

Process Controller 1/4 DIN - 96 x 96 mm Dual-loop - QD line Controller - Programmer QP line

The Hardware Package

2 analog inputs, 1 remote set input, 3 logic inputs, 2 control outputs, 4 auxiliary relay outputs, 2 logical outputs, 1 retransmission and RS485 Modbus-Jbus communication.

Complete Configurability

From the keyboard and via serial connection, using a guided menu, you can choose the operation mode, the control algorithm, the input and output types, the Set points. You can also insert all parameters.

FUZZY Intelligence

In combination with the PID algorithm and an advanced tuner, this always guarantees a smooth and precise regulation, even for critical processes.

High Security

Guaranteed: by the ISO9000 certificate for planning and construction quality; by the CE brand for security and immunity from disturbances; and by 3 levels of accessibility to parameters.

These 96x96 DIN controllerprogrammers are particularly suitable for the control of industrial processes.







ASCON spa

20021 Bollate - (Milano) Italy - Via Falzarego, 9/11 - Tel. +39 02 333 371 - Fax +39 02 350 4243 http://www.ascon.it e-mail info@ascon.it



QD Series - Dual Controller configurable as: 1 loop, cascade, ratio or 2 independent loops QP Series - Controller-Programmer 16 programs 255 segments

All the performance for precise and safe control

The Hardware Package

- Up to 2 inputs for thermocouples, Pt 100, mA, Volt.
- 3 logical inputs for modifying the operating modes: Auto/Man, Local/Remote, keyboard lock, etc...
- Up to 2 control outputs with single or double action: relay or logic, mA or Volt and three point stepping.
- Up to 4 configurable auxiliary relay outputs and 2 logic outputs associated to the program.
- 1 isolated auxiliary output, in mA or Volt, for input, Set point, output or deviation retransmission.
- All types of Set points. The possibility of selecting between Local and Remote, Programmed (QP Series), and of choosing one among the 3 stored Set points.
- RS485 serial communication, with Modbus-Jbus protocol.

Complete Configurability.

The possible variants are all always available in the instrument. The operation mode is chosen based on the application. In field operation it is always possible, with the greatest simplicity, to reconfigure the instrument to adapt it to unexpected new requirements. The configuration is effected by keyboard or in serial line. Using a simple, menu-driven tree structure, you can choose, in sequence: control algorithm, input types, ranges, engineering units, output type with security values, Set points, etc...

Fuzzy Intelligence and an advanced "Tuning"

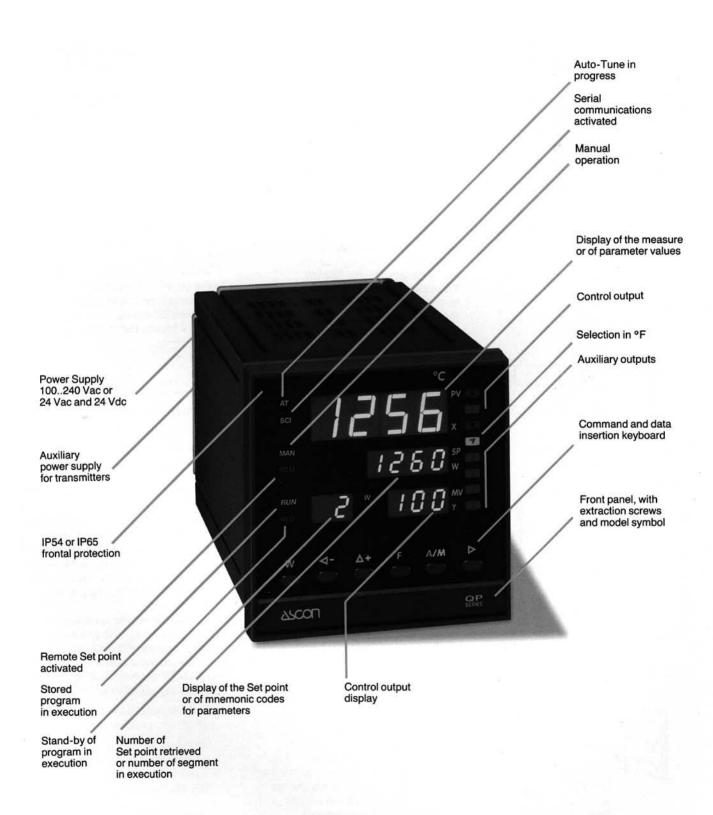
The power and flexibility offered by an advanced PID combined with FUZZY Logic guarantee a precise regulation of the most critical processes, whether in response to the dynamic solicitations or to any variations of the Set point. The tuning of the control parameters is highly facilitated by the use of an intelligent self-tuning algorithm.

Maximum Protection

All parameters are saved for an unlimited time in non-volatile memory. Their access is protected by password. They are divided into 4 homogeneous groups and are configurable with 3 different levels of operativity: visible and modifiable, visible but not modifiable, invisible. All this gives the instrument more security, but at the same time, more ease for the final operator, without limiting the great flexibility of use.

High Security

Like all ASCON instruments, these are designed in conformance with the most recent EN-IEC security regulations for industrial systems and apparatus, marked with the CE brand, and built in accordance with ISO9002/EN29002 Quality Assurance Management System, guaranteed by CSQ.



Operation

Fig. 1: Block diagram of Cascade control mode

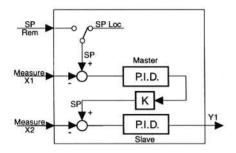


Fig. 2: Block diagram of Ratio control mode

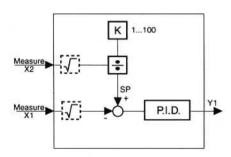


Fig. 3: Outline of Programs selection switch

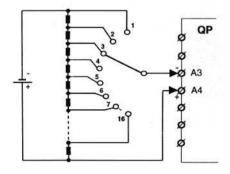
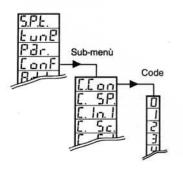


Fig. 4: Tree-structure of Function Menù



OPERATIONAL MODES

The QD Series process controller includes 2 distinct loops which can be coordinated with each other.

4 selectable operational modes are planned, in configuration as:

1 loop with single or double action, Cascade control loop with single or double action,

Ratio control loop with single or double action.

2 independent loops.

Cascade Control (See fig.1)

The primary controller output (Master) becomes the Set point for the secondary controller (Slave). This operational mode is particularly useful in critical processes, where there are long delays, dead times, non linearity, etc.

In fact, the secondary controller anticipates and practically cancels the perturbances acting on the primary process for a more efficient and stable control.

Ratio Control (see fig. 2).

A ratio between two variables in the process is maintained at a fixed value. Thanks to the capability of calculating the square root of the input values, it is suitable for combustion control (air/fuel ratio) or for the mixing of 2 fluids.

