CLEVELAND CONTROLS™

γ2 SERIES

Process controller
Setpoint programmer
1/16 DIN - 48 x 48 mm
gamma 2® series M5 line

The M5 model is the most sophisticated controller of the gamma2® Series. Its advanced features provide high-speed data acquisition and signal management and ensure efficient transfer of information to the supervisor. Simple, customizable procedures keep it user friendly.

The continuous, self-teaching adaptive tuning option enables M5 controllers to recalculate PID parameters as process conditions change without operator intervention. Outputs (analog, time-proportioning or valve control) are freely addressable to the various functions including control, alarm or retransmission.
Equipped with a programmable set point and memory chip, the M5 is a mini process controller.

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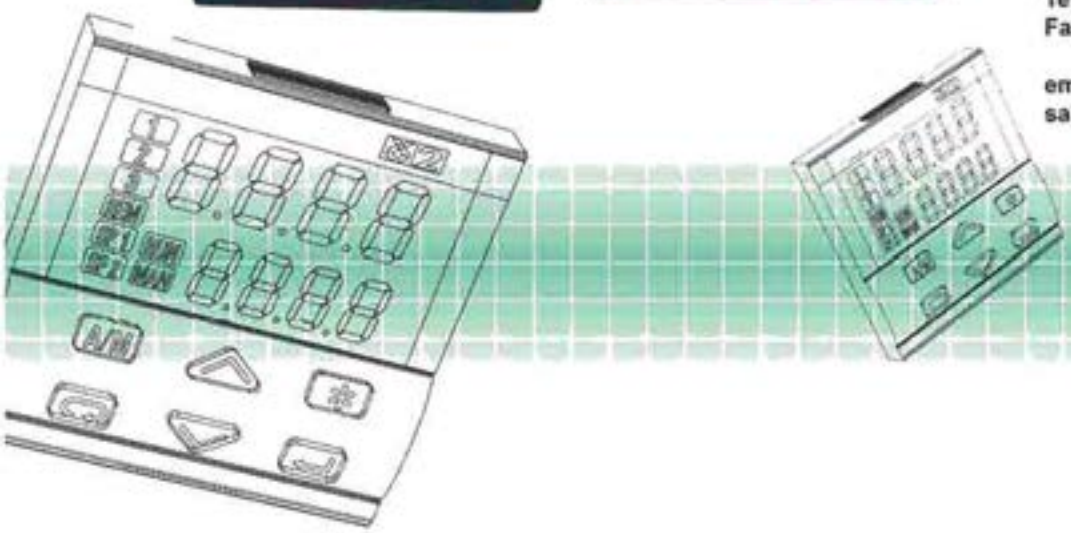
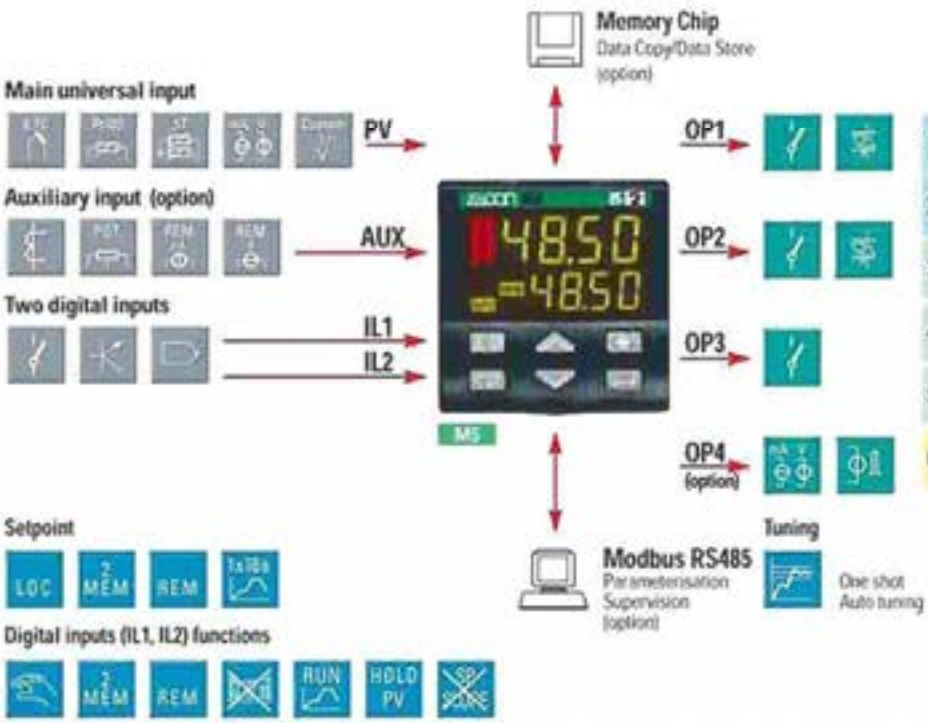


