GEFRAN

GEFLEX V*alves*

MODULAR POWER CONTROLLER FOR MOTORIZED VALVES

OPERATING INSTRUCTIONS AND WARNINGS

Code **80346B** / Edition **0.3** - **07/09**

TABLE OF CONTENTS

GRAPHIC SYMBOLS USED

To distinguish between the type and importance of the information provided in these instructions for use, graphic symbols have been used as a reference to make interpreting the information clearer.

Indicates the contents of the various manual sections, the general warnings, notes, and other points to which the reader's attention should be drawn

Indicates a particularly delicate situation that could affect the safety and correct working operation of the controller, or a rule that must be strictly observed to avoid dangerous situations

Indicates a condition of risk for the safety of the user, due to the presence of dangerous voltages at the points shown

Indicates a suggestion based on the experience of the GEFRAN Technical Staff, which could prove especially useful under given circumstances

Indicates a reference to Detailed Technical Documents available on the GEFRAN web site www.gefran.com

1 • PRELIMINARY INSTRUCTIONS

This section contains information and warnings of a general nature which should be read before proceeding with controller installation, configuration and use..

General description

Modular controllers GEFRAN series GEFLEX Multifunction have been designed for temperature control in any applications involving heating or cooling processes.
They represent an exclusive combination of performance, reliability and applicational flexibility.
In particular, this new line of Gefran temperature controllers is the ideal solution for application in sectors where performance and service continuity are important, including: extrusion lines

- injection molding for plastic materials
- thermoformers
- presses for rubber
- wrapping and packaging machines
- processing plant for the food industry
- cooling switchboards
- climatic chambers and test benches
- ovens
- paint plants
- etc.

The GEFLEX Multifunction series controllers are made on an extremely versatile hardware and software platform, that allows the most suitable I/O composition for the plant to be chosen from a series of options.

Attention: the programming and configuration parameters are described in the "Programming and Configuration" manual enclosed with the Geflex Master and downloadable from www.gefran.com

Preliminary Warnings

The following preliminary warnings should be read before installing and using the series GEFLEX Multifunction controller. This will allow the controller to be put into service more quickly and will avoid certain problems which may mistakenly be interpreted as malfunctions or limitations of the controller.

- Immediately after unpacking the controller, make a note of the order code and the other identification data given on the label affixed to the outside of the container and copy them to the table below.
  These details must always be kept close at hand and referred to the personnel involved in the event of help from Gefran Customer Service Assistance.

SN.....	(Serial Number)
CODE	(Product code)
TYPE.....	(Order code)
SUPPLY.....	(Type of electrical power supply)
VERS.	(Firmware Version)

- Check also that the controller is complete and has not been damaged at all during transit, and that the package contains not only the controller and these Instructions for Use, as well as for the GEFLEX Multifunction Master model, the "Programming and Configuration manual".
  Any inconsistencies, omissions or evident signs of damage should be reported immediately to your Gefran sales agent.

- Check that the order code corresponds with the configuration requested for the application the controller is needed for, referring to Section:
  "Technical - Commercial Information".

Example: GFX-S2 - V/0-0 - D - RR - P - P0

- Slave model
- Functional module
- Rated voltage
- Cooling output
- Auxiliary outputs
- Digital input
- Diagnostics

- Before installing the GEFLEX Multifunction temperature controller in the machine control panel or host system, read paragraph 2.1 "Overall dimensions and mounting dimensions".

- If the instrument is to be configured by PC, make sure you have the WINSTRUM Kit.
  For the order code refer to Section "Technical-Commercial Information".

Users and/or system integrators who wish to know more about the concepts of serial communication between standard PC and/or Gefran Industrial PC and Gefran Programmable Instruments, can access the various technical reference Documents in Adobe Acrobat format available in the Download section of the Gefran Web Site **www.gefran.com** including:

- Serial Communication
- MODBus Protocol

In the event of presumed instrument malfunction, before contacting Gefran Technical Service Assistance, refer to the Troubleshooting Guide given in Section 6 "Maintenance", and if necessary refer to the F.A.Q. Section (Frequently Asked Questions) on the Gefran Web Site **www.gefran.com**

2 • INSTALLATION AND CONNECTION

This section contains the instructions necessary for correct installation of the GEFLEX Multifunction controllers into the machine control panel or the host system and for correct connection of the controller power supply, inputs, outputs and interfaces.

Before proceeding with installation read the following warnings carefully!
Remember that lack of observation of these warnings could lead to problems of electrical safety and electromagnetic compatibility, as well as invalidating the warranty.

Electrical power supply

- the controller is NOT equipped with an On/Off switch: the user must provide a two-phase disconnecting switch that conforms to the required safety standards (CE marking), to cut off the power supply upstream of the controller. The switch must be located in the immediate vicinity of the controller and must be within easy reach of the operator. One switch may control more than one controller.
- if the controller is connected to NOT isolated electrical equipment (e.g. thermocouples), the earth connection must be made with a specific conductor to prevent the connection itself from coming directly through the machine structure.
- if the controller is used in applications with risk of damage to persons, machinery or materials, it is essential to connect it up to auxiliary alarm equipment. It is advisable to make sure that alarm signals are also triggered during normal operation. The controller must NOT be installed in flammable or explosive environments; it may be connected to equipment operating in such atmospheres only by means of appropriate and adequate types of interface, conforming to the applicable safety standards.

Notes Concerning Electrical Safety and Electromagnetic Compatibility:

- **CE MARKING: EMC Conformity (electromagnetic compatibility)**
  in accordance with EEC Directive EMC 2004/108/CE.
  Series GEFLEX Multifunction controllers are mainly designed to operate in industrial environments, installed on the switchboards or control panels of productive process machines or plants.
  As regards electromagnetic compatibility, the strictest generic standards have been adopted, as indicated in the table below.
- **BT Conformity (low tension)**
  in accordance with Directive 2006/95/CE.

EMC conformity has been tested with the following connections (table 1).

Advice for Correct Installation for EMC

Instrument power supply

- The power supply to the electronic equipment on the switchboards must always come directly from an isolation device with a fuse for the instrument part.
- The electronic instruments and electromechanical power devices such as relays, contactors, solenoid valves, etc., must always be powered by separate lines.
- When the electronic instrument power supply is strongly disturbed by the commutation of transistor or power units or motors, an isolation transformer should be used for the controllers only, earthing the screen.
- It is essential that the plant has a good earth connection:
  - the voltage between neutral and earth must not be > 1V
  - the Ohmic resistance must be < 6Ω;
- If the mains voltage fluctuates strongly, use a voltage stabilizer.
- In the proximity of high frequency generators or arc welders, use adequate mains filters.
- The power supply lines must be separate from the instrument input and output ones.

Inputs and outputs connection

- The externally connected circuits must be doubly isolated.
- To connect the analogue inputs (TC, RTD) the following is necessary:
  - physically separate the input cables from those of the power supply, the outputs and the power connections.
  - use woven and screened cables, with the screen earthed in one point only.
- To connect the regulating and alarm outputs (contactors, solenoid valves, motors, fans, etc.), fit RC groups (resistance and condensers in series) in parallel to the inductive loads that operate in Alternating Current.
  (Note: all the condensers must conform to VDE (class X2) standards and withstand a voltage of at least 220V AC. The resistances must be at least 2W).
- Fit a 1N4007 diode in parallel with the coil of the inductive loads that operate in Direct Current.

