GEFRAN

3400 / 4400
CONFIGURABLE CONTROLLERS

Main features
- Cascade control
- Ratio control
- Square root extraction on input signal
- Programmer with 4 setpoints and 4 ramps
- Thermocouple or resistance thermometer inputs and linear inputs with configurable scale and linearisation
- Isolated inputs for remote setpoint, valve position feedback signal or load break detection
- Two control outputs with independent PID parameters (Heat/Cool)
- AUTO/MAN station with bumpless transfer incorporated
- Configurable output for a retransmission signal
- Serial line: optoisolated 4-wires configurable.
  Protocol: GEFRAN CENCAL

Main applications
- Climatic chambers and test benches
- Furnaces and ovens that require a setpoint that varies with time
- Steriliser, autoclaves, dryers, plant for transformation
- Chemical and pharmaceutical industries
- Food processing plants
- Water treatment
- Siderurgy industry
- Furnaces for ceramics and bricks
- Heat exchange control

GENERAL

Microprocessor controller in 48x96 / 96x96mm format (1/8 DIN -1/4 DIN). Manufactured using SMT, the 3400 provides a complete operator interface with IP54 level of protection (IP65 with faceplate cover).

The faceplate has a membrane keypad with 6 keys, a backlit LCD display that is available also with large dimensions (model 4400) that displays the process variable, setpoint, bargraphs of the percentage output power and the deviation and indication of the alarm and controller states.

The main input for the control variable is universal and gives the possibility to connect a wide range of sensors such as thermocouples, resistance thermometers or mV signals even with custom linearisation.

A second auxiliary analogue input is available for remote setpoint linear signal, potentiometer valve position feedback or input from a current transformer.

With a digital input it is possible to select between two preset setpoints or switch between local and remote setpoint.

With three isolated digital inputs, it is possible to select one of four setpoint programmes or supply a start, stop and reset signal, or select local/remote, auto/manual or hold.

The instrument has up to four outputs, each one factory configured, according to the order code, as relay, isolated logic, isolated analogue or interface for MD81 expansion unit output.

The output functions are configurable from the faceplate.

Apart from the control outputs, that can be heat-cool with independent PID, and the alarm outputs, outputs can be dedicated to the open/close control of a motorised valve (with or without position feedback potentiometer), retransmission signal of the measured variable, the setpoint, the deviation or the control of the MD8 expansion unit for an extra 8 alarms.

The 3400/4400 series controllers can be used as setpoint programmers with up to 8 segments (4 ramps and 4 holds). Other control functions are also available such as ratio control between two variables and cascade control with specific and configurable parameters.

The serial communication option can be for Current Loop, RS232 or RS485 and it is possible to read and write any of the instrument's parameters.

The programming procedure is simplified by the menu guide structure with different configuration levels for a rapid and easy access to the data.

TECHNICAL DATA

INPUTS
Accuracy 0,1% f.s. ± 1 digit
Sampling time 120msec

TC- Thermocouple
J (Fe-CuNi) 0...1000°C / 32...1832°F
K (NiCr-Ni) 0...1300°C / 32...2372°F
R (Pt13Rh-Pt) 0...1750°C / 32...3182°F
S (Pt10Rh-Pt) 0...1750°C / 32...3182°F
T (Cu-CuNi) -100...400°C / -148...752°F
B (Pt30Rh-Pt6Rh) (*) 50...1800°C / 122...3272°F
E (NiCr-CuNi) -100...750°C / -148...1382°F
N (NiCr-Si-NiSi) 0...1300°C / 32...2372°F
Ni-Ni18Mo (Ni-Ni18Mo)
            0…1100°C / 32...2012°F
(*) for type B thermocouples, the class of accuracy is valid for temperatures above 500°C.

RTD 2/3-wires
Pt100 -200...600°C / -328...1112°F

DC - Linear
0...50mV, 10...50mV
External shunts are used for voltage ranges 0...10V and current ranges of 0...20mA and 4...20mA.
Custom 32 segment characterisation.
Ri > 1MΩ.