ISO 9001 Certified

gamma 2®

Your needs	Our solutions
High speed data acquisition and signal management	Sampling time: 100ms measure update time: 50 ms
Use of different actuators	Analogue output, heat/cool (linear, water, oil), valve control output with potentiometer position feedback
Process with time variable characteristic	Initial and automatic calculation of the right control parameters
Alarm signalling and diagnostic	4 alarms addressable to one or more outputs, latching/blocking, absolute or deviation thresholds, loop break alarm, heater break alarm by current transformer input
Interfacing with other devices	Serial communications at 19200 baud Modbus/Jbus protocol, analogue retransmission output and Remote Setpoints
Temperature profile	1 program with 16 segments, 2 stored Setpoints
Safe and reproducible configuration and parameter settings	Memory chip for data transfer and storing, configuration and parameterisation software
Quick learning	Every model has the same operating method
Ergonomic compatibility with other devices	Two colours: beige or darkgrey front panels
Environmental protection	IP65 front panel protection (indoor, dust and water protection)
Easy to use	Ergonomic keypad, clear and comprehensive display
Noise immunity	Electromagnetic compatibility
Universal input signals, linear as well as non-linear	Configurable input (TC, RTD, mA, Volt and ΔT, infrared sensor, "custom" linearisation)
Reliability and safety	CE compatibility. is ISO 9001 certified, 3 years warranty
Technical support	Technical application assistance from ASCON sales and after sales service

Resources



Operating mode

	Control		Alarms			Retransmission
						PV/SP
1	Single action	OP1		OP2	OP3	OP4
2	Single action	OP4	OP1	OP2	OP3	
3	Double action	OP1	OP2		OP3	OP4
4	Double action	OP1	OP4	OP2	OP3	
5	Double action	OP4	OP2	OP1	OP3	
6	Valve	OP1	OP2		OP3	OP4

