

Process controller with PROFIBUS DP and Modbus Master/Slave 1/4 DIN - 96 x 96 mm gammadue® series Q5 line



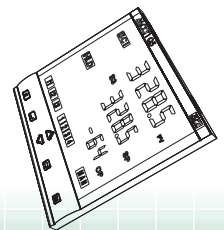
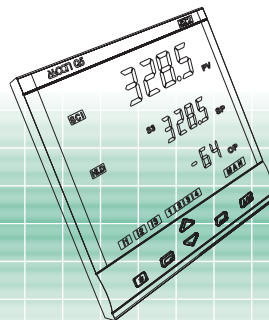
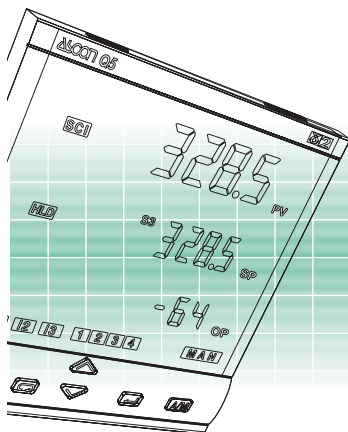
Sophisticated multifunction process controller with high level communications

By its three different kinds of serial communications:

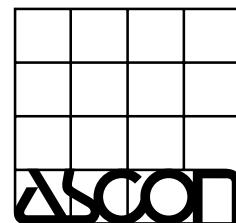
- PROFIBUS DP Slave
- Modbus Master
- Modbus Slave,

the **gammadue®** Q5 line can interface, on different levels, with other devices, by exchanging informations, after processing them by mathematical package.

The frequency input, added to the traditional inputs, two retransmission or control analogue outputs and four programs allow you to use it for the most diversified control strategies.



ISO 9001 Certified



Tuning

- Two methods of tuning are available:
- one shot **initial Fuzzy-Tuning**
 - self-teaching **continuous Adaptive-Tuning**

Fuzzy-Tuning

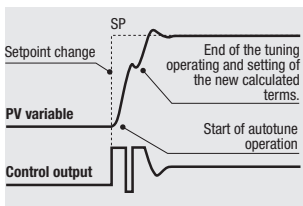
Two methods of initial tuning are available:

- **Auto-Tuning "one shot"**
- **Natural frequency "one shot"**

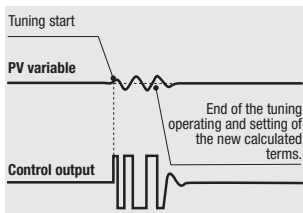
The **Fuzzy-Tuning** automatically selects one of the two methods which assure the best result for each condition.

The **Auto-Tuning** method works best on the step response basis.

When activated, if a deviation exists between the Setpoint and process variable larger than 5% of scale range, the controller modifies the output value. Then, in a short time, it calculates the PID parameters and the new algorithm is operational immediately. The main advantages of this method are fast calculation and quick implementation.



The **Natural frequency** method works best when the process variable is very near to the Setpoint. When activated, it causes a process oscillation around the Setpoint value. The main advantage of this method is a reduced disturbance to the process.



Adaptive-Tuning

It is self-teaching and waits for process change to recalculate the new PID parameters.

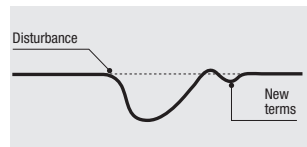
The new PID calculation does not influence the control output, avoiding any disturbance.

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.



Integrity in data copy

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 and to configure the PROFIBUS DP profile file.

Memory chip

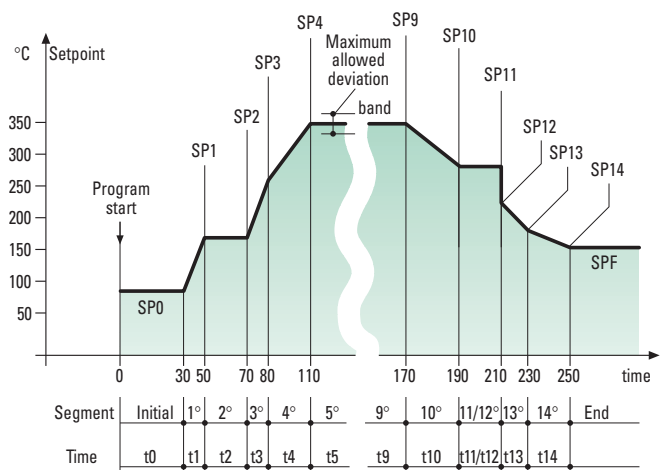
The **memory chip** makes possible a fast and safe transfer of data related to the configuration and all parameters. With a simple operation, the information can be stored and copied to the **memory chip**. The procedure can be protected by a password.



Setpoint programmer

Up to 4 profiles with 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, by external commands or by serial communications.