GEFRAN S.p.A. declines all responsibility for any damage to persons or property caused by tampering, neglect, improper use or any use which does not conform to the characteristics of the controller and to the indications given in these Instructions for Use.

EMC conformity has been tested with the following connections

FUNCTION	CABLE TYPE	LENGTH
Power supply cable	1 mm^2	1 mt
Relay output cables	1 mm^2	3,5 mt
Serial connection wire	0,35 mm^2	3,5 mt
Power connection cable	see related sections	3.5 mt
Thermocouple input probe	0,8 mm^2 compensated	5 mt
“PT100” temperature resistance input probe	1 mm^2	3 mt

Table 1

EMC Emission		
Electrical device of measure, control, laboratory, prescription electromagnetic compatibility	EN 61326-1	
Generic standards, emission standard for residential commercial and light industrial environments	EN 61000-6-3	
Emission enclosure	EN 61000-6-3	Group1 Class B
Emission AC mains	EN 61000-6-3	Group1 Class B
Radiated emission	EN 61326 CISPR 16-2	Class B
EMC Immunity		
Generic standards, immunity standard for industrial environments	EN 61000-6-2	
Immunity ESD	EN 61000-4-2	4 kV contact discharge level 2 8 kV air discharge level 3
Immunity RF interference	EN 61000-4-3 /A1	10 V/m amplitude modulated 80 MHz-1 GHz 10 V/m amplitude modulated 1.4 GHz-2 GHz
Immunity conducted disturbance	EN 61000-4-6	10 V/m amplitude modulated 0.15 MHz- 80 MHz (level 3)
Immunity burst	EN 61000-4-4	2 kV power line (level 3) 2 kV I/O signal line (level 4)
Immunity pulse	EN 61000-4-5	Power line-line 1 kV (level 2) Power line-earth 2 kV (level 3) Signal line-earth 1 kV (level 2)
Immunity Magnetic fields	EN 61000-4-8	100 A/m (level 5)
Voltage dips, short interruptions and voltage immunity tests	EN 61000-4-11	100%U, 70%U, 40%U,
LVD Safety		
Safety requirements for electrical equipment for measurement, control and laboratory use	EN 61010-1	

2.1 Overall dimensions and mounting dimensions

1) Position each GEFLEX module with the longer side aligned with the vertical axis of the electrical panel to increase adequate natural air flow to the heat sink. The minimum distance from the side walls of the panel must be 20 mm; from the top and bottom walls, the minimum distance must be 100mm.

2) If a Master (GFX-M2...), install the module at the extreme left of the space reserved on the electromechanical plate; line up the Slave (GFX-S2…) or Expansion (GFX-E2…) modules progressively to the right of the Master, for a maximum of ten modules in all (see "Connection Examples").

3) The distance between the modules is shown on the attached drawing. The minimum distances can be used if the actual current is less than or equal to 75% of the maximum current shown on the GEFLEX data plate.

4) Attach each GEFLEX module to the electromechanical plate by means of DIN EN50022 guide or directly with 5MA screws (see "Dimensions and Cutout").

5) Remove the screw fastening the wire to the ground terminal, and then remove the protective cover from the power terminals by sliding it upward.

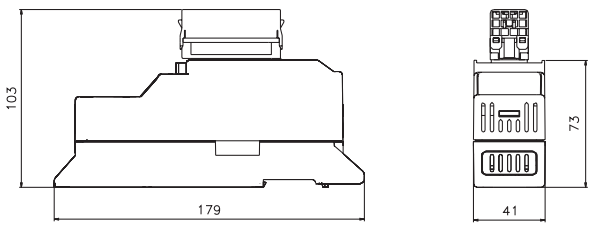
6) Wire signal terminal boards "J1" and "J2", connect the INPUT power terminals to Line, OUTPUT to Load and COMMON to the return phase of Load (see "Electrical Connections").

7) Attach the protective cover of the power terminals and connect the wire to the ground terminal.

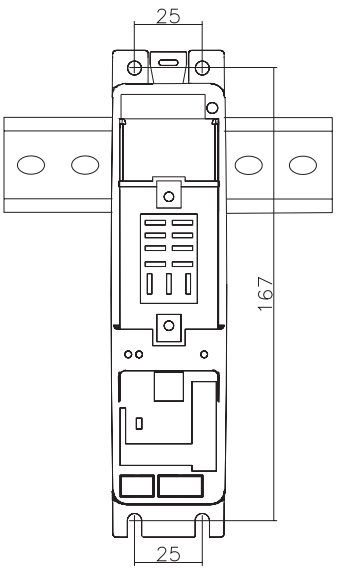
8) If the module is a Master (GFX-M2...), wire its connector to the serial interface see "Electrical Connections").

9) If the module is a Slave (GFX-S2...) or Expansion (GFX-E2...), attach the flat wire to the corresponding connector "J3" of the module immediately to the left (see "Connection Examples").