Set point Programmer

QP Series are single loop controllers, offering programmed Set point as an additional option. When operating as Controller-Programmer, a program is built using a simple guided procedure, formed out of the sequence of segments (see fig. 5).

For each of these segments, the end point is set along with the time, in addition to the associated logic output status and to the PID parameters chosen between two available sets. The number of loops (finite or infinite) is configurable, as is the execution mode: based on duration priority or on slope-priority of the segments. Up to 16 programs can be stored, with a max of 99 segments/program, for a max of up to 255 segments.

You can select, run and suspend the program from the keyboard, from logic inputs or through serial port.

A program can also be executed easily using and external voltage divider (see fig. 3).

Display of the progress status (segment being executed, time elapsed, time left, etc.) helps the operator.

MENU DRIVEN FUNCTIONS

The man-machine interface is made simple by menus.

The tree-structured main menu passes to the submenu and then to the insertion of parameters and configuration codes.

Figure 4 shows the menu structure.

CONTROL ALGORITHM

The QD and QP Series controllers use an innovative control technique based on **FUZZY** logic, combined with the traditional PID.

"FUZZY" logic uses some concepts from artificial intelligence.

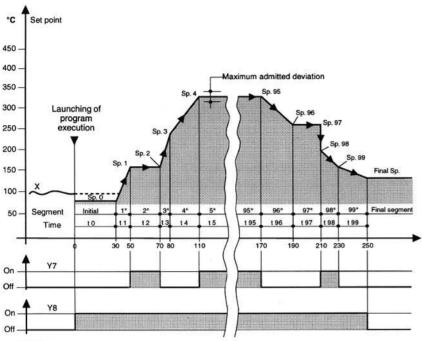
At the basis is a set of rules allowing it to act not on the basis of binary statuses (for example, black/white, open/closed, hot/cold), but rather on the evaluation of intermediary statuses (for example, very hot, hot, lukewarm, cold, very cold).

This operation mode is similar to human reasoning, with gradations leading to more real evaluations, and therefore, to more corrective actions. PID-FUZZY control, by ASCON, offers the following substantial advantages:

- reacts rapidly to load and Set point variations, avoiding overshooting;
- allows accurate control of critical processes, even when there are significant changes in the operational conditions (see fig. 6).

The controller calculates the "FUZZY" parameters automatically, deriving them from PID parameters optimized at the time of launching.

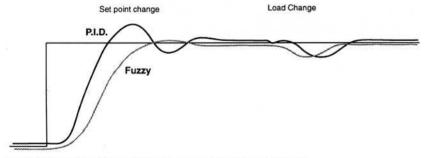
Fig. 5: Example of Programmed Set point with priority slope.



Notes:

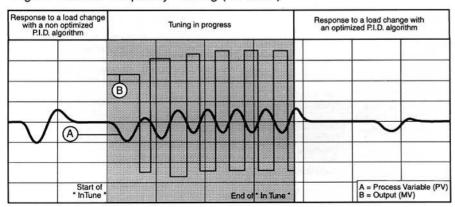
- 1 With duration of initial segment t 0 = 0, execution begins from segment 1 with W = X
- 2 With deviation greater than a maximum admitted value, time count stops in order to guarantee scheduled duration.

Fig. 6: Comparision of step response curves between P.I.D. algorithm and P.I.D.+Fuzzy algorithm in different operating conditions.



Note: P.I.D. parameters have been optimized before the change

Fig. 7: " Natural Frequency " tuning (In Tune)



Self-tuning "In-Tune"

This is a new method for calculating the PID parameters, called that of "natural frequency".

Tuning can occur at a Set point change or during process steady conditions. The method consists in the analysis of the response of the process of solicitations, even very small ones, imposed by the controller for calculating the natural frequency of the process.

The result is a great deal better than that obtainable using conventional methods, such as Ziegler and Nichols or similar ones (see fig. 7).

Technical data

Features at env. 25°C	Description						
Total Configurability	From the keyboard or serial line, with a guided menu, you can choose, in sequence: type of control, operational mode, inputs, outputs, Set points and insert all control parameters.						
Operational Modes	1 Loop with single/						
	1 Loop as above ar	Only for QP Series					
	2 independent loop		4				
	Cascade (1 master	Only for QD Series					
	Ratio (direct/revers			200			
	Algorithm	ith					
	Supplementary P.I.D. parameters for main loop						
	Prop. Band (P) 0.5999.9%						
	Integral T. (I)	0.1100 min					
	Derivative T. (D)	0.0110 min	Excludable with 0.0				
	Fuzzy Intensity	0.090%					
	Output Man.Reset	0100%					
Control	Cycle T.	1200 sec.	"Duty Cycle" output	t			
	Hysteresis	0.0110%	For On-Off control				
	Dead Band	0.05%	Heat/Cool output				
	Relative cool	Total Control of the					
	gain	0.13	riour ocor output				
	Excursion T.	15600 sec					
	Min output resol.	0.110%	Three point stepping output				
	Potentiometer	100Ω10ΚΩ	Timee point dioppin	goulput			
	Fotentiometer	AND ACCOUNT OF THE PARTY OF THE	EO OOO pointo				
	Common characteristics	A/D converter with 50.000 points Sampling time: 0.5 to 30 sec., configurable Input shift: -60 + 60 digits Input filter: 030 sec					
	Accuracy $ \begin{array}{c} 0.2\% \pm 1 \text{digit (T/C,} \\ 0.1\% \pm 1 \text{digit (mA,} \end{array} $			Between 100240Vac error is irrelevant			
Input X1 (range, see tab. 1)	Resistance Thermometer	Pt100Ω at 0°C (IEC 751) With selection °C / °F /°K	Connection with 2 or 3 wires	Line: 20Ω max (3 wire: Thermal drift: < 0.1°C/10°C env. T < 0.5°C/10Ω line R.			
	Thermocouples	L,J,T,K,R,S,B,N, E,W (IEC 854) compensation, with selection internal or external or C/°F/°K in °C/°F/°K		Line: 150Ω max Thermal drift: $< 2\mu V/^{\circ}C$ env. T. $< 5\mu V/10\Omega$ linė R.			
	Continuous	420mA,0-20mA	THE PARTY OF THE P	∠ oµviioù inio i i.			
	current	$Ri = 30\Omega$	Engineering units, floating point, with				
	Continuous	0-20mV, 0-50mV Ri = 10M Ω 0-1/1-5/0-5/0-10V	or without sq.rt. L.R9999999 H.R9999999	Input drift: < 0.1%/20°C env. T.			
	Voltage	$Ri = 10k\Omega$	(min 100 digits)				
Input X2	Characteristics iden	itical to input X1 (only	ROUND SHOW OF THE CONTRACT				
Auxiliary inputs	3 logic	Permanent closure of external associated allow:	Y1 = forcing value	recall of 3 stored d lock, 2nd PID = Remote Set point,			
	Run, hold, waitprogram (only for QP Series)						
150		direct or reverse actio					
	(for combinations of possible outputs, see below)						
	Lower limit 090% (Heat)						
	Upper limit 10010% (Heat), -10010% (Cool)						
	Max slope 020% /sec. (Heat / Cool)						
	Safety value 0100%, -100100% (Heat / Cool)						
	Forcing value 0100%, -100100% (Heat / Cool), from logic input						
Main	3			250Vac, 2x105 transition			
output Y1	Discontinuous	Logic 0-22Vdc, 20mA (for solid state relay)		Galvanically isolated:			
	Counting	Current 0-20mA, 4-20mA 750Ω/10V max		500 Vac/1min, Protected from s.c.			
	Continuous		1-5V, 0-5V, 0-10V	Res.: 12 bit (0.025%)			
	124 24 24 112 112 12 12 12 12 12 12 12 12 12 12 1	Voltage	500Ω/20mA max	Accuracy: 0.1%			