Technical data

Features at env. 25°C	Description			
Total configurability	The choices are: input type, operating mode, type of control, safety strategies, alarm strategies			
Operating modes	1 loop with single/double output			
	1 loop as the latter with the addition of the Setpoint programmer			
Control mode	Algorithm	PID with overshoot control or On-Off		
		PID with valve algorithm, for controlling motorised valves		
	Proport. band (P)	0.1 ÷ 999.9%		
	Integral time (I)	1 ÷ 9999 sec.	User enabled/disabled	PID control
	Derivative time (D)	0.1 ÷ 999.9 sec.		
	Manual reset	0 ÷ 100% output	User enabl./disabled	P and PD control
	Cycle time	0.2 ÷ 30.0 sec.		Time prop. control
	Hysteresis	0.1 ÷ 5.0%		On-Off control
	Dead band	0.0 ÷ 5.0%		Heat-Cool control
	Cool Proport. band	0.1 ÷ 999.9%		
	Cool Integral time	1 ÷ 9999 sec.	User enabled/disabled	
	Cool Der. time	0.1 ÷ 999.9 sec.		
	Cool cycle time	0.2 ÷ 30.0 sec.		
	Motor travel time	15 ÷ 600 sec.		Motorised valves
	Motor minim. step	0.1 ÷ 5.0%		
	Feedback potent.	100Ω ÷ 10KΩ		
PV input (for signal ranges see table 1)	Common characteristics	A/D converter with resolution of 160.000 points Update measurement time: 50 ms Sampling time (max. update time of the output adjustable): 0.1 ÷ 10.0 sec. configurable - Input shift: -60 ÷ +60 digit Input filter with enable/disable: 0.1 ÷ 999.9 sec.		
	Accuracy	0.25% ± 1 digits for temperature sensors 0.1% ± 1 digits (for mA and mV)		Between 100 ÷ 240V~ the error is minimal
	Resistance thermometer (for ΔT: R1+R2 must be <320Ω)	Pt100Ω a 0°C (IEC 751) °C/°F selectable	2 or 3 wires or 2 Pt100 for ΔT	Max. wire res.: 20Ω (3 wires) 0.1°C/10°C Env. t. <0.1°C/10Ω Wire res.
	Thermocouple	L,J,T,K,R,S (IEC 584) °C/°F selectable	Internal cold junction compensation	Max. wire res: 150Ω Sensitivity <2μV/°C Env. t. <0.5μV/10Ω Wire res.
	DC input (current)	0/4 ÷ 20mA Rj = 30Ω	Engineering units Decimal point conf. with or without √ Initial Sc.: -999 ÷ 9999 Full Sc.: -999 ÷ 9999 (minim. range 100 digits)	Input drift: <0.1% / 20°C Env. temperature
	DC input (voltage)	0 ÷ 50 mV Rj = 10MΩ		
		1-5/0-5/0-10V Rj = 10KΩ		
Auxiliary inputs (options)	Remote Setpoint. Not isolated accuracy 0.1%	Current 0/4 ÷ 20mA Rj = 30Ω	Bias in engineering units and ± range	
		Voltage 1-5/0-5/0-10V Rj = 300KΩ	Ratio from -9.99 ÷ +99.99	
			Local + Remote Setpoint	
	CT current transformer	max span 50 or 100 mA, how selectable	Display from 10 to 200 A resolution of 1A with alarm threshold (Heater break alarm)	
	Potentiometer	100Ω ÷ 10KΩ supply: 300mV	Position feedback measurement	
Digital inputs	2 logic	The closure of the external contact produces any of the following actions	Auto/Man mode change, Local/Remote Setpoint mode change, Stored Setpoints activation, keypad lock, measure hold and slopes inhibit.	
			Start, stop, hold of a program (only with Setpoint programmer)	
Control output (analogue)	Single or double channel, direct or reverse action			
	Minimum limit	0 ÷ 100.0% (OP1 heat)		
	Maximum limit	0 ÷ 100.0% (OP1 heat), -100.0 ÷ 0% (OP2 cool)		

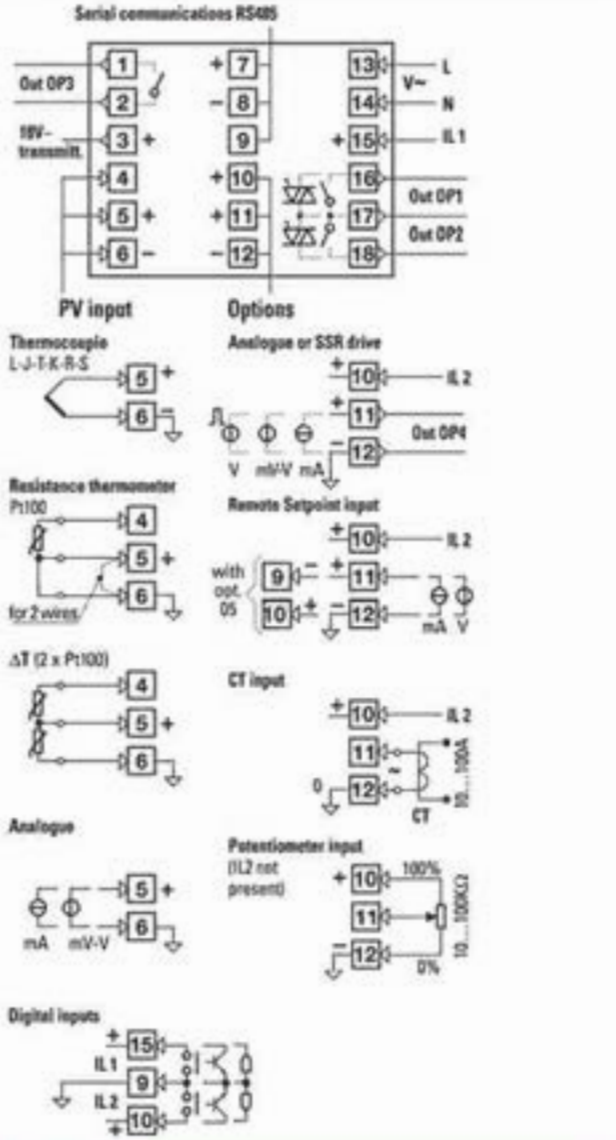
Input type	Scale range	
RTD Pt100Ω at 0°C	-200 ÷ 600	°C
	-328 ÷ 1112	°F
	-99.9 ÷ 300.0	°C
	-99.9 ÷ 572.0	°F
RTD 2xPt100Ω at 0°C for ΔT	-50.0 ÷ 50.0	°C
	-58.0 ÷ 122.0	°F
T/C type L Fe-Const.	0 ÷ 600	°C
	32 ÷ 1112	°F
T/C type J Fe-Cu 45% Ni	0 ÷ 600	°C
	32 ÷ 1112	°F
T/C type T Cu - CuNi	-200 ÷ 400	°C
	-328 ÷ 752	°F
T/C type K Cromel Alumel	0 ÷ 1200	°C
	32 ÷ 2192	°F
T/C type R Pt13%Rh-Pt	0 ÷ 1600	°C
	32 ÷ 2912	°F
T/C type S Pt10%Rh-Pt	0 ÷ 1600	°C
	32 ÷ 2912	°F
0/4 ÷ 20 mA, 0 ÷ 50 mV	Configurable engineering units	
0/1 ÷ 5 V, 0 ÷ 10 V	mA, mV, V, bar, psi, Rh, ph	
mV Custom scale	On request	