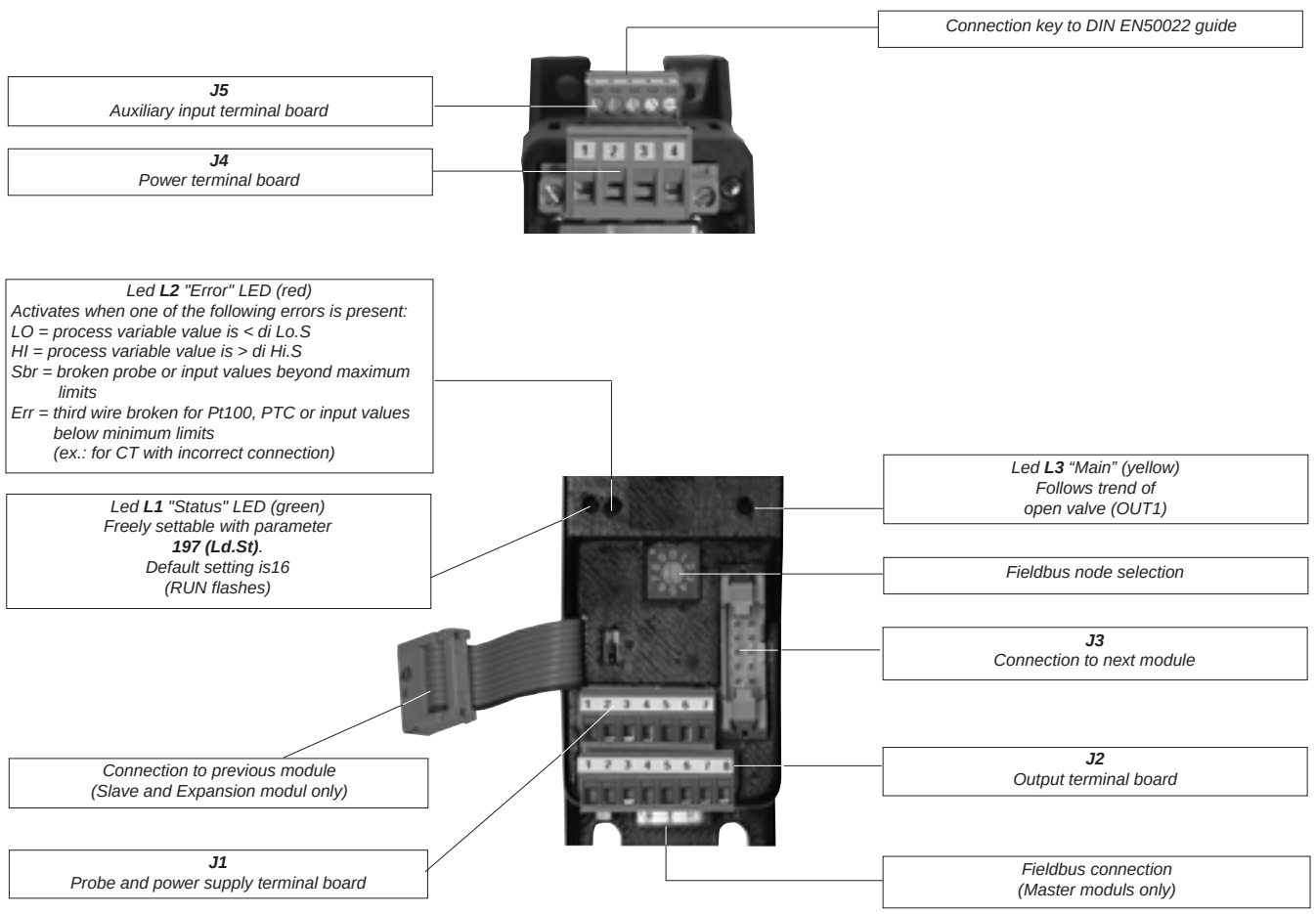
Base with "Double Relay" module



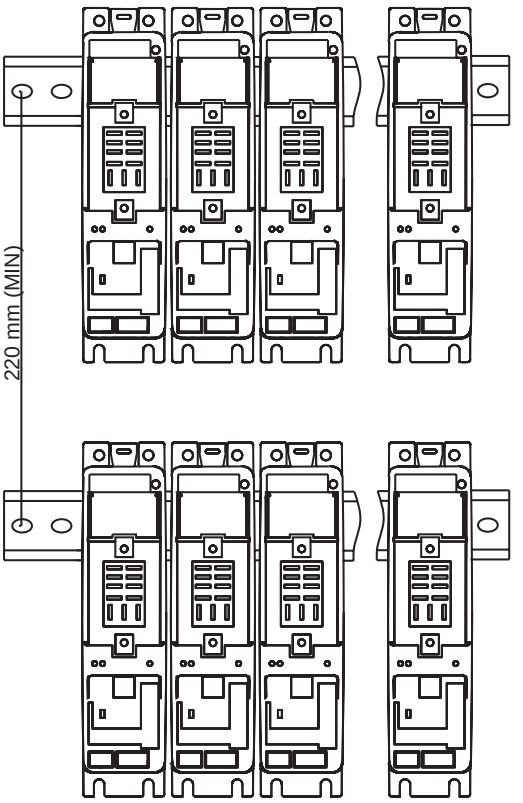
Base
Mounting on electromechanical plate with quick coupling to DIN EN50022 guide or with 5mA screws

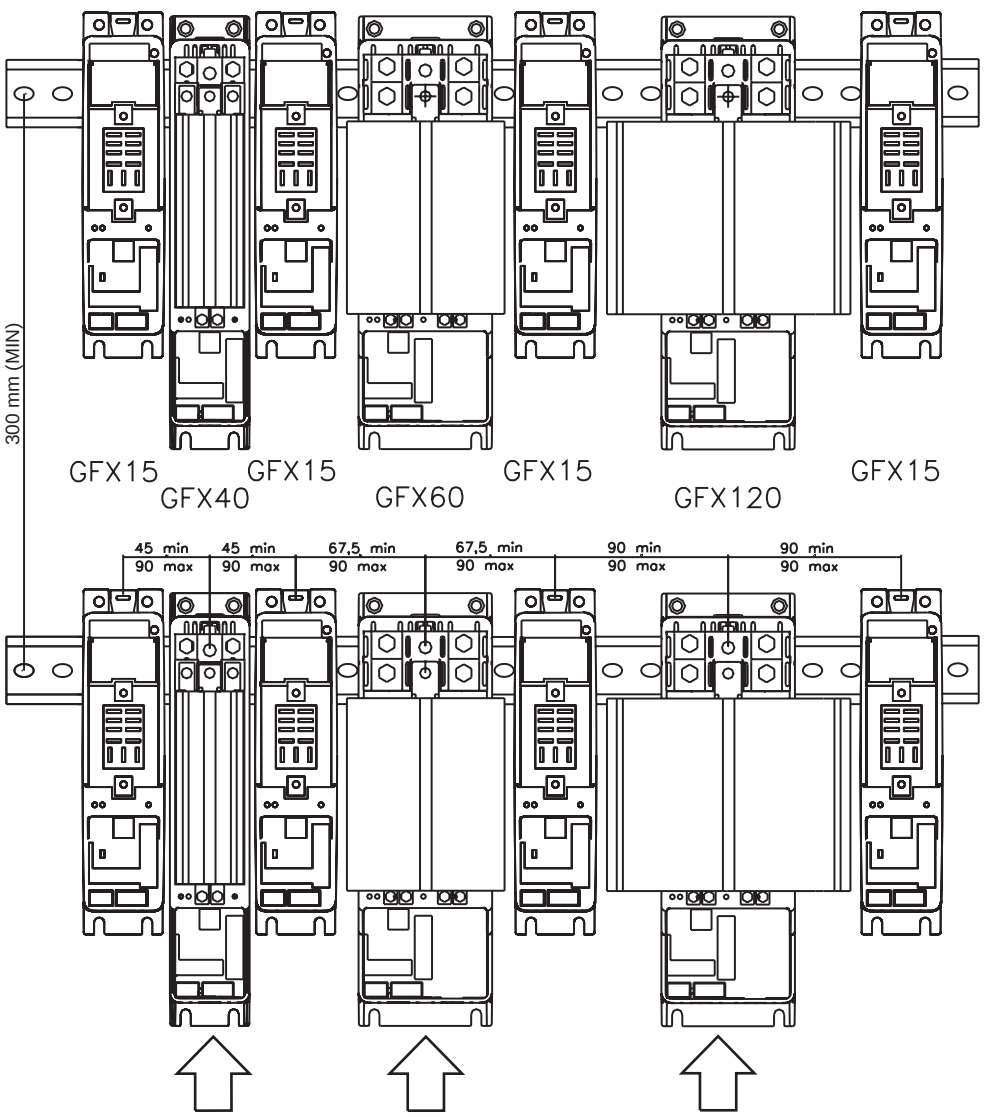


2.2 Description of base



2.3 Connection examples





3 • ELECTRICAL CONNECTIONS

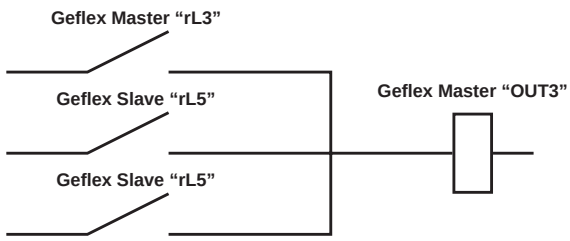
3.1 Wire terminal table

	Flexible wire conductor	Conductor with prod terminal with insulating collar
SIGNAL	0,14 - 1,5mm² / 28-16AWG	0,25 - 0,5mm² / 24-20AWG
POWER	0,2 - 2,5mm² / 24-12AWG	0,25 - 2,5mm² / 24-12AWG
Cross-cut screwdriver, blade 0.4 x 2.5mm		