Table 1: Input X1

Input type, s	cale range	
Pt100Ω at 0°C	-200600 °C -3281112 °F	
Thermoresistance	-99.9300.0 °C -99.9572,0 °F	
J Thermocouple	0600 °C	
Fe-Cu 45% Ni	321112 °F	
L Thermocouple	0600 °C	
Fe-Cu/Ni	321112 °F	
T Thermocouple	-200400 °C	
Cu - CuNi	-328752 °F	
K Thermocouple	01200 °C	
Cromed Alumel	322192 °F	
S Thermocouple	01600 °C	
Pt10% Rh-Pt	322912 °F	
R Thermocouple	01600 °C	
Pt13% Rh-Pt	322912 °F	
B Thermocouple	4001800 °C	
Pt30% Rh-Pt6%Rh	7523272 °F	
N Thermocouple	01200 °C	
Nicrosil-Nisil	322192 °F	
Thermocouple	01100 °C	
Ni-NiMo18%	322012 °F	
W Thermocouple	02000 °C	
W3%Re-W25%Re	323632 °F	
420mA, 020mA		
050mV, 0200mV 01V, 15V, 05V 010V	Configurable eng. units *	

^{*} Linear or with square root extraction and decimal point selection

Dual action

For processes with "dual action" output Y1 (for example Heat-cool), two outputs are available with the following possible combinations:

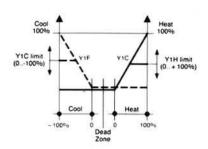
Y1 Heat	12.00			10000	1000	77533	13/15/5	10.00
Y1 Cool	R	R	L	R	С	С	С	L

R =Relay; L =Logic; C =Continuous (mA or Volt);

When Y6 continuous output is used for Y1 cool, the retransmission output is not available.
4...20 mA or 0...10 Vdc.

