

# MG3300

Digital regulator of air capacity



## OPERATIVITY

MG3300 regulator accepts an input signal from a hot wire capacity sensor, amplifies it and displays the capacity in engineering unities (m/sec), compares it with a SET POINT settable value and generates a signal to control a valve or an inverter to realize a PID automatic regulation (with proportional action and settable integral time parameters).

The capacity value is compared with an alarm SET to generate an acoustic and visual alarm (display flashing) if the surveyed capacity is below (or above in the case of set up output with opposite action) the set value, repeating the alarm signalling with a relay contact (alarm filter: 200ms).

At the switching on of the instrument, a timeout for the heating of the hot wire capacity sensor is present: the small display visualizes the StbY message (stand by) while the big display visualizes three dashes, the alarm relay is excited, the instrument does not effectuate any regulation.

The instrument permits the generation of a signal to control manually the valve or the inverter through the front buttons.

The elaboration of the signals occurs through a microprocessor which simplifies their management and allows a complete system configuration (sensor calibration, alarm setting up and working SET POINT, setting up of the automatic or manual output regulation parameters, output calibration, etc.)

A high brightness display visualizes the capacity, a second display helps the operator in the programming while in the normal functioning it supports the informations useful for the operator.

The instrument is totally controlled by the front buttons with double functionality which allow the programming and some other particular functions (emergency control which brings the output to the maximum, external lamp control, silencing of the incorporated siren, control of the automatic or manual functioning selection).

The availability of a serial interface RS485 permits to connect the instrument to a digital system to which informations about the functioning can be transmitted or from which it can be easily configurated.

## CONVENTIONS

The present handbook makes use of the following conventions:

The main titles are highlighted in **CAPITAL BOLDFACE**.

The **boldface** highlights the text or indicates a minor title.

The *italic* highlights the text used in the notes.

The following terms have specific meanings inside this handbook:

**ATTENTION!** The attention messages highlight procedures which, if not observed, could produce data loss or device damaging.

**WARNING!** The warning messages draw the user attention on procedures which, if not correctly executed, can provoke serious injuries.

### WARNING!

This device is supplied 24V ac 50/60Hz. The supply must be provided by a security isolation transformer.

The measuring terminals are provided exclusively for voltages below 50V in a.c. or 120V in c.c. with respect to the ground.

The relay terminals can be connected to dangerous voltage (max 250Vac); in this case, the instrument can be installed only in closet, rack, or panel which will not allow the access to the terminal connection during the functioning.

The device must be used only within the limits and for the purposes fixed by the manufacturer and indicated in this handbook; its use outside these limits can cause danger for the operator.

Do not use liquids for the cleaning of the device; use only a dry cloth.

### ATTENTION!

MG3300 is a fixed installation measuring electric device with permanent connections. The device is arranged for internal use.

The device contains electrostatic charges sensible circuits, any manipulation of the sideboards must be made using ground connected antistatic canvas and bracelet, if it is not possible, discharge the static electricity touching a ground connected metallic structure.

## 1 GENERAL SPECIFICS

### 1.1 MECHANICAL AND PHISICAL CHARACTERISTICS

**Connections:** 18 extractable screw terminals  
0,2÷2,5mm<sup>2</sup> (AWG24÷12)

Telephonic connector 6 poles for sensor

Telephonic connector 8 poles for RS485

**Display:** red high-efficiency LED 7 segments

3 figures 14mm for the measurement

4 figures 7.5mm for the operativity

Led 3 mm red emergency indicationE

Led 3 mm green lamp control L

Led 3 mm yellow alarm inverter

**Functioning temperature:** 0÷50°C

**Storage temperature:**-0÷50°C

**Dampness:** 25÷90% non condensating

**Container:** autoextinguishing ABS resin

**Front :** polycarbonate serigraphed antiscratch

**Dimensioni:** 96x96x100mm DIN 43700 norms

**Front protection:** IP54

**Connections:** screw terminals

### 1.2 ELECTRICAL CHARACTERISTICS

**Supply:** 24Vac ±10% 50/60Hz

**Consumption:** 8VA max

**Fuse:** 0,4A

#### 1.2.1 MGC input (telephone connector)

Hot wire MGC sensor capacity 0,2÷1,0m/sec  
on 6 poles telephone connector (see Figure 1 for numbering)

#### 1.2.2 Standard input

Standard signal 0/4÷20mA, impedance 100 Ohm

#### 1.2.3 ENCODER input

Input for incremental Encoder . NPN signal  
max capacity 5V/10mA. Max frequency 5KHz

#### 1.2.4 Inverter alarm input

Inverter alarm blocked contact without voltage. Max capacity 5V/10mA

#### 1.2.5 Valve or inverter control output

Selectable through hardware bridge (see LK1 Figure 2) and software setup 0÷20mA or 4÷20mA (see 4.4.1). Max capacity 10V/20mA.