3.2 Operation of Geflex "Master" relay

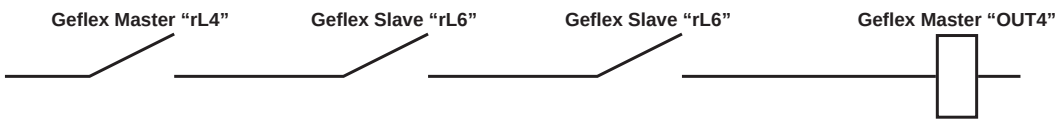
The "OUT3" and "OUT4" relays on the Geflex Master module provide special functions designed to reduce user wiring. These functions are active even when the Geflex Master module is not powered.

• The "OUT3" relay can be energized by the "rL3" command of the Geflex Master and by the "rL5" command of each Geflex Slave. This "**OR**" function of alarms among the devices can be used, for example, for a "maximum temperature setpoint" alarm in each zone to be heated by appropriately configuring the "Ax.r" parameters.



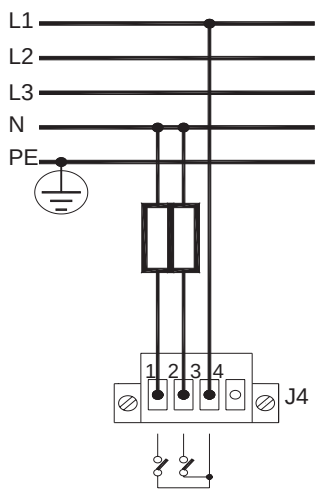
Output "OUT3" can function independently of the state of the Geflex Slaves by setting parameter "rL5" to 128 on each Geflex Slave.

• The "OUT4" relay can be energized only with the simultaneous presence of the "rL4" command of the Geflex Master and commands "rL6" of all the Geflex Slave. This "**AND**" of alarms among the devices can be used, for example, to signal "minimum temperature setpoint reached" in each zone to be heated by appropriately configuring the "Ax.r" parameters.



Output "OUT4" can operate independently of the state of the Geflex Slaves by setting parameter "rL6" to 160 (128+32) on each Geflex Slave. For more information, see the "Configuration and Programming" manual".

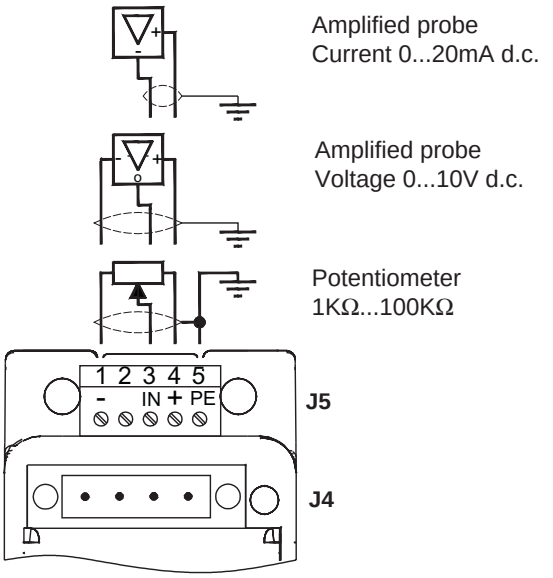
3.3 Power connections

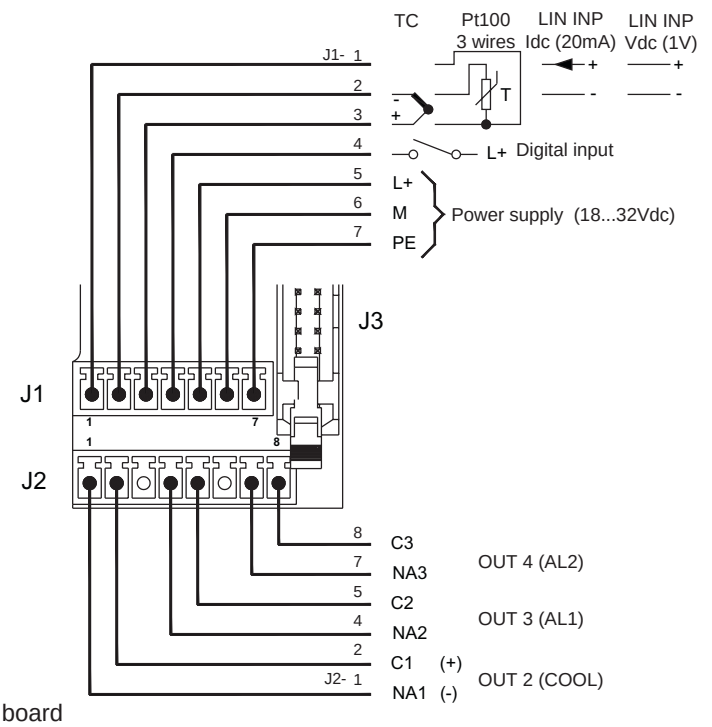


Open valve (OUT 1): jumper 1-3
Close valve (OUT 7): jumper 2-3

Double relay module "RR"

3.4 Input / Output / Power Supply connections





(Logic output PNP18...32VDC
optional not isolated
from power supply)

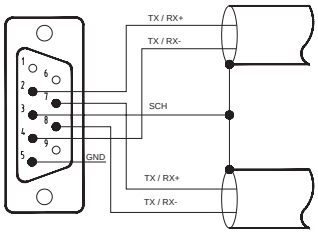
J1: Probe and power supply terminal board
J2: Relay output terminal board
J3: Connection among modules
J4: Power terminal board
J5: Aux. input terminal board

3.5 Serial connections

“MODBUS” serial

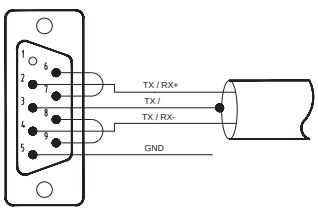
D-SUB Connector
9-pin Male

Shielded cable 1 pair 22 AWG
MODBUS conformity



From previous module on Modbus network

To next module on Modbus network



From Modbus network

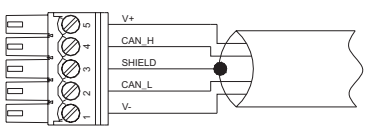
We advise you to connect pins 6 to 7 and pins 8 to 9 on the connector of the last Geflex on the Modbus network to insert the line termination.

It is also advisable to connect the "GND" signal between Modbus devices having a line distance > 100m.