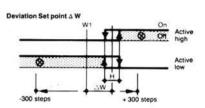
Features at env. 25°C				Des	cription				
at env. 25 C	Relay with NC) cont	arte 5	A/250\/ac 2v	(T-10)				
	Helay Willi NC	COITE	acis, 5	7250 Vac, 2x	10 ⁵ transitions - Hysteresis 0.0110.00% Deviation Set point ± 300 digits				
Auxiliary		High A	ctive	Tymo of	Band Set point	0300 digit			
outputs Y2-Y3	Action		.117%	Type of action	Indep. Set point	from HR to LR			
(also available	Mode	Low A	ctive		Set point to Y1	0100%			
for loop 2 in	WHITE SEC	i .	Sensor breat	and the second s	010070				
QD Series)		Specia Function		Name of the last o	(only for QP Series)				
	Security status		0110		abled or disabled with NO or NC contact				
Auxiliary	The state of the s	110.00	10205	Language - Marrows					
outputs, Y4-Y5	Same charact	eristic	cs of Y2-Y3 (available only if continuous Y1)						
Auxiliary	Galvanic. isola	ated:	Curre		Input retransmission				
analog	500 Vac/1 min		0-20mA, 4-20mA 750Ω/10V max		Set point retransmission W1				
output Y6	Protected from		Voltage:		Output retransmission Y1 (1st channel Δ)				
(option)	12 bit (0.025%		1-5V,	0-5V, 0-10V	Output retransmissi	on Y1 (2nd channel ∇)			
AU 22	Accuracy: 0.10	%	500Ω/	20mA max	Error retransmission (0 to 25% of the range				
logic outputs	Open collecto				30 mA max, 28 Vdc				
QP Series only)	500 Vac isolat	tion Va	ac max	/1 min.	Voltage drop: 1Vdc	max - 30 mA			
	Up or down ra	mp			Local				
	can be set in digits/min,				Local and 3 stored				
Set point	between 0.010% of			ange	Remote only				
out point					Local and remote				
	Limits: lower t				Local and (local + remote)				
	sett separately with		in the range		Programmable (only for QP Series)				
Remote			Curre		Bias in engineering	units			
Set point			0-20mA, 4-20mA		-100% +200%				
(not available	Not isolated		Ri =	30Ω	(compatible with display)				
with	Accuracy 0.19	%	Voltag		Ratio: -9.99 + 10.00				
programmed				0-5V, 0-10V	100000000000000000000000000000000000000	TOTAL			
				300 kΩ	Local Set point + Remote Set point				
Set point option)									
Set point option)	16 programs r					is total.			
	From 1 to 999	9 гере	etitions	/ program or	infinite.	is total.			
Programmed	From 1 to 999 Time base cor	9 repe	etitions able in	/ program or seconds, mir	infinite.	is total.			
Programmed Set point	From 1 to 999 Time base cor Priority of dura	9 repending repending to 19 miles of 19 mi	etitions able in or slope	/ program or seconds, mire.	infinite. outes, hours.				
Programmed Set point (option:	From 1 to 999 Time base con Priority of dura Up to 6 logic of	9 repending repending to the second s	etitions able in or slope s and 3	/ program or seconds, mir e. B logic inputs,	infinite. lutes, hours. programmable and r	elated to the program.			
Programmed Set point	From 1 to 999 Time base cor Priority of dura Up to 6 logic of Selection betw	9 rependigura ation of outputa ween t	etitions able in or slope s and 3 he 2 a	/ program or seconds, mire. B logic inputs, vailable sets of	infinite. outes, hours. programmable and r of PID parameters for	elated to the program.			
Programmed Set point (option:	From 1 to 999 Time base cor Priority of dura Up to 6 logic of Selection betw Auxiliary volta	9 rependiguration of the second secon	etitions able in or slope s and 3 he 2 a out for	/ program or seconds, mire. B logic inputs, vailable sets of selecting the	infinite. nutes, hours. programmable and r of PID parameters for program remotely.	elated to the program. each segment.			
Programmed Set point (option: QP Series only)	From 1 to 999 Time base con Priority of dura Up to 6 logic of Selection betw Auxiliary volta Run, hold, wa	9 rependiguration of the second secon	etitions able in or slope s and 3 he 2 a out for s	/ program or seconds, mire. B logic inputs, vailable sets of selecting the jutable from the	infinite. iutes, hours. programmable and r of PID parameters for orogram remotely. e keyboard, logic inp	elated to the program. each segment. uts and via serial port.			
Programmed Set point (option:	From 1 to 999 Time base con Priority of dura Up to 6 logic of Selection betw Auxiliary volta Run, hold, wa With "Natural	9 rependiguration of the second secon	etitions able in or slope s and 3 he 2 ar out for s uency'	/ program or seconds, mire. B logic inputs, vailable sets of selecting the jutable from the method. Tur	infinite. nutes, hours. programmable and r of PID parameters for program remotely. e keyboard, logic inp oing can occur at a Se	elated to the program. each segment. outs and via serial port. et point change or			
Programmed Set point (option: QP Series only)	From 1 to 999 Time base con Priority of dura Up to 6 logic Selection betw Auxiliary volta Run, hold, wa With "Natural during proces	9 repending repending to the second repending to the second repending to the second repending re	etitions able in or slope s and 3 he 2 ar out for s , executency' dy con	/ program or seconds, mine. B logic inputs, vailable sets of selecting the jutable from the method. Turiditions, with l	infinite. iutes, hours. programmable and r of PID parameters for orogram remotely. e keyboard, logic inp	elated to the program. each segment. outs and via serial port. et point change or			
Programmed Set point (option: QP Series only)	From 1 to 999 Time base cor Priority of dura Up to 6 logic Selection betv Auxiliary volta Run, hold, wa With "Natural during proces Incorporated,	9 repending repending to the second repending to the second repending to the second repending re	etitions able in or slope s and 3 he 2 ar but for s , execu- uency' dy con Bumple	/ program or seconds, mires. B logic inputs, vailable sets of selecting the jutable from the method. Turiditions, with less action	infinite. programmable and r of PID parameters for program remotely. e keyboard, logic inp ding can occur at a Se aunch enabling index	elated to the program. each segment. outs and via serial port. et point change or			
Programmed Set point (option: QP Series only)	From 1 to 999 Time base cor Priority of dura Up to 6 logic Selection betv Auxiliary volta Run, hold, wa With "Natural during proces Incorporated, Switching from	9 repending repending a control of the control of t	etitions able in or slope s and 3 he 2 ar out for s uency' dy con Bumple board,	/ program or seconds, mires. B logic inputs, vailable sets of selecting the putable from the method. Turiditions, with less action logic inputs, or seconds.	infinite. intes, hours. programmable and r of PID parameters for orogram remotely. e keyboard, logic inp ing can occur at a Se aunch enabling index or via serial port	elated to the program. each segment. outs and via serial port. of point change or			
Programmed Set point (option: QP Series only) Auto-tune Auto-Man st.	From 1 to 999 Time base cor Priority of dura Up to 6 logic Selection betv Auxiliary volta Run, hold, wa With "Natural during proces Incorporated, Switching from	9 repending repe	etitions able in or slope s and 3 the 2 ar out for s , executency dy con Bumple board, ous pro	/ program or seconds, mires. B logic inputs, vailable sets of selecting the putable from the method. Turiditions, with less action logic inputs, or seconds.	infinite. programmable and r of PID parameters for program remotely. e keyboard, logic inp ding can occur at a Se aunch enabling index	elated to the program. each segment. outs and via serial port. of point change or			
Programmed Set point (option: QP Series only) Auto-tune Auto-Man st. Serial Comms. (option)	From 1 to 999 Time base cor Priority of dura Up to 6 logic Selection betw Auxiliary volta Run, hold, wa With "Natural during proces Incorporated, Switching from RS 485, Modb (read only or re	9 repending repe	etitions able in or slope s and 3 he 2 ar out for s , executency' dy con Bumple board, ous pro- rite)	/ program or seconds, mires. B logic inputs, vailable sets of selecting the putable from the method. Turn ditions, with 1 less action logic inputs, cotocol, 1200, 2	infinite. intes, hours. programmable and r of PID parameters for orogram remotely. e keyboard, logic inp ing can occur at a Se aunch enabling index or via serial port	elated to the program. each segment. outs and via serial port. of point change or			
Programmed Set point (option: QP Series only) Auto-tune Auto-Man st. Serial Comms.	From 1 to 999 Time base cor Priority of dura Up to 6 logic of Selection bette Auxiliary volta Run, hold, wa With "Natural during proces Incorporated, Switching from RS 485, Mode (read only or re 24 Vdc ± 10%	9 rependiguration of attion of attio	etitions able in or slope s and 3 the 2 ar out for: , executency' dy con Bumple board, ous pro rite) mA ma	/ program or seconds, mines. B logic inputs, vailable sets of selecting the jutable from the method. Turn ditions, with less action logic inputs, of tocol, 1200, 20x	infinite. nutes, hours. programmable and r of PID parameters for orogram remotely. e keyboard, logic inp ing can occur at a Se aunch enabling index or via serial port	elated to the program. each segment. outs and via serial port. of point change or			
