0LFG			5			3		1		1	•	

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