“DeviceNet” serial

Connector 5 pin

Shielded cable 2 pairs 22/24 AWG
DeviceNet conformity



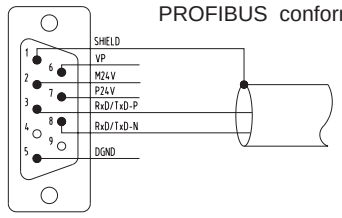
From DeviceNet network

We advise you to connect a 120Ω 1/4W resistance between the "CAN_L" and "CAN_H" signals at both ends of the DeviceNet network.

“PROFIBUS DP” serial

D-SUB connector
9-pin Male

Shielded cable 1 pair 22 AWG
PROFIBUS conformity



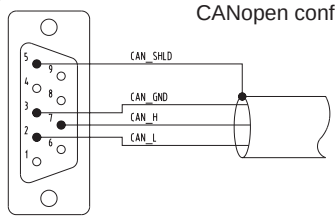
From PROFIBUS network

We advise you to connect a 220Ω 1/4W resistance between the "RxD/TxD-P" and "RxD/TxD-N" signals, a 390Ω 1/4W resistance between the "RxD/TxD-P" and "Vp" signals, and a 390Ω 1/4W resistance between the "RxD/TxD-N" and "DGND" signals at both ends of the Profibus network.

“CANopen” serial

D-SUB Connector
9-pin Female

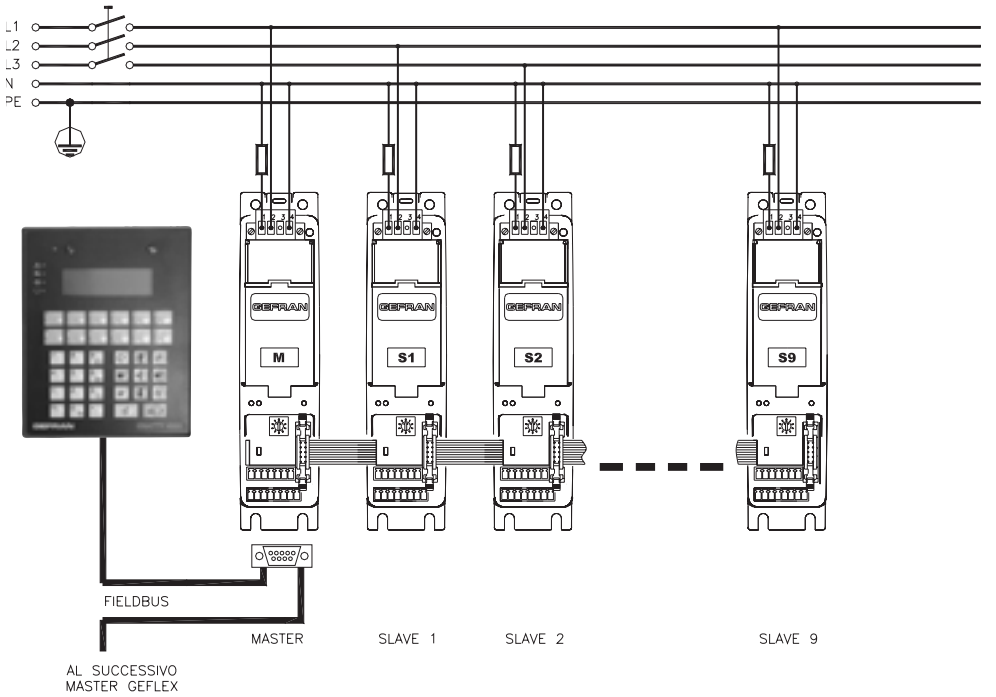
Shielded cable 2 pairs 22/24 AWG
CANopen conformity



From CANbus network

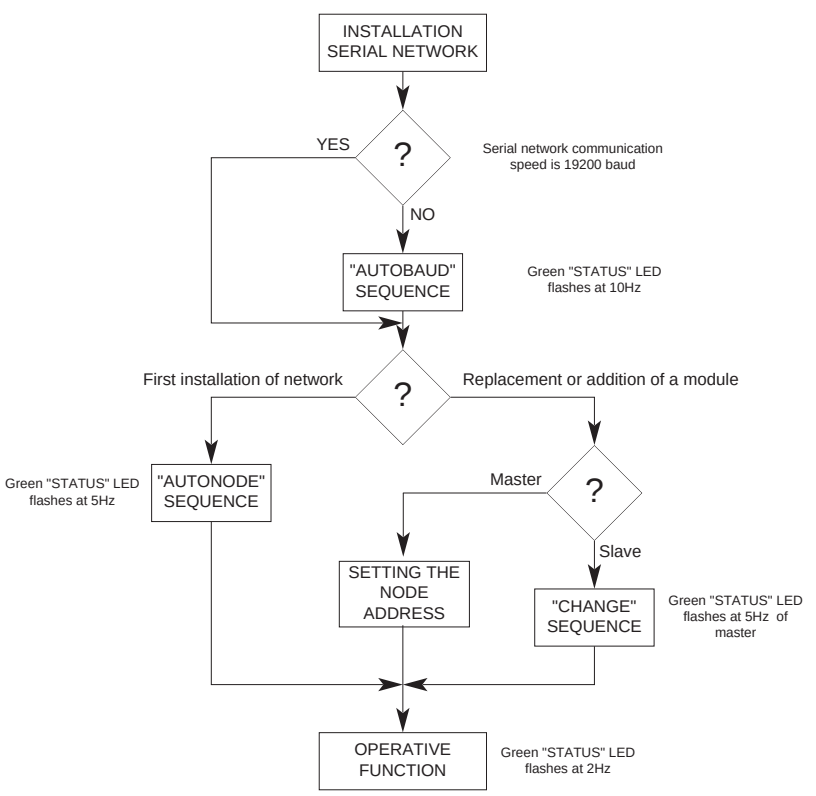
We advise you to connect a 120Ω 1/4W resistance between the "CAN_L" and "CAN_H" signals at both ends of the CANbus network.

3.6 Connection of MASTER + SLAVE modules



4. INSTALLATION OF MODBUS SERIAL NETWORK

In a network, there is typically a Master that "manages" communication by means of "commands" and Slaves that interpret these commands.
Geflex Masters are to be considered slaves to the network master, which is usually a supervision terminal or PLC.
In addition, both the Geflex Masters and Slaves are identified in an unequivocal manner by means of a node address (ID).
The Geflex Master differs from the Geflex Slave only because the Geflex Master can be connected to the fieldbus.
In addition, the Geflex Master shows the state of the Geflex Slave on its outputs "OUT4" and "OUT5" by means of the OR and AND functions:
The Geflex Masters are available (see order code) with one of the following protocols: ModBus, Profibus or CANopen.
The following procedures are to be considered indispensable for the ModBus protocol.
For the other protocols, refer to the specific Geflex Profibus and Geflex CANopen manuals.
GEFLEX modules are supplied preset for 19200 baud without parity and with rotary selector for node address “0”.
A maximum of ninety GEFLEX modules can be installed in a serial network, with node address selectable from “10” to “99”.



4.1 “AUTOBAUD” sequence

Adjust the serial communication speed and parity of the Geflex models to the supervision terminal or PLC.
If network speed is 19200 baud and there is no parity, go directly to the "AUTONODE" sequence.