Programmed Set point (option: QP Series only) Auto-tune Auto-Man st. Serial Comms. (option) Auxiliary	From 1 to 999 Time base cor Priority of dura Up to 6 logic of Selection bette Auxiliary volta Run, hold, wa With "Natural during proces Incorporated, Switching from RS 485, Mode (read only or re 24 Vdc ± 10%	9 rependiguration of attion of attio	etitions able in or slopes and 3 the 2 are out for s , executed, executed, ous pro-	/ program or seconds, mires. B logic inputs, vailable sets of selecting the putable from the method. Turn ditions, with 1 less action logic inputs, of tocol, 1200, 2 lax ars (2, 3, 4 wires)	infinite. intes, hours. programmable and r of PID parameters for orogram remotely. e keyboard, logic inp ing can occur at a Se aunch enabling index or via serial port 2400, 4800, 9600 bit/s	elated to the program. each segment. outs and via serial port. et point change or c.			
Programmed Set point (option: QP Series only) Auto-tune Auto-Man st. Serial Comms. (option) Auxiliary	From 1 to 999 Time base cop Priority of dura Up to 6 logic of Selection betwoer auxiliary volta Run, hold, wa With "Natural during proces Incorporated, Switching from RS 485, Modb (read only or read o	9 rependiguration of attion of attio	etitions able in or slope s and 3 he 2 ar out for s , execusency' dy con Bumple board, ous pro rite) mA mansmitte Out of	/ program or seconds, mire. B. Blogic inputs, vailable sets of selecting the putable from the method. Turnditions, with 1 less action logic inputs, cotocol, 1200, 2 less (2, 3, 4 wire range or hard	infinite. intes, hours. programmable and r of PID parameters for orogram remotely. e keyboard, logic inp ing can occur at a Se aunch enabling index or via serial port 2400, 4800, 9600 bit/s e connections) dware failure (short o	elated to the program. each segment. outs and via serial port. et point change or c.			
Programmed Set point (option: QP Series only) Auto-tune Auto-Man st. Serial Comms. (option) Auxiliary	From 1 to 999 Time base cor Priority of dura Up to 6 logic of Selection bette Auxiliary volta Run, hold, wa With "Natural during proces Incorporated, Switching from RS 485, Mode (read only or re 24 Vdc ± 10%	9 rependiguration of attion of attio	etitions able in or slopes and 3 he 2 arout for s out for s uency' dy con Bumple board, ous pro rite) mA mansmitte Out of is mor	/ program or seconds, mire. 8. logic inputs, vailable sets of selecting the putable from the method. Turn dittions, with 1 less action logic inputs, control, 1200, 2 logic inputs, contr	infinite. intes, hours. programmable and r of PID parameters for orogram remotely. e keyboard, logic inp ing can occur at a Se aunch enabling index or via serial port 2400, 4800, 9600 bits e connections) dware failure (short of	elated to the program. each segment. outs and via serial port. et point change or c.			
Programmed Set point (option: QP Series only) Auto-tune Auto-Man st. Serial Comms. (option) Auxiliary	From 1 to 999 Time base cop Priority of dura Up to 6 logic of Selection betwoer auxiliary volta Run, hold, wa With "Natural during proces Incorporated, Switching from RS 485, Modb (read only or read o	9 rependiguration of attion of attio	etitions able in or slope s and 3 the 2 ar out for s out f o	/ program or seconds, mire. B. Blogic inputs, vailable sets of selecting the putable from the method. Turnditions, with 1 less action logic inputs, cotocol, 1200, 2 less (2, 3, 4 wire range or hard	infinite. intes, hours. programmable and r of PID parameters for orogram remotely. e keyboard, logic inp ing can occur at a Se aunch enabling index or via serial port 2400, 4800, 9600 bit/s e connections) dware failure (short of e outputs are alues	elated to the program. each segment. outs and via serial port. et point change or c.			
Programmed Set point (option: QP Series only) Auto-tune Auto-Man st. Serial Comms. (option) Auxiliary	From 1 to 999 Time base cor Priority of dura Up to 6 logic of Selection betw Auxiliary volta Run, hold, wa With "Natural during proces Incorporated, Switching from RS 485, Modb (read only or re 24 Vdc ± 109 Up to 2 extern	9 rependiguration of attion of attio	etitions able in or slope s and 3 he 2 ar out for s out for s uency' dy con Bumple board, ous pro rite) mA mansmitte Out of is mor forceo Settat	/ program or seconds, mires. B logic inputs, vailable sets of selecting the putable from the method. Turniditions, with I less action logic inputs, of tocol, 1200, 200 ars (2, 3, 4 wires) are (2, 3, 4 wires) intored and the I to security value security value security value security values.	infinite. intes, hours. programmable and r of PID parameters for orogram remotely. e keyboard, logic inp ing can occur at a Se aunch enabling index or via serial port 2400, 4800, 9600 bit/s e connections) dware failure (short of e outputs are alues	elated to the program. each segment. uts and via serial port. et point change or c. sec., 2 wires,			
Programmed Set point (option: QP Series only) Auto-tune Auto-Man st. Serial Comms. (option) Auxiliary	From 1 to 999 Time base cor Priority of dura Up to 6 logic of Selection betw Auxiliary volta Run, hold, wa With "Natural during proces Incorporated, Switching from RS 485, Modb (read only or re 24 Vdc ± 109 Up to 2 extern Main input	9 repending of the second of t	etitions able in or slope s and 3 he 2 are out for s , executency' dy con Bumple board, ous pro rite) mA ma nsmittee Out of is mor forced Settat 010	/ program or seconds, mires. 8. logic inputs, vailable sets of selecting the putable from the method. Turn ditions, with I less action logic inputs, of tocol, 1200, 200. 1. A wire (2, 3, 4 wires arange or hard the ito security value, -100 +	infinite. intes, hours. programmable and r of PID parameters for program remotely. e keyboard, logic inp ing can occur at a Se aunch enabling index or via serial port 2400, 4800, 9600 bit/s e connections) dware failure (short of e outputs are alues	elated to the program. each segment. uts and via serial port. et point change or c. sec., 2 wires, r open circuit)			
Programmed Set point (option: (OP Series only) Auto-tune Auto-Man st. Serial Comms. (option) Auxiliary power supply	From 1 to 999 Time base cor Priority of dura Up to 6 logic Selection betw Auxiliary volta Run, hold, wa With "Natural during proces Incorporated, Switching from RS 485, Mode (read only or re 24 Vdc ± 109, Up to 2 extern Main input Control output	9 repending of the second of t	tetitions able in or slopped to the total able in or slopped t	/ program or seconds, mires. 8. logic inputs, vailable sets of selecting the putable from the method. Turn ditions, with I less action logic inputs, of tocol, 1200, 200 xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	infinite. intes, hours. programmable and r of PID parameters for program remotely. e keyboard, logic inp ing can occur at a Se aunch enabling index or via serial port 2400, 4800, 9600 bit/s e connections) dware failure (short of e outputs are alues lue: 100% (for double act	elated to the program. each segment. uts and via serial port. et point change or c. sec., 2 wires, r open circuit)			
Programmed Set point (option: (OP Series only) Auto-tune Auto-Man st. Serial Comms. (option) Auxiliary power supply Operational	From 1 to 999 Time base cor Priority of dura Up to 6 logic of Selection betw Auxiliary volta Run, hold, wa With "Natural during proces Incorporated, Switching from RS 485, Modb (read only or re 24 Vdc ± 109 Up to 2 extern Main input Control output Auxiliary outp	9 repending of the second of t	tetitions able in in or slopped able in or slopped	/ program or seconds, mire. 8. logic inputs, vailable sets of selecting the putable from the method. Turn ditions, with 1 less action logic inputs, of the putable from the second of the putable from the second of the second o	infinite. intes, hours. programmable and r of PID parameters for program remotely. e keyboard, logic inp ing can occur at a Se aunch enabling index or via serial port 2400, 4800, 9600 bit/s e connections) dware failure (short of e outputs are alues ilue: 100% (for double act be configured: exclu s are saved for unlim	elated to the program. each segment. uts and via serial port. et point change or c. sec., 2 wires, r open circuit) ion) ded, NO or NC ited time in			
Programmed Set point (option: (OP Series only) Auto-tune Auto-Man st. Serial Comms. (option) Auxiliary power supply Operational	From 1 to 999 Time base cor Priority of dura Up to 6 logic Selection betw Auxiliary volta Run, hold, wa With "Natural during proces Incorporated, Switching from RS 485, Mode (read only or re 24 Vdc ± 109, Up to 2 extern Main input Control output	9 repending of the second of t	tetitions able in or slopped abl	/ program or seconds, mire. 8. logic inputs, vailable sets of selecting the putable from the method. Turn ditions, with 1 less action logic inputs, of the putable from the method. Turn ditions, with 1 less action logic inputs, of the method of the method in the security value security security security value security value security value security v	infinite. intes, hours. programmable and r of PID parameters for program remotely. e keyboard, logic inp ing can occur at a Se aunch enabling index or via serial port 2400, 4800, 9600 bit/s e connections) dware failure (short of e outputs are alues itue: 100% (for double active be configured: exclus s are saved for unlim y. comogeneous groups	elated to the program. each segment. uts and via serial port. et point change or c. sec., 2 wires, r open circuit) ion) ded, NO or NC ited time in , configurable as:			