Auxiliary input
Isolated 1500V
For remote setpoint:
0...10V - Ri > 100KΩ
0...20mA - Ri = 50Ω
4...20mA - Ri = 50Ω
For potentiometer:
0...1V - Ri > 10MΩ (potentiometer with value from 100Ω to 20KΩ)
For current transformer:
0...5Aac, 50/60Hz - Ri = 20mΩ

Digital
Isolated 1500V
3 isolated command inputs for Start/Stop/Reset functions, Set Locale/Remoto, Auto/Man, Hold, direct selection of one of the four program set-points:
- NPN 12V/3,5mA
- PNP 24V/6mA (12V/2mA)

OUTPUTS
Isolated 1500V
Maximum and minimum adjustment from the faceplate keys:
• Direct control (Heat)
• Inverse control (Cool)
• Retransmission of local or remote set-point
• Retransmission of the input signal
• Retransmission of the deviation signal between the values of the setpoint and the input.
• Alarm 1 or 2
• Open/Close for valve positioner motor

Continuous
0...10V max 20mA
0...20, 4...20mA Rmax = 500Ω
Resolution 4000 steps, max. update time 80msec.

Relay
Contact, which can be selected as NO/NC rated at 5A/250Vac at cosφ = 1 (with resistive load) with spark suppression on the NO contact.

Logic
23Vdc, Rout = 470Ω (20mA, max.12V).
Voltage output for SSRs.

MD81
MD81 expansion unit of the alarms (alarms 3...10)

SERIAL LINE
The instrument is equipped with Passive Current Loop (1200 baud) interface or RS422/485, RS232 (1200 / 2400 / 4800 / 9600 baud).
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POWER SUPPLY
100...240Vac/dc ± 10%, 50/60Hz
12VA max (3400), 15VA max. (4400)
Protection by internal fuse not serviceable by the user.

AMBIENT CONDITIONS
Working temperature: 0...50°C
Storage temperature: -20...70°C
Humidity: 20...85%Ur non condensing

CONTROLLER
On/Off, P, PD, PI, PID control with independent and adjustable parameters for both the direct and the inverse actions.
By selecting a configuration parameter, the controller may be configured as: single loop, ratio and cascade controller.
• Cool setpoint relative to the heat setpoint ±25,0% f.s.
• Two control outputs (Heat/Cool) with the Cool setpoint entered in the range: ±25,0% f.s. with respect to the Heat setpoint
• Proportional band for direct action (Heat) 0,0...999,9% f.s.
• Proportional band for direct action (Cool) 0,0...999,9% f.s.
• Manual reset (deviation correction factor) ±999 scale digits
• Offset of the primary input ±999 scale digits

• Offset of the secondary input ±999 scale digits
• Digital filter on the input variable: 0,1...20,0 sec
Mathematical operations on input signal: square root extraction:
$(A \times Input {}^\wedge D + B)/C$
Scale configurable in the range: -1999...9999.
• Reset power for direct / inverse action (0...100% / 0...-100%)
• Antireset (limitation band for the integral action) 0...9999 scale digits
• Feed Forward 500...-199%
• Integral time for direct / inverse action 0,00...99,99 min
• Derivative time for direct / inverse action 0,00...9,99 min
• Maximum/minimum limit of the direct/inverse action output 0...100%
The main control and support functions are:
• Soft-start: gradual increase of the main output after power-up of the instrument over a time 0,0...100,0 min
• Self-Tuning: automatic research for the optimal control parameters during the start-up phase.
• Auto-Tuning: automatic update of the tuning parameters following a variation of the controlled system and/or of the set-point.
• AUTO/MAN station with bumpless transfer incorporated
• LBA: Loop Break Alarm with adjustable delay (0,0...20,0 min) and power (0,0...100,0%) of intervention
• HB: Heater Break or alarm for interrupted load with reference to the current transformer input.

