DIN-rail mounting double action controller with analogue output

D3 line

User Manual • M.I.U. D3-3/03.04 • Cod. J30-478-1AD3 EF

D3 line

User manual

ASCON spa
ISO 9001 certified

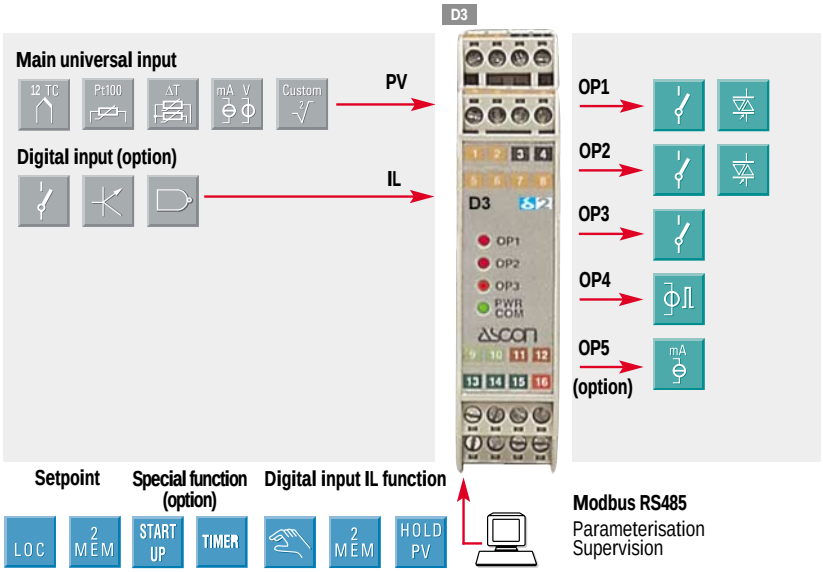
Table of contents

- Resources
- Model code
- Description and table of standard parameters
- Description and table of special function parameters
- Technical specifications

ASCON spa
20021 Bollate
(Milan) Italy
Tel. +39 02 333 371
Fax +39 02 350 4243
http://www.ascon.it
e-mail info@ascon.it



Resources



Operating mode

	Control			Alarms			Retransmission
							PV/SP
1	Single action	OP1			OP2	OP3	OP5
2		OP4		OP1	OP2	OP3	OP5
3		OP5		OP1	OP2	OP3	
4	Double action	OP1	OP2			OP3	OP5
5		OP1	OP4		OP2	OP3	OP5
6		OP4	OP2	OP1		OP3	OP5
7		OP1	OP5		OP2	OP3	
8		OP5	OP2	OP1		OP3	
9		OP5	OP4	OP1	OP2	OP3	
10	Valve	OP1	OP2			OP3	OP5

Fuzzy tuning with automatic selection

One shot Auto tuning

One shot Natural frequency

Model code

Configuration

Mod. D 3 (Line) | 5 B C D (Basic) - E F 0 0 (Accessories) / I L M N (1st part) - O P Q R (2nd part)

The product code indicates the specific hardware coniguration of the instrument, that can be modified by specialized engineers only

Line	D 3

Ouput OP1-OP2	B
Relay - Relay	1
SSR - SSR	5

Serial communications	C
CanBus	3
RS485 Modbus/Jbus SLAVE	5

Options	D
None	0
Valve drive output	2
Analogue output	5
Valve drive output + Analogue output (retr.)	7

Special function	E
Not fitted	0
Start-up + Timer	2

User manual	F
Italian/English (std)	0
French/English	1
German/English	2
Spanish/English	3

