ASCON TECNOLOGIC

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Programmer Process Controller
Multi-input, Multi-output
Multi-functions

Series **QP**

INSTRUCTION MANUAL
96/06 - Code: ISTR_M_QP_E_01_--

Ascon Tecnologic Srl

www.ascontecnologic.com

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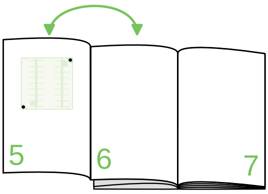
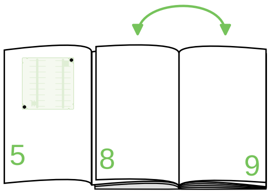
11	SERIAL COMMUNICATIONS (See MIU-CS)	separately supplied

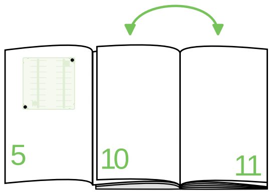
READING INSTRUCTION

To better read and understand this manual please note the following:

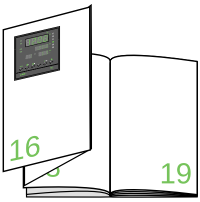
Electrical wiring

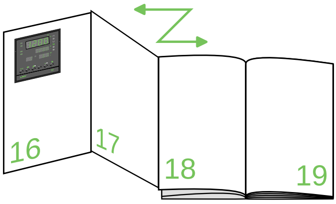




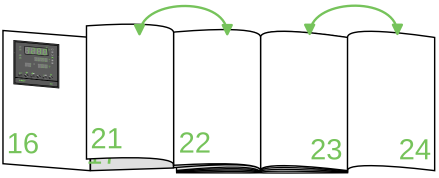


Configuration

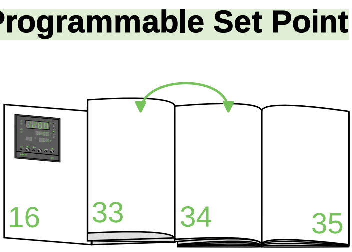




Parameterization



Programmable Set Point



Thank you for choosing an ASCON controller.

The QP series controllers can be used as programmer controllers. They are available with two main versions: the first with "Standard Set point" (Local/Rem/3 memorized S.p.), the second with "Programmable Set point" as an option (e.g. QP-3…1)
They are fitted with AUTO-TUNE, as auxiliary for sistem start-up, and serial communications for introduction into a distributed control network.
They are complete because all possible variables are always present.
Configuration of the instrument permits determination of the operating mode according to the required application.

1.1 Identification of model

Model code: QP A B C D

- Power supply — A
- Serial communications RS485 — B
- Auxiliary analog output Y6 — C
- Programmable Set point — D

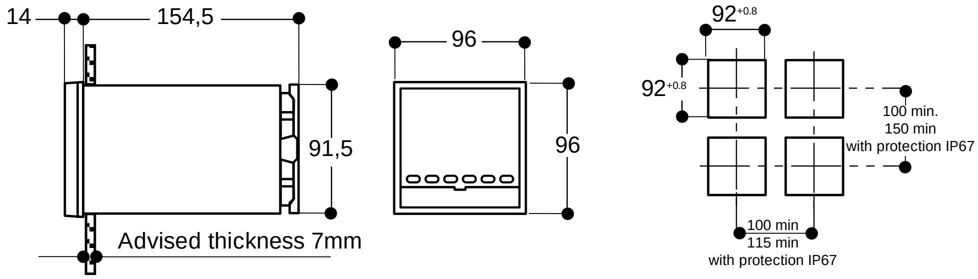
Power supply	**A**
100…240V 50/60 Hz	3
16…28V 50/60 Hz and 20…30V dc	5

Serial communications (option)	**B**
None	0
RS485 Modbus - Jbus	3

Y_6 auxiliary output (option)	**C**
None	0
0/4…20mA, 0/1…5V, 0…10V	1

Programmable Set point (option)	**D**
None	0
Provided (16 Prgm.s, 255 Segm.s)	1

2.1 Overall dimensions

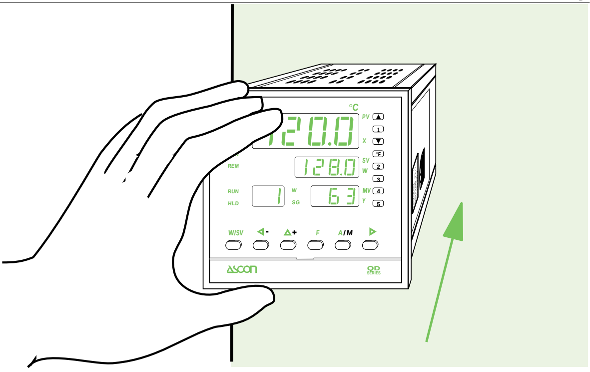


2.2 Panel installation

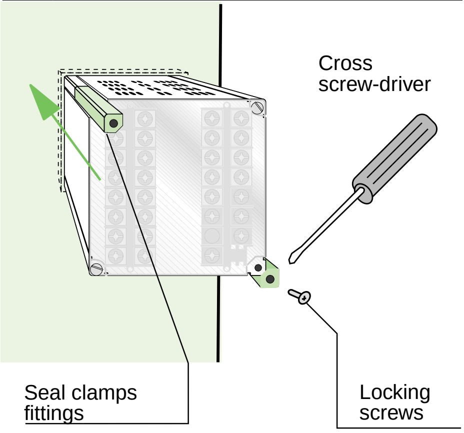
A • Panel fitting

Install away from:
- heat sources
- corrosive gases
- dusty environments

ENVIROMENT:
Temperature: 0…50 °C
Humidity : 30…85UR%

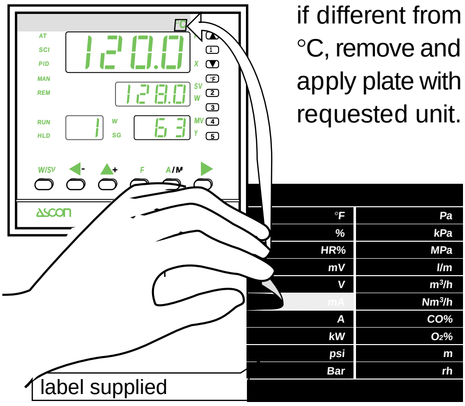


B • Fixing with clamps



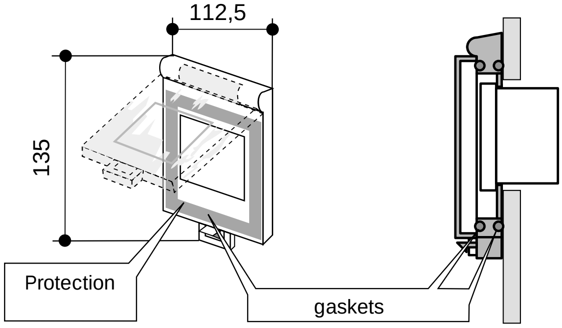
C • plate for engineering units

if different from °C, remove and apply plate with requested unit.



2.3 Front protection IP67

mod. F10-435-2A101



E

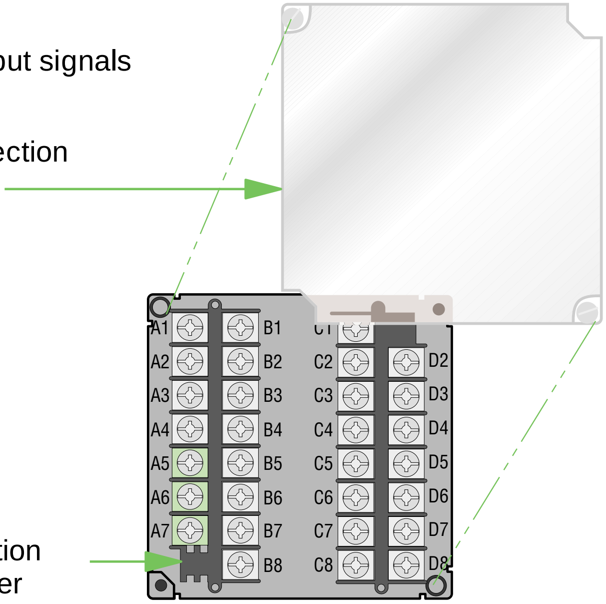
A • Terminal board

27 screw terminals M3.5

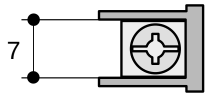
3 gilded terminals for imput signals

Wiring protection plate

Cold joint compensation thermometer



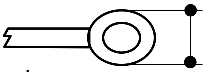
B • Effecting the connections



cable section
0,25÷2,5 mm²
AWG 22÷14

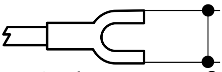
Preferential

with eyelet terminals



N° 2 wires max.6

with fork terminals



N° 2 wires max.6

3.1 Precautions and advised conductor course

Although this controller is designed to resist the heaviest disturbances present in industrial environments (as per CE mark), it is advised to keep to the following precautions:

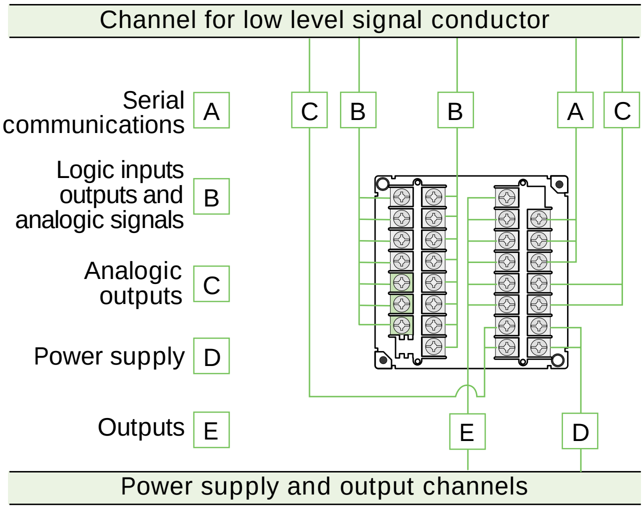
A. Precautions

Single out supply line from power line

Keep away from teleruptors, electromagnetic contactors and powerful motors

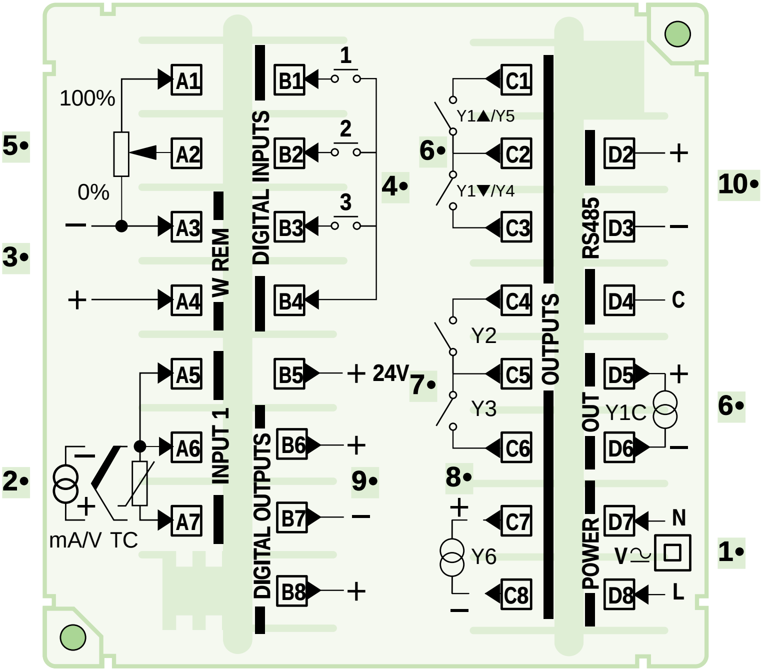
Keep away from power groups, in particular if with phase control

B. Advised conductor course



E

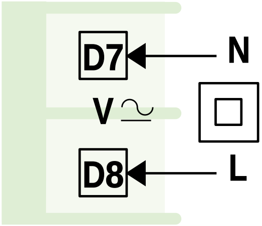
Wiring diagram



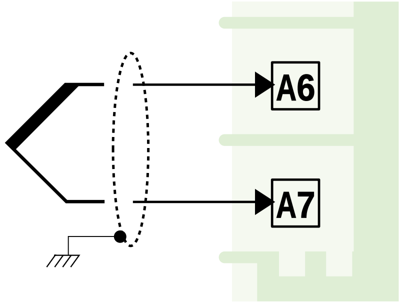
Relay outputs, combined to the terminals C1/C2 and C2/C3, can be configured as auxiliary output Y4 and Y5 (alarms) only if they are not used as main control output.

1• Single power supply

switching type with double isolation
Standard:
100…240Vac
-15 +10% (250 Vac max)
or:
24Vac - 24Vdc -15 +10%
Absorbed power 5 VA max



2• "X" measurement inputs

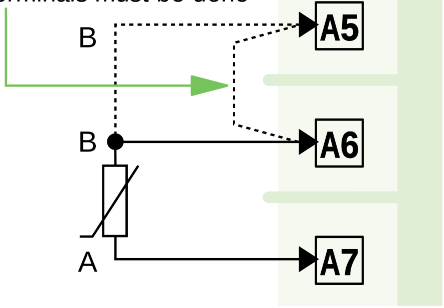


A • For Thermocouples
J-L-T-K-S-R-B-N-E-W

- Respect polarities
- For eventual extensions, use a compensated cable suitable for the type of used thermocouple
- The eventual screen is well earthed at only one end

2 • "X" measurement input (continued)

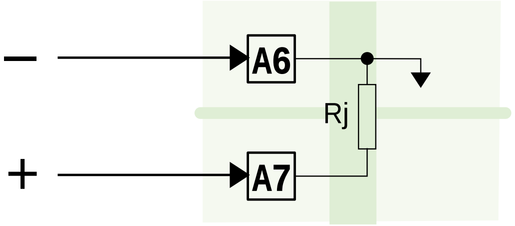
For 2 wires connection a jumper among A5 and A6 terminals must be done



B • For RTD Pt100

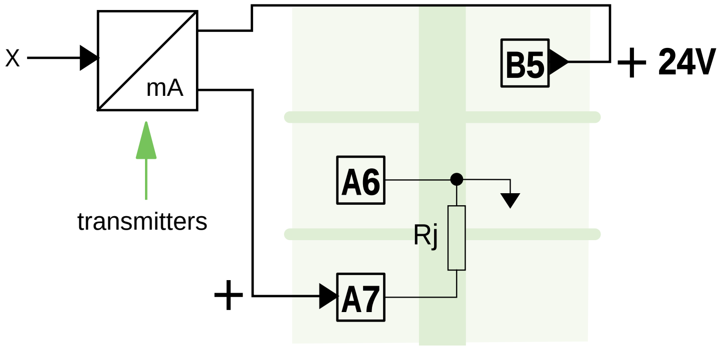
- For 3-wires connection, use cables of same section (min. 1mm^2)
  Line 20Ω max. for wire
- For 3-wires connection, use cables of adeguate section (min.1,5mm^2)
  Note: with a 15m probe-controller distance and a 1,5mm^2 section cable, the error is about 1°C.

C • Continuous mA, Volt



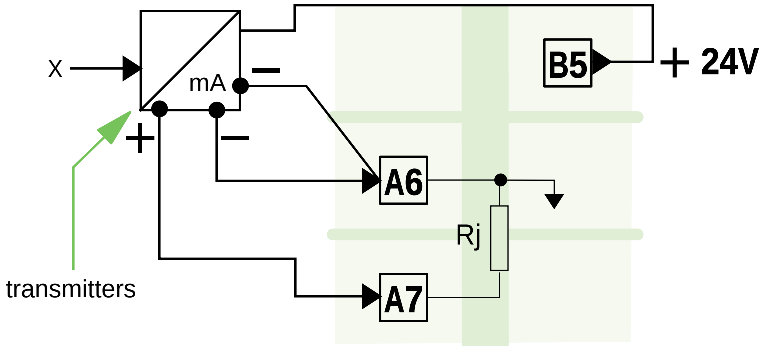
Internal Rj = 30Ω per mA
Internal Rj = 10MΩ per mV
Internal Rj = 10KΩ per Volt

C.1 • For 2 wires transmitter



auxiliary power supply for transmitter
24 Vdc ±10%
30mA max

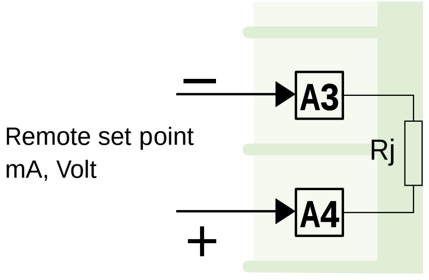
C.2• For 3 or 4 wires transmitter



auxiliary power supply for transmitter
24 Vdc ±10%
30mA max

3• Auxiliary input

On Standard Set point version these terminals must be used as Remote Set point input.

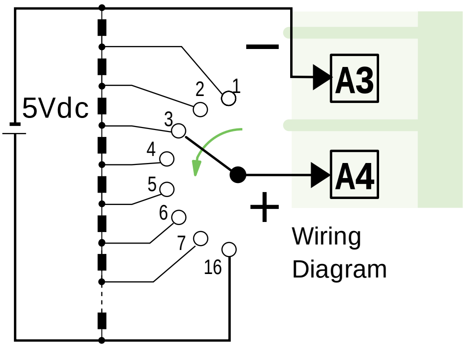


Current
0/4…20mA
Internal Rj = 30Ω

Voltage
1…5V, 0…5V, 0…10V
Internal Rj = 300 KΩ

NOT galvanically isolated

On Programmable Set point version these terminals must be used as Prgm selection input.



A stabilized external voltage sourse (max 5Vdc) allows to select one of the memorized Prgm.s.