PROGRAMMER
The programmer function enables the controlled variable to follow a profile of 8 segments (4 setpoints and 4 ramps).
Each step is defined by the following data:

FACEPLATE DESCRIPTION

A - Indication of process variable, digits h. 10mm (3400) and 20mm (4400)
B - Indication of setpoint, digits h. 7mm (3400) and 14mm (4400)
C - Deviation display
D - Main output display
E - Function key
F - G - Lower/Raise keys
H - Data key
I - Man/Auto key
L - Local/Remote key
M - Status indicator
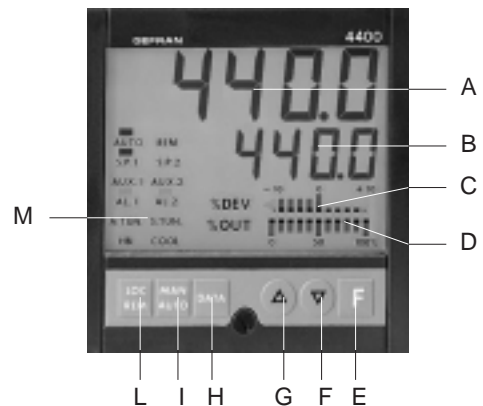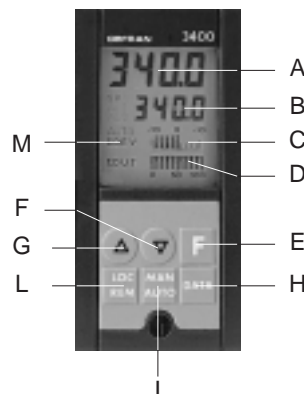
LCD backlit display
IP54 faceplate protection (IP65 available)

- Setpoint
- Time of setpoint and of programmable ramp up to 99days 23hrs 59min. 59sec.
- Accuracy of the time base: better than ±4 sec every 10 hours.
- H: Holdback band or maximum allowed deviation for the running of the program: 1...1000 scale digits.
Program START/STOP/RESET commands:
- from the faceplate keys,
- from the logic inputs,
- from serial line
In the STOP condition, it is possible to:
- vary the value of the current setpoint using the Raise and Lower keys.

- display and modify the set of the program being run.

