

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



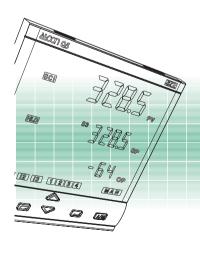


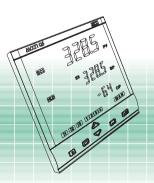
Sophisticated multifunction process controller with high level communications

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.

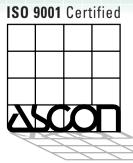












Tuning

Two methods of tuning are available:

- one shot initial Fuzzy-Tuning
- self-teaching continuous Adaptive-Tuning

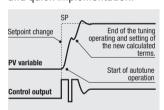
Fuzzy-Tuning

Two methods of initial tuning are available:

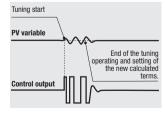
- Auto-Tuning "one shot"
- Natural frequency "one shot" The Fuzzy-Tuning automatically selects one of the two methods which assure the best result for each condition.

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

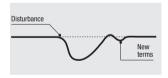
It is self-teaching and waits for process change to recalculate the new PID parameters. The new PID calculation does not influence the control output, avoiding any disturbance.

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 nonlinear 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

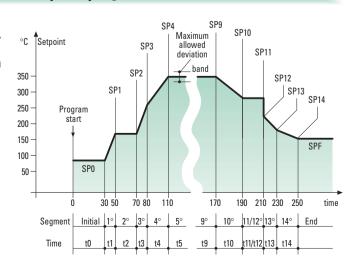
The memory chip makes possible a fast and safe transfer of data related to the configuration and all parameters.
With a simple operation, the information can be stored and copied to the memory chip. The procedure can be protected by a password.



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

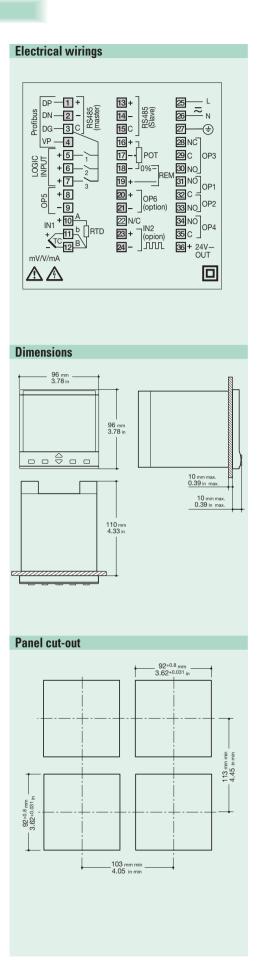
Features	Description							
(at 25°C T. env.amb.) Total configurability	From keypad or serial communication the user selects: - the type of input - the type of Setpoint - the type of control algorithm - the type of output - the type and functionality of the alarms - control parameter values - access levels							
	Common characteristics	A/D converter w Update measure Sampling time (n 0.110.0 s. Config Input filter with e	points output adjustable): + 60 digit 3.9 seconds					
PV input (for signal ranges see table 1)	Accuracy	0.25% ± 1 digits fo 0.1% ±1 digits (fo		Between 100 and 240V~error is minimal				
	Resistance thermometer (for ΔT : R1+R2 must be <320 Ω)	Pt100 Ω at 0°C (IEC 751) °C/°F selectable L,J,T,K,S,R,B,N,E, W3,W5 (IEC 584) Rj >10M Ω	2 or 3 wires connection Burnout (with any combination) Internal cold junction compensation with NTC Error 1°C/20°C		<2µV/°C Env. Temp.			
	DC input (current)	$\begin{tabular}{lll} $\circ C/\circ F$ & $\pm 0.5 \circ C$ Burnout$ \\ $selectable$ & $4-20mA, 0-20mA$ \\ $R_j>30\Omega$ & Burnout. Engineering units, conf. decimal point, position with or without $\sqrt{}$ \\ $I-5, 0-5, 0-10V$ & R_j>10k\Omega$ & F. Sc.: $-9999,999 \\ $I.S.:9999,999$ & F. Sc.: $-9999,999$ \\ \end{tabular}$			<5μV/10Ω Wire Res.			
	DC input (voltage)				Input drift: <0.1% / 20°C Env. Temp. <5μV/10Ω Wire Res.			
	Frequency (option) 0-2.000 / 0-20.000Hz	Low level ≤2V High level 4-24V Current	(min. range of 100 digit					
Auxiliary inputs	RemoteSetpoint not isolated accuracy 0.1%	0/4-20mA Rj = 30Ω Voltage 1-5, 0-5, 0-10V Rj = 300kΩ	gineering un -9.99+99.9 mote Setpoi					
	Potentiometer The closure of the	from 100Ω to 10 k Ω						
Digital inputs 3 logic	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		uble action PID loop or On/Off with 1, 2, 3 or 4 alarms						
απα σαφαιδ	Algorithm PID with overshoot control or On/Off, valve drive PID algorithm to control motorised positioners							
	Proport. band (P)	0.5999.9%	ou positioner					
	Integral time (I) Derivative time (D)	19,999 s 0.1999.9 s		enabled				
	Error dead band	0.110.0 digit		disabled				
	Overshoot control	0.011.00		-				
	Manual reset Cycle time (Time	0100%		Single action				
	poportional only)	0.2100.0 s		PID algorithm				
	Min./Max output limits	0100% separat	ole	_				
	Control output rate limit	0.0199.99%/s						
Control mode	Soft-start output value	1100% time 19,999 s	enabled					
	Output safety value	-100100%	disabled					
	Control output forcing value	-100100%						
	Control output hysteresis	05% Span in e	units	On/Off algorithm				
	Dead band	0.05.0%						
	Cool proportional band (P)	0.5999.9%						
	Cool integral time (I)	19,999 s		enabled	Double action			
	Cool derivative time (D)	0.19,999 s	disabled	PID algorithm (Heat/Cool)				
	Cool cycle time (Time proportional only)	0.2100.0 s						
	Cool control output high limit	0100%						
	Cool output max. rate	0.0199.99/s						
		1			5			