Max impedance for 20mA 500Ω

Min impedance for 10V 1KΩ

#### 1.2.6 Repetition output

Selectable through hardware bridge (see LK2 Figure 2) and software setup 0÷20mA or 4÷20mA (see 4.4.3). max capacity 10V/20mA.

Max impedance for 20mA 500Ω

Min impedance for 10V 1KΩ

#### 1.2.7 Alarm Relay

Low capacity alarm relay: SPDT 3A/250Vac

#### 1.2.8 Lamp relay

Lamp control relay : SPST 3A/250Vac

#### 1.2.9 Serial output (telephone connector)

Serial output RS485 with protocol MODBUS.  
Possibility of local and remote programming of the instrument (see):

- programmable Baud rate from 1,2 to 19,2 Kbaud
- Instrument address configurable from 0 to 31

## 1.3 I ELECTRIC CONNECTIONS

Each terminal is screw tightening and can receive conductors with section 0.2÷2.5mm<sup>2</sup> (AWG 24÷12).

**WARNING! Before making any connection, make sure that the supply network of the instrument is disconnected.**

**ATTENTION:** The sideboards contain circuits electrostatic charge sensible, each direct manipulation of the sideboard must be done using antistatic canvas and bracelet ground connected, if it is not possible, discharge the static electricity touching a ground connected metallic structure before operating on the sideboards.

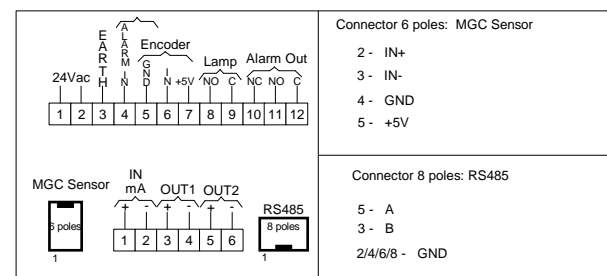


Figure 1 : Terminals connections

## 2 AUTO FUNCTIONING

In this functioning mode the small display visualizes the SET POINT value.

The instrument compares the input with the SET POINT setup value and makes an automatic regulation based on the regulation parameters (proportional band and integral time) set up during the programming.

Pressing the PRG button for 1 second the little display visualizes the **Set** message, the big display visualizes the SET POINT value settable through the buttons ▲ (Increase) and ▼ (Decrease).

Pressing again the PRG button you go back to the normal functioning.

After 60 seconds without pressing the buttons you have the automatic leaving from the set programming.

## 3 MANUAL FUNCTIONING

In this functioning mode the little display visualizes the **Mano** message.

Pressing the PRG button for 1 second the little display visualizes the **out** message, the big display visualizes the output value in modifiable percentage by the buttons ▲ (Increase) e ▼ (Decrease). Pressing again the PRG button you go back to the normal functioning.

After 60 seconds without pressing the buttons you have the automatic leaving from the manual setup of the output.

**When the instrument passes from the AUTO functioning to the MANUAL one the output keeps the last regulation value calculated in automatic.**

## 4 CONFIGURATION

The configuration of MG3300 regulator occurs through programming. It is possible to enter the programming through the buttons placed in front of the instrument (LOCAL) or by entering the serial line with protocol MODBUS (REMOTE).

The configuration phase is made up of the setup window of the alarm set and of three different blocks marked by an input code:

- code 475 : Zero calibration and selected sensor span;

- code **029** : initial set setup, of the decimal point, of the proportional band and of integral time;

- code **224** : output 1 setup, output 2, sensor selection, serial setups and selection/programming local /remote.

### 4.1 PROGRAMMING DESCRIPTION

To enter the programming phase press the PRG button: after 3 seconds the small display visualizes the **PROG** message, releasing the button you directly enter the setup window of the alarm set (see 4.1.1).

Pressing the button ► (fast selection) you pass to the window setup code to enter the desired programming block (see 4.1.2).

To pass from a programming window to another press the button ► (fast selection).

After 60 seconds without pressing the buttons you have the automatic leaving from the programming.

#### 4.1.1 Alarm Set (ALR) setup

The small display visualizes the **Alr** message, the big display visualizes the alarm set value settable by the buttons ▲ (Increase) and ▼ (Decrease).