ALARMS
- 2 + 8 (with the MD81 expansion unit) alarm levels that may be set as an absolute, relative or symmetrically relative value with respect to the setpoint or auxiliary input; with direct or inverse action and possibility to inhibit the alarm during power-up.
- The faceplate keys are used to configure the alarms in condition of LBA, HB, H and end-of program alarms.
- Programmable limits for the entered parameters may be configured within the selected scale.
- Programmable hysteresis for each alarm ±999 scale digits.
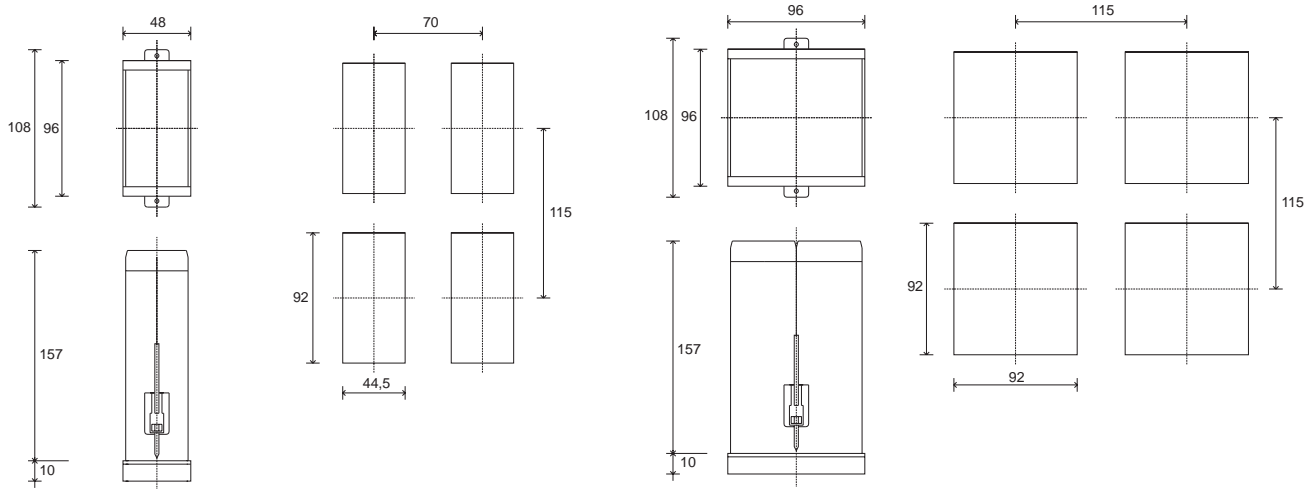- Non-repetitive response time: max. 80msec.
- Indication: the messages AL1 and AL2 appear or the LEDs of the MD81 alarm unit light up in phase of entering the relative setpoints, and flash when the output relay is energised or the output is active.
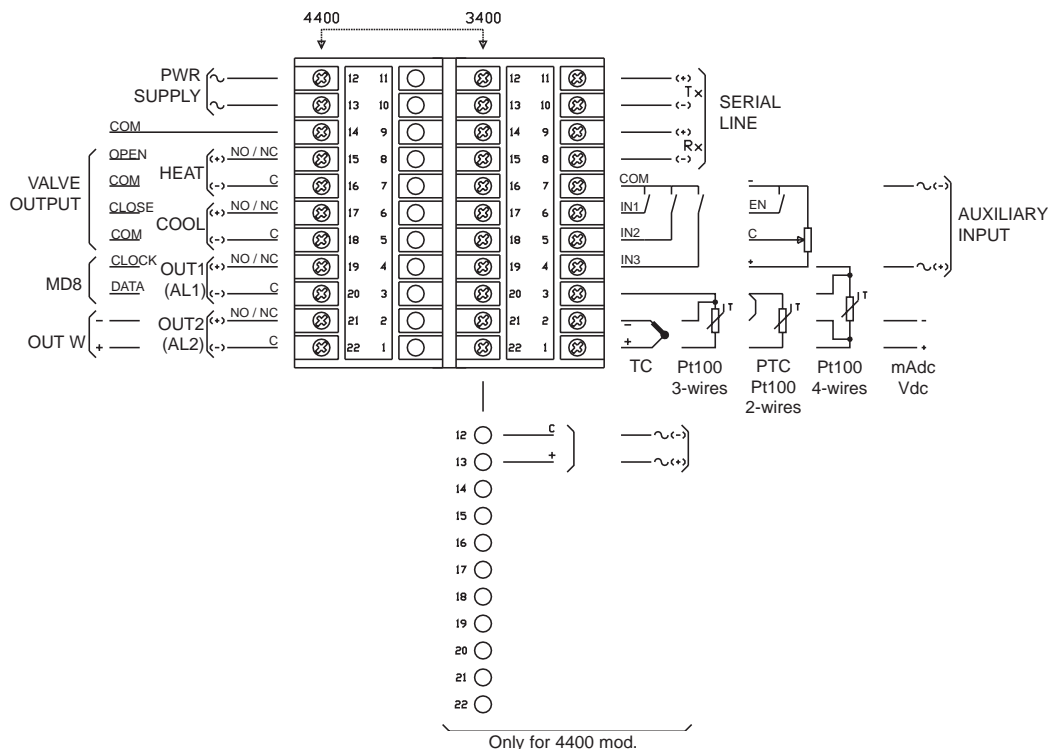
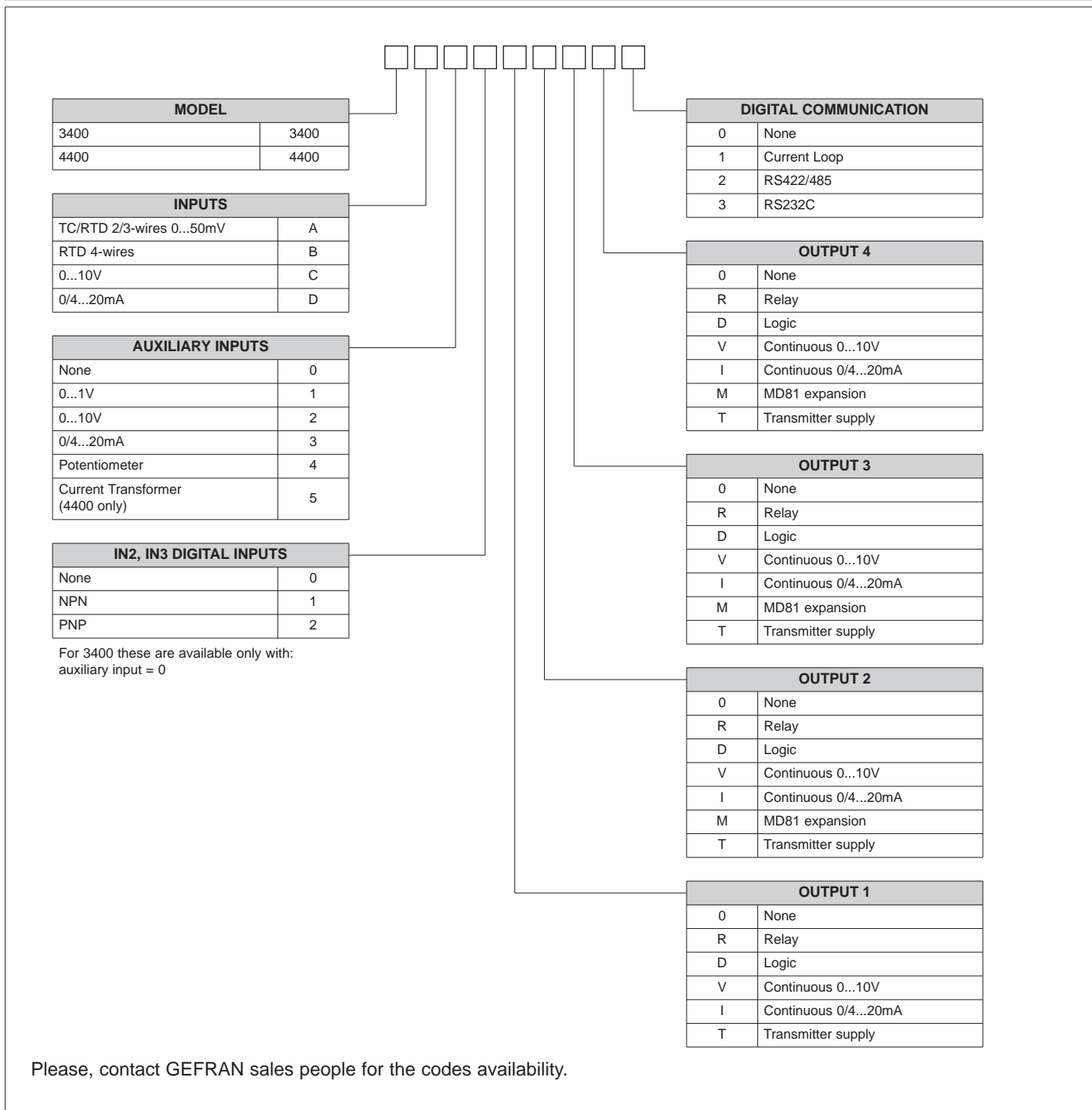### WEIGHT
600g (3400)
850g (4400)