Input type	Scale range
	-99.9300.0 °C
RTD Pt100 IEC751	-99.9572.0 °F
NID PLIOUIEC/31	-200600 °C
	-3281112 °F
RTD 2xPt100	-50.050.0 °C
IEC751 per ∆T	-58.0122.0 °F
TC L Fe-Const	0600 °C
DIN43710	321,112 °F
TC J Fe-CU45% NI	0600 °C
IEC584	321,112 °F
TC T Cu-CuNi	-200400 °C
IEC584	-328752 °F
TC K Chromel-Alumel	01,200 °C
IEC584	322,192 °F
TC S Pt10% Rh Pt	01,600 °C
IEC584	322,912 °F
TC R Pt13% Rh Pt	01,600 °C
IEC584	322,912 °F
TC B Pt30% Rh Pt 6%	01,800 °C
IEC584 TC N Nicrosil-Nisil	323,272 °F
IEC584	01,200 °C
TC E Ni10% CR CuNi	322,192 °F 0600 °C
IFC584	321,112 °F
IEU304	01,112 °C
TC NI-NiMo18%	322,012 °F
TC D W3%Re 25%Re	02,000 °C
IEC584	323,632 °F
TC C W5%Re W26%Re	02,000 °C
IEC584	323,632 °F
0/420 mA	
050/300 mV	Configurable
0/15 V	engineering units
0,10 V	mA, mV, V, bar, psi, Rh, ph
Custom scale	On request
Frequency (option)	02kHz or 020kHz