The green "STATUS" LED L1 mentioned in the procedure can vary its behavior based on parameter Ld.St , which has a default setting of 16.
The red LED not mentioned in the procedure can vary its behavior based on the presence of an error on the main input.

1) Cut power to the Geflex modules.

2) Connect the serial cables to all of the Master modules (GFX-M1…) in the network and to the supervision terminal.

3) Set the rotary selector on the Geflex modules to be installed (or on all the module in case of a first installation) to “0”.

4) Turn on power to the electrical pane.

5) Check that the green "STATUS" LEDs are flashing at high frequency (10Hz).

6) The supervision terminal has to transmit a series of generic "MODBUS" read messages to the network.

7) The procedure is finished when all of the green "STATUS" LEDs L1 on the Geflex modules flash at a normal frequency (2 Hz). (If parameter 197 Ld.St = 16 as default.).

The new speed parameter is saved permanently in each Geflex, so you will not have to activate the "AUTOBAUD" sequence at future power-ups.

Steps 1 and 4 are necessary only for Geflexes with firmware 1.0x. In later versions, when the rotary selector is moved, the green "STATUS" LED remains on steadily for about 6 seconds, after which it resumes its normal operation, saving the address.

4.2 “AUTONODE” sequence

Each GEFLEX module has to be assigned an unequivocal node address in the serial network.
If the entire network was previously initialized and you want to add a new module to the network, go directly to the "CHANGE" sequence. The node address is assigned by means of the rotary selector on each module.
Geflex Master modules can assume tens values only 1 = 10, 2 = 20, ... 9 = 90.
(ex. Geflex Master rotary selector = 2, node address = 20)
Geflex Slave modules can assume only the values that are the sum of their own rotary selector (representing units) plus the tens set on the connected master.
(ex. Geflex Master rotary selector = 2, node address = 20; Geflex Slave rotary selector = 3, node address = 20+3= 23).

The green "STATUS" LED L1 mentioned in the procedure can vary its behavior based on parameter Ld.St , which has a default setting of 16.
The red LED not mentioned in the procedure can vary its behavior based on the presence of an error on the main input.

1) Cut power to the Geflex modules.

2) Set the rotary selector on the Slave modules (GFX-S1...) in progression from "1" to "9".

3) The rotary selector on the Master modules (GFX-M1..) must be set from "1" to "9".

4) Energize the electrical panel, check that the green "STATUS" LEDs flash at a frequency of 2Hz. (If parameter 197 Ld.St = 16 as default). In this step, each module has acquired the status of its rotary selector.

5) Cut power to the Geflex modules.

6) Disconnect the serial cable from each Geflex Master.

7) Turn the rotary selector of the Master module to position "A".

8) Energize the electrical panel.

9) Check that the green "STATUS" LED on the Master module flash at a frequency of about 5Hz.

10) The procedure is finished when the green "STATUS" LED and red "ERR" LED flash at a frequency of about 2Hz.

11) Turn the power off.

12) Connect the serial cable to each Geflex Master.

13) Return the rotary selector on the Master module to the position assigned at point 3.

The new node address parameter is saved permanently in each Geflex, so you will not have to activate the "AUTONODE" sequence at future power-ups.

Steps 1, 4, 5, 8 and 11 are necessary only for Geflexes with firmware 1.0x. In later versions, when the rotary selector is moved, the green "STATUS" LED remains on steadily for about 6 seconds, after which it resumes its normal operation, saving the address.

4.3 “CHANGE” sequence

This is necessary when replacing a module or adding a new module to the network in order to assign a correct node address and communication speed.
For a Master module (GFX-M1...), simply set the rotary selector to the position you want, then energize the electrical panel.
For a Slave module (GFX-S1...), do as follows.

1) Cut power to the Geflex modules.

2) Disconnect the serial cable from the Geflex Master.

3) Turn the rotary selector of the Slave to be inserted to position “0”.

4) Turn the rotary selector of the Master to position “A”.

5) Turn on power to the Geflex modules.

6) Check that the green "STATUS" LED of the Slave is flashing at high frequency (10 Hz).

7) Check that the green "STATUS" LED of the Master is flashing at medium frequency (5Hz).

8) During this phase, the new module learns the speed and address (decimal part).

9) The procedure is finished when all of the green "STATUS" LEDs flash at a normal frequency (2 Hz).

10) Cut power to the Geflex modules.

11) Connect the serial cable to the Geflex Master module.

12) Return the rotary selector on the Geflex Master to the position assigned at point.

The new node address parameter is saved permanently in each Geflex, so you will not have to activate the "AUTONODE" sequence at future power-ups.

Steps 1, 4, 5, 8 and 11 are necessary only for Geflexes with firmware 1.0x. In later versions, when the rotary selector is moved, the green "STATUS" LED remains on steadily for about 6 seconds, after which it resumes its normal operation, saving the address.

4.4 Software On/Off

This function is obtained with the digital input if configured (diG = 6).).
All outputs (control and alarms) are OFF (logic level 0, relays de-energized) and all the instrument control functions are inhibited except for "ON" function and serial dialog.
The PV input continues to be sampled

If software on/off is performed, you will have the following consequences:

1) Reset Auto-tuning, Self-tuning and Soft-start functions

2) Digital input (if present) enabled only if linked to SW shutdown function

3) In case of restart after SW shutdown, the ramp linked to the set starts from the PV

4) Outputs OFF: except for OUT4 (Master) and OUT6 (Slave) of the Geflex instrument, which are forced ON

5) Reset HB alarm

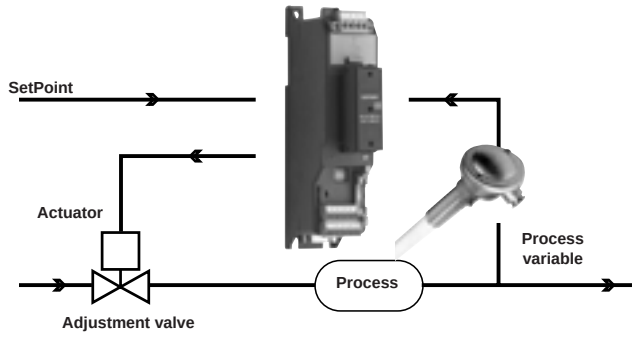
6) Reset LBA alarm

7) In case of Geflex, Heat and Cool bit of status word STATUS_ST_RAM and POWER are reset.

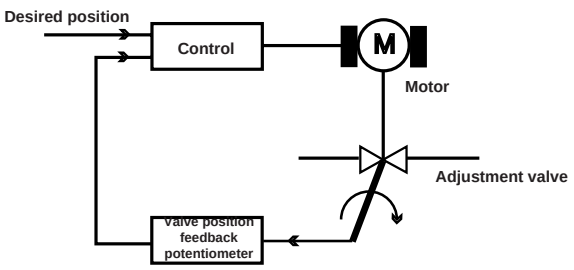
8) The current power level is saved when the instrument is switched off. When it is switched on again, integral power is calculated as the difference between saved power and proportional power. This calculation is defined as “desaturation at switch-on”.