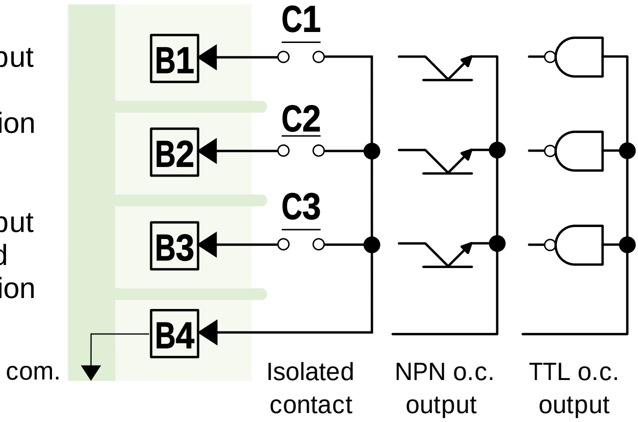
$$Vin = \frac{N° \ Prgm}{3.2}$$

Each Prgm has to be selected by a different voltage value as follows: (E.g. Prgm 8 = 2,5 Vdc).
With Vin = 0 the selection is inhibited.

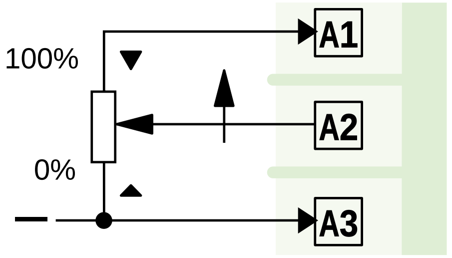
4 • Logic inputs

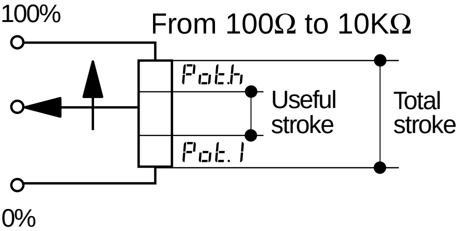
When the external logic input is ON (maintained closed contact), the relevant function is operating.

When the external logic input is OFF (maintained opened contact), the relevant function is not operating.
(see page 19)



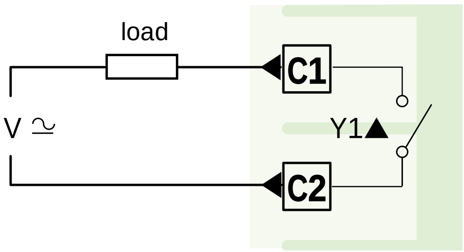
5 • Input feedback potentiometer (servomotors)





6.0• Relay single output

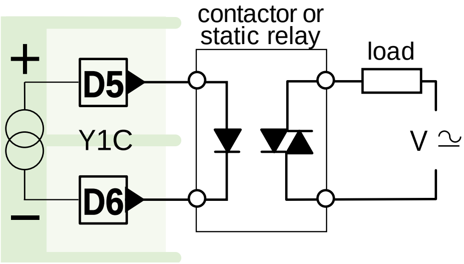
configuration N=0



One N.O. contact

6.1• Logic single output

configuration N=1

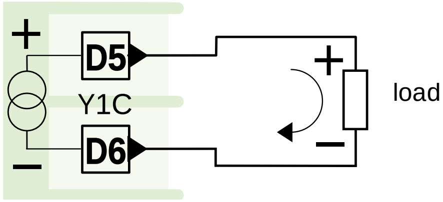


Output 0…22Vdc ±20% (20mA max.)
galvanically isolated

E

6.2• Continuous single output

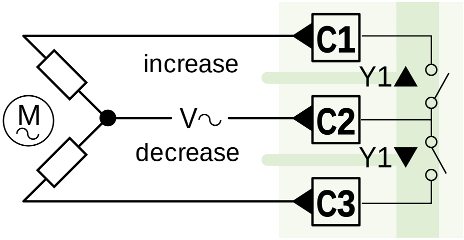
configuration N=2



galvanically isolated
500Vac/1min
750Ω/15V max in current
500Ω/20mA max in voltage

6.3• Output for servomo-

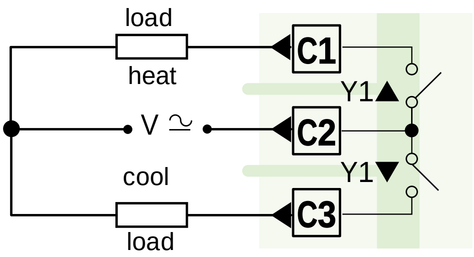
configuration N=3



Three position with two interlocked contacts (increase, stop, decrease)

6.4• Relay / relay dual action output

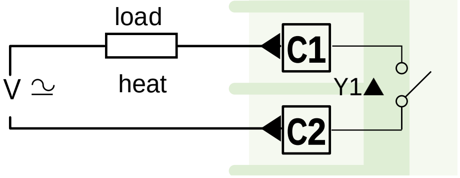
configuration N=4

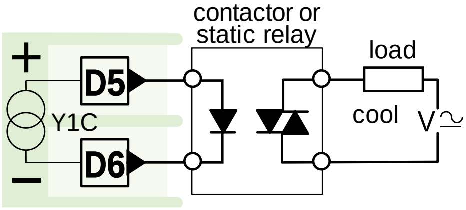


2 N.O. contacts

6.5• Relay / logic dual action output

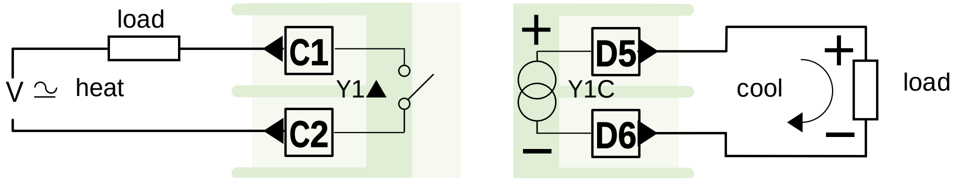
configuration N=5





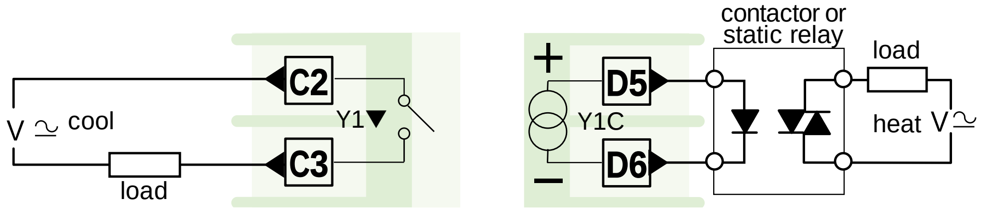
6.6• Relay / continuous dual action output

configuration N=6



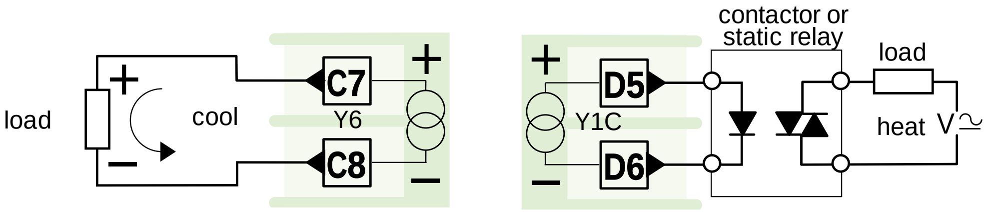
6.7• Logic / relay dual action output

configuration N=7



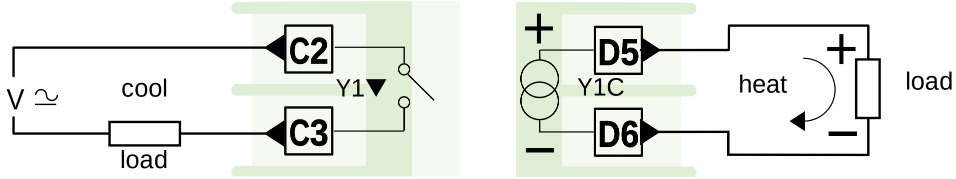
6.8• Logic / continuous dual action output

configuration N=8



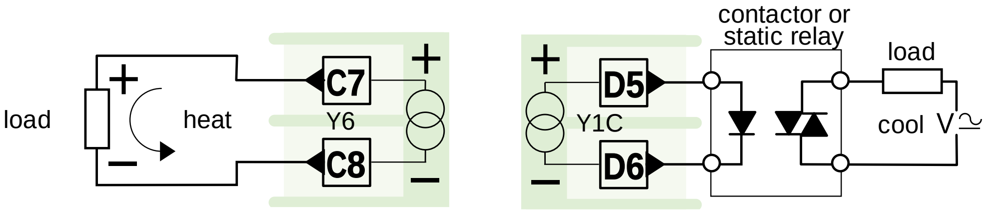
6.9• Continuous/ relay dual action output

configuration N=9



6.10• Continuous / logic dual action output

configuration N= 10



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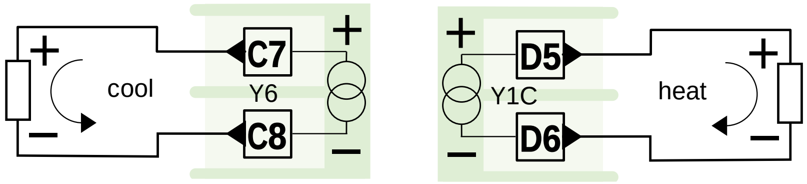
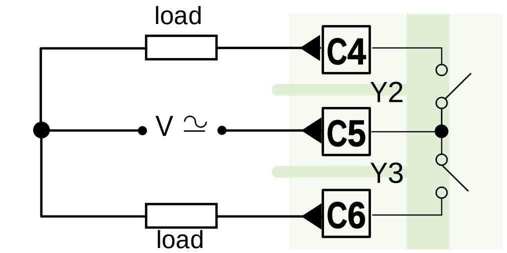
6.11• Continuous / continuous dual action output

configuration N= 11

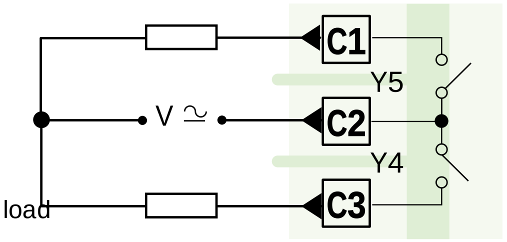


7• (6•) Auxiliary output Y2 - Y3 - Y4 -Y5

see page 19



2 N.O. relay outputs



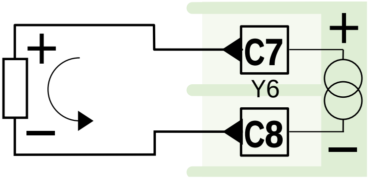
2 N.O. relay outputs

The 2 N.O. relay outputs can be used as Y4 and Y5 auxiliary outputs, only if they are not used before as main control relay output.

E

8• Retransmission output Y6 (option)

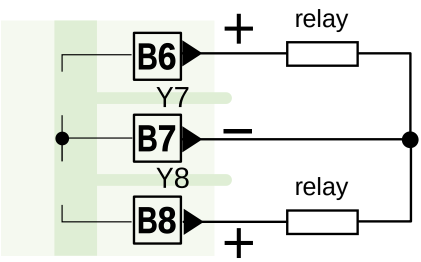
see page 19



galvanically isolated
500Vac/1min
750Ω /15V max in current
500Ω /20mA max in voltage

9• Y7 & Y8 Logic Outputs (for external relays)

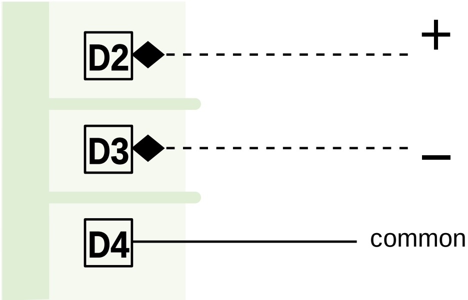
For "Programmable Set point" version only

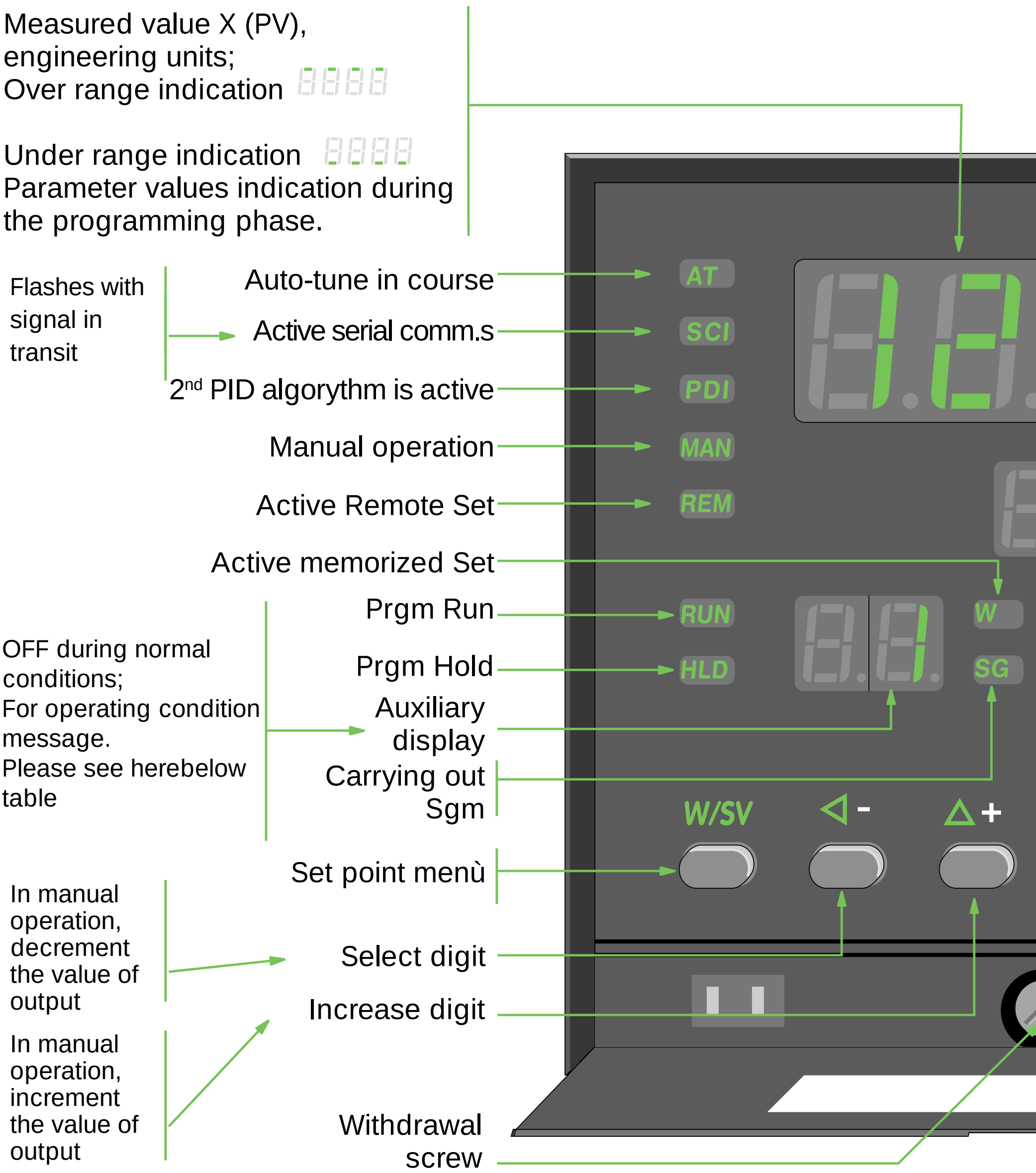


They can be freely configured to the programme.
The galvanically isolated
500 Vac/1min
30mA max, 28 Vdc (if Off)
1Vdc max at 30mA.

10• Serial communications (option)

Consult direction for use "SERIAL COMMUNICATIONS SUPPLEMENT"

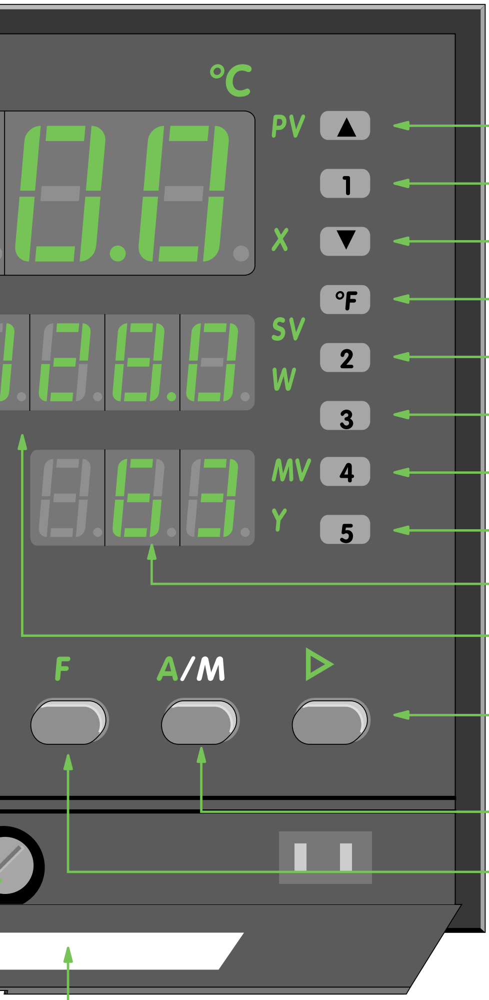




E

RUN HLD	message	W SG	Instrument operating condition	
	1,2,3	W	One of 3 memorized Set points	
	C	W	Computer set point is operating	
	yr	—	One of three logic inputs is forcing Y1 equal to Remote Set Point	
	yP	—	One of three logic inputs is forcing Y1 equal to Forcing output value	
	0	SG	Initial segment	Programmable Set point version
	F	SG	Final segment	
	...	SG	Segment n°...	
	- -	SG	Reset mode	

Programme mode leds	
RUN	(Lighted) Programme carrying out
RUN	(blinking) Wait mode for "Out of Prgm Max Deviation" condition
HLD	Wait mode by keys, logic input or serial comm.s command. Wait mode when "Manual" operating condition is selected during a Programme carrying out.