#### 4.1.2 Code setup(CODE)

The small display visualizes the **Code** message, the big display visualizes 000 . Pressing the button ► you select the desired digit (characterized by the flashing) settable through the buttons ▲ (Increase) and ▼ (Decrease).

**Pressing the button ► (fast selection) you enter the first window of the block related to the set code.**

**Table 1: Programming**

TAS TI	FUNCTION	SMA LL DISP LAY	BIG DISP LAY
	Alarm set	ALr	0.30
►	Select Setup code  Windows of the block Setup code	COdE	- - -
►	Select digit for CODE		
▲	Increase		
▼	Decrease		

## 4.2 Code = 475

By this code you can enter the calibration code of the setup sensor (see **Table 2**).

To pass from a programming window to another press the button **▶**(fast selection). To exit the programming press the button PRG.

### 4.2.1 Zero sensor calibration (ZERO)

In this window it is possible to calibrate the zero of the set up sensor. The small display visualizes the **ZERo** message, the big display visualizes the engineering value related to the sensor, pressing the button **▼** (Decrease) the indication resets.

### 4.2.2 Span sensor calibration (SPAN)

In this window it is possible to calibrate the span of the set up sensor. The small display visualizes the **SPAn** message, the big display visualizes the engineering value related to the sensor and adjustable through the buttons **▲** (Increase) and **▼** (Decrease).

**Pressing the button **▶**(fast selection) in this window you enter again the di setup code window.**

**Table 2:Code 475**

BUT TONS	FUNCTION	SMALL DISPLAY	BIG DISPLAY
<b>▶</b>	Select		
	Zero sensor	ZERo	0.00
	Span sensor	SPAn	0.50
<b>▲</b>	Increase (only SPAN window)		
<b>▼</b>	Decrease / Reset		

## 4.3 Code = 029

By this code you can enter the setup PID parameters block (see **Table 3**).

To pass from a programming window to another press the button **▶**(fast selection). To exit the programming press the button PRG.

### 4.3.1 Initial set (SET) setup

In this window you can set up the initial set value charged by the instrument at the switching on. The small display visualizes the **SEt** message, the big display visualizes the settable value pressing the buttons **▲** (Increase) e **▼** (Decrease).

### 4.3.2 Decimal point setup (DP)

In this window it is possible to set up the position of the decimal point. The small display visualizes the **dP** message, the big display visualizes the position of the decimal point which can be set up by the button **▶** (Select).

### 4.3.3 Proportional Band setup (PB)

In this window it is possible to set up the percentage value of the proportional band. The small display visualizes the **Pb** message, the big display visualizes the settable band value by the buttons **▲** (Increase) e **▼** (Decrease).

*The band value used for the regulation is calculated in an automatic way relating to a fixed end-scale of 2.00.*

### 4.3.4 Integral time setup (TI)

In this window it is possible to set up the value in seconds of the integral time. The small display visualizes the **ti** message, the big display visualizes the value of the settable time by the buttons **▲** (Increase) and **▼** (Decrease).

### 4.3.5 Output action setup(OUT)

In this window it is possible to set up the kind of output action. The small display visualizes the **out** message, the big display visualizes the kind of settable output by the buttons **▲** (Increase) and **▼** (Decrease).

dir = direct output action (0÷100%)

inv = opposite output action (100÷0%)

**Pressing the button **▶**(fast selection) in this window you can enter again the code setting window.**

**Table 3: Code 029**

BUT TONS	FUNCTION	SMALL DISPLAY	BIG DISPLAY
<b>▶</b>	Select		
	Initial set	SEt	0.50
	Decimal Point	dP	P.PP
	Proportional Band	Pb	<b>15</b>
	Integral time	ti	<b>1.5</b>
	Output action	out	dir

►	Select decimal point
▲	Increase
▼	Decrease

#### 4.4 Code = 224

By this code you enter the setting block of parameters related to the outputs, to the serial and selection local/remote ( see **Pressing the button ►(fast selection) in this window you can enter again the code setting window.**

**Table 4).**

To pass from a programming window to another press the button ►(fast selection). To exit the programming press the button PRG.

##### 4.4.1 Setting output type 1 (OUT1)

In this window it is possible to set up the kind of output you desire. The small display visualizes the **Out1** message, the big display visualizes the type of settable output with the buttons ▲(Increase) and ▼(Decrease).

0-- = output set as 0÷10V o 0÷20mA

4-- = output set as 4÷20mA

*The selection 0÷20mA or 4÷20mA must be done even by a hardware bridge LK1 (see Figure 2).*

##### 4.4.2 Span output 1 (SPN1) calibration

In this window it is possible to calibrate the output end scale 1. The small display visualizes the **SPn1** message, the big display visualizes the span value of the adjustable output by the buttons ▲(Increase) and ▼(Decrease).