5 • ADJUSTMENT WITH MOTORIZED VALVE

In an adjustment process the adjustment valve has the function of varying fuel delivery (frequently corresponding to the thermal energy introduced into the process) in relation to the signal coming from the controller.
For this purpose it is provided with an actuator able to modify its opening value, overcoming the resistances produced by the fluid passing inside it.
The adjustment valves vary the delivery in a modulated manner, producing finite variations in the fluid passage inner area corresponding to finite variations of the actuator input signal, coming from the controller. The servomechanism, for example, comprises an electric motor, a reducer and a mechanical transmission system which actions the valve.
Various auxiliary components can be present such as the mechanical and electrical safety end travels, manual actioning systems, position location.



CONTROL EXAMPLE FOR V0 VALVE



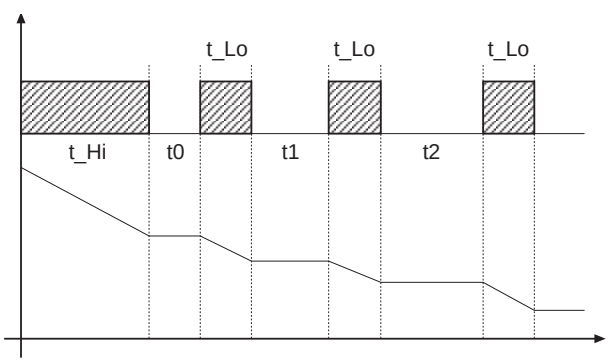
VALVE POSITION CONTROL

The controller determines, on the basis of the dynamics of the process, the control output for the valve corresponding to the opening of the same in such a way so as to maintain the desired value of the process variable.
With counter-reaction valves the position is normally provided by a potentiometer assembled on the actuator.

5.1 Characteristic parameters for valves control

- Actuator time (_At_) is the time employed by the valve to pass from entirely open to entirely closed (or vice-versa), and can be set with a resolution of one second.
It is a mechanical feature of the valve+actuator unit.
NOTE: if the actuator's travel is mechanically limited it is necessary to proportionally reduce the _At_ value.

- Minimum impulse (t_Lo) expressed as a % of the actuator time (resolution 0.1%).
Represents the minimum change in position corresponding to a minimum change in power supplied by the instrument below which the actuator will not physically respond to the command.
This represents the minimum variation in position due to which the actuator does not physically respond to the command.
The minimum duration of the movement can be set in t.on, expressed as a % of actuator time.
- Impulsive intervention threshold (t_Hi) expressed as a % of the actuator time (resolution 0.1%) represents the position displacement (requested position – real position) due to which the manoeuvre request becomes impulsive.



You can choose between 2 types of control:
1) ON time of movement = t.on and OFF time proportional to shift and greater than or equal to t_Lo (we recommend setting t.on = t.Lo) (set t.off = 0).
2) ON time of movement = t.on and OFF time = t.off. A value set for t.off < t.on is forced to t.on. To activate this type, set t.off < > 0.
The type of movement approach allows fine control of the reverse drive valve (from potentiometer or not), especially useful in cases of high mechanical inertia.
Set t_Hi = 0 to exclude modulation in positioning.
This type of modulated approach allows precise control of the feedback actioned valve, by a potentiometer or not, and is especially useful in cases of high mechanical inertia. Setting t_Hi = 0 excludes modulation in positioning.

- Dead zone(_db_) is a displacement band between the adjustment setpoint and the process variable within which the controller does not supply any command to the valve (Open = OFF; Close = OFF).
It is expressed as a percentage of the bottom scale and is symmetrical with respect to the setpoint.
The dead zone is useful in an operative process to avoid straining the actuator with repeated commands and an insignificant effect on the adjustment. Setting _db_ = 0 the dead zone is excluded.

Graph of behavior inside the band with integral time ¤ 0.

With integral time = 0, movement ON time is always equal to OFF time.

t0 = t_Lo

6 • VALVE CONTROL MODES

With the controller in manual, the setting of parameter At.ty ≥ 8 allows direct control of the valve open and close commands; the instrument indicates the presumed or real position (for type V2):

V0 - for floating valve without potentiometer;
V2 - for valve with feedback from potentiometer.

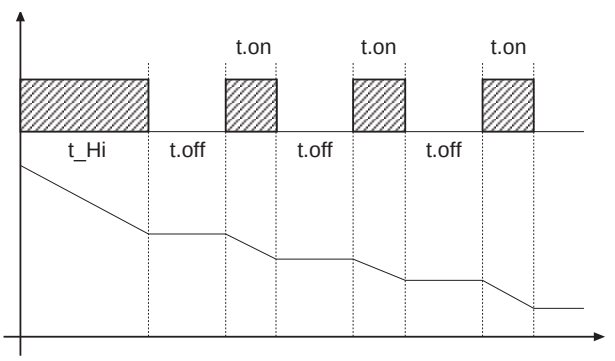
Model V0 have similar behaviour: every manoeuvre request greater than the minimum impulse t_Lo is sent to the actuator by means of the OPEN/CLOSE relays; every action updates the presumed position of the virtual potentiometer calculated on the basis of the actuator travel declared time.
In this way there is always a presumed position of the valve which is compared with the position request of the controller.
Having reached a presumed extreme position (entirely open or entirely closed determined by the “virtual potentiometer”) the controller provides a command in the same direction, in this way ensuring the real extreme position is reached (minimum command time = t.on).
The actuators are usually protected against the OPEN command in the entirely open position or CLOSE command in the entirely closed position.
The V2 model reads the real position of the valve by means of the auxiliary analogue input, expresses the value as a percentage (0.0 – 100.0%) and compares it with the position requested by the controller, then sends the appropriate command to the valve.
The auxiliary input of the controller is used to obtain the valve position.
Calibration is requested to memorise the extreme position of the potentiometer, minimum and maximum.
The potentiometer is usually supplied by the controller itself

V3 - for floating valve, PI control

When the difference between the position calculated by the controller and the only proportional component exceeds the value corresponding to the minimum impulse t_Lo the controller provides an OPEN or CLOSE command of the duration of the minimum impulse itself t_Lo.
At each delivery the integral component of the command is set to zero (discharge of the integral).
The frequency and duration of the impulses is correlated to the integral time (_ti_).

Non-movement behavior
t_Hi = 0: with power = 100% or 0.0%, the corresponding open or close outputs always remain enabled (safety status).

Movement behavior
t_Hi < > 0: with position attained corresponding to 100% or 0.0%, the corresponding open or close outputs are switched off.



If t.off = 0, current function is maintained.

If t.off ¤ 0 movement mode will be as shown on the graph

7 • AUTOMATIC CALIBRATION OF CONNECTED POTENTIOMETER

1) Enable virtual keyboard
[191] Hd.1 = 2
[224] S.In = bit 5 = 1
[345] Status6_W = bit 7 = 1

2) Minimum value
[311] Page = 31
[312] Row = 0

Minimum procedure
Set the potentiometer in minimum position by activating the close output (OUT 7), setting bit 1 = 1 di [320] NEW TAST.
When the position is reached, reset bit 1 = 0 of [320] NEW TAST.
Confirm the minimum calibration by setting bit 0 = 1 of [320] NEW TAST and resetting within 0.5 sec.