Output Y1 ▲ ON

Output Y1 ON

Output Y1 ▼ ON

°F Selection

Output Y2 ON

Output Y3 ON

Output Y4 ON

Output Y5 ON

Output Y1/MV

Set point W/SV

Enter or Scroll values

Automatic/Manual

Function menù

Front cower with identification label

Increasing for servomotors or Y1 channel (heat)

De-activated with continuous or dual action discontinuous output

Decreasing for servomotors or Y1 channel (cool)

to 0…100% (to -100.100% for Y1 with dual output) or servomotor position

Local or Remote operating Set point; Parameter or activable command mnemonic codes during programming phase

E

When the mounting and wiring are completed, the instrument shall be configured and then, programmed. The controller is of the universal type, this means that all the functions are available on the instrument, configuration and programming allow to select and adjust the desired functions.

5.1• Configuration Access

Configuration is essential for the correct operation of the controller.
Proceed with care.

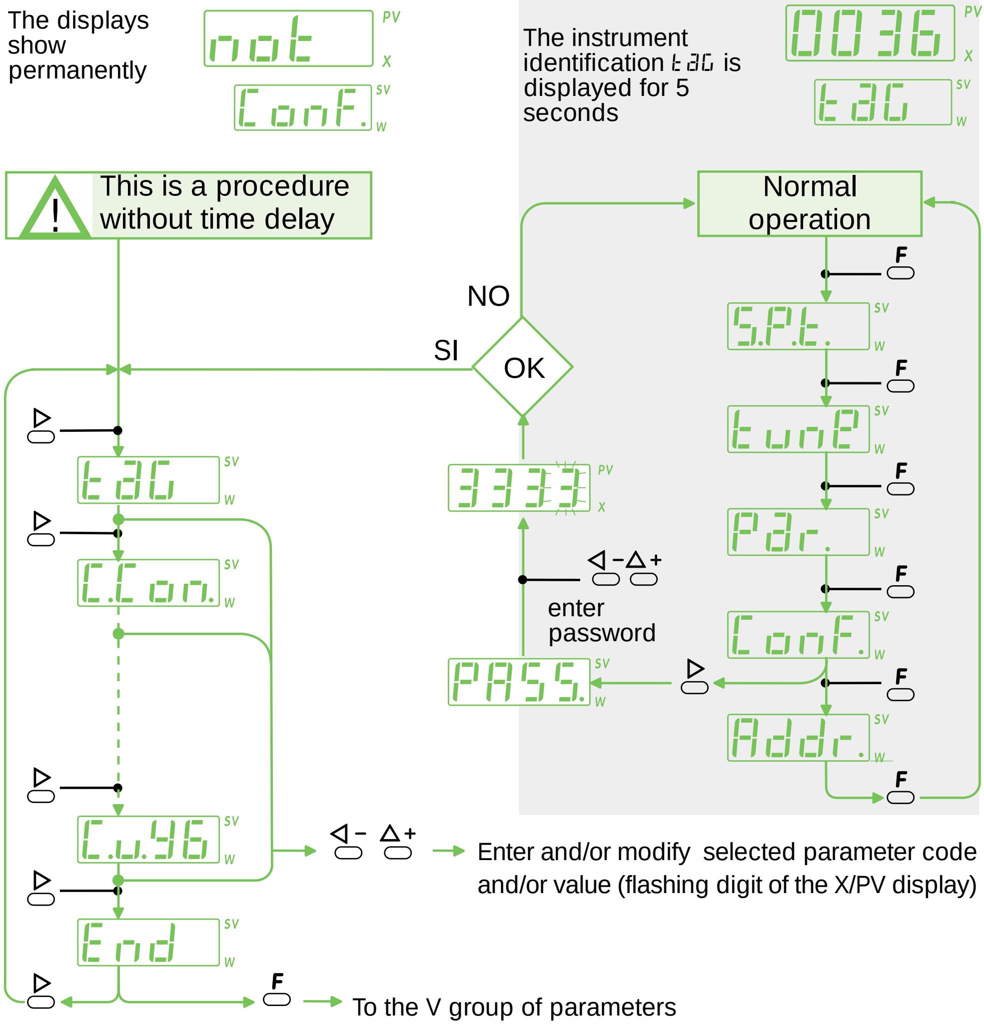
It is possible enter in configuration phase by two different ways.

5.1.2• Not configured instrument (1st configuration)

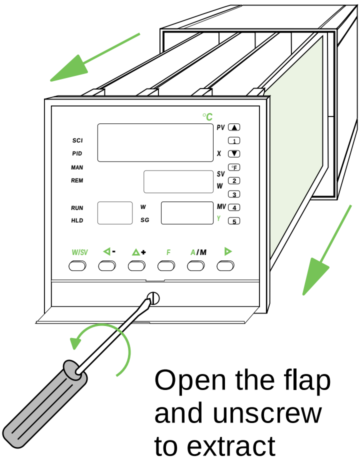
When powered, the instrument is in the stand-by mode, all the outputs are not operating.

5.1.3• Configured instrument (configuration modify)

When powered, the instrument automatically checks if the configuration is correct. For 5 seconds all the outputs are not operating. After 5 seconds, and if the configuration is correct, the instrument automatically starts.

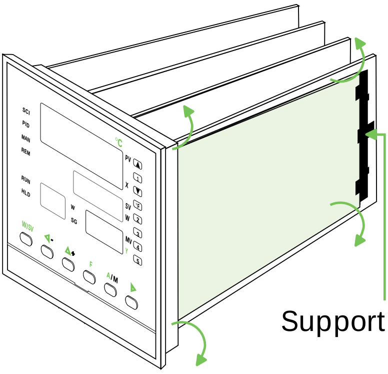


A • Instrument Withdrawal



Open the flap
and unscrew
to extract

B • Unhook the paper support

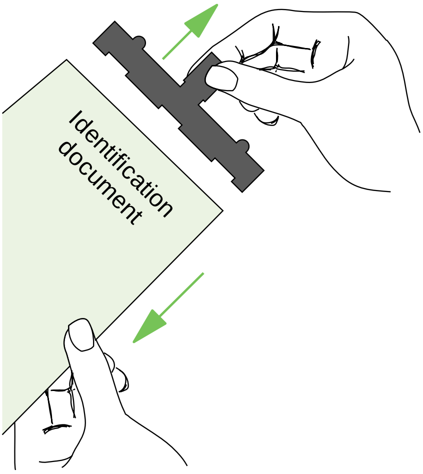


Support

Left the support, unhook
and unthread the paper

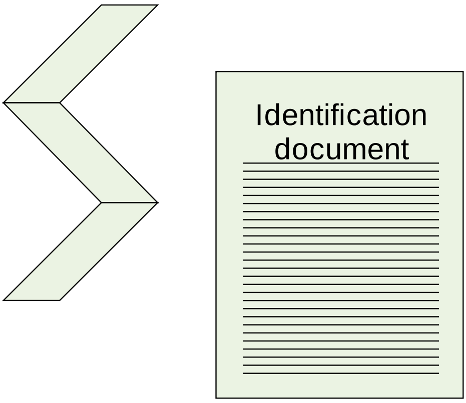
E

C • Share paper



D • Write table

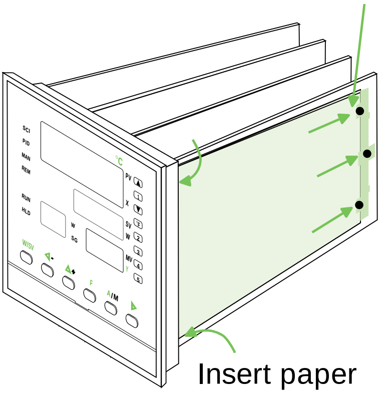
Open paper



Fold the paper and
connect to the support

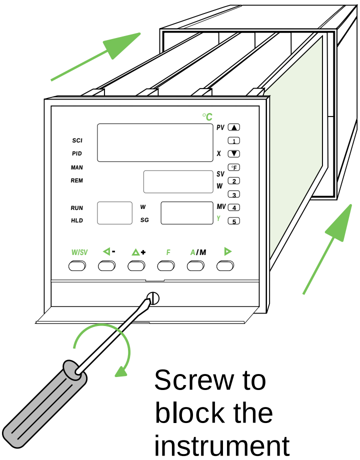
E • Insert paper

Graft
the support
in the 3 pivots

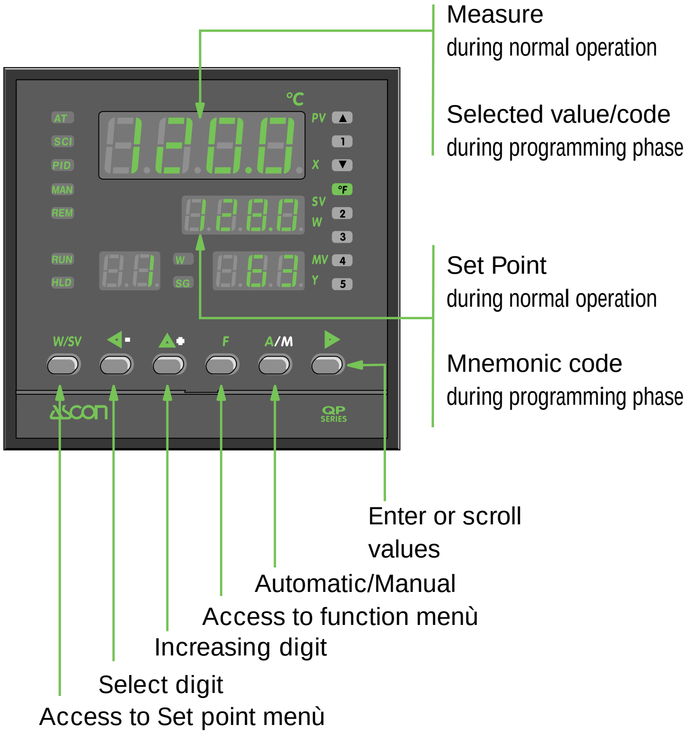


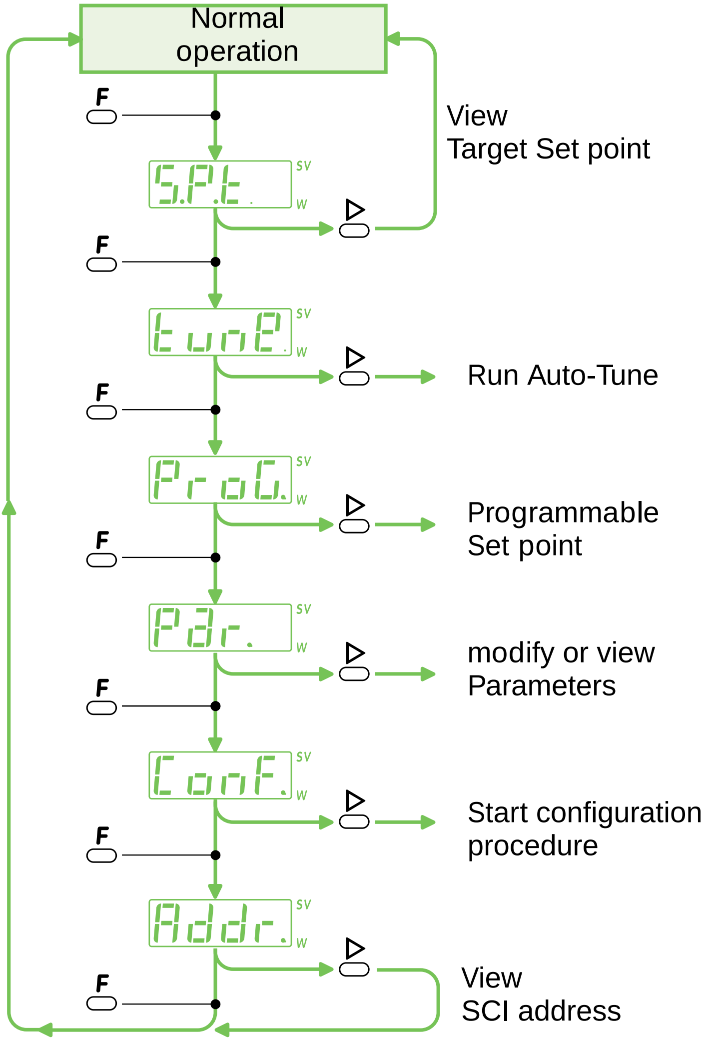
Insert paper

F • Instrument insert



Screw to
block the
instrument


Measure
during normal operation
Selected value/code
during programming phase
Set Point
during normal operation
Mnemonic code
during programming phase
Enter or scroll
values
Automatic/Manual
Access to function menù
Increasing digit
Select digit
Access to Set point menù


Normal
operation
View
Target Set point
Run Auto-Tune
Programmable
Set point
modify or view
Parameters
Start configuration
procedure
View
SCI address

E

5.2 Configuration phase

procedure without time delay

Before entering the configuration codes and parameter values given in the pages 18 and 19, it is suggested to carefully fill the given herebelow table with the selected codes/values.
All configuration codes/values affect the following ones, due to this, entering of the configuration codes/vaules must be done in accordance with the sequence given herebelow.

When the configuration phase is started, the first configuration parameter is displayed. By pressing the ⊳ key, all the configuration parameters are scrolled in accordance with the sequence given in the following table.

ConF.

Parameter mnem. code (display W/SV)	parameter description	Entered Code and/or value (display X/PV)	Ref.
tAG	Identification tag number		A
C.Con.	Algorythm and control action		B
C. S.P.	"Standard" Set point type		C
C. Pr.	Programmable Set point		C1
C.In.I	Input type and scale range		D
C. Sc.	°C,°F e K selection		E
C. C.J.	Temperature of external cool joint		F
C. d.d.	Decimal point for linear scales		G
C. lo.	Scale beginning value for linear scales		H
C. hi.	End scale value for linear scales		K
C.L. i.1	1 Input Logic function		I
C.L. i.2	2 Input Logic function		J
C.L. i.3	3 Input Logic function		L
C.Inr.	Remote Set point input range		M
C. Y1	Y1 control output type		N
C.uY1	Y1 output range		O
C. Y2	Y2 alarm type		P
C. Y3	Y3 alarm type		Q
C. Y4	Y4 alarm type		R
C. Y5	Y5 alarm type		S
C. Y6	Y6 2nd analog output (retransmission) type		T
C.uY6	Y6 output range		U
End	End of configuration		

To the V group of parameters

The configuration codes/parameter values (shown with **grey background**), appear, or not , depending on the previously selected ones. (see notes page 18 & 19)

Attention: not coherent codes with the previously selected ones, if entered, are not accepted. Not admitted codes are also not accepted.

When the selected value is higher than the admitted value, the X/PV display shows:

When the selected value is lower than the admitted value, the X/PV display shows:

For an easy and quick subsequent identification/modification of the controller operating characteristics, it is suggested (as soon as the configuration is completed), to fill the "Identification document", located inside the instrument, with the configuration codes/values. (see page 15)

tAG

Identification code — A

Selectable range 0000.. 9999

Freely selectable tag number (in accordance to the customer service assignement).
When the configured controller is powered, the X/PV display shows the tag number for 5 seconds.

C.Con.

Algorythm and control action — B

On - Off	Reverse	0
	Direct	1
P.I.D.	Reverse	2
	Direct	3
double P.I.D.	Reverse	4
	Direct	5

Press these keys to select digits, to modify values and enter parameter codes/values, codes and values are automatically accepted after 5 seconds.

◁ – Select digit

△ + increasing digit

C. S.P.

Standard Set point type — C

Only Local	0
Local and 3 memorized	1
Only Remote	2
Local and Remote	3
Local and Local + Remote	4

Not displayed if Progr. Set point version

C. Pr.

Programmable Set point type — C1

Time basis	Priority	
0…9999 sec.s	Slope	0
	Duration	1
0,0…999,9 min	Slope	2
	Duration	3
0…999,9 min	Slope	4
	Duration	5
0,0…999,9 hours	Slope	6
	Duration	7
0…9999 hours	Slope	8
	Duration	9

Not displayed if Standard Set point version

C. In. 1

Input type and scale range — D

RTD Pt100 Ω IEC 751	-200…600°C	0
	-328…1112°F	
	73…873 K	
	-99.9…300.0°C	1
	-99.9…572.0°F	
	173.3…573.2 K	
Thermocouple **J** FeCu45%Ni IEC584	0…600°C	2
	32…1112°F	
	273…873K	
Thermocouple **L** FeConst. DIN 43710	0…600°C	3
	32…1112°F	
	273…873 K	
Thermocouple **T** Cu CuNi IEC 584	-200…400°C	4
	-328…752°F	
	73…673 K	
Thermocouple **K** Cromel-Alumel IEC 584	0…1200°C	5
	32…2192°F	
	273…1473 K	
Thermocouple **S** Pt10%Rh-Pt IEC 584	0…1600°C	6
	32…2912°F	
	273…1873 K	
Thermocouple **R** Pt13%Rh-Pt IEC 584	0…1600°C	7
	32…2912°F	
	273…1873 K	
Thermocouple **B** Pt30% Rh-Pt6%Rh IEC 584	400…1800°C	8
	752…3272°F	
	673…2073 K	
Thermocouple **N** Nicrosil-Nisil IEC 584	0…1200°C	9
	32…2192°F	
	273…1473 K	
Thermocouple **E** Ni-NiMo18% IEC 584	0…1100°C	10
	32…2012°F	
	273…1373 K	
Thermocouple **W** W3%Re-W25%Re IEC 584	0…2000°C	11
	32…3632°F	
	273…2273 K	
4…20 mA	Linear scales	12
0…20 mA		13
0…50 mV		14
0…200 mV		15
0…1 V		16
1…5 V		17
0…5 V		18
0…10 V		19
4…20 mA	Linear scales with square root extraction $\sqrt{}$	20
0…20 mA		21
0…50 mV		22
0…200 mV		23
0…1 V		24
1…5 V		25
0…5 V		26
0…10 V		27

C. Sc.

°C, °F, K selection and cool joint compensation for X input — E

Internal compensation	°C	0
	°F	1
	K	2
External compensation	°C	3
	°F	4
	K	5

External compensation does not appear with Pt100 Ω or linear inputs.
When the external cool joint compensation is configured, its value must be set by the parameter CCJ1 **(Tab. F)**

C. d.d.

Input decimal point for linear scales — G

None	0
1 decimal point	1
2 decimal points	2
3 decimal points	3

This code does not appear when the D table (C. In 1) is selected between 0 and 11.