Table 1 : PV input

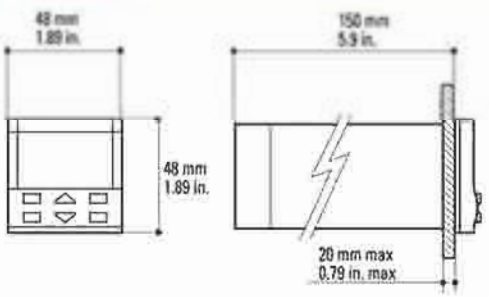
Technical data

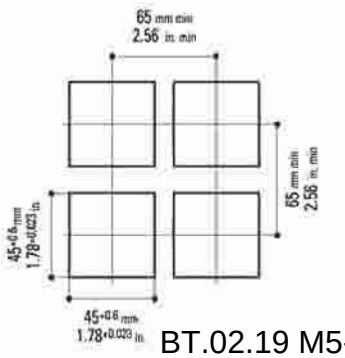
Features at env. 25°C	Description				
	Max. slope	0.01 ÷ 99.99%/sec. up and down			
	Safety value	-100 ÷ 100%. User enabled/disabled			
Control output	Time proportioning	Relay	Double action, 2 poles NO, 2A/250V~ resistive loads		
		Triac	Double action, 2 poles NO, 1A/250V~ resistive loads		
		SSR drive	0 ÷ 22V-, 20mA max (for static switches)	Galvanic isolation 500V~/1min. 12 bit (0.025%) Accur. 0.1% Short circuit protection	
	Analogue (optional)	Current	0/4 ÷ 20mA max 750Ω/10V max		
		Voltage	0 ÷ 1/5/10V 500Ω / 20mA max		
	Motorised valve (3 states) Raise - Stop - Lower	Double action 2 poles NO, 2A/250V~ resistive load			
	2 poles NO, 2A/250V~ resistive load - hysteresis 0.1 ÷ 5.0% symmetrical				
Alarms	Action	Active high	Action type	Deviation threshold	± range
				Band threshold	0 ÷ range
		Active low		Absolute threshold	Whole range
		Special functions	Heater Break detection		
			Loop Break Alarm		
			Activation inhibit (blocking)		
			Acknowledge (latching)		
			Related to the program (optional) (OP3)		
Analogue output OP4 (optional)	Galvanic isolation 500V~/1min Resolution: 12 bit (0.025%) Accuracy: 0.1% Short circuit protected	Current 0/4 ÷ 20mA 750Ω/10V max	Retransmission of PV or SP		
		Voltage 1-5/0-5/0-10V 500Ω/20mA max			
Setpoint	Ramp up and down, with slope in digit/sec., digit/minute or digit/hour between 0.0 ÷ 10.0% of the range High and low limits	Local plus 2 stored Setpoints			
		Only Remote			
		Local and Remote			
		Local with trim			
		Remote with trim			
		Time programmable (optional) (OP3)			
Programmable Setpoint (optional)	1 program, 16 segments (1initial and 1 end) From 1 to 9999 cycles or continuous cycling (OFF) Time values in seconds, minutes and hours Start, stop, hold, etc. activated from the keypad, digital input and serial comm.s				
Tuning	One shot tune-step response method for calculating the PID terms parameters				
	Adaptive tune self-learnig, not intrusive, analysis of the process response to disturbances and continuous calcufation of the PID parameters (not available with the Setpoint Programmer option)				
Auto/Manual station	Integrated in the controller, bumpless				
Serial comm.s (optional)	Operated from keypad, digital inputs and serial communications RS 485 isolated, Modbus/Jbus				
	1200, 2400, 4800, 9600, 19200 bit/sec., 2 wires				
Auxil. supply	18V~ ± 20%, 30mA max for transmitters (2, 3, 4 wires)				
Operational safety	Measure input	Detection of out of range, short circuit or sensor break with automatic activation of the safety strategies and alerts on display			
	Control output	Safety value:-100 ÷ +100%, (user enabled/disabled)			
	Parameters	Parameters and configuration data are stored in a non volatile memory for an unlimited time. They are organised in functionally homogeneous groups, as: visible and changeable, visible and not changeable, not visible			
	Access protection	Password to access the configuration data and the parameter protection menu			
General characteristics	Power supply	100-240V~ (-15% +10%) 50/60Hz or 24V~(-25% +12%), 50/60Hz and 24V- (-15% +25%). Power consumption 3W max			
	Safety	Compliance EN61010-1 (IEC 1010-1), inst. class 2 (2500V), poll. class II			
	Electromagnetic compatibility	Compliance to the CE standards for industrial system and equipment			
	Protection EN60529 (IEC 529)	IP65 front panel			
	Dimensions	1/16 DIN - 48 x 48, depth 150 mm, weight 230 gr apx.			