Input type and range			I	L
TR Pt100 IEC751	-99.9…300.0 °C	-99.9…572.0 °F	0	0
TR Pt100 IEC751	-200…600 °C	-328…1112 °F	0	1
TC L Fe-Const DIN43710	0…600 °C	32…1112 °F	0	2
TC J Fe-Cu45% Ni IEC584	0…600 °C	32…1112 °F	0	3
TC T Cu-CuNi	-200 …400 °C	-328…752 °F	0	4
TC K Cromel-Alumel IEC584	0…1200 °C	32…2192 °F	0	5
TC S Pt10%Rh-Pt IEC584	0…1600 °C	32…2912 °F	0	6
TC R Pt13%Rh-Pt IEC584	0…1600 °C	32…2912 °F	0	7
TC B Pt30%Rh Pt6%Rh IEC584	0…1800 °C	32…3272 °F	0	8
TC N Nicrosil-Nisil IEC584	0…1200 °C	32…2192 °F	0	9
TC E Ni10%Cr-CuNi IEC584	0…600 °C	32…1112 °F	1	0
TC NI-NiMo18%	0…1100 °C	32…2012 °F	1	1
TC W3%Re-W25%Re	0…2000 °C	32…3632 °F	1	2
TC W5%Re-W26%Re	0…2000 °C	32…3632 °F	1	3
Dc input 0…50mV	Engineering units		1	4
Dc input 10…50mV	Engineering units		1	5
Custom input range			1	6

Control mode		M
ON-OFF reverse action		0
ON-OFF direct action		1
P.I.D. single reverse action		2
P.I.D. single direct action		3
P.I.D. double action	Linear cool output	4
	ON-OFF cool output	5
	Water cool output	6
	Oil cool output	7

Output configuration		N
Single Action	Double action	
Relay	Heat Relay, Cool Relay	0
SSR drive	Heat Relay, Cool SSR Drive	1
Analogue	Heat SSR Drive, Cool Relay	2
Valve drive	Heat Relay, Cool Analogue	3
	Heat Analogue, Cool Relay	4
	Heat SSR Drive, Cool Analogue	5
	Heat Analogue, Cool SSR Drive	6

Alarm 1 type and function AL..		O 1	P 2	Q 3
Disabled or used by Timer (only for AL3)		0	0	0
Sensor break / LBA		1	1	1
Absolute	active high	2	2	2
	active low	3	3	3
Deviation	active high	4	4	4
	active low	5	5	5
Band	active out	6	6	6
	active in	7	7	7

Setpoint type	R
Local only	0
Local and 2 tracking stored Setpoint	1
Local and 2 Stand-by stored Setpoint	2

Standard parameters description

The parameters shown in the table are divided into groups which work in the same way. Below they will be described as they are listed in the table.

Configuration

IL **Digital input function** - Table 1

Parameter description
Not used
PV measure hold
Auto/Man
1st stored Setpoint
2st stored Setpoint
Run Timer

unit **Engineering units** - Table 2

Parameter descr.	Parameter descr.
°C (degree Centigrade)	A (Ampere)
°F (degree Fahrenheit)	bar
- (none)	psi
mV (millivolt)	Rh
V (Volt)	pH
mA (milliampere)	

Setpoint (SP)

A1S.P **A2S.P** **A3S.P** **AL1 - AL2 - AL3 threshold**

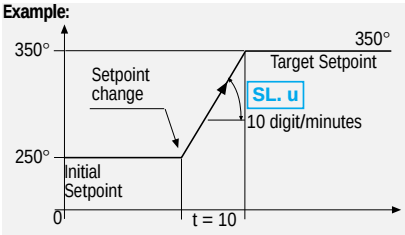
Alarm occurrences of OP1,OP2 and OP3 outputs, respectively linked to AL1, AL2 and AL3.
The range of the alarm threshold correspond to the whole span and it is not limited by the SP Setpoint span.

SL. u rump up
SL. d rump down

Setpoint ramp up- Setpoint ramp down

This parameter specifies the maximum rate of change of the SP in digit/min. The SP value is reached according to the configured rate of change. The new SP value is called "Target SP" (available via serial communications).

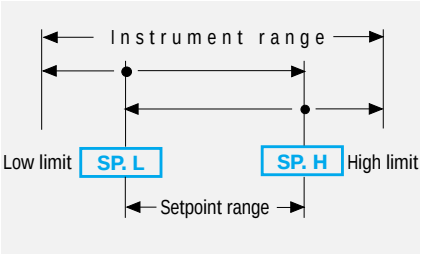
Example:



When the parameter is OFF, this function is disabled and the new Setpoint is reached immediately after being entered.