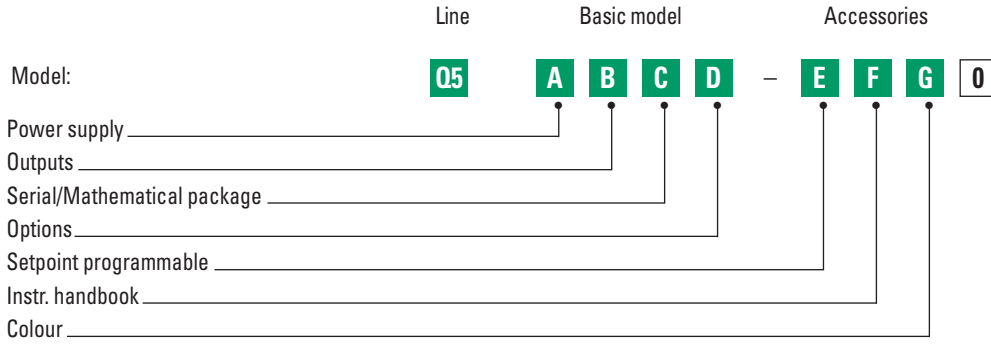
Technical data

Features (at 25°C T. env. amb.)	Description	
Total configurability	From keypad or serial communication the user selects: - the type of input - the type of Setpoint - the type of control algorithm - the type of output - the type and functionality of the alarms - control parameter values - access levels	
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 s. Configurable - Input shift: - 60...+ 60 digit Input filter with enable/disable: 0.1...999.9 seconds
	Accuracy	0.25% ± 1 digits for temperature sensors 0.1% ± 1 digits (for mV and mA)
	Resistance thermometer (for ΔT: R1+R2 must be <320Ω)	Pt100Ω at 0°C (IEC 751) °C/°F selectable
	Thermocouple	L, J, T, K, S, R, B, N, E, W3, W5 (IEC 584) Rj > 10MΩ °C/°F selectable
	DC input (current)	4-20mA, 0-20mA Rj > 30Ω
	DC input (voltage)	0-50mV, 0-300mV Rj > 10MΩ 1-5, 0-5, 0-10V Rj > 10kΩ
	Frequency (option)	Low level ≤ 2V 0-2.000 / 0-20.000Hz High level 4-24V
Auxiliary inputs	Remote Setpoint not isolated accuracy 0.1%	Current 0/4-20mA Rj = 30Ω Voltage 1-5, 0-5, 0-10V Rj = 300kΩ
	Potentiometer	from 100Ω to 10kΩ
Digital inputs 3 logic	The closure of the external contact produces any of the following actions:	Auto/Man mode change, Local/Remote Setpoint mode change, 3 Stored Setpoint activation, keyboard lock, measure hold, slope inhibit and output forcing Program Run/Hold and selection (if option installed)
Operating mode and Outputs	1 single or double action PID loop or On/Off with 1, 2, 3 or 4 alarms	
Control mode	Algorithm	PID with overshoot control or On/Off, valve drive PID algorithm to control motorised positioners
	Proport. band (P)	0.5...999.9%
	Integral time (I)	1...9,999 s
	Derivative time (D)	0.1...999.9 s
	Error dead band	0.1...10.0 digit
	Overshoot control	0.01...1.00
	Manual reset	0...100%
	Cycle time (Time proportional only)	0.2...100.0 s
	Min./Max output limits	0...100% separately adjustable
	Control output rate limit	0.01...99.99%/s
	Soft-start output value	1...100% time 1...9,999 s
	Output safety value	-100...100%
	Control output forcing value	-100...100%
	Control output hysteresis	0...5% Span in engineering units
	Dead band	0.0...5.0%
	Cool proportional band (P)	0.5...999.9%
Cool integral time (I)	1...9,999 s	
Cool derivative time (D)	0.1...9,999 s	
Cool cycle time (Time proportional only)	0.2...100.0 s	
Cool control output high limit	0...100%	
Cool output max. rate	0.01...99.99%/s	

Input type	Scale range
RTD Pt100 IEC751	-99.9...300.0 °C
	-99.9...572.0 °F
	-200...600 °C
RTD 2xPt100 IEC751 per ΔT	-328...1112 °F
	-50.0...50.0 °C
TC L Fe-Const DIN43710	-58.0...122.0 °F
TC J Fe-CU45% NI IEC584	0...600 °C
TC T Cu-CuNi IEC584	0...600 °C
TC K Chromel-Alumel IEC584	-200...400 °C
TC S Pt10% Rh Pt IEC584	-328...752 °F
TC R Pt13% Rh Pt IEC584	0...1,200 °C
TC B Pt30% Rh Pt 6% IEC584	32...2,192 °F
TC N Nicrosil-Nisil IEC584	0...1,600 °C
TC E Ni10% CR CuNi IEC584	32...2,912 °F
TC NI-NiMo18%	0...1,600 °C
TC D W3%Re 25%Re IEC584	32...2,912 °F
TC C W5%Re W26%Re IEC584	0...2,000 °C
0/4...20 mA	32...3,632 °F
0...50/300 mV	0...2,000 °C
0/1...5 V	32...3,632 °F
0...10 V	0...2,000 °C
Custom scale	0...1,112 °F
Frequency (option)	0...1,100 °C
	32...2,012 °F
	0...2,000 °C
	32...3,632 °F
	0...2,000 °C
	32...3,632 °F
	Configurable engineering units mA, mV, V, bar, psi, Rh, ph
	On request
	0...2kHz or 0...20kHz

Table 1: PV input

Ordering codes



Power supply	A
100-240V~ (-15% +10%)	3
24V~ (-25% +12%) or 24V~ (-15% +25%)	5
OP1-OP2 outputs	B
Relay-Relay	1
Triac-Triac	5
Serial communications/Mathematical package	C
Not fitted	0
Mathematical package	1
RS 485 Modbus/Jbus SLAVE + Mathematical package	5
RS 485 Modbus/Jbus SLAVE+MASTER + Mathematical package	6
PROFIBUS DP SLAVE + Mathematical package	7
RS 485 Modbus/Jbus SLAVE+PROFIBUS DP SLAVE + Mathematical package	8
Options	D
None	0
Frequency input (Remote Setpoint not available)	1
Second analogue/digital output (OP6)	4
Frequency input + second analogue output (OP6) (Remote Setpoint not available)	6
Setpoint programmer	E
Not fitted	0
Four "16 segments" programs	4
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

If not differently specified the controller will be supplied with standard version
Model: Q5 3100-0000