Programmed Set point (option: (OP Series only) Auto-tune Auto-Man st. Serial Comms. (option) Auxiliary power supply Operational	From 1 to 999 Time base cor Priority of dura Up to 6 logic of Selection betw Auxiliary volta Run, hold, wa With "Natural during proces Incorporated, Switching from RS 485, Modb (read only or re 24 Vdc ± 109 Up to 2 extern Main input Control output Auxiliary outp	9 repending of the second of t	tetitions able in or slopped abl	/ program or seconds, mines. 8. Blogic inputs, vailable sets of selecting the putable from the method. Turn ditions, with I less action logic inputs, of selecting the putable from the method. Turn ditions, with I less action logic inputs, of second 1200, 200, 200, 200, 200, 200, 200, 200	infinite. intes, hours. programmable and r of PID parameters for program remotely. e keyboard, logic inp ing can occur at a Se aunch enabling index or via serial port 2400, 4800, 9600 bit/s e connections) dware failure (short of e outputs are alues ilue: 100% (for double act be configured: exclu bs are saved for unlim y. comogeneous groups ole, visible or not mode	elated to the program. each segment. uts and via serial port. et point change or c. sec., 2 wires, r open circuit) ion) ded, NO or NC ited time in configurable as: lifiable, invisible			
Programmed Set point (option: (OP Series only) Auto-tune Auto-Man st. Serial Comms. (option) Auxiliary power supply Operational	From 1 to 999 Time base co Priority of duri Up to 6 logic of Selection betwood of the Market of the	9 repending of the second of t	tetitions able in or slope in	/ program or seconds, mines. 8. logic inputs, vailable sets of selecting the putable from the method. Turn ditions, with I less action logic inputs, of the putable from the method. Turn ditions, with I less action logic inputs, of the putable from the method. Turn ditions, with I less action logic inputs, of the putable from the method in the security value security value security value security value security value security value in the method	infinite. intes, hours. programmable and r of PID parameters for program remotely. e keyboard, logic inp ing can occur at a Se aunch enabling index or via serial port 2400, 4800, 9600 bit/s e connections) dware failure (short of e outputs are alues lue: 100% (for double act be configured: exclu s are saved for unlim y. comogeneous groups ole, visible or not modessing the V° group	elated to the program. each segment. uts and via serial port. et point change or c. sec., 2 wires, r open circuit) ion) ded, NO or NC ited time in , configurable as: lifiable, invisible of parameters, to pro-			
Programmed Set point (option: (OP Series only) Auto-tune Auto-Man st. Serial Comms. (option) Auxiliary power supply Operational	From 1 to 999 Time base cor Priority of dura Up to 6 logic of Selection betw Auxiliary volta Run, hold, wa With "Natural during proces Incorporated, Switching from RS 485, Modb (read only or re 24 Vdc ± 109 Up to 2 extern Main input Control output Auxiliary outp	9 repending of the second of t	tetitions able in or slopped shall be in or s	/ program or seconds, mires. 8. logic inputs, vailable sets of selecting the putable from the method. Turn ditions, with I less action logic inputs, of the color, 1200, 200, 200, 200, 200, 200, 200, 20	infinite. intes, hours. programmable and r of PID parameters for program remotely. e keyboard, logic inp ing can occur at a Se aunch enabling index or via serial port 2400, 4800, 9600 bit/s e connections) dware failure (short of e outputs are alues lue: 100% (for double act be configured: exclu s are saved for unlim y. comogeneous groups ole, visible or not mode essing the V° group ers for the Set point a	elated to the program. each segment. uts and via serial port. et point change or c. sec., 2 wires, r open circuit) ion) ded, NO or NC ited time in , configurable as: lifiable, invisible of parameters, to pround for the configuratio			
Programmed Set point (option: (OP Series only) Auto-tune Auto-Man st. Serial Comms. (option) Auxiliary power supply Operational security	From 1 to 999 Time base cor Priority of dura Up to 6 logic Selection betv Auxiliary volta Run, hold, wa With "Natural during proces Incorporated, Switching from RS 485, Mode (read only or re 24 Vdc ± 109 Up to 2 extern Main input Control output Auxiliary outpi Parameters Access keys	9 repending repe	tetitions able in in or sloper shall be in or shall be	/ program or seconds, mires. Blogic inputs, vailable sets of selecting the putable from the method. Turnditions, with 1 less action logic inputs, of tocol, 1200, 2 less (2, 3, 4 wires (2	infinite. intes, hours. programmable and r of PID parameters for orogram remotely. e keyboard, logic inp ing can occur at a Se aunch enabling index or via serial port 2400, 4800, 9600 bit/s e connections) dware failure (short or e outputs are alues 100% (for double act be configured: exclu s are saved for unlim y, omogeneous groups oble, visible or not mod cressing the V° group ers for the Set point a dz, -15 + 10% (250V	elated to the program. each segment. uts and via serial port. et point change or c. sec., 2 wires, r open circuit) ion) ded, NO or NC ited time in , configurable as: lifiable, invisible of parameters, to pround for the configuratio			
Programmed Set point (option: (OP Series only) Auto-tune Auto-Man st. Serial Comms. (option) Auxiliary power supply Operational	From 1 to 999 Time base co Priority of duri Up to 6 logic of Selection betwood of the Market of the	9 repending repe	tetitions able in in or slopped shall be in or shall be	/ program or seconds, mires. Blogic inputs, vailable sets of selecting the putable from the method. Turniditions, with I less action logic inputs, of the putable from the method. Turniditions, with I less action logic inputs, of the putable from the method in the security was a less of the putable from the method in the security was a less of the method in the met	infinite. intes, hours. programmable and r of PID parameters for orogram remotely. e keyboard, logic inp ing can occur at a Se aunch enabling index or via serial port 2400, 4800, 9600 bit/s de connections) dware failure (short of e outputs are alues alues alues are saved for unlim y omogeneous groups ole, visible or not mod essing the V° group ers for the Set point a ltz, -15 + 10% (250V and 2030Vdc	elated to the program. each segment. uts and via serial port. et point change or c. sec., 2 wires, r open circuit) ion) ded, NO or NC ited time in , configurable as: lifiable, invisible of parameters, to pround for the configuratio			
Programmed Set point (option: (OP Series only) Auto-tune Auto-Man st. Serial Comms. (option) Auxiliary power supply Operational security	From 1 to 999 Time base color Priority of dury Up to 6 logic of Selection betwoeld a With "Natural during proces Incorporated, Switching from RS 485, Modb (read only or no 24 Vdc ± 109 Up to 2 extern Main input Control output Auxiliary output Parameters Access keys Power supply	9 repering the second of the s	tetitions able in in or slopped shall be in o	/ program or seconds, mines. 8 logic inputs, vailable sets of selecting the putable from the method. Turniditions, with I less action logic inputs, of the putable from the method. Turniditions, with I less action logic inputs, of the method in the security value of the method in the security value security value in the method in the met	infinite. intes, hours. programmable and r of PID parameters for orogram remotely. e keyboard, logic inp ing can occur at a Se aunch enabling index or via serial port 2400, 4800, 9600 bits de connections) dware failure (short of e outputs are alues lues lues 100% (for double act be configured: exclu s are saved for unlim y, omogeneous groups ole, visible or not mod cessing the V° group ers for the Set point a dz, -15 + 10% (250V and 2030Vdc max	elated to the program. each segment. iuts and via serial port. et point change or c. sec., 2 wires, r open circuit) ion) ded, NO or NC ited time in , configurable as: liffable, invisible of parameters, to product of the configuration ac max) or			