Logic input notes

2,3,4,5 & 9 codes depend on the type of Set point previously entered. (**Tab. C**)

Index 8 and from 12 to 18 are displayed if Programmable Set point type has been chosen.

Is present only if Remote Set point has been selected **Tab. C** codes 2,3,4.

C. C.J.

External cool joint temperature		F
Admitted range	0 .... 50°C	
	32 .... 122°F	
	273 .... 323 K	

Enter a value coherent with the admitted range. Higher and lower values will not be accepted.
This code is not available with internal Cold joint compensation

C. Lo.

Input beginning value for linear scales	H
-999 ... 9999	

C. hi.

Input full value for linear scales for	K
-999...C. Lo. -100 or C. Lo+100...9999	

minimum span 100 counts

C.L. i.1 C.L. i.2 C.L. i.3

Functions of the 3 logic inputs	I-J L
None	0
Manual control (loop A)	1
1st memorized Set point	2
2nd memorized Set point	3
3rd memorized Set point	4
Remote Set point	5
Local Set point	6
Locked keyboard	7
2nd P.I.D. algorythm	8
Y1 Remote Set point input	9
Y1 Forcing value	10
Programme Launch/Stop	12
Programme Run/Hold	13
Programme Launch-Run/Hold	14
Programme Stop	15
Programme Hold (Local S.p)	16
Next segment	17
Back to the beginning of sgm.	18

(see note on the left)

C. Irr.

Remote Set point scale range		M
Current	4...20 mA	0
	0...20 mA	1
Voltage	1...5 V	2
	0...5 V	3
	0...10 V	4

(see note on the left)

C. Y1

Control output type			N
	Y1(▲)	Y1(▼)	
Single	Relay		0
	Logic		1
	Continuous		2
	Servomotors		3
Double	Relay	Relay	4
	Relay	Logic	5
	Relay	Continuous	6
	Logic	Relay	7
	Logic	Continuous	8
	Continuous	Relay	9
	Continuous	Logic	10
	Continuous	Continuous	11

Codes 8, 10 and 11, can be selected if the 2nd analog output option (Y6) is fitted. These codes depend on the **Tab. B** (C.Con).

If control action is (Tab. B)	Select (Tab. n)
On - Off	0... 1
single P.I.D.	2...3
double P.I.D.	4...5

C.u.Y.1

Y1 output range		O
Current	4...20 mA	0
	0...20 mA	1
Voltage	1...5 V	2
	0...5 V	3
	0...10 V	4

The code is available only if the main output (Y1) is of the analog type (see **Tab. N** codes 2, 6, 9, 11).

C. Y2 C. Y3 C. Y4 C. Y5

Y2-Y3-Y4-Y5 Alarm type		P-Q R-S
Disabled		0
X1 Input interruption (1)	N.A.(close)	1
	N.C. (open)	2
Independent loop A	Active high	3
	Active low	4
Deviation loop A	Active high	5
	Active low	6
Band loop A	Active outside	7
	Active inside	8
Output Y1 loop A	Active high	9
	Active low	10
Out of Prgm. max. Dev. (2)	N.O.(close)	23
	N.C. (open)	24
Configured to the Prgm. (2)		25

Y4 and/or Y5 outputs are not available if the control output has been already used as single or double relay for servomotor output. **Tab. N** Codes 0, 3, 4, 5, 6, 7, 9

(1) Only for thermoelements, 4...20mA and 1...5V

(2) Displayed if Programmable Set point version, only.

C. Y6 ⚠ OPTION

Y6 2nd analog output type		T
Disabled		0
Retransmission	Measure X1	1
	Set point W	2
	Output Y1	3
	Output Y1(channel ▼)	4
	Deviation 0...25%	5

This code is available only if the 2nd analog output has not been used as second control output
(C. Y6 **Tab. N** codes 8, 10, 11)

C.u.Y6

Y6 output range		U
Current	4...20 mA	0
	0...20 mA	1
Voltage	1...5 V	2
	0...5 V	3
	0...10 V	4

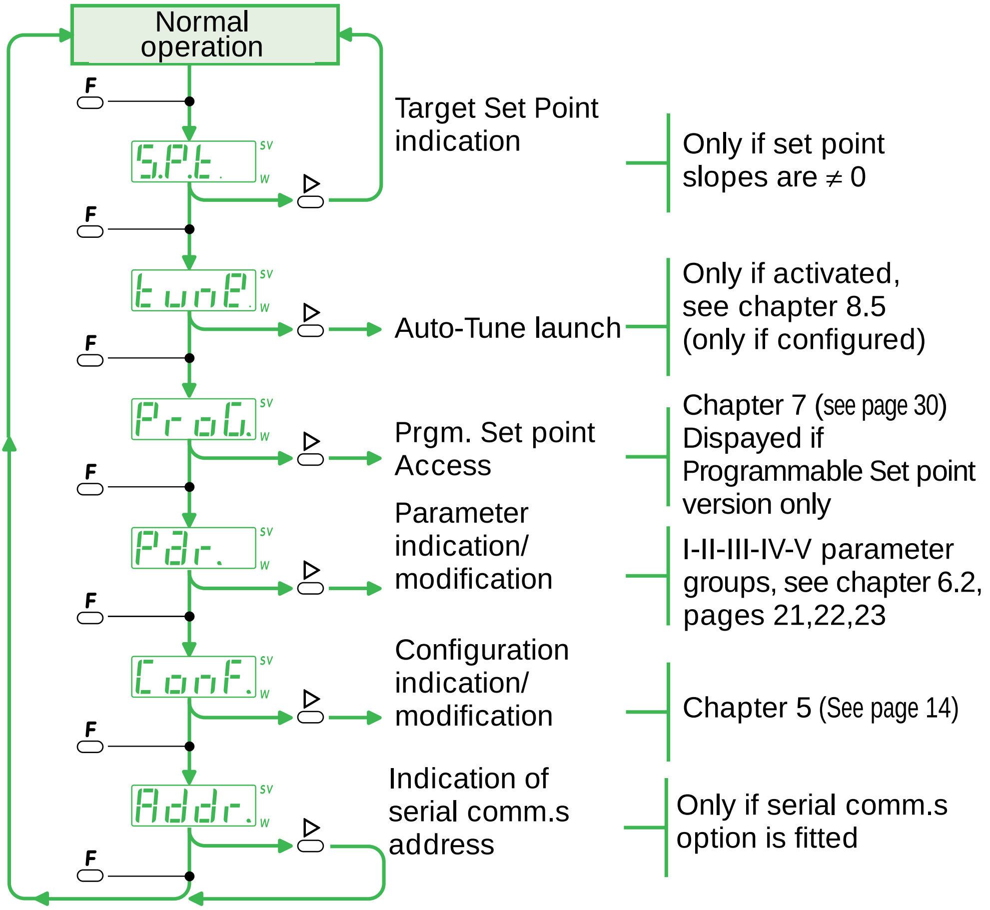
The code is not available if C. Y6 is disabled, **Tab. T** - Codes 1,2,3,4,5 or if double output is selected and Y1 (channel ▼) is logic or continuous type. **Tab. N** - Codes 8, 10, 11

When the configuration phase is completed the programming phase shall be started.

6.1• Main menù

The main menu allows controller configuration and parameterization, Auto tune launch (start), indication of target Set point and serial comm.s address.

Press F key during normal operation, main menu functions are shown in the following sequence:



6.2• Parameters access

Starting from normal operation, press F key repeatedly until the display W/SV shows Pdr., press ▷ key to reach the first parameter of the first group S.P. 1

Parameters are divided into 5 homogeneous groups.
Press F key to reach the next parameter group.
The V group of parameters is protected by a Password, enter 1111 when display shows PASS .

6.3 Parameterization

This procedure is time delayed. If no keys are pressed for about 30 seconds, the instrument returns to the normal operation.

1st GROUP

P.d.r. — F — Parameter indication/modification

For a quick and easy use, parameters of 1st group are shown, herebelow, in accordance with the selected Set point type.

"Standard" Set point

- 10 / S.P. 1 — 1st memorized Set point (2)
- 20 / S.P. 2 — 2nd memorized Set point (2)
- 30 / S.P. 3 — 3rd memorized Set point (2)
- 0.0 / S.I. u. — Slope up during transition Set point (3) 0.0…10.0% of span
- 0.0 / S.I. d. — Slope down during transition Set point (3) 0.0…10.0% of span
- 300 / Y2S.P. — Y2 Set point (4)
- 0.50 / Y2HY. — Y2 hysteresis (5) 0.01…10.00% of span
- 300 / Y3S.P. — Y3 Set point (4)
- 0.50 / Y3HY. — Y3 hysteresis (5) 0.01…10.00% of span
- 300 / Y4S.P. — Y4 Set point (4)
- 0.50 / Y4HY. — Y4 hysteresis (5) 0.01…10.00% of span
- 300 / Y5S.P. — Y5 Set point (4)
- 0.50 / Y5HY. — Y5 hysteresis (5) 0.01…10.00% of span

"Programmmable" Set point

- 0 / S.P. L. — Local Set point S.P.L. l.…S.P.L.h.
- 0.0 / S I. u. — Slope up during transition Set point (3) 0.0…10.0% of span
- 0.0 / S I. d. — Slope down during transition Set point (3) 0.0…10.0% of span
- 300 / Y2S.P. — Y2 Set point (4)
- 0.50 / Y2HY. — Y2 hysteresis (5) 0.01…10.00% of span
- 300 / Y3S.P. — Y3 Set point (4)
- 0.50 / Y3HY. — Y3 hysteresis (5) 0.01…10.00% of span
- 300 / Y4S.P. — Y4 Set point (4)
- 0.50 / Y4HY. — Y4 hysteresis (5) 0.01…10.00% of span
- 300 / Y5S.P. — Y5 Set point (4)
- 0.50 / Y5HY. — Y5 hysteresis (5) 0.01…10.00% of span

2nd GROUP

F

For a quick and easy use, parameters of the 2nd group are shown, herebelow, in accordance with the selected

Single and double P.I.D. algorythm and Control action (B table 2 - 3 - 4 - 5)

Display	Default	Parameter
P.b.	5.0	Proportional band 0.5...999.9%span
t. i.	1.0	Integral time (reset) (0.0 = Off) 0.0...100.0 min.
t.d.	0.20	Derivative time (rate) (0.00 = Off) 0.00...10.00 min.
r.Y.	50	Balance output shift (only when t. i is Off) 0...100% for single action or -100...100% for double action
F. Int.	50.0	Fuzzy intensity (0.0 = Off) 0.0…90.0%
t.c.	30	Y1 cycle time (only for relay or logic output) 1…200 seconds
t.c. C.	30	Y1▼ cycle time (6) (only for relay or logic output) 1…200 seconds
d.b.	1.0	Dead band (6) 0.0…5.0% of output
r.c.r.	1.0	Cool relative gain (6) 0.1…3.0

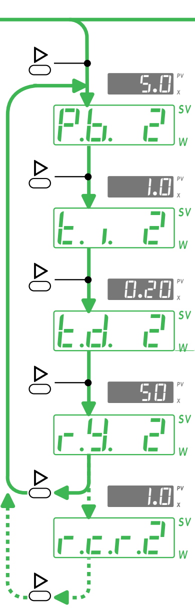
P.I.D. algorythm and Control action with only servomotors output (B table 2 - 3 and N table 3)

Display	Default	Parameter
P.b.	5.0	Proportional band 0.5...999.9% span
t. i.	1.0	Integral time (0.0 = Off) 0.0...100.0 min.
t.d.	0.00	Derivative time (0.00 = Off) 0.00...10.00 min.
F. Int.	50	Fuzzy intensity (0.0 = Off) 0.0...90.0%
t.Y.	60	Stroke time Value 15…600 seconds
dY.	1.0	Dead zone Output 0.1…10.0% output
Pot. l		Valve position calibration Valve is driven fully closed
Pot. l		A/M Wait stopping of valve press A/M key to enter valve closed value (0)
Pot.h		Valve is driven fully opened Wait stopping of valve press A/M key to enter valve opened value (100)

On-Off algorythm and control action (B table 0 - 1)

Display	Default	Parameter
HY.	0.50	Hysteresis (On- Off) 0.10...10.00%span

3rd GROUP



Proportional band (7)
0.5...999.9%span

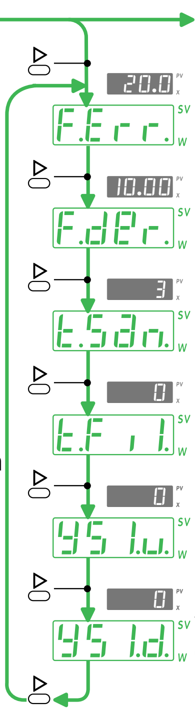
Integral time (reset) (7)
(0.0 = Off)
0.0...100.0 min.

Derivative time (rate) (7)
(0.00 = Off)
0.00...10.00 min.

Balance output shift (7)
(only when t. i2 is Off)
0...100% for single action or
-100...100% for double action

Cool relative gain (6)
0.1…3.0

4th GROUP



Fuzzy scale amplitude (7)
0.5…999.9% span

Derivative Fuzzy (7)
0.10…99.99% span/min

Sampling time
0…30 seconds
(0 = 0.5sec.s)

Time constant of the
input filter (0 = Off)
0…30 seconds

Max speed for increasing
Y1 value (8)
(0 = Off) 0…20 %/sec.s

Max speed for decreasing
Y1 value (8)
(0 = Off) 0…20 %/sec.s

E

Notes

1 Local Set point is available only with Programmable Set point version.
Wide range settable but within the Set point limits entered under the V parameter group.

2 The 3 memorized Set points are displayed only if the “Set point type” code is selected as “local and 3 memorized (C. SP **Table C** , see page 16). The memorized Set points are adjustable over the full scale range but within the Set point limits entered under the V parameters group.

3 If set to 0.0, the slope is excluded. The Set point change is of the step type.
The maximum set value is 10% of span expressed in digits/min. Example:

Range:	-200…600°C
Span:	800°C
Maximum set value:	80.0 digit/min
Corresponding to:	80.0°C/min

Only for "Programmable Set point version" slopes can be expressed in the following modes: 0,1 digits/sec, 0,1 digits/min or 0,1 digits/hour. It depends on the selected value during the configuration phase (**Table C1** page 18).

4 This parameter is not displayed if the “alarm type” code is selected as “Disabled” or “Input interruption", if grater the Prgm. max deviation or linked to the Prgm. (**Tables P-Q-R-S** 0, 1, 2, 23, 24, 25,see page 19)
The set range of Y2 and Y3 Set point, changes in accordance with the configuration of the “alarm type” as follows:

- Independent: over the full scale range
- Deviation: -300…+300
- Band: 0…300

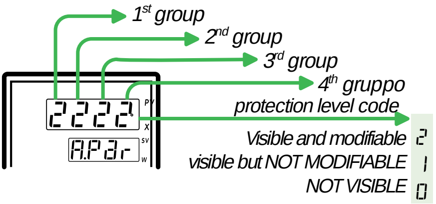
5 This parameter is not displayed if the “alarm type” code is selected as “Disabled” or “Input interruption” if grater the Prgm. max deviation or linked to the Prgm.(**Tables P-Q-R-S** 0, 1,2, see page 19)

6 Only for double action output.

7 Not displayed if the "Algorythm and control action" is "On-Off" or if one of the 3 logic inputs is configured as "2nd PID algorythm" (**Table P-Q-R** code 8)

8 Not displayed if the "Algorythm and control action" is "On-Off" or if the "Control Action" is selected for servomotors.