Setpoint low limit and Sepoint high limit

Low / high limit of the Setpoint value.



SP. 1 **SP. 2** **1st stored SP - 2nd stored SP**

Values of the two Setpoints, that are activated by mean of digital input or communications parameters. If configured with "**Tracking**", the previous Local Setpoint value will be lost, when the stored Setpoint is selected.
If configured with "**Stand-by**" the Local Setpoint value will not be lost, when the Stand-by Setpoint is selected. It will operate again when back to Local.

Table of standard parameters

Configuration

Mnemonic code	Parameter description	Range	Units	Factory setting	Notes
IL	Digital input function IL	see table 1		not used	
Unit	Engineering unit	see table 2		none	
Sc.dd	N° of decimals	0...3		0	linear scale only
Sc.Lo	Low range	-999...9999	engineer. units	Low range	minimum range 100 digit
Sc.Hi	High range	-999...9999	engineer. units	High range	
Prot	Communications protocol	M.bus/Jbus		M.bus	
baud	Baud rate	1200,2400,4800,9600 baud		9600	
retr	Output range	0...20/4...20	mA	4-20	if output OP5 option is present
rtH	Retransmitted signal	PV/SP		PV	unless used as a control analogue output

Setpoint

Mnemonic code	Parameter description	Range	Units	Factory setting	Notes
A1S.P	AL1 alarm threshold	PV range	engineer. units	0	It is not enabled if the controller has been configured with alarm n° 2 not active or of sensor break type
A2S.P	AL2 alarm threshold	PV range	engineer. units	0	
A3S.P	AL3 alarm threshold	PV range	engineer. units	0	
SL. u	Setpoint ramp up	OFF / 0.1...999.9	digit/min	inhibited	With OFF the new Setpoint is reached immediately after being entered.
SL. d	Setpoint ramp down	OFF / 0.1...999.9	digit/min	inhibited	
SP L	Setpoint low range	low range...SP H	engineer. units	low range	
SP H	Setpoint high range	SP L...high range	engineer. units	high range	
SP 1	1st stored Setpoint	PV range	engineer. units	----	
SP 2	2nd stored Setpoint	PV range	engineer. units	----	
SP	Setpoint	PV range	engineer. units	----	

Control mode

Mnemonic code	Parameter description	Range	Units	Factory setting	Notes	Algorithm Type
hy.	Control output hysteresis	0.1...10.00	%range	0.5		On - Off
tune	Tune run/stop	Start/stop				PID
P.b.	Proportional band	0.5...999.9	%range	5.0		
t.i.	Integral time	OFF / 0.1...100.0	min	5.0		
t.d.	Derivative time	OFF / 0.01...10.00	min	1.00		
O.C.	Overshoot control	0.01...1.00		1.00	Setting 1 is disabled	
M.res	Manual reset	0.0...100.0	% output	5.0	Without integral time	
d.err	Error dead band	OFF / 0.01...10.0	digit	inhibited		
t.c.	Cycle time	1...200	sec	20	Time proportional only	
OP. H	Control output high limit	10.0...100.0	% output	100.0		
S.Out	Output safety value	0.0...100.0	% output	0	-100.0...+100.0 Heat/Cool	
MV.tM	Motor travel time	15...600	sec	60		Valve drive
MV.hy	Minimum output step	0.1...5.0	% output	0.5		
dbnd	Dead band	-10.0...10.0	% output	0.5		Heat Cool
r.C.G.a	Cool relative gain	0.1...10.0		1		
hy. C	Cool output hysteresis	0.1...10.0	% range	0.5	On/Off only	
t.c. C	Cool cycle time	1...200	sec	20	Time proportional only	
OP. HC	Cool control output high limit	10.0...100.0	% ouput	100.0	PID only	
A.Man	Auto/man selection	Auto/Man		Auto		