Maximum procedure
Set the potentiometer in maximum position by activating the open output (OUT 1), setting bit 3 = 1 of [320] NEW TAST.
When the position is reached, reset bit 3 = 0 of [320] NEW TAST.
Confirm the maximum calibration by setting bit 0 = 1 of [320] NEW TAST and resetting within 0.5 sec.

8 • MANUAL CALIBRATION OF VALVE

Enable virtual keyboard
[191] Hd.1 = 2
[224] S.In = bit 5 = 1
[345] Status6_W = bit 7

Set bit 1 = 1 of [320] NEW TAST to command the close output (OUT 7).
Set bit 3 = 1 of [320] NEW TAST to command the open output (OUT 1).

8 • TECHNICAL SPECIFICATIONS

Inputs	
Accuracy main input	0,2% f.s. ±1 scale points at 25°C ambient temperature
Thermal drift	0,005% f.s. / °C
Main input (configurable digital filter)	TC, RTD 60mV,1V Ri≥1MΩ; 20mA Ri=50Ω Sampling time 120 msec.
Type TC (Thermocouples) (ITS90)	J, K, R, S, T, (IEC 584-1, CEI EN 60584-1, 60584-2) a custom linearization can be inserted
Cold junction error	0,1° / °C
RTD type (scale settable in indicated range, with/without decimal point) (ITS90)	DIN 43760 (Pt100), JPT100
Max. line resistance for RTD	20Ω
Accuracy auxiliary input	0,2% f.s. ±1 scale points at 25°C ambient temperature
Auxiliary input	- Potentiometer ≥ 1KΩ - 0/2...10V (Ri >100K) - 0/4...20mA (Ri >50Ω) Sampling time 240msec
Logic input	24V, 8mA
Functionality	
Safety	Detection of short circuit or opening of probes, LBA alarm, HB alarm
°C / °F selection	Configurable
Linear scale ranges	-1999...9999
Controls	Pid, Autotune, on-off
pb - dt - it	0,0...999,9 % - 0,00...99,99 min - 0,00...99,99 min
Action - Control outputs	heat / cool - on / off, PWM, GTT
Max. power limit heat / cool	0,0...100,0 %
Cycle time - Softstart	0...200 sec - 0,0...500,0 min
Fault power setting	-100,0...100,0 %
Automatic blanking	Maintains sampling of process variable PV; when active, disables the control
Configurable alarms	Up to 4 alarm functions assignable to an output and configurable of type: maximum, minimum, symmetrical, absolute/relative, LBA, HB
Alarm masking	Exclusion during warm up memory, reset from digital input
Outputs	
Relay (OUT 2, 3, 4)	NO, 3A, 250V cosφ=1
Logic (OUT 2)	24Vdc, 35mA
Continuous (OUT 2)	0/2...10V, 0/4...20mA at 500Ω max.
Functional modules	
"RR" double relays	NO, 3A 250V cosφ=1 unico comune
Power supply	
Power supply	24Vdc ±25%, 5W max.
Power supply for amplified probe	+24Vac ± 25% 40mA max.
Serial	
Serial interface	RS485, optoisolated
Baude rate	1200, 2400, 4800, 9600, 19200
Protocol for Geflex master	MODBUS RTU
Optional field bus protocols	CANopen 10K...1Mbit/sec PROFIBUS DP 9,6...12Mbit/sec
General characteristics	
Indications	3 LEDs (diagnostics)
Protection	IP20
Working / storage temperature range	0...40°C / -20...70°C
Relative humidity	20...85% Ur non condensing
Installation	Barra DIN EN50022 or panel from 5MA screws
Weight max	600gr

9 • TECHNICAL-COMMERCIAL INFORMATION

This section contains information on the order codes for the Controller and on main accessories.

As specified in the Preliminary Warnings of these Operating Instructions, correct interpretation of the Controller order code permits immediate identification the controller's hardware configuration. It is therefore essential to give the order code each time you have to contact Gefran's Customer Care Service to solve any problems.

Master Valve **GFX-M2** B_V / 0 M 0 RR P 0

FUNCTIONAL MODULE	
Without functional module	B_V
With double relays modul	V

SERIAL COMMUNICATION	
MODBUS RTU	M
PROFIBUS DP	P
CANopen	C
DeviceNet	D

COOLING OUTPUT	
Absent	0
Logic	D
Relays	R
Continuous output 0...10V (0/4...20mA)	C

DIAGNOSTIC	
0	None
IM	Multifunction input 0/4...20mA, (0...10V)
PO	Potentiometer input

DIGITAL INPUT	
P	PNP Digital Input

AUXILIARY OUTPUTS	
RR	2 Relays

Slave Valve **GFX-S2** B_V / 0 0 0 00 P 0

FUNCTIONAL MODULE	
Without functional module	B_V
With double relays modul	V

COOLING OUTPUT	
Absent	0
Logic	D
Relays	R
Continuous output 0...10V (0/4...20mA)	C

DIAGNOSTIC	
0	None
IM	Multifunction input 0/4...20mA, (0...10V)
PO	Potentiometer input

DIGITAL INPUT	
P	PNP Digital Input

AUXILIARY OUTPUTS	
0	Absent
RR	2 Relays

GEFRAN spa reserves the right to make aesthetic or functional changes at any time and without notice.

10.1 Accessories

KIT WINSTRUM

Software for management / configuration of Geflex units.
The main parameters of all Geflex models can be varied with a simple, intuitive interface.

ORDER CODE

Winstrum software on CD, RS232/485 converter complete with cables to connect the PC and the Geflex . . . . . ***WSK - 1 - 1 - 0***

Winstrum software on CD, IRDA interface for Geflex . . . . . ***WSK - 1 - 2 - 0***
[Note: the PC used must be equipped with an IRDA (infrared) interface]

GFX-OP

Operator terminal for field configuration of the entire Geflex range

Two types of terminals are available:
- for installation on the Geflex heatsink or on DIN guide
- for installation on the faceplate

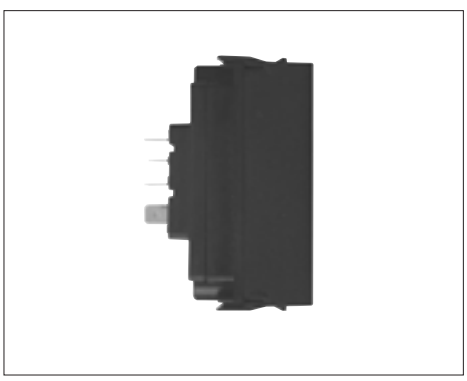
ORDER CODE

Programming terminal for Geflex (installation on DIN guide or on heatsink), complete with connection cable to Geflex (L = 0.2 m) . . . . . ***GFX-OP-D***
Note: see cable section for other cable lengths

Programming terminal for Geflex (installation on faceplate) . . . . . ***GFX-OP-P***
Note: see cable section for connection cable

Kit consists of:
power supply, connection cable PC <--> GFX-DP-D (L = 2 m), power adapter for the Geflex . . . . . ***GFX-OP-K***

MODULES



Series of modules insertable on base

ORDER CODE

Double relay module . . . . . ***GFX-OUT-RR***

Note: See the Geflex catalog for more accessories.