##### 4.4.3 Setting output type 2 (OUT2)

In this window it is possible to set up the kind of desired output. The small display visualizes the message **Out2**, the big display visualizes the kind of settable output with the buttons ▲(Increase) and ▼(Decrease).

0-- = output set as 0÷10V or 0÷20mA

4-- = output set as 4÷20mA

*The selection 0÷20mA or 4÷20mA must be done even by a hardware bridge LK2 (see Figure 2).*

##### 4.4.4 Span output 2 (SPN2) calibration

In this window it is possible to calibrate the output end scale 2. The small display visualizes the **SPn2** message, the big display visualizes the span value of the adjustable

output by the buttons ▲(Increase) and ▼(Decrease).

##### 4.4.5 Minimum output 1 (LO 1) setup

In this window it is possible to set up the minimum output value 1. The small display visualizes the message **Lo 1**, the big display visualizes the percentage settable value by the buttons ▲(Increase) and ▼(Decrease).

##### 4.4.6 Maximum output 1 (HI 1) setup

In this window it is possible to set up the maximum output value 1. The small display visualizes the message **Hi 1**, the big display visualizes the percentage settable value by the buttons ▲(Increase) and ▼(Decrease).

##### 4.4.7 Minimum output 2 (LO 2) setup

In this window it is possible to set up the minimum output value 2. The small display visualizes the message **Lo 2**, the big display visualizes the percentage settable value by the buttons ▲(Increase) and ▼(Decrease).

##### 4.4.8 Maximum output 2 (HI 2) setup

In this window it is possible to set up the maximum output v2. The small display visualizes the message **Hi 2**, the big display visualizes the percentage settable value by the buttons ▲(Increase) and ▼(Decrease).

##### 4.4.9 Sensor selection (SENS)

In this window it is possible to select the type of desired sensor. The small display visualizes the message **SEnS**, the big display visualizes the type of settable sensor by the buttons ▲(Increase) and ▼(Decrease).

1 = MGC wire hot Sensor

2 = mA

EnC = Encoder

*The selection of the MGC sensor or of the standard input in mA must be done even by a hardware bridge LK6 (see Figure 2).*

##### 4.4.10 Timeout heating setting for MGC sensor (TRIS)

This window is present only if the the kind of sensor selected is MGC.

In this window it is possible to set the value in seconds of the heating time at the switching on of the device for the MGC sensor. The small display visualizes the message **triS**, the big display visualizes the value of settable time by the buttons ▲(Increase) and ▼(Decrease).

#### 4.4.11 Baud Rate setting (BAUD)

This window is present only if there is the RS485 board. In this window it is possible to set the baud rate. The small display visualizes the message **bAud**, the big display visualizes the value of Kbaud settable by the buttons ▲ (Increase) and ▼ (Decrease).

#### 4.4.12 Serial address setting (ADDR)

This window is present only if there is the RS485 board. In this window it is possible to set the value of the serial address of the regulator. The small display visualizes the message **Addr**, the big display visualizes the value of the settable address by the buttons ▲ (Increase) and ▼ (Decrease).

	Min output 2	Lo 2	000
	Max output 2	Hi 2	110
	Sensor selection	SEnS	1
	Heating Timeout MGC	triS	999
	Baud rate	bAud	96
	Serial address	Addr	01
	Local /remote	SEL	LOC
▲	Increase		
▼	Decrease		

#### 4.4.13 Selection programming remote/local (SEL)

This window is present only if there is the RS485 board. In this window it is possible to select the programming mode. The small display visualizes the message **SEL**, the big display visualizes the way of programming settable by the buttons ▲ (Increase) and ▼ (Decrease).

LOC = LOCAL mode : the regulator is programmed by the buttons placed on the front of the instrument

rEM = REMOTE mode : the regulator is programmed by access from the serial line

**Pressing the button ►(fast selection) in this window you can enter again the code setting window.**

**Table 4: Code 177 or 224**

BUTTONS	FUNCTION	SMALL DISPLAY	BIG DISPLAY
	Select		
	Output type 1	Out1	4 - -
	Output Span 1	SPn1	100
►►	Output type 2	Out2	4 - -
	Output Span 2	SPn2	100
	Min output 1	Lo 1	000
	Max output 1	Hi 1	110



Figure 2: Position LINK

LK1 = SELECTION OUTPUT TYPE 1 mA / V  
 LK2 = SELECTION OUTPUT TYPE 2 mA / V  
 LK5 = SELECTION INPUT TYPE MGC / mA