Alarm and auxiliary

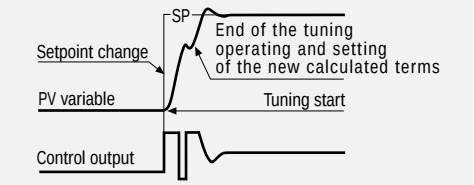
Mnemonic code	Parameter description	Range	Units	Factory setting	Notes
A1hy	AL1 hysteresis	0.1...10.0	% range	0.5	The same parameters are available for AL2 and AL3 alarms
A1Lb	Latch. and blocking alarm functions	none / Ltch / Bloc / LtbL		none	
t.Lba	LBA delay	OFF / 1...9999	sec	inhibited	OFF = sensor break
St.OP	Soft-start output value	OFF / 0.1...100.0	% ouput	0.5	t.mod = OFF only
St.tn	Soft-start activation time	1...9999	sec	1	Only if sT.OP different than OFF
t.Fil	Filter time costant	OFF / 1...30	sec	inhibited	
In.Sh	Input shift	OFF / -60...+60	digit	inhibited	
Addr	Communications address	1...247		247	
rt.lo	Retransmission low range	PV range	engineer. units	----	If OP5 output is present and not configured as control output
rt.hi	Retransmission high range	PV range	engineer. units	----	

Control mode

tune **Automatic tune**

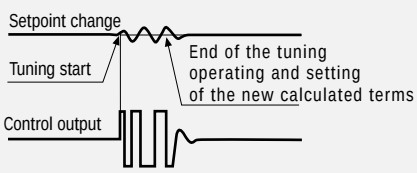
The Fuzzy-Tuning determines automatically the best PID term with respect to the process behaviour.
The controller provides **2 types** of **"one shot"** tuning algorithm, that are selected automatically according to the process conditions when the operation is started

A - STEP respose



This type is selected when, at the start of the autotune operation, the PV is far from the Setpoint of more than 5% of the span. This method has the big advantage of fast calculation, with a reasonable accuracy in the term calculation.

B - Natural frequncy



This type is selected when the PV is close to the SP Setpoint.
This method has the advantage of a better accuracy in the term calculation with a reasonable speed calculation.

The Fuzzy Tuning determines automatically the best method to use to calculate the PID term, according the process conditions.

Control mode - follows

p.B. **Proportional band**
This parameter specifies the proportional band coefficient that multiplies the error (SP - PV)

t.i. **Integral time**
It's the integral time value, that specifies the time required by the integral term to generate an output equivalent to the proportional term. When Off the integral term is not included in the control algorithm.

t.d. **Derivative time**
It is the time required by the proportional term P to repeat the output provided by the derivative term D. When Off the derivative term is not included in the control algorithm.

O.C. **Overshooot control**
This parameter specifies the span of action of the overshoot control. Setting lower values (1.00 —> 0.01) the overshoot generated by a Setpoint change is reduced. The overshoot control doesn't affect the effectiveness of the PID algorithm. Setting 1, the overshoot control is disabled.

M.res **Manual reset**
This specifies the control output value when PV = SP, in a PD only algorithm (lack of the integral term).

d.err **Error Dead Band**
Inside this band for (PV - SP), the control output does not change to protect the actuator
(output Stand-by)

t.c. control output
t.c. C cool output
Control output cycle time
It's the cycle time of the time proportioning control output. The PID control output is provided by the pulse width modulation of the waveform.

OP. H control output
OP.HC cool output
Control output high limit
It specifies the maximum value the control output can be set.
Separate parameters for both heat and cool outputs limitation are available.

S.Out **Output safety value**
Output Value in case of input anomaly.

MV.tM **Travel time**
It provides the time required to the valve to go from the 0% position to 100%

MV.hy **Minimum step**
It specifies the minimum allowed time of activation of the output to a valve that produces a sensible effect. It is related to the deadband of the valve

d.bnd **Dead band**
It is the zone where it is possible to separate or overlap the heat and cool actions.

r.Cga **Relative cool gain**
It permits to adjust the proportional cool action.