Electrical wirings



Dimensions



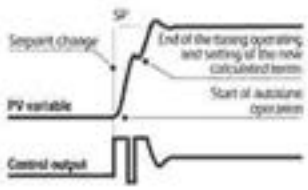


BT.02.19 M5-E

Tuning

Two methods of tuning are available:
- **Auto-Tuning** "one shot"
- **Adaptive-Tuning** continuous and self-teaching

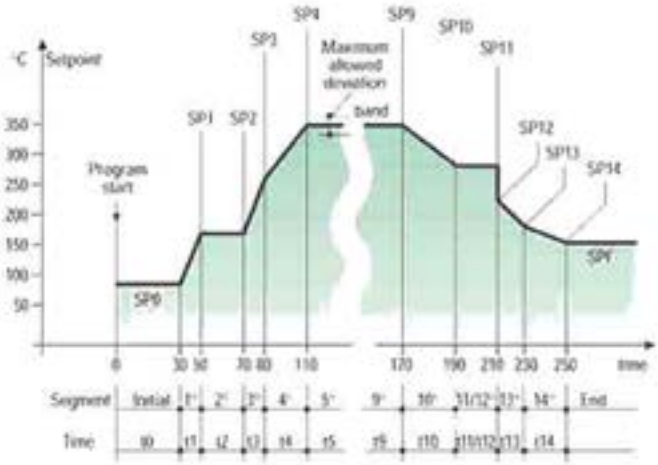
The **Auto-Tuning** method works best on the step response basis. When activated it modifies the output value and, in a short time, calculates the PID parameters. The new algorithm is operational immediately.
The main advantages of this method are fast calculation and quick implementation.



The ASCON self teaching **Adaptive-Tuning** waits for process change to recalculate the new PID parameters.
The new PID calculation does not influence the control output, avoiding any disturbance.
The PID optimisation is done only when necessary (e.g. Setpoint changes or process disturbances like load changes).
No action by the operator is required.
The operating mode of Adaptive-Tuning is safe and user friendly.
It tests the process response after a disturbance, it memorises the intensity and frequency of the reaction, then the Adaptive-Tuning checks the new information with its statistical data base.
The correct PID algorithm is then ready to implement.
This tuning is ideal for non-linear processes where the PID parameters must be adapted to changing conditions.