9 Functions and parameters protection level code.



10 Parameter is present if Y1 is not configured as servomotor output or one of the 3 logic inputs is configured as "Y1 forcing value" (**Table I-J-L** code 10)

5th GROUP

PASS — Enter correct password (see page 20)

OK? NO → Return to normal operation from configuration phase

SI ↓

AP.dr. (2222) — Functions and parameters protection level code (8) 0000…2222

A.tu. (1) — Auto Tune On/Off code
0 Off
1 On

SC1 (9) — Serial comm.s code (only if serial comm.s option is fitted) see the herebelow table

Addr. (1) — Serial comm.s address (only if serial comm.s option is fitted) 1…247

S.P.L.1. (IN.SCALA) — Scale beginning
Set point lower limit
Scale beginning value…SPLh

S.P.L.h. (F. SCALA) — Full scale
Set point higher limit
SPL 1…full scale value

S.P.r.b. (0) — Remote Set point Bias (only if remote Set point is selected) -100…200 % of span (engineering units)

S.P.r.r. (1.00) — Remote Set point Ratio (only if remote Set point is selected) -9.99…10.00

Y1. (0) — Minimum Y1output (not displayed if On-Off algorythm, servomotor output or control double output are selected) 0…90% of output

Yh. (100) — Maximum Y1output (not displayed if On-Off algorythm or servomotor outputs are selected)

Yh. C. (100) — Maximum Y1▼ output (Only if double output is selected) 10…100% of output

In.Sh. (0) — Input shift -60…60% digits

Y1Pr. (0) — Y1 output Forcing value (10) 0…100% of output (-100…100% double output)

Sa.Y1 (0) — Y1 output safety value 0…100% of output (-100…100% double output)

Sa.Y2 (0) — Y2 output safety condition
0 = Disabled
1 = Open contact

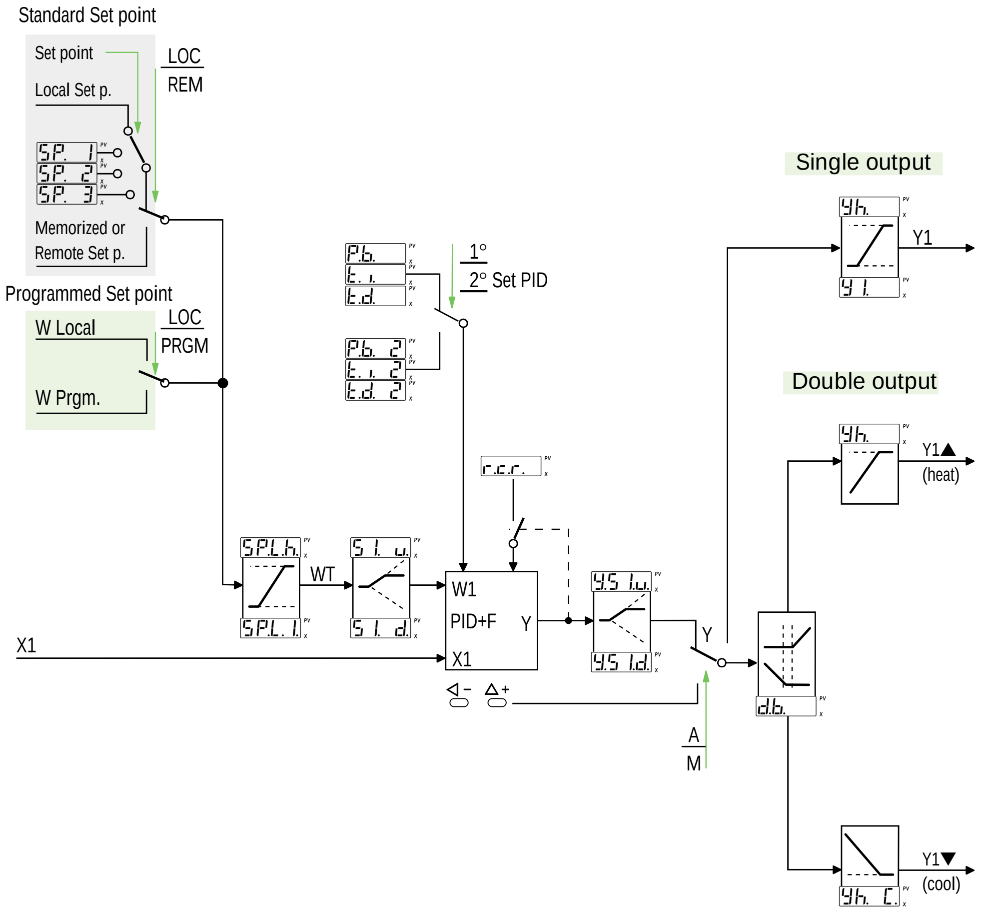
Sa.Y3 (0) — Y3 output safety condition
0 = Disabled
1 = Open contact

Sa.Y4 (0) — Y4 output safety condition
0 = Disabled
1 = Open contact

Sa.Y5 (0) — Y5 output safety condition
0 = Disabled
1 = Open contact

Code	Protocol	Baud R.	Operating M.
0	—	—	Disabled
1	ModBus	9600	Read only
2	ModBus	4800	
3	ModBus	2400	
4	ModBus	1200	
5	JBus	9600	
6	JBus	4800	
7	JBus	2400	
8	JBus	1200	
9	ModBus	9600	Read and write
10	ModBus	4800	
11	ModBus	2400	
12	ModBus	1200	
13	JBus	9600	
14	JBus	4800	
15	JBus	2400	
16	JBus	1200	
17	ModBus	9600	Supervision system or local mode
18	ModBus	4800	
19	ModBus	2400	
20	ModBus	1200	
21	JBus	9600	
22	JBus	4800	
23	JBus	2400	
24	JBus	1200	

6.4•Block diagram for 1 Std. Loop with single and/or double output



When the QP controller is configured with a double action (e.g. Heat/Cool) two different outputs are used from the same PID algorythm. In addition some specific parameters are available to help the PID algorythm: r.c.r parameter which defines the ratio between Heating Proportional band and Cooling Proportional band. db parameter instead set the dead zone transition among the two Heating & Cooling actions. Besides the Maximum Y1 output value can be modified by Yh. and Yh.C for the different outputs.

6.5• Parameters description

To semplify the use of parameters, they are grouped in homogeneous groups with the similar functions

1st GROUP

S.P. 1 — **1st memorized Set point**

S.P. 2 — **2nd memorized Set point**

S.P. 3 — **3rd memorized Set point**

These pre-fixed Set point values can be recalled by logic inputs, keyboard or serial comm.s. The selected Set point number appears on the auxiliary display

S l. u. — **Set point Slope up**

S l. d. — **Set point Slope down**

Set point speed change (digits/min) (digits/sec.s, digits min, digits/hours for Prgm Set point)

Y2SP. — **Y2 Alarm Set point**

Y3SP. — **Y3 Alarm Set point**

Y4SP. — **Y4 Alarm Set point**

Y5SP. — **Y5 Alarm Set point**

Set point of Y2,Y3,Y4,Y5 outputs. The alarms type depend on the relative configuration code.

Y2HY. — **Y2 hysteresis**

Y3HY. — **Y3 hysteresis**

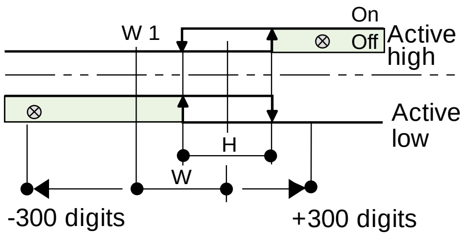
Y4HY. — **Y4 hysteresis**

Y5HY. — **Y5 hysteresis**

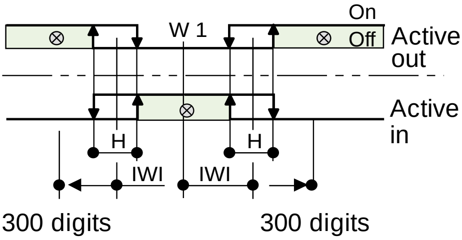
Hysteresis of Y2,Y3,Y4,Y5 outputs (% of span)

Alarm types

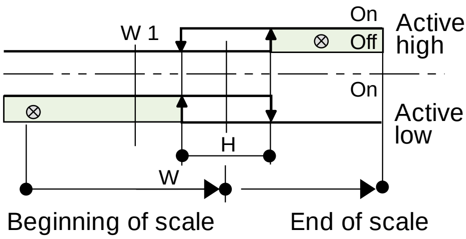
Deviation



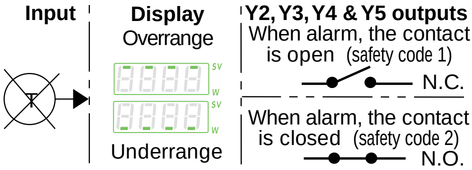
Band



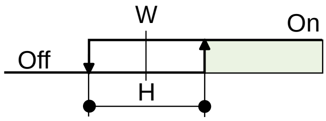
Independent



Input interruption



Hysteresis



2nd GROUP

P.b. **Proportional band**

The proportional action modifies the Y1 control output value respect the deviation (W - X) in a proportional way.

t. i. **Integral Time**

This is the necessary time of the Integral action to give the same power which has already given by the proportional action

t.d. **Derivative time**

This is the necessary time of proportional action to reach the same level of P. + D. actions

r.Y. **Balance output shift**

If t. i is Off, the Balance Output Shift corresponds to the Y1 value on steady conditions (W = X)

F. int. **Fuzzy intensity**

It allows to change the strenght of Fuzzy algorythm respect the PID algorythm during the control mode

t.c. **Y1 cycle time**

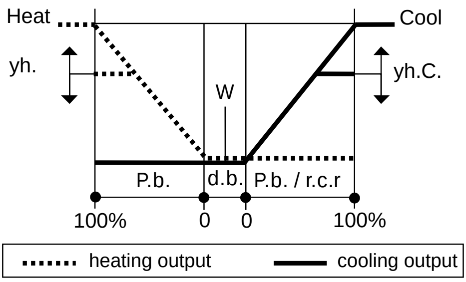
t.c. C. **Y1▼ cycle time**

This is the basic time used by the control algorythm to change the On % value respect the Off % value of Y1 output during the control mode.

d.b. **Dead band**

Dead Band between heating/cooling control outputs.

Heating / cooling algorythm



r.c.r. **Cool Relative Gain**

This value is the ratio between the cooling/heating proportional band

t.Y. **Valve stroke time**

Necessary time to go from 0 to 100% of servomotor stroke.

dY. **Output dead zone**

Output sensitivety or output dead zone

Pot. I. **Valve position calibration**

It allows to enter into the calibration procedure of the potentiometer position.

HY. **Y1 hysteresis**

Hysteresis of Y1 output (% of span).

E

3rd GROUP

P.b. 2 **2nd Proportional band**

The proportional action modifies the Y1 control output value resoect the deviation W-X in a proportional way.

t. i. 2 **2nd Integral time**

This is the necessary tyme of the integral action to give the same power wich has already given by the proportional action

t.d. 2 **2nd Derivative time**

This is the necessary time of proportional action to reach the same level of P. + D. actions

r.Y. 2 **2nd Balance output shift**

If t. i is Off, the Balance Output Shift corresponds to the Y1 value on steady conditions (W = X) (When the correct PD algorythm is entered and the process has been stabilized, on off-set conditions, enter the Y1 value shown on the W/SV display).

r.c.r. 2 **2nd Cool Relative Gain**

This value is the ratio between the cooling/heating proportional band

4th GROUP

F.Err. **Fuzzy scale amplitude**

It means the % of span where the Fuzzy logic operates.

F.dEr. **Fuzzy derivative**

This parameter inform the Fuzzy algorythm about the maximum process speed. (% of span)

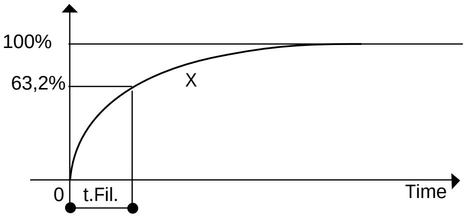
t.Sdn **Sampling time**

It refers to the sampling time of the controller. (sec.s)

t.Fil **X1 input Time constant**

Time Constant of the input RC filter applied on the process variable (X) input (sec.s).

Filter effects



YS.lu. **Max speed for increasing of Y1 value**

YS.ld. **Max speed for decreasing of Y1 value**

It limits the increasing speed of Y1 output (output% / min. see note 3 page 23)

5th GROUP

AP.dr. **Functions and Parameters protection level code** (See page 23)

At.u. **Auto-Tune On/Off code**

0 = Off
1 = On
If the code “0” is entered, the function does not appear in the main menu.

SC 1 **Serial comm.s code** (see table on V° group)

Addr. **Serial comm.s address**

The address can be selected between 1 and 247.

S.P.L.l. **Scale beginning Set point lower limit**

It limits the selection of the minimum Set point value.

S.P.L.h **Full scale Set point higher limit**

It limits the selection of the maximum Set point value.

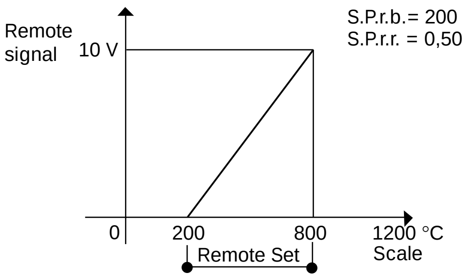
S.P.r.b. **Remote Set point Bias**

Starting point of analog remote Set point (eng. units).Selectable up to -100…+200% of range scale.

S.P.r.r. **Remote Set point Ratio**

It defines the remote Set point span (eng. units).

Example



Remote Set point span = span x S.P.r.r.

y 1 **Minimum Y1 output**

Minimum Y1 output value during control mode. This limit also operates in manual mode.

yh. **Maximum Y1 output**

Maximum Y1 output value during control mode. This limit also operates in manual mode.

yh. C. **Maximum Y1▼ output**

Maximum “cool” Y1 output value during the heating / cooling control mode. This limit also operates in manual mode.

In.Sh. **X1 Input shift**

This function allows to shift the scale range within ±60 digits.

y 1P.r. **Y1 Output forcing value**

Controller forces Y1 output to the selected value when the corresponding Logic input is active

S.d.y 1 **Y1 output safety value**

Controller forces the Y1 to the selected value in the under/overrange conditions

S.d.y2 **Y2 output safety condition**

S.d.y3 **Y3 output safety condition**

S.d.y4 **Y4 output safety condition**

S.d.y5 **Y5 output safety condition**

Controller forces the Y2 , Y3 ,Y4 and Y5 alarms to the selected conditions in the under/overrange conditions (see table page 19)

E

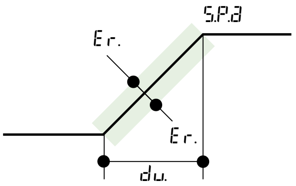
7.1• Introduction

The programmable Set point version of QP series (e.g. QP..1) has been developed to build, memorize recall and carry out programmes. By the above it is possible to link a Set point change and time together.

7.2• Main technical characteristics

- 16 programmes (max)
- Continuous or 1...9999 cycles (programme times)
- Seconds, minutes or hour time basis
- Duration or slope priority (in case of anomalies)
- Run, stop, hold, reset functions, etc. . These command are available by keyboard, logic input or serial comm.s.
- Up to 6 configurable time programmed logic outputs
- Auxiliary input for Programmes remote selection by the memorized ones (see page 7).

7.3• Programme structure



The programme is composed by a set of connected segments. On each segment the configuration of the following parameters is possible:

- Target Set point (S.P.d)
- Duration (du)
- Maximum deviation (Er.)
- State of the 6 logic outputs
- Selection of the two available PID algorythm

Necessary data

- Programme composition
  1 Initial segment called 0
  1 Final segment called F
  1...99 standard segments

7.3.1• Initial segment

By this segment the process reaches the expected starting condition of the real programme.

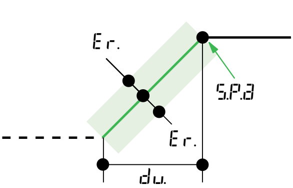
7.3.2• Final segment

By this segment, the process variable can be positioned at a fixed value and state, after the programme end.

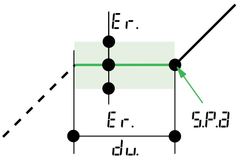
7.3.3• Standard segments

By these ones it is possible to set the real programme.
Three different types of segment can be set:

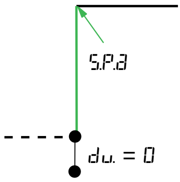
Ramp

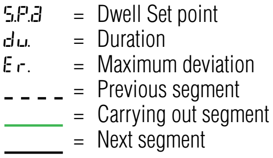


Steady

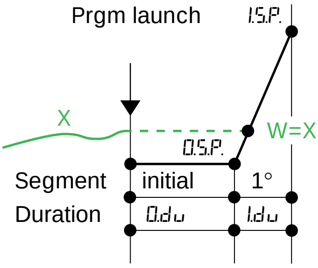


Step



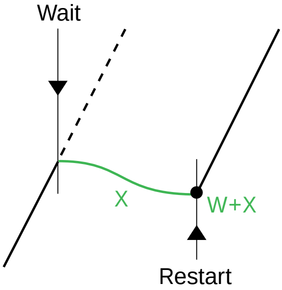


7.4• Working conditions



7.4.1• Programme launch with X (Pv) different from the Set point (Segment (0)

The initial segment duration (O.du.) is = 0 or too short.
The real programme starts with the 1st segment with W (Sv)= X (Pv) to carry on the Process variable to the fixed Set point (O.S.P).
The configured priority influences the controller behaviour.

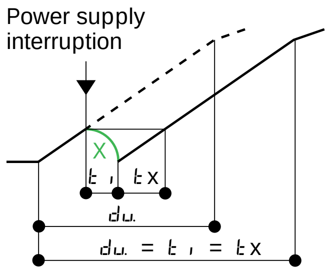


7.4.2. Programme restarts after a wait condition (from Manual mode or Local Set point mode

After the stop the programme restarts with W (Sv)= X (Pv)
The configured priority influences the controller behaviour.

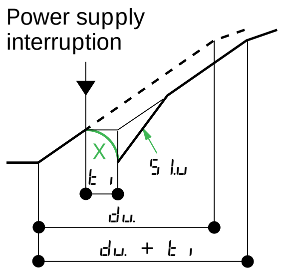
7.4.3 Programme restarts after a power supply interruption

The configured priority influences the controller behaviour.
It can be applied during a ramp segment only.