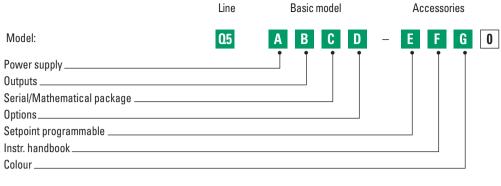
Table 1: PV input

Technical data

Features (at 25°C T. env.amb.)	Description								
	Motor travel time 1		15.	5600 s					
Control mode	Motor minim			to 0	0.15.0%		Valve drive PID a	algorithm	
	Feedback potentiometer			100					
OP1-0P2	SPST relay N.O., 2A/250V~ for resistive load								
outputs	Triac, 1A/250V~ for resistive load								
OP3 output	SPDT relay N.O., 2A/250V~ for resistive load SPST relay N.O., 2A/250V~ for resistive load								
OP4 output	SPST relay N	I.O., 2A/				ad			
Analogue / digital OP5 and OP6 (option) outputs	Control retransmission of PV/SP		Galvanic isolation: 500V~ /1 min. Short circuit protected Resolution 12 bit Accuracy: 0.1%		nin. cuit I n 12 bit	Digital: 0	nalogue: $0/15V$, $010V$, 500Ω / 20 mA max. $0/420$ mA, 750Ω /15V max. ligital: $0/24V$ - $\pm10\%$ - 30 mA max. or solid state relay		
	Hysteresis 0	5% Sr	Span in engineering u			its			
	117010100100	Active	o high			n threshold ±ran	ne .		
AL1- AL2 - AL3					Action type Sensor brea	Band th	reshold 0r	ange	
AL4 alarms		Active	ive low			Absolut	e threshold whol	e range	
	Action					k, heater	break alarm		
		Special			Acknowledge (latching), activation inhibit (blocking)				
		runctio	unctions		The state of the s				
	Local + 3 sto	red			OP3, OP4 connected to Timer or Program (if option installed) Up and down ramps 0.1999.9 digit/min or digit/h				
	Remote only				(OFF=0)				
	Local and Remote				Low limit:				
Setpoint	Local with trim				from low range to high limit				
	Remote with trim				High limit:				
	Programmable If option				from low limit to high range				
	instaned hemote Setpoint not available with frequency input								
Programmable	4 programs, 16 segments (1 initial and 1 end)								
Setpoint	From 1 to 9999 cycles or continuous cycling (OFF)								
(optional)	Time values in seconds, minutes and hours Start, stop, hold, etc. activated from the keypad, digital input and serial line								
	Fuzzy-Tuning type. The controller selects automatically Step response								
	the best method according to the process conditions Natural frequency								
Tuning	Adaptive Tune self-learning, not intrusive, analysis of the process response to perturbations and continuous calculation of the PID parameters								
Auto/Man	Standard wit	th bump	less fu	ıncti	on,				
Serial comm.s (option)	by keypad, digital or serial communications RS 485 isolated, SLAVE Modbus/Jbus protocol, 1,200, 2,400, 4,800, 9,600, 19,200 bit/s 3 wires. RS 485 isolated, MASTER Modbus/Jbus protocol, 1,200, 2,400, 4,800, 9,600, 19,200 bit/s 3 wires. RS485 asynchronous / isolated, PROFIBUS DP protocol, from 9,600 bit/s at 12MB/s selectable, max. lenght 100 m (at 12 Mb/s).								
Auxiliary supply	+24- ± 20% 3	30mA ma	ax fo	or ex	ternal tran	smitter s	supply		
	Measure input	Measure Detection of out of range, short circuit or sensor break with						break with alerts on display	
Operation	Control output	S	Safety	and	forcing val	ue sepa	rately adjustable:	-100%100%	
alarm safety	Parameters						data are stored in	a non volatile	
	Access protection	P F	memory for an unlimited time Password to access the configuration and parameters data Fast view						
General characteristics	Power suppl (fuse protect	tod) 2						Power consumption 5W max.	
	Safety	C p	Compliance to EN61010-1 (IEC1010-1), installation class 2 (2,50 pollution class 2, instrument class II						
	Electromagn		Compliance to the CE standards						
	UL and cUL Approval	F	File E176452						
	Protection EN60529 (IEC Dimensions	J3231	IP65 front panel						
Dimensions 1/4 DIN - 96 x 96, depth 110 mm, weight 500 g approx.						μι υλ.			



Ordering codes



Power supply	A
100-240V~ (-15% +10%)	3
24V~ (-25% +12%) or 24V- (-15% +25%)	5
OP1-OP2 outputs	В
Relay-Relay	1
Triac-Triac	5
Carriel and the street of the	C
Serial communications/Mathematical package Not fitted	
Mathematical package	0
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
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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 E
Not fitted	0
Four "16 segments" programs	4
Tour To segments programs	
Instruction handbook	F F
Italian-English (std)	0
French-English	1
German-English	2
Spanish-English	3
Front case colour	G
Dark (std)	0
Beige	

If not differently specified the controller will be supplied with standard version $\pmb{\mathsf{Model}\colon \mathsf{Q5\,3100\text{-}0000}}$