Auxiliary

In.Sh **Input shift**
This value is added to the measured PV input value. Its effect is to shift the whole PV scale of up to ± 60 digits.

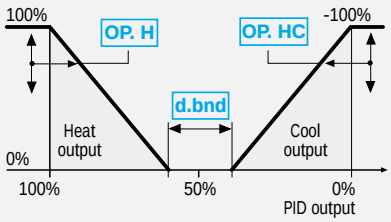
Addr **Controller address**
The address range is from 1 to 247 and must be unique for each controller on the communications bus to the supervisor.

Heat/Cool control

By a sole PID control algorithm, the controller handles two different outputs, one of these performs the Heat action, the other one the Cool action. **It is possible to overlap the outputs.**

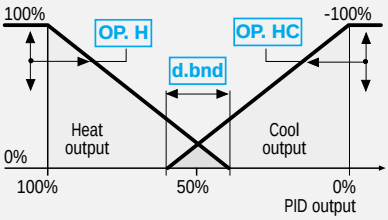
A - Heat/Cool actions separated

d.bnd positive 0...10.0%



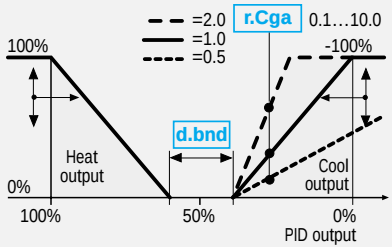
B - Heat/Cool actions overlapped

d.bnd negative -10.0....0%

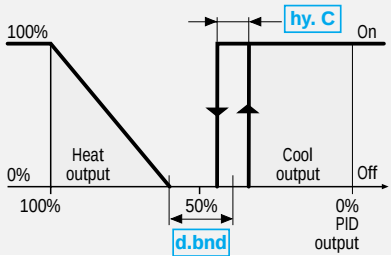


C - Cool action adjusting

Example with different relative cool gains



D - On-Off Cool action



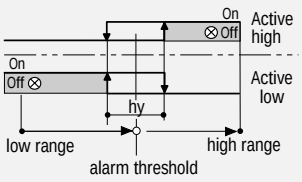
Alarm occurances of OP1 - OP2 - OP3 outputs, respectively linked to AL1 - AL2 - AL3

The relay/SSR output OP1, OP2 and OP3, can be used as alarm outputs only if they are not used as control outputs.

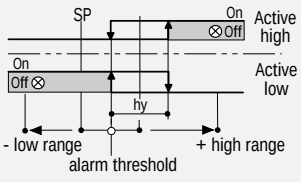
For each alarm is possible to configure:
A - The type and the operationg condition of the alarm
B - The functionality of the alarm acknowledgement
C - The blocking function on start-up
D - Loop break or sensor break

A- Alarm type and function

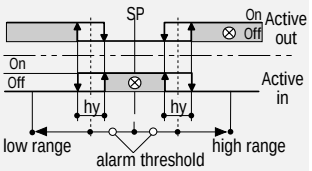
Absolute alarm



Deviation alarm



Band alarm



B/C- Latching and blocking enable

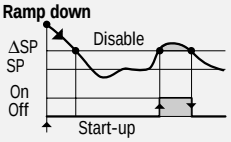
A1L.b **A2L.b** **A3L.b** **AL1, AL2, AL3 latching and blocking**
For each alarm it is possible to select the following functions:

None
latching
blocking
both latching and blocking

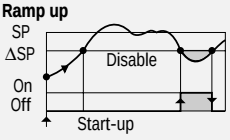
Alarm acknowledge function
The alarm, once occurred, is maintained until to the time of acknowledgement. The acknowledge operation is performed by serial communications.
After this operation, the alarm leaves the alarm state only when the alarm condition is no longer present.

Start-up disabling

Ramp down



Ramp up



ΔSP Threshold = SP±range

D- "Loop Break Alarm" LBA or sensor break

LBA delay **t.Lba**
Setting "none"
the alarm works as Sensor break with immediate action.