DIMENSIONS AND CUT-OUT

Dimensions: 48x96mm - 96x96mm (1/8 DIN - 1/4 DIN), depth 157mm

CONNECTION DIAGRAM

⚠ Apply users' manual warnings for a correct installation

MODEL	
3400	3400
4400	4400

DIGITAL COMMUNICATION	
0	None
1	Current Loop
2	RS422/485
3	RS232C

INPUTS	
TC/RTD 2/3-wires 0...50mV	A
RTD 4-wires	B
0...10V	C
0/4...20mA	D

OUTPUT 4	
0	None
R	Relay
D	Logic
V	Continuous 0...10V
I	Continuous 0/4...20mA
M	MD81 expansion
T	Transmitter supply

AUXILIARY INPUTS	
None	0
0...1V	1
0...10V	2
0/4...20mA	3
Potentiometer	4
Current Transformer (4400 only)	5

OUTPUT 3	
0	None
R	Relay
D	Logic
V	Continuous 0...10V
I	Continuous 0/4...20mA
M	MD81 expansion
T	Transmitter supply

IN2, IN3 DIGITAL INPUTS	
None	0
NPN	1
PNP	2

For 3400 these are available only with:
auxiliary input = 0

OUTPUT 2	
0	None
R	Relay
D	Logic
V	Continuous 0...10V
I	Continuous 0/4...20mA
M	MD81 expansion
T	Transmitter supply

OUTPUT 1	
0	None
R	Relay
D	Logic
V	Continuous 0...10V
I	Continuous 0/4...20mA
T	Transmitter supply

Please, contact GEFRAN sales people for the codes availability.