Programmed Set point (option: (OP Series only) Auto-tune Auto-Man st. Serial Comms. (option) Auxiliary power supply Operational security	From 1 to 999 Time base cor Priority of dura Up to 6 logic of Selection betw Auxiliary volta Run, hold, wa With "Natural during proces Incorporated, Switching from RS 485, Modic (read only or re 24 Vdc ± 109 Up to 2 extern Main input Control output Auxiliary output Parameters Access keys Power supply Isolation acco	9 repering the second of the s	tetitions able in pror slopped shall part and sale in pror slopped shall part and	/ program or seconds, mires. 8 logic inputs, vailable sets of selecting the putable from the method. Turn ditions, with I less action logic inputs, of the putable from the second of th	infinite. intes, hours. programmable and r of PID parameters for program remotely. e keyboard, logic inp ing can occur at a Se aunch enabling index or via serial port e400, 4800, 9600 bits e connections) dware failure (short of e outputs are alues ilues ilues ilues or via serial port exclus are alues ilues ilue; omogeneous groups ole, visible or not mod eassing the V° group ers for the Set point a faz, -15 + 10% (250V and 2030Vdc max wer, pollution level 1,	elated to the program. each segment. iuts and via serial port. et point change or c. sec., 2 wires, r open circuit) ion) ded, NO or NC ited time in , configurable as: liffable, invisible of parameters, to product of the configuration ac max) or			
Programmed Set point (option: (OP Series only) Auto-tune Auto-Man st. Serial Comms. (option) Auxiliary power supply Operational security	From 1 to 999 Time base cor Priority of dura Up to 6 logic of Selection betw Auxiliary volta Run, hold, wa With "Natural during proces Incorporated, Switching from RS 485, Mody (read only or 24 Vdc ± 109 Up to 2 extern Main input Control output Auxiliary output Auxiliary output Parameters Access keys Power supply Isolation acco to ENS 1010	9 repension of the second of t	tetitions able in or slopped able in slopped abl	/ program or seconds, mines. 8. a logic inputs, vailable sets of selecting the putable from the method. Turn ditions, with I less action logic inputs, of the putable from the second of	infinite. intes, hours. programmable and r of PID parameters for program remotely. In keyboard, logic inp ing can occur at a Se aunch enabling index or via serial port 2400, 4800, 9600 bit/s de connections) dware failure (short of the outputs are alues alu	elated to the program. each segment. uts and via serial port. et point change or c. sec., 2 wires, r open circuit) ion) ded, NO or NC ited time in configurable as: lifiable, invisible of parameters, to pround for the configuratio ac max) or			
Programmed Set point (option: (OP Series only) Auto-tune Auto-Man st. Serial Comms. (option) Auxiliary power supply Operational security	From 1 to 999 Time base cor Priority of dura Up to 6 logic of Selection betw Auxiliary volta Run, hold, wa With "Natural during proces Incorporated, Switching from RS 485, Modb (read only or re 24 Vdc ± 109 Up to 2 extern Main input Control output Auxiliary outpi Parameters Access keys Power supply Isolation acco to ENS 1010 Electromagne	9 repension of the second of t	tetitions able in or slopped able in slopped able in stalling able in stall	/ program or seconds, mires. Sologic inputs, vailable sets of selecting the putable from the method. Turn ditions, with I less action logic inputs, of the putable from the method. Turn ditions, with I less action logic inputs, of the putable from the second of the method in the security value security value security value security value security value in the method in the security value in the method in the security value in the securit	infinite. intes, hours. programmable and r of PID parameters for program remotely. In keyboard, logic inp ing can occur at a Se aunch enabling index privia serial port 2400, 4800, 9600 bit/s de connections) dware failure (short of the outputs are alues al	elated to the program. each segment. uts and via serial port. et point change or c. sec., 2 wires, r open circuit) ion) ded, NO or NC ited time in configurable as: lifiable, invisible of parameters, to pround for the configuration fac max) or			
Programmed Set point (option: (OP Series only) Auto-tune Auto-Man st. Serial Comms. (option) Auxiliary power supply Operational security	From 1 to 999 Time base cor Priority of dura Up to 6 logic of Selection betw Auxiliary volta Run, hold, wa With "Natural during proces Incorporated, Switching from RS 485, Modb (read only or re 24 Vdc ± 109 Up to 2 extern Main input Control output Auxiliary outpi Parameters Access keys Power supply Isolation acco to ENS 1010 Electromagne compatibility	9 repension of the second of t	tetitions able in or slope in	/ program or seconds, mines. 8. logic inputs, vailable sets of selecting the putable from the method. Turn ditions, with I less action logic inputs, of the security value of the security value. 1. security value of the security value. 1. security value of the s	infinite. intes, hours. programmable and r of PID parameters for program remotely. e keyboard, logic inp ing can occur at a Se aunch enabling index or via serial port 2400, 4800, 9600 bit/s e connections) dware failure (short or e outputs are alues lue: 100% (for double act be configured: exclu s are saved for unlim y comogeneous groups ole, visible or not mod cessing the V° group ers for the Set point a dz, -15 + 10% (250V and 2030Vdc max wer, pollution level 1, III° required for CE brand ustrial apparatus	elated to the program. each segment. uts and via serial port. et point change or c. sec., 2 wires, r open circuit) ion) ded, NO or NC ited time in , configurable as: iifiable, invisible of parameters, to pround for the configuration ac max) or			
Programmed Set point (option: (option: QP Series only) Auto-tune Auto-Man st. Serial Comms. (option) Auxiliary power supply Operational security	From 1 to 999 Time base cor Priority of dura Up to 6 logic of Selection betw Auxiliary volta Run, hold, wa With "Natural during proces Incorporated, Switching from RS 485, Modb (read only or re 24 Vdc ± 109 Up to 2 extern Main input Control output Auxiliary outpi Parameters Access keys Power supply Isolation acco to ENS 1010 Electromagne	9 repension of the second of t	tetitions able in or slope in	/ program or seconds, mines. 8. logic inputs, vailable sets of selecting the putable from the method. Turn ditions, with I less action logic inputs, of the security value of the security value. 1. security value of the security value. 1. security value of the s	infinite. intes, hours. programmable and r of PID parameters for program remotely. In keyboard, logic inp ing can occur at a Se aunch enabling index privia serial port 2400, 4800, 9600 bit/s de connections) dware failure (short of the outputs are alues al	elated to the program. each segment. uts and via serial port. et point change or c. sec., 2 wires, r open circuit) ion) ded, NO or NC ited time in , configurable as: iifiable, invisible of parameters, to pround for the configuration ac max) or			
Programmed Set point (option: (option: QP Series only) Auto-tune Auto-Man st. Serial Comms. (option) Auxiliary power supply Operational security	From 1 to 999 Time base cor Priority of dury Up to 6 logic of Selection betw Auxiliary volta Run, hold, wa With "Natural during proces Incorporated, Switching from 24 Vdc ± 109 Up to 2 extern Main input Control output Auxiliary output Parameters Access keys Power supply Isolation accoo to ENS 1010 Electromagne compatibility Environmental Protections	9 repension of the second of t	tetitions able in or slopped shall be able in sh	/ program or seconds, mines. 8. a logic inputs, vailable sets of selecting the putable from the method. Turn ditions, with I less action logic inputs, of the putable from the second of	infinite. intes, hours. programmable and r of PID parameters for program remotely. In keyboard, logic inp ing can occur at a Se aunch enabling index or via serial port Interest of the serial port I	elated to the program. each segment. uts and via serial port. et point change or c. sec., 2 wires, r open circuit) ion) ded, NO or NC ited time in , configurable as: lifiable, invisible of parameters, to pround for the configurationac max) or			
Programmed Set point (option: (option: QP Series only) Auto-tune Auto-Man st. Serial Comms. (option) Auxiliary power supply Operational security	From 1 to 999 Time base cor Priority of dury Up to 6 logic of Selection betw Auxiliary volta Run, hold, wa With "Natural during proces Incorporated, Switching from RS 485, Modb (read only or re 24 Vdc ± 109, Up to 2 extern Main input Control output Auxiliary output Auxiliary output Parameters Access keys Power supply Isolation acco to ENS 1010 Electromagne compatibility Environmental	9 repension of the second of t	tetitions able in or slopped shall be in shall be i	/ program or seconds, mines. 8. a logic inputs, vailable sets of selecting the putable from the method. Turn ditions, with I less action logic inputs, of the putable from the second of	infinite. intes, hours. programmable and r of PID parameters for program remotely. In keyboard, logic inp ing can occur at a Se aunch enabling index privia serial port 2400, 4800, 9600 bit/s de connections) dware failure (short of the outputs are alues a	elated to the program. each segment. uts and via serial port. et point change or c. sec., 2 wires, r open circuit) ion) ded, NO or NC ited time in , configurable as: lifiable, invisible of parameters, to pround for the configurationac max) or			