Setpoint programmer

If the Adaptive-Tuning is not requested, the controller can be fitted with a Setpoint programmer option.
A profile of up to 16 segments can be programmed.
Number of cycles as well as the max. allowed deviation can be configured.
The time base can be selected from seconds, minutes and hours. Run, Hold and Stop functions can be performed by means the front keypad or by external commands.



Integrity in data copy

Memory chip

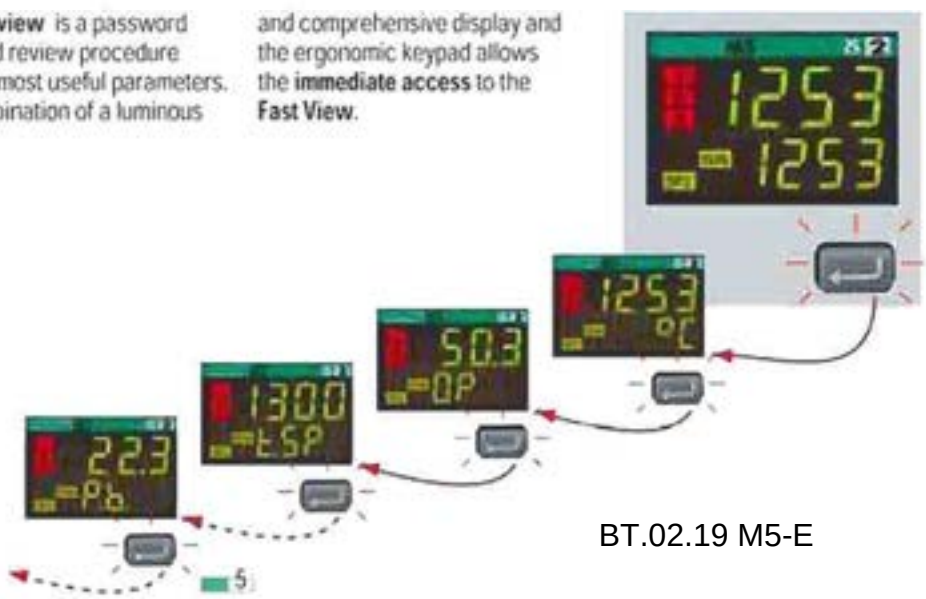
The **memory chip** makes possible a fast and safe transfer of data related to the configuration and all parameters.
With a simple operation, the information can be stored and copied to the **memory chip**.
The procedure can be protected by a password.

Configuration software

A software tool is available to improve both the configuration and the parameterization.
All the data can be stored to file.
It is also possible to down-load the linearisation of the "custom" input by using the polynomial's coefficients.

Fast view - fast parameter access

The **Fast view** is a password protected review procedure of the 10 most useful parameters.
The combination of a luminous and comprehensive display and the ergonomic keypad allows the **immediate access** to the **Fast View**.



S E R I E S

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Ordering codes

	Line	Basic model					Accessories			
Model:	M5	A	B	C	D	-	E	F	G	0

Power supply
Outputs
Serial comm.s/Options
Setpoint
Instr. handbook
Colour

Power supply	A
100-240V~ (-15% +10%)	3
24V~ (-25% +12%) or 24V⎓ (-15% +25%)	5

Outputs OP1 (OP2)	B
Relay-Relay	1
Relay-Triac	2
Triac-Relay	4
Triac-Triac	5

Serial comm.s	Options		C	D
Not fitted	None [2]		0	0
	Auxiliary input	Feedback potentiometer [2]	0	1
		Remote Setpoint [1]	0	2
		Current transformer	0	3
	Auxiliary output	SSR drive/Analogue	0	4
		SSR drive/Analogue + Remote Setpoint [1] [2]	0	5
RS 485 Modbus/Jbus protocol	None [2]		5	0
	Auxiliary input	Feedback potentiometer [2]	5	1
		Remote Setpoint [1]	5	2
		Current Transformer	5	3
	SSR drive/Analogue auxiliary output		5	4

Setpoint Programmer	E
Not fitted	0
Fitted (adaptive-tuning not available)	1

Instruction handbook	F
Italian-English (std)	0
French-English	1
German-English	2
Spanish-English	3

Front case colour	G
Dark (std)	0
Beige	1

[1] Not available with Setpoint programmer installed (E =1)
[2] Second digital input (IL2) not available