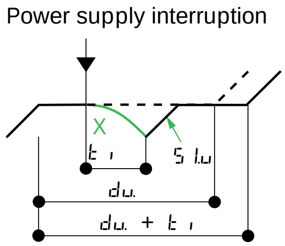
A• Slope priority

- The ramp slope remains constant.
- At the end of the power supply interruption, the process variable reaches the programmed Set point value with the same previous ramp slope. The “slope” parameters do not influence the controller behaviour.
- The carrying out duration becomes du + ti + tx



B• Duration priority

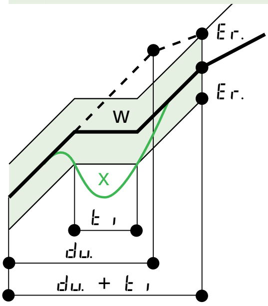
- The segment duration remains constant.
- At the end of the power supply interruption the process variable reaches the programmed Set point value with the previously entered “slope” parameter (up & down). If set correctly, it is possible to make up for the whole ti delay.
- If not, the carrying out segment duration becomes du + ti



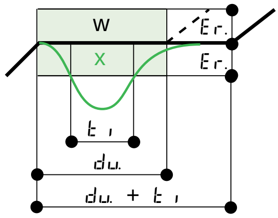
C• Steady segment

- If the power supply interruption happens during a steady segment, the controller behaviour is equal for both priorities.
- At the end of the power supply interruption the process variable reaches the programmed Set point value with the previously entered “slope” parameter (if different from 0).
- The carrying out segment duration is du + ti

A. Ramp



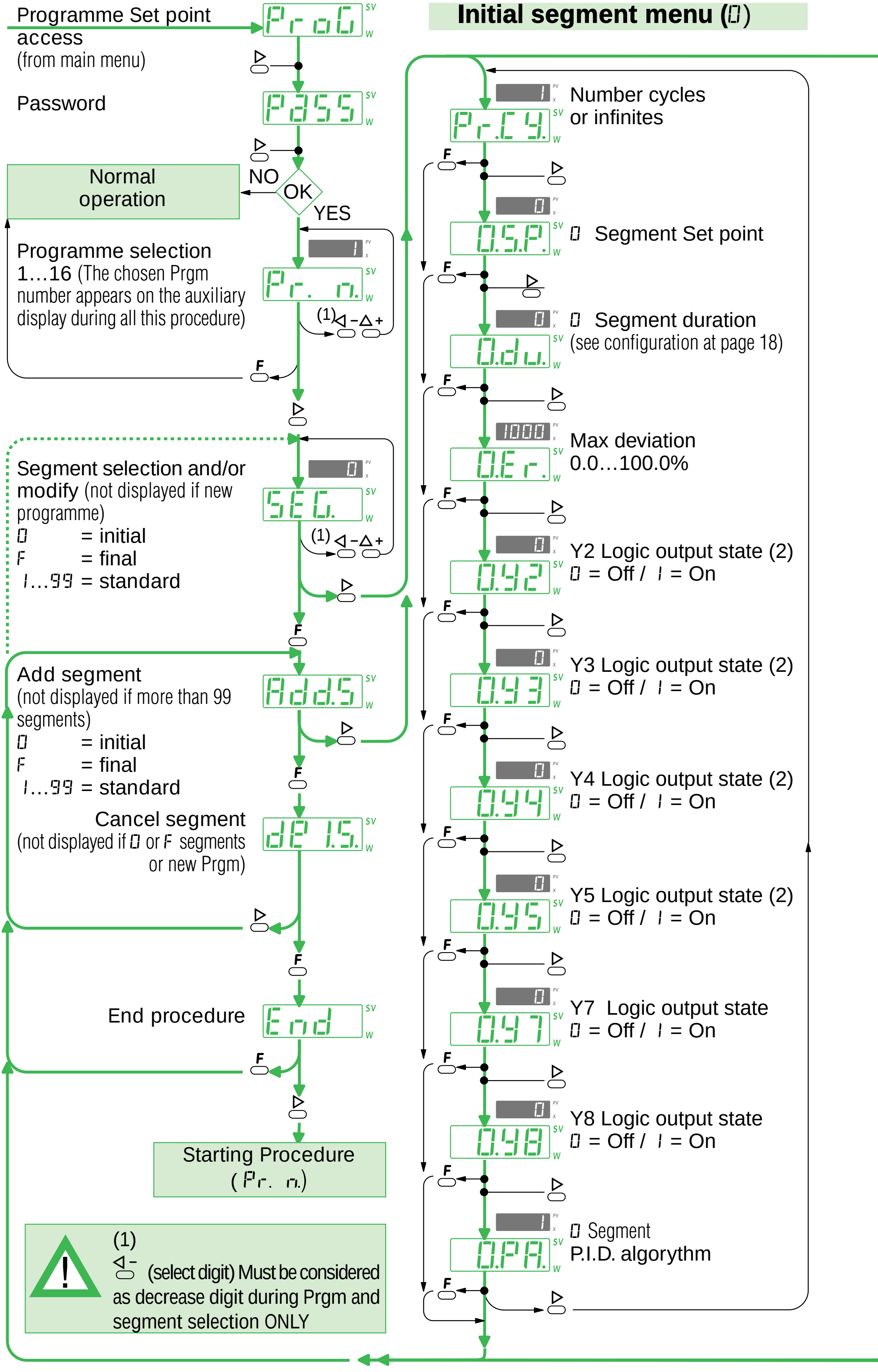
B. Steady



7.4.4• Out of Maximum deviation (Er)

When process variable is greater than the entered “Maximum deviation” (Er), the time counting of carrying out segment goes to a stand-by condition, up to the process variable come back into the “Maximum deviation". The carrying out segment duration is du + ti

7.5• Programme loading and/or modifying



For all segments:	
	F next segment
	▷ select parameter

Final segment menu F

0 — F.S.P. — F Segment Set point

0 — F.Y2 — Y2 Logic output state (2)
0 = Off / 1 = On

0 — F.Y3 — Y3 Logic output state (2)
0 = Off / 1 = On

0 — F.Y4 — Y4 Logic output state (2)
0 = Off / 1 = On

0 — F.Y5 — Y5 Logic output state (2)
0 = Off / 1 = On

0 — F.Y7 — Y7 Logic output state
0 = Off / 1 = On

0 — F.Y8 — Y8 Logic output state
0 = Off / 1 = On

1 — F.PA. — F Segment
P.I.D. algorythm

(2) Displayed if previously configured to the programme (**Table P, Q, R, S,** cod. 23, 24, 25)

(3) ••• Each parameter mnemonic code has an identification number (two digits) corresponding the selected segment

(4) 1 During a new segment addition, the controller displays the equal parameter values to the previous segment

Standard segment menu (1...99)

(4) 0 — (3) ••• S.P. — ••• Segment Set point

(4) 0 — (3) ••• du. — ••• Segment duration
(see configuration at page 18)

(4) 1000 — (3) ••• Er. — Max deviation
0.0…100.0%

(4) 0 — (3) ••• Y2 — Y2 Logic output state (2)
0 = Off / 1 = On

(4) 0 — (3) ••• Y3 — Y3 Logic output state (2)
0 = Off / 1 = On

(4) 0 — (3) ••• Y4 — Y4 Logic output state (2)
0 = Off / 1 = On

(4) 0 — (3) ••• Y5 — Y5 Logic output state (2)
0 = Off / 1 = On

(4) 0 — (3) ••• Y7 — Y7 Logic output state
0 = Off / 1 = On

(4) 0 — (3) ••• Y8 — Y8 Logic output state
0 = Off / 1 = On

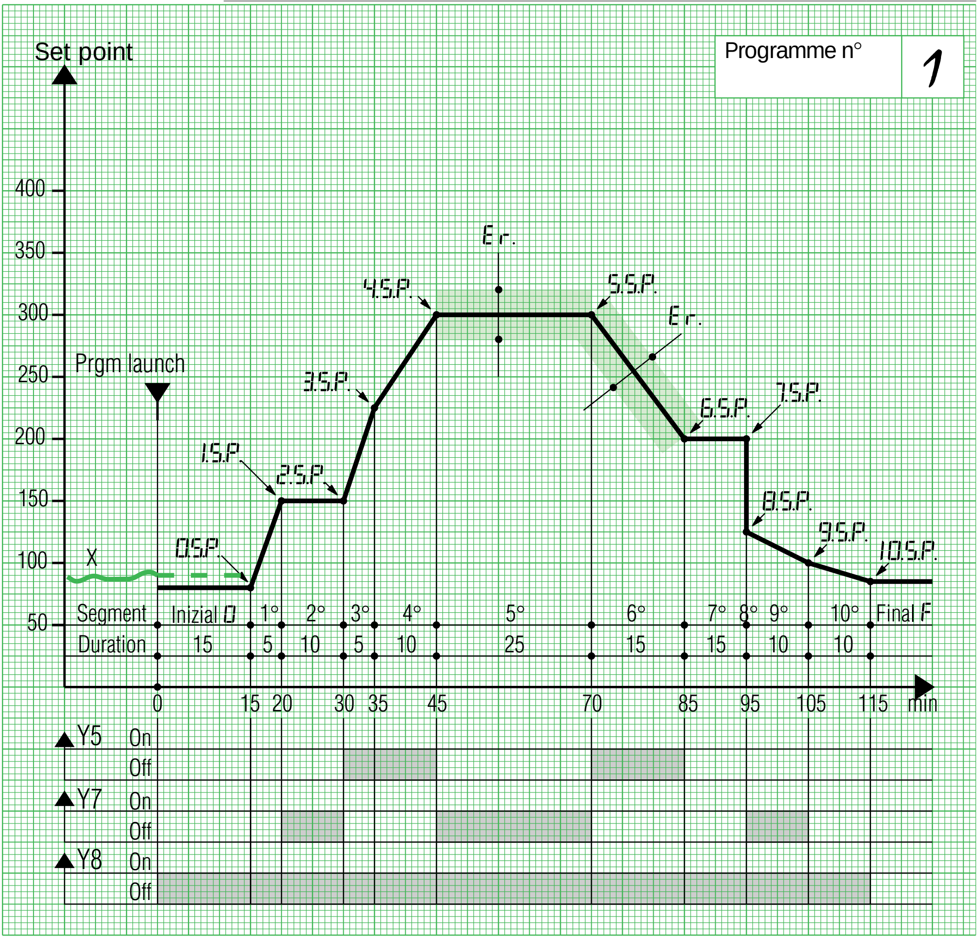
(4) 1 — (3) ••• PA. — ••• Segment
P.I.D. algorythm

7.6• PRGM Programming Guide

A• Enter the following data, previously selected during Configuration phase

Segment duration	0…9999 sec ☐	0…999,9 min ☐	0…9999 min ✔	0...999,9 hours ☐	0...9999 hours ☐
Logic Output	Y2 State ✔	Y3 State ☐	Y4 State ☐	Y5 State ☐	Y7 Programma ✔
	Y2 Max dev. ☐	Y3 Max dev. ✔	Y4 Max dev. ✔	Y5 Max dev. ☐	
	Y2 Programme ☐	Y3 Programme ☐	Y4 Programme ☐	Y5 Programme ✔	Y8 Programme ✔

B• Draw the prgm profile, linking the Logic output state to each segment

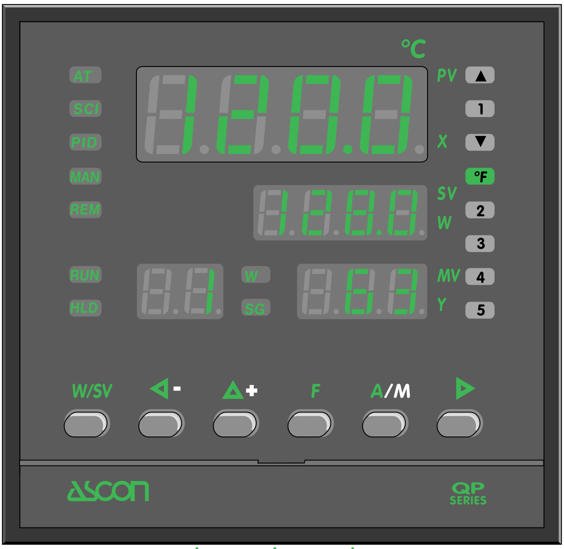


C• Complete the herebelow table with the requested Prgm data

Description	N° of cycles	Set point	Duration	Max dev.	Output Y2	Output Y3	Output Y4	Output Y5	Output Y7	Output Y8	PID algor.
range.	0...9999			0,0...100,0%	0 = Off / 1 = On						1 o 2
Cod./n° seg.	Pr.C Y.	S.P.	d.u.	E r.	Y2	Y3	Y4	Y5	Y7	Y8	PA.
Initial	0	0 80	0 15	0 100.0	0 0	0 0	0 0	0 0	0 0	0 1	0 1
Final		F 85			F 0	F 0	F 0	F 0	F 0	F 1	F 1
1°		1 150	1 5	1 100.0	1 0	1 0	1 0	1 0	1 0	1 1	1 1
2°		2 150	2 10	2 100.0	2 0	2 0	2 0	2 0	2 0	2 1	2 1
3°		3 225	3 5	3 100.0	3 0	3 0	3 0	3 0	3 0	3 1	3 1
4°		4 300	4 10	4 100.0	4 0	4 0	4 0	4 0	4 0	4 1	4 2
5°		5 300	5 25	5 3,0	5 0	5 1	5 0	5 0	5 1	5 1	5 2
6°		6 200	6 15	6 3,0	6 0	6 0	6 1	6 1	6 0	6 1	6 2
7°		7 200	7 10	7 100.0	7 0	7 0	7 0	7 0	7 0	7 1	7 1
8°		8 125	8 0	8 100.0	8 0	8 0	8 0	8 0	8 0	8 1	8 1
9°		9 100	9 10	9 100.0	9 0	9 0	9 0	9 0	9 0	9 1	9 1
10°		10 85	10 10	10 100.0	10 0	10 0	10 0	10 0	10 0	10 1	10 1

7.7• Command selection and operating phases

The Command selection can be done by 3 different ways:



RS485 Mod Bus/Jbus

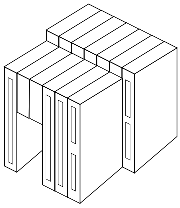
Keyboard

W Set point menu
Command selection

▷ Enter value
Enter the selected value

By Serial comm.s

Logic inputs



see page 36

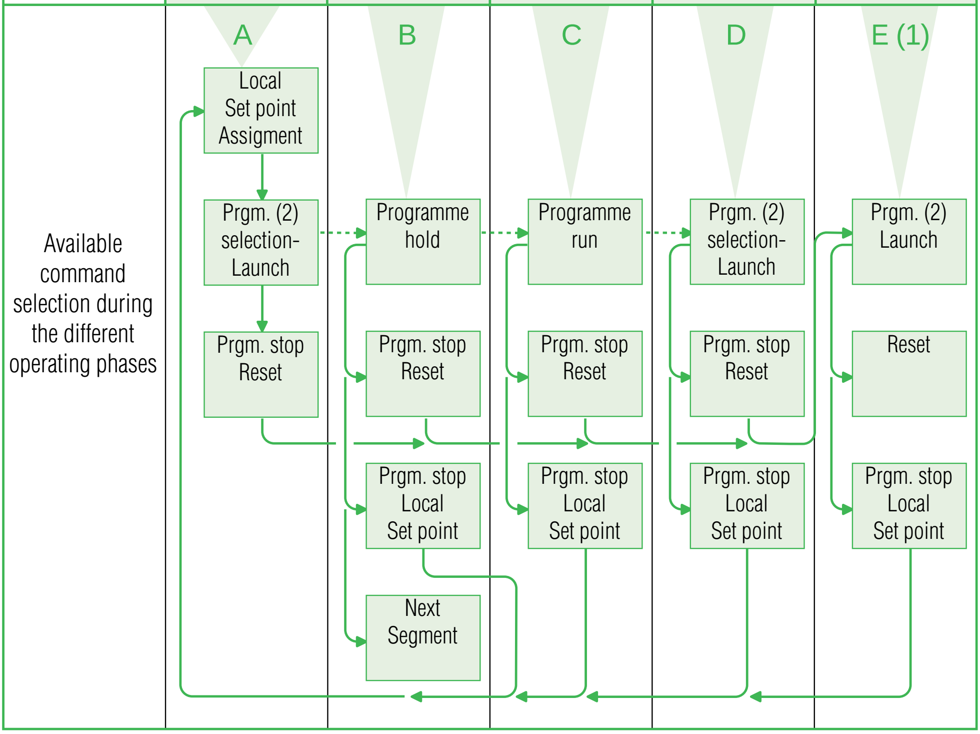
The command selection depends on the operating phases.
The 5 available phases are the following:

A Local Set point mode
B Programme run mode
C Programme hold mode
D Programme end (final segment) mode
E Reset mode

E

Commands selection during the different operating phases

Operating Set point	Local	Programmed	Programmed	Programmed final segment	Programme Initial Segment 0
Operating phase	**Normal**	**Programme run**	**Programme hold**	**Programme end**	**Reset**



To better understand the meaning of the above flow chart, the operating phases have been shown in a sequence way. For modifying procedure and command activation please see the herewith enclosed. Operating Instructions sheet (Chapter 8.3 Set point Menu for Programmable Set point version).

Notes
1) After the programme stop; the controller goes to a specific mode: Reset condition, ready to start with the 0 segment of the programme.

2) During the above phases the programme can be selected if it has not already done by the auxiliary input (see page 7).

7.8• Logic inputs IL1, IL2, IL3

Each logic input can be freely configured to perform one of the available functions during the proper configuration phase. An external logic signal shall be of the maintained type. The following type of logic inputs can be accepted to do this: isolated contact, NPN o.c. or TTL o.c. outputs. The function is operating when the logic input is “ON”, while the logic input is “OFF” when the function must be inhibited.
“ON” logic inputs have the priority with respect to the keyboard and Serial comm.s controls.