Fig. 8: Output characteristic for dual action controllers. Example: Heat - Cool

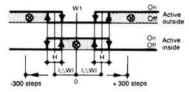


Y1C = Cool output (----) Y1H = Heat output (----) Indication for Y1: -100%... + 100%

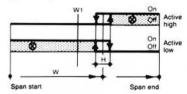
Fig. 9: Auxiliary control outputs Y2 and Y3



Band Set point I Δ W I

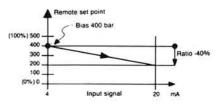


Independent Set point W



Note: W1: Main Set point H: Auxiliary outputs hysteresis

Fig. 10: Example of Bias and Ratio setting for a Controller with scale range 0...500 bar

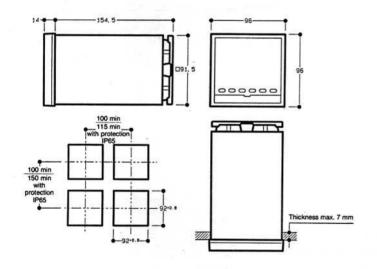


Connections and fitting dimensions

CONNECTIONS QD Series

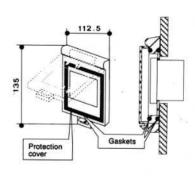
Notes:
1 To supply a 3 or 4 wire transmitter, use terminals B5 (+) and A6 (-) or B5 (+) and B7 (-)
2 Main control output Y1 can be selected within the 5 built-in possible functions: relay (terminals C1 and C2), logic or continuous 4...20 mA or 0...10 Volt (terminals D5 and D6) and three point stepping (terminals C1, C2 and C3).

OVERALL DIMENSIONS

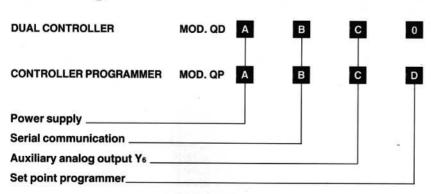


FRONT PROTECTION KIT IP65:

mod. F10-435-2A101



Ordering Codes



Power supply	Α
100240 Vac 50/60 Hz	3
1628 Vac 50/60 Hz and 2030 Vdc	5
Serial Communication (option)	В
None	0
RS485, Modbus, Jbus	3
Auxiliary analog output Y ₆ (option)	С
None	0
0/420mA, 0/15V, 010V)	1
Set point programmer (option QP only)	D
None	0
Up to 16 programs, 255 segments	1