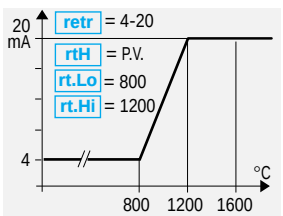
Setting a value between 1 and 9999 sec
the alarm works as LBA+Sensor break with delay.

When the cause of the alarm disappears, the alarm status stops.

OP5 Retransmission output (if option installed)

When OP5 output is present and not configured as control output, it retransmits linearised PV or SP.

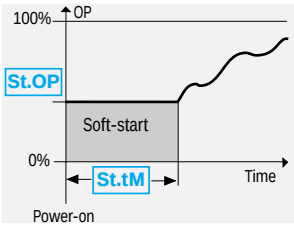
With rt.Lo greater than rt.Hi it is possible to obtain a reverse scale.



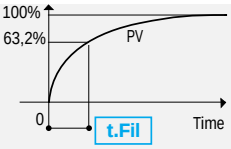
Soft-start control output function

St.OP **Soft-Start value**
Value of the control output during the Soft-start activation time.

St.TM **Soft-Start activation time**
Time duration (starting from the power on) of the Soft-start function.



Input digital filter



Time constant, in sec, of the RC input filter applied to the PV input.
When this parameter is set to "inhibited" the filter is bypassed.

Special parameters description

In order to have the above functions the product code digit E must be 2
For example: mod. D3 3100-2000

To improve the instrument performances and to reduce the wiring and installation costs, two special functions are available:
- **Start-up**
- **Timer**

⚠ **This functions is disable with Heat/Cool control. Selecting Timer or Start-up, the Soft-start function is disabled, therefore the parameters St.TM St.OP will not be enabled .**

1 To select these two functions to use set the parameter as in table 1:

Timer/Start-Up operating mode

t.Mod This parameter defines (see table 3):
- When the count starts.
- The state of the control output at the end of the count

2 **To select the Start-up function** select 1

3 **To select the Timer function** select the value from 2 to 6 and use alarm AL3 (output OP3) configured with configuration code Q = 0.
Example: conf. I L M N - O P 0 R

Table 3

Timer/Start-up counting mode		Output to 0
Disabled		0
Start-up function		1
Counting start time	End mode	
When inside the band	Control mode	2
	Output to 0	3
When lauched	Control mode	4
	Output to 0	5
When launched Control disabled	Output to 0	6
When launched stand-by Setpoint	Output to 0	7

4 If Timer function is selected it will show the parameter above:

t.Act **Timer action**
By this parameter can be defined:(see table 4)
- the time units
- the starting mode
- the OP3 status when the timer is running.

When the timer is not running, the OP3 takes the opposite status

Timer setting

time Timer (1…9999 sec/min.)

S.P.SB **Stand-by Setpoint**

(only for **t.Mod** = 7)(SP L...SP H)

Table 4

Time units	Starting mode	OP3 status [1]	Value
Seconds	Manual by serial communications	Off	0
		On	1
	Automatic at the power on [2]	Off	2
		On	3
Minutes	Manual by serial communications	Off	4
		On	5
	Automatic at the power on [2]	Off	6
		On	7

[1] If used by Timer

[2] Using this selection, manual starting mode is possible too

Table of special function parameters - (if option installed)

Timer and Start-Up

Mnemonic code	Parameter description	Range	Unit	Factory setting	Notes
t.Mod	Timer/Start-up operation mode	see table 3		0	
t.Act	Timer action	see table 4		0	tMode ≠ to 1
time	Timer setting	1...9999	sec/min	0.5	
S.P.Sb	Standy-By Setpoint	SP L...SP H		0	For t.Mod = 7
t.h.SU	Start-Up hold time	0...500	min	1	
S.P.SU	Start-Up Setpoint	SP L...SP H		0	
OP.HS	Control output high limit	5.0...100.0	output %	100.0	

Start-Up function

Setting **t.Mod** to **1**
Three parameters are associated to the Start-up function:

t.h.S.U **Start-Up hold time**

S.P.S.U **Start-Up Setpoint**