	Function	Code	Logic input state Off	On	Notes
	None	0			
	Manual control	1	AUTO	MAN	
	Locked keyboard	7	UNLOCK	LOCK	Logic and Serial comm.s controls can be used during lock condition 2nd PID algorythm
	Y1 forcing value	10	Std mode	Active	
Standard Set point version	1st memorized Set point.	2	Local Set point	Active	If more than one logic input are simultaneously ON, the last request will be operating
Standard Set point version	2nd memorized Set point.	3	Local Set point	Active	
Standard Set point version	3rd memorized Set point	4	Local Set point	Active	
Standard Set point version	Remote Set point	5	Local Set point	Active	
Standard Set point version	2nd PID algorythm	8	1st PID set	Active	
Standard Set point version	Y1=Remote Set point input	9	Std mode	Active	
	Local Set point (1)	6	Remote Set point	Active	Standard Set point version
			Prgm Set point		Programmable Set point version (when local mode, it stop the programme carrying out)
Programmable Set point version	Programme launch/stop	12	STOP	LAUNCH	If “ON” condition is maintained the prgm runs to the end. If during the programme the condition changes (OFF) the controller switches on Prgm stop - Reset condition
Programmable Set point version	Programme run/hold	13	HOLD	RUN	If “ON” condition is maintained the prgm runs to the end. If during the programme the condition changes (OFF) the controller switches on Prgm. - Hold condition
Programmable Set point version	Programme launch + run / hold	14	HOLD	LAUNCH RUN	“OFF” condition holds the programme With “ON” the programme runs when: - Local mode - Final segment of another Prgm -after “Hold” condition (OFF)
Programmable Set point version	Programme Reset	15	–	RESET	When “ON” during the programme carrying out, the controller switches on Prgm stop - Reset condition
Programmable Set point version	Hold (to Local Set point)	16	RUN	HOLD	When “ON” during the programme carrying out, the controller switches on Hold condition. With “OFF” the Prgm runs again.
Programmable Set point version	Next segment	17	–	OK	When “ON”, the programme goes to the beginning of th next segment
Programmable Set point version	Reset	18	–	OK	The “ON” condition resets the segment time, during the steady segment type only. It causes a new start of the same segment from the beginning

1) When the controller works on “Local mode”, the logic inputs (associated to the programme) are inhibited.

8.0• Functions menu

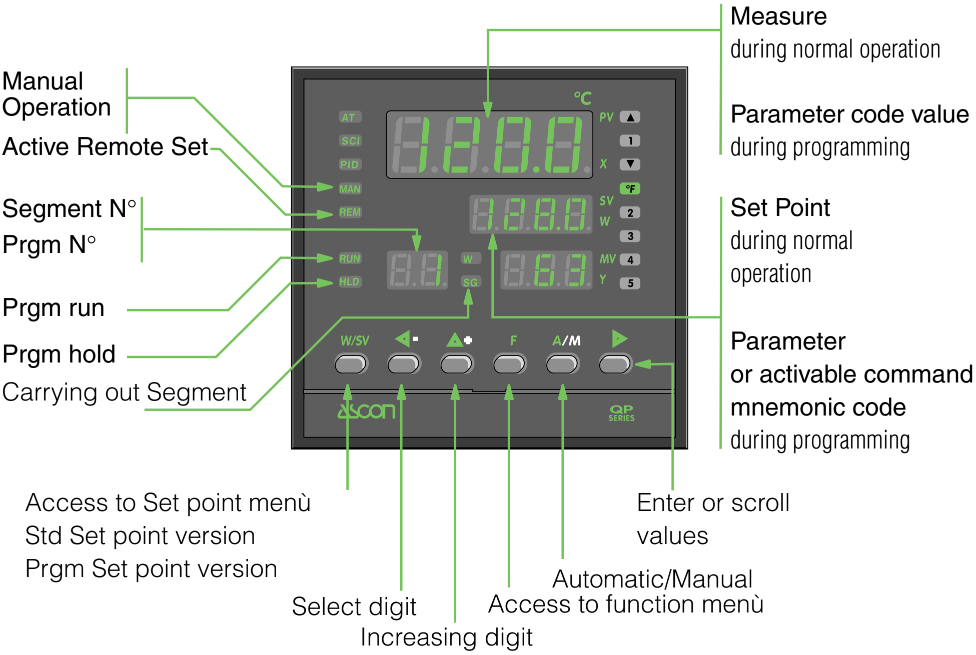
8.1• Changing a numeric field

8.2• Standard Set point menu

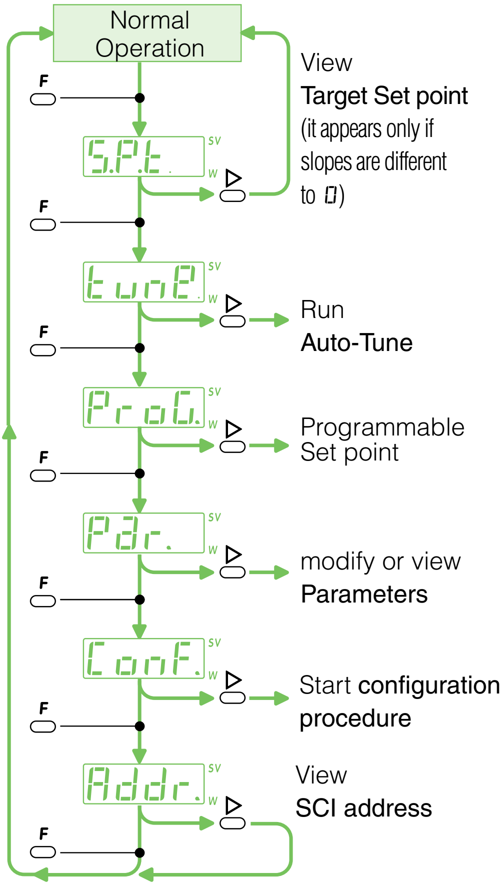
8.3• Prgm Set point menu

8.4• Auto Man

Keys and displays functions



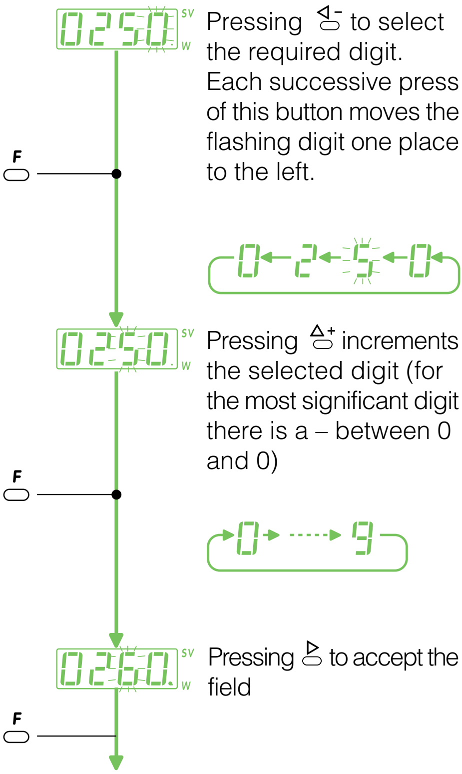
8.0• Function menu



8.1• Modification of a numeric field

It is possible to modify any numeric field by changing each digit in turn.

Example: to change 250 to 260



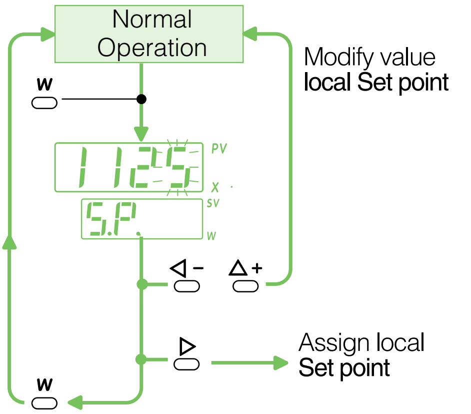
Pressing ◁– to select the required digit. Each successive press of this button moves the flashing digit one place to the left.

Pressing △+ increments the selected digit (for the most significant digit there is a – between 0 and 0)

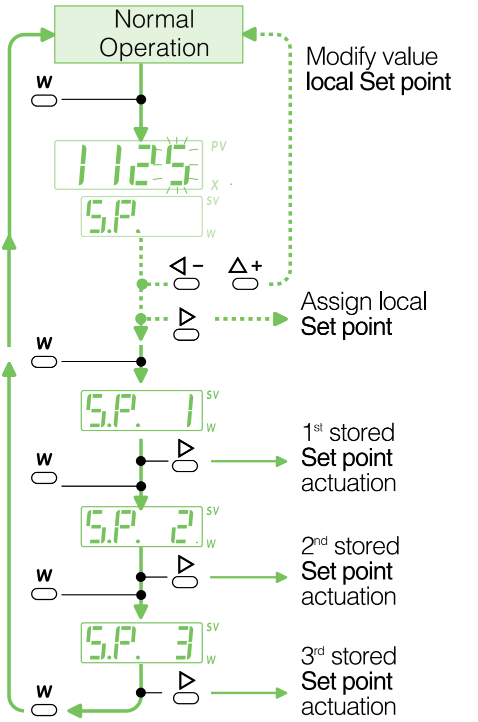
Pressing ▷ to accept the field

8.2•

8.2.1• Local only

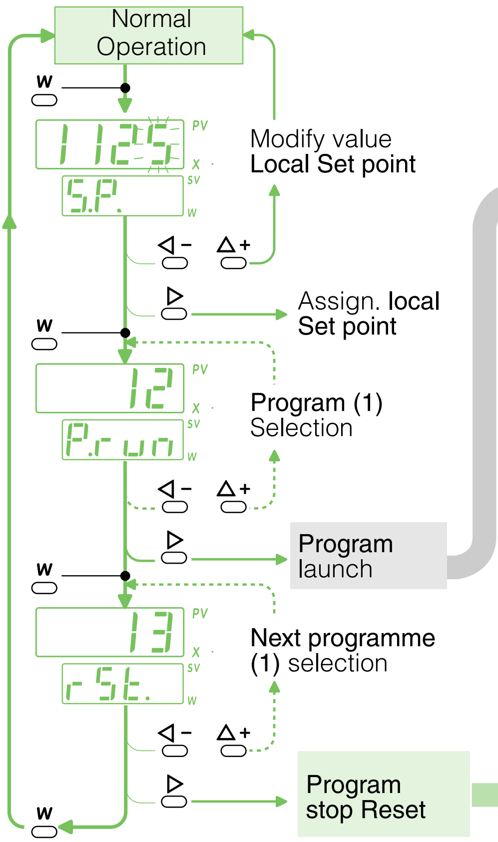


8.2.2• Local + 3 stored Sets

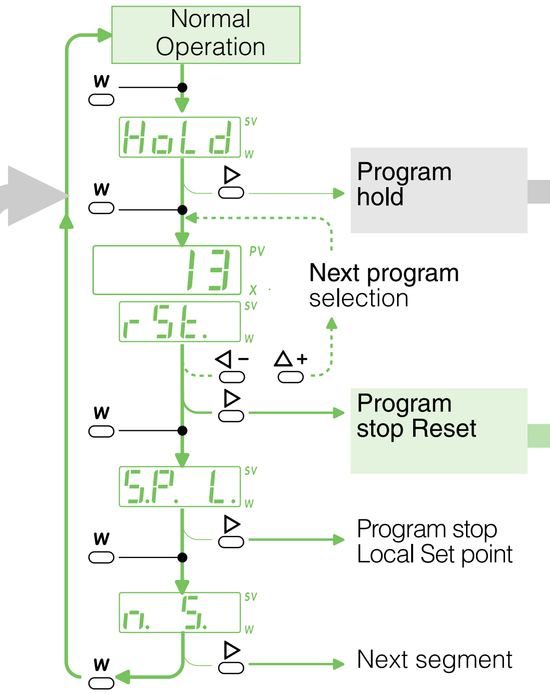


8.3•

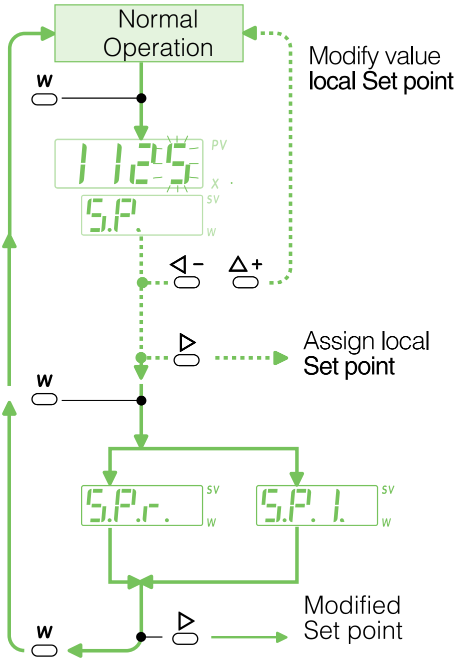
8.3.A• Local Set point mode



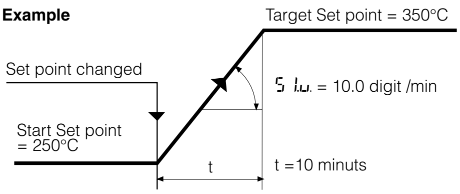
8.3.B• Program carrying out



8.2.3• Local + Remote



Note:
After the Set point has been modified the new target Set point will be reached after a period of time, depending upon the values entered in the S l.u (Slope up) and S l.d (Slope down) gradient parameters.



Target Set point

If slope gradient is equal to zero there will be a step change

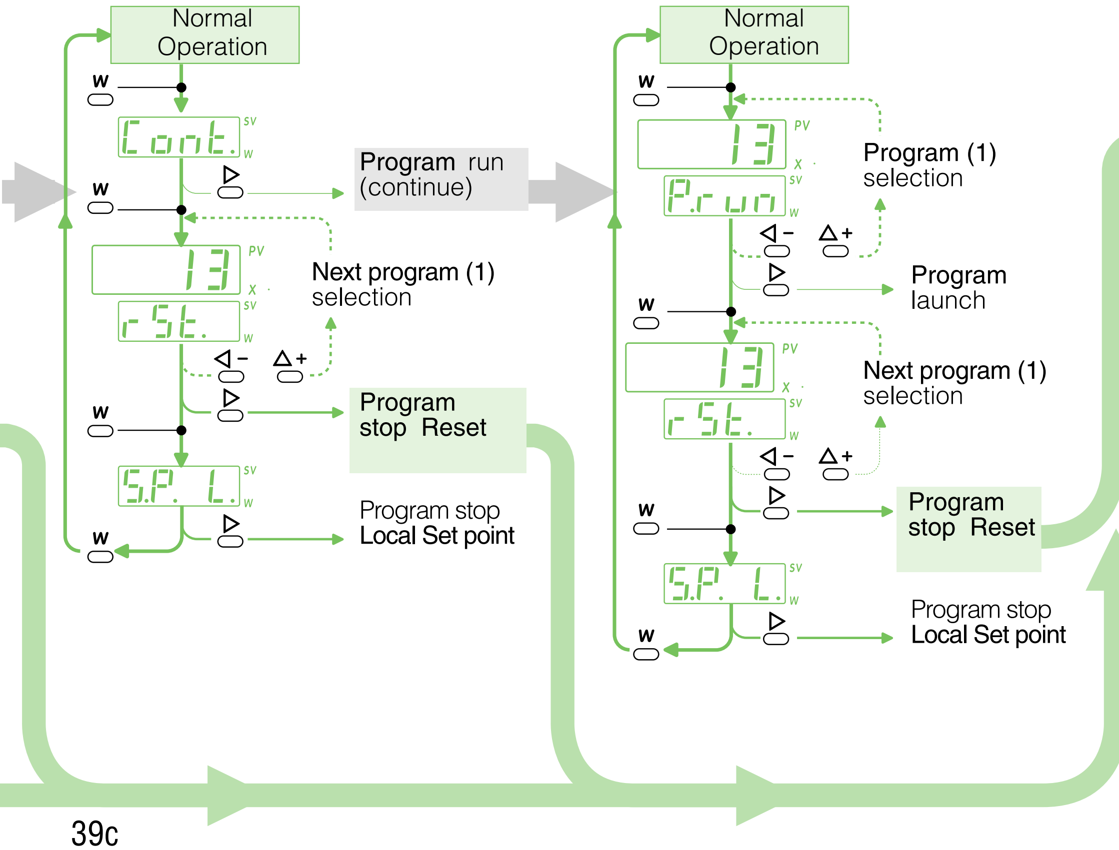
With Remote Set point we suggest, to set SL.u and/or SL.d to 0 (zero)
*The new Set point value which must be reached, it is called "**target Set point**".*
It appears under S.P.t code during the main menù scrolling.

Programmable Set point menu, (for each operating phase)

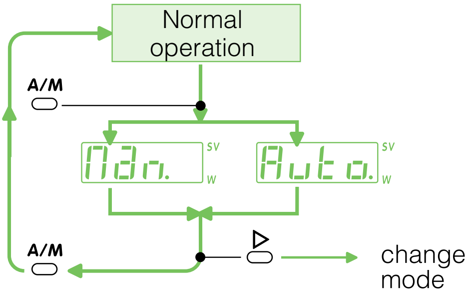
8.3.C• Program Hold

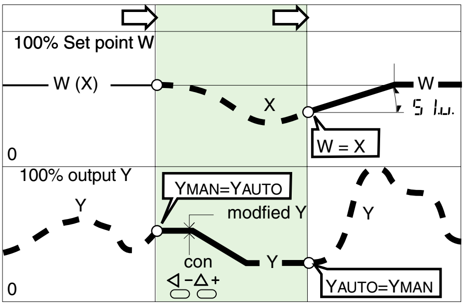
8.3.D• Program end

(F final segment)

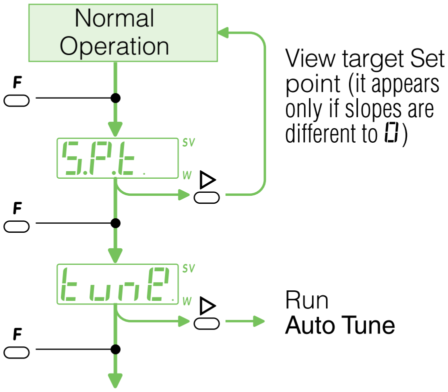


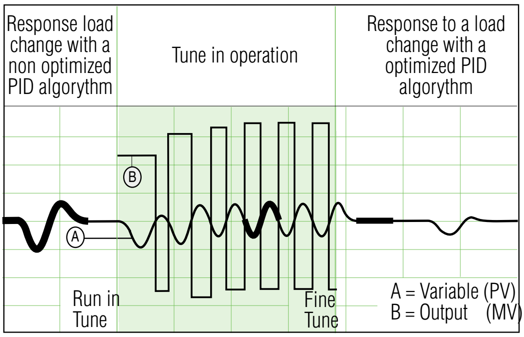
8.4• Auto Man



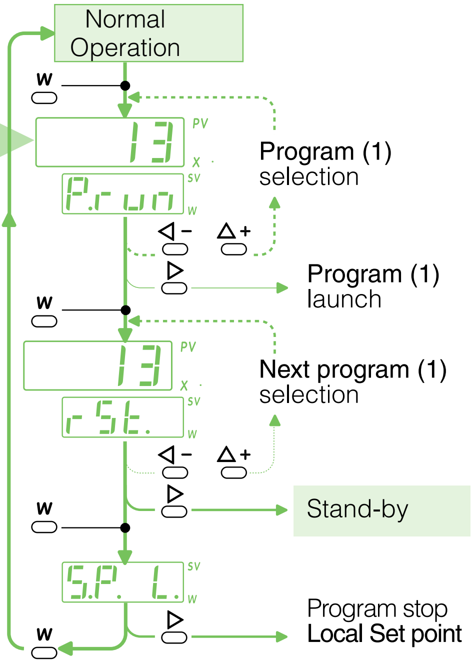


8.5• Auto Tune





8.3.E• Reset



To end each phase without actions.
Press W until the routine goes out or wait 30 s pressing no keys.

Note:

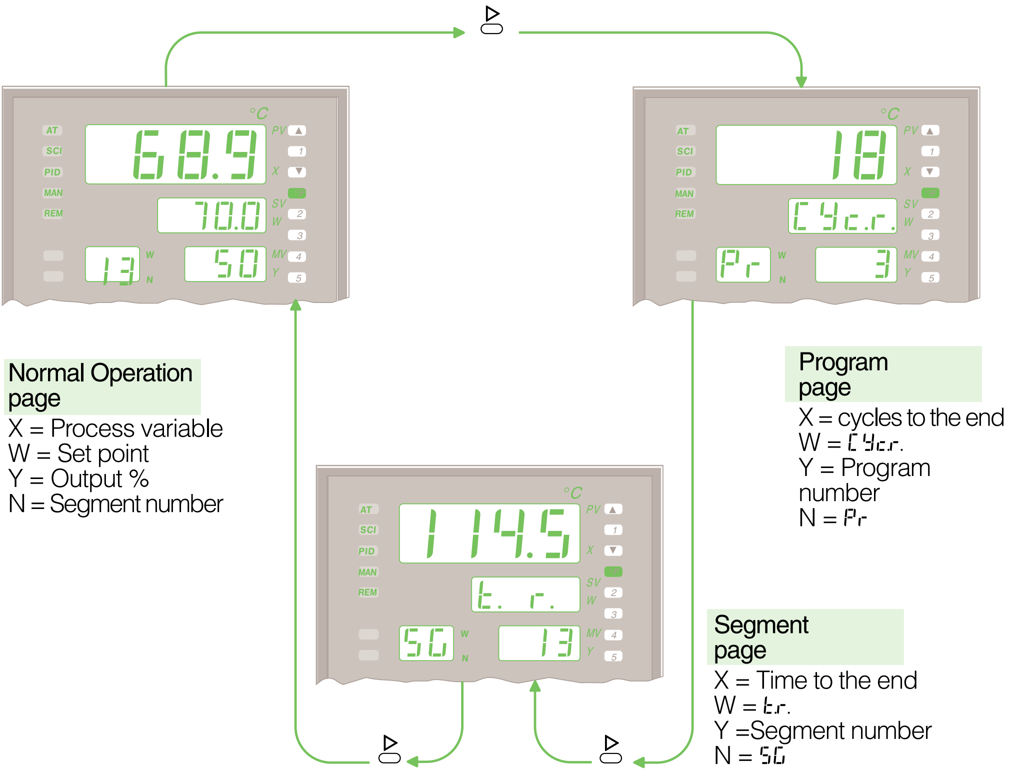
(1) Not available selection if already selected by external logic command (see page 7).
The controller displays the external program number which is visible but not changeable

8.6.1•Auxiliary display Possible combination during the different operation phases

C W — Local Set point by P.C. (normally off)	RUN 25 SG — Program Stand-by when out of max dev. fix loght when into max dev.	F SG — Program end final segment
RUN 25 SG — Program carrying out (segment n°25)	HLD 28 SG — Program Stand-by from keyboard, logic inputs, serial comm.s or if manual mode. (segment n° 28)	88 — Program Reset

8.6.2• Pages

During the program carrying out, it is possible to select different "pages". They display the control variables, program and segment data, in a cycling way. This selection can be done pressing time to time the key.
This selection is inhibited when out of Normal operation.



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 mode	1 Loop with single/double output			
Control mode	Algorythm	On-Off, P.I.D., PID + FUZZY and PID " with "three point stepping" output		
	Proportional Band (P)	0.5…999.9%	Escludable	
	Integral time (I)	0.0…100.0 min		
	Derivative time (D)	0.00…10.00 min		
	FUZZY intensity	0.0…90.0%		
	Balance output shift	0…100%	For P. and P.D. algorythm	
	Cycle time	1…200 sec.	For discontinuous output	
	Hysteresis	0.01…10.00%	For On-Off algorythm	
	Dead zone	0.0…5.0%	For PID algorythm to double action (heat-cool)	
	Cool Relative gain	0.1…3.0		
	Valve stroke time	15…600 sec	For servomotors output	
	Output dead zone	0.1…10.0%		
	Potentiometer	100Ω…10KΩ		
Input measure X1 (see page 18)	Common characteristics	A/D converter with 50.000 points Sampling time: 0.5 to 30.0 sec. configurable Input shift: -60…+ 60 digits Input filter: 0…30 sec.s (excludable)		
	Accuracy	0.2% ± 1 digit (T/C, RTD) 0.1% ± 1 digit (mA e V)		Between 100…240Vac, error is irrelevant
	Thermoresistance	Pt100Ω a 0 °C (IEC 751) With °C/°F/°K selection	2 or 3 wires connections	Line: 20Ω max (3 wires) Thermal drift: 0.1°C/10°C env. T. <0.5°C/10Ω line R.
	Thermocouple	L,J,T,K,R,S,B,N,E,W (IEC 548) With °C/°F/°K selection	Internal or external cold joint compensation in °C/°F/K	Line: 150Ω max Thermal drift: <2µV/°C.env. T. <5µV/10Ω line R.

Features at env. 25°C	**Description**				
Input measure X1 (see page 18)	Continuous current	4…20mA,0-20mA Ri=30Ω	Engineering units, floating point, with or without sq.rt. extraction L.R. -999…9999 H.R. -999…9999 (min 100 digits)	Input drift: <0.1%/20°C env. T.	
	Continuous voltage	0-20mV, 0-50mV Ri=10 MΩ			
		0-1/1-5/0-5/0-10V Ri=10kΩ			
Auxiliary inputs	3 of logic type	Permanent closure of external associated command allow:	Auto/Man switching, local/Remote Set point selection, recall of 3 stored Set points, keyboard lock. 2nd PID algorythm, (only for Std. Set point version) Y1 = Remote Set point Y1 = forcing value Run, hold, reset, etc. of the programme (only for Prgm Set point version (QP…1)		
Main outputY1	Single or double, with direct or reverse action				
	Lower limit	0…90%(channel ▲)			
	Upper limit	100…10% (channel ▲) -100…-10% (channel ▼)			
	Safety value	0…100%,-100…100% (for double output)			
	Forcing value	0…100%,-100…100% (for double output) from Logic input			
	Discontinuous	Double action relay, 2 contats N.O., 5A/250Vac, 2x10 ^{5} transitions			
		Logic	0-22Vdc, 20mA max for solid state relay	Galvanically isolated: 500 Vac/1min s.c. protection	
	Continuous	Current	0-20mA, 4-20mA 750Ω/15Vdc max	Galvanically isolated: 500 Vac/1min s.c. protection Resol.: 12 bit (0.025%) Accuracy: 0.1%	
		Voltage	1-5V,0,5V,0-10V 500Ω/20mA max		
	"Three Points Stepping"		Double action relay 2 Contats NO, 5A/250Vac, 2 x 10 ^{5} transitions		
Y2-Y3-Y4-Y5 auxiliary outputs	Relay with contact NO, 5A/250Vac, 2x10 ^{5} transitions - Hysteresis 0,01…10,00%				
	Action mode	Active high	Active type	Deviation Set point	± 300 digits
				Band Set point	0…300 digits
		Active low		Independent Set point	from Beginning to Full sc.
				Set point to Y1	0…100%
		Special functions	Input interruption (only for thermoelements, 4…20mA, 1…5V		
			Maximum deviation (only for Prgm Set point version)	Time programmed & associated to the programme	
	Safety state		enabled or not enabled with NO or NC contact		
Y6 auxiliary analogic output (option)	Galvanically isolated: 500Vac/1 min Protected by s.c. 12 bit (0.025%) Tollerance: 0.1%	In current: 0-20mA, 4-20mA 750Ω/15V max	Measure X retransmission		
			Set point W retransmission		
		In voltage: 1-5V, 0-5V, 0-10V 500Ω/20mA max	Y1 output (channel ▲) retransmission		
			Y1 output (channel ▼) retransmission		
			Error retransmission 0…25% of range		
2 logic outputs (Y7-Y8)	Open collector, 500 Vac isolation Vac max/1 min. 30 mA max, 28 Vdc (OFF status) Voltage drop: 1 Vdc max - 30 mA		Only for Prgm Set point version (time programmed & associated to the programme)		
Set point	Up or down ramp can be set in digits/min. between 0.0…10.0% of the range Limits: lower to upper can be set separately within the range		Local only	Standard Set point	
			Local and 3 memorized		
			Remote only		
			Local and Remote		
			Local+(Local and Remote)		
			Programmable		

Features at env. 25°C	Description		
Remote Set point (Not available with programmed Set point option)	Non isolated Accuracy 0.1%	Current: 0-20mA, 4-20mA Ri = 30Ω	Bias in engineering units (-100% + 200%) (compatible with display)
		Voltage: 1-5V, 0-5V, 0-10V Ri = 300 kΩ	Ratio from -9.99…+ 10.00
			Sum Local Set point + Remote Set point
Programmed Set point (Option)	16 programms max, 99 segments/program max, 255 segments total. From 1 to 9999 repetitions / program or infinite. Time base configurable in seconds, minutes, hours. Priority of duration or slope (in case of anomalies). Up to 6 logic outputs and ' logic inputs, programmable and related to the program. Selection between the 2 available sets of PID parameters for each segment. Auxiliary voltage input for selecting the program remotely. Run, hold, reset, etc., excludable from the keyboard, logic inputs and via serial port.		
Auto-tune	With "Natural Frequency", method, Tuning can occur at a Set point change or during process steady conditions, with launch enabling index.		
Auto-Man station	Incorporated, with Bumpless action Auto-Man transfer via keyboard, logic input and serial communications		
Serial Comm.s (option)	RS 485, Modbus, Jbus protocol, 1200,2400,4800,9600 bit/sec., 2 wires (read only or read write or supervision system local mode)		
Auxiliary power supply	24 Vdc ± 10%, 50 mA max Up to 2 external transmitters (2, 3 o 4 wires connection)		
Operational security	Main input	Out of range or hardware failure (short or open circuit) is monitored and the outputs are forced to security values	
	Control output	Settable security value: 0…100%, -100…+100% (for double action)	
	Auxiliary outputs	Security status can be configured: excluded, N.O. or N.C.	
	Parameters	All parameters values are saved for unlimited time in non volatile memory. Subdivided into 5 homogeneous groups, configurable as: visible and modifiable, visible or not modifiable, invisible.	
General features	Access keys	"Password" for accessing the V° group of parameters, to programming parameters for the Set point and for the configuration..	
	Power supply	100…240V, 50/60 Hz, -15…+10% (250 Vac max) or 16…28V, 50/60 Hz e 20…30Vdc Absorbed power 5VA max	
	Electric safety	EN61010, installation category II° (2500V), pollution level 2	
	Electromagnetic compatibility	According to norms required for CE brand for systems and industrial apparatus	
	Environmental	KWF according to DIN 40040, working ambient temperature 0…50°C	
	Protection according to DIN40050	P 20 (terminal block), P 30(case), IP54 (front panel) or IP67 with kit F10-435-2A101, material guard UL 94 V11	
	Dimensions: 96 x 96 DIN, depth: 154.5 mm, weight: 0.8 kg appr.		

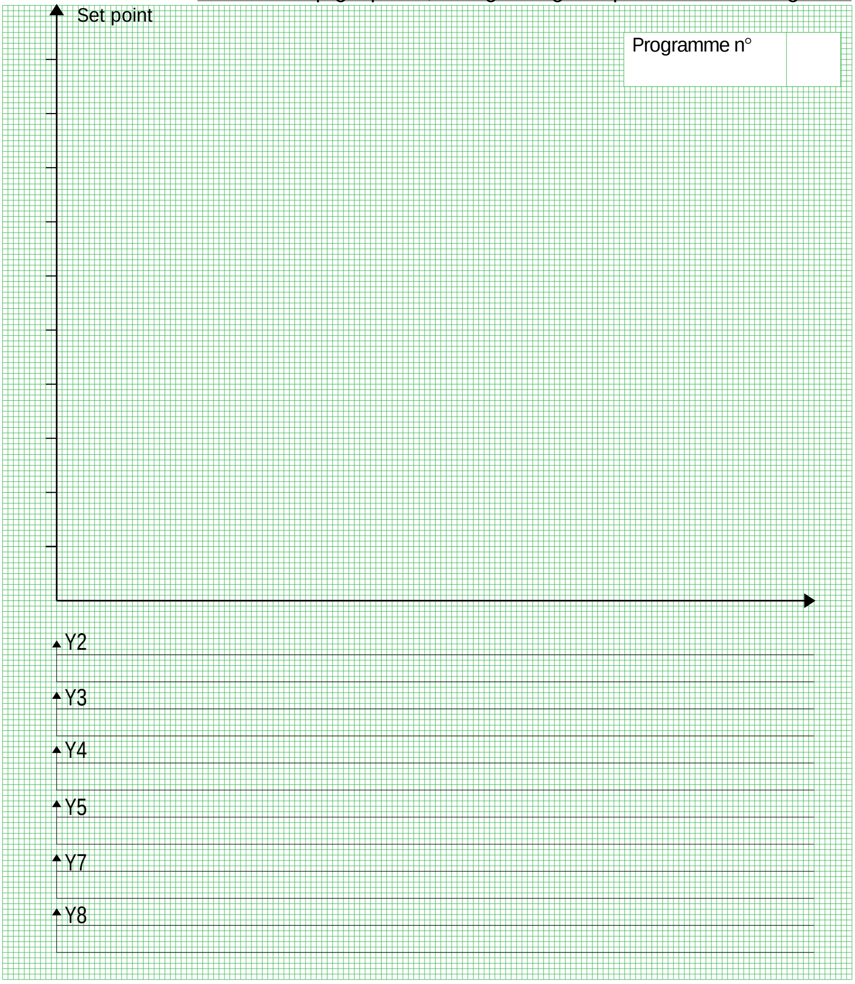
E

7.6• PRGM Programming Guide

A• Enter the following data, previously selected during Configuration phase

Segment duration	0…9999 sec.s ☐	0…999,9 min. ☐	0…9999 min ☐	0...999,9 hours ☐	0...9999 hours ☐
Logic Output	Y2 State ☐	Y3 State ☐	Y4 State ☐	Y5 State ☐	Y7 Programme ☐
	Y2 Max der. ☐	Y3 Max der. ☐	Y4 Max der. ☐	Y5 Max der. ☐	
	Y2 Programme ☐	Y3 Programme ☐	Y4 Programme ☐	Y5 Programme ☐	Y8 Programme ☐

B• Draw the prgm profile, linking the logic output state to each segment.



C• Complete the herebelow table with the requested Prgm data

Description	N° of cycles	Set point	Duration	Max der.	Output Y2	Output Y3	Output Y4	OutputY5	OutputY7	Output Y8	PID algor.
range	0...9999			0,0...100,0%	0 = Off / 1 = On						1 o 2
Cod./n° seg.	Pr.C Y.	SP.	du	Er.	Y2	Y3	Y4	Y5	Y7	Y8	PA.
Initial	0	0	0	0	0	0	0	0	0	0	0
Final		F			F	F	F	F	F	F	F
1°		1	1	1	1	1	1	1	1	1	1
2°		2	2	2	2	2	2	2	2	2	2
3°		3	3	3	3	3	3	3	3	3	3
4°		4	4	4	4	4	4	4	4	4	4
5°		5	5	5	5	5	5	5	5	5	5
6°		6	6	6	6	6	6	6	6	6	6
7°		7	7	7	7	7	7	7	7	7	7
8°		8	8	8	8	8	8	8	8	8	8
9°		9	9	9	9	9	9	9	9	9	9
10°		10	10	10	10	10	10	10	10	10	10
11°		11	11	11	11	11	11	11	11	11	11
12°		12	12	12	12	12	12	12	12	12	12
13°		13	13	13	13	13	13	13	13	13	13
14°		14	14	14	14	14	14	14	14	14	14
15°		15	15	15	15	15	15	15	15	15	15
16°		16	16	16	16	16	16	16	16	16	16
17°		17	17	17	17	17	17	17	17	17	17
18°		18	18	18	18	18	18	18	18	18	18
19°		19	19	19	19	19	19	19	19	19	19
20°		20	20	20	20	20	20	20	20	20	20

WARRANTY

The equipment is guaranteed free from manufacturing defects for 1 year after installation, for a maximum of 18 month after delivery.
Faults caused by use other than that described in the operating instructions are excluded from the guarantee.

CE conformity

E

We declare that this instrument is in conformity with the following Standards for Industrial enviroment:

EN 50081-2	Electromagnetic compatibility Generic emission standard
EN 50082-2	Electromagnetic compatibility Generic immunity standard
EN 61010	General safety requirements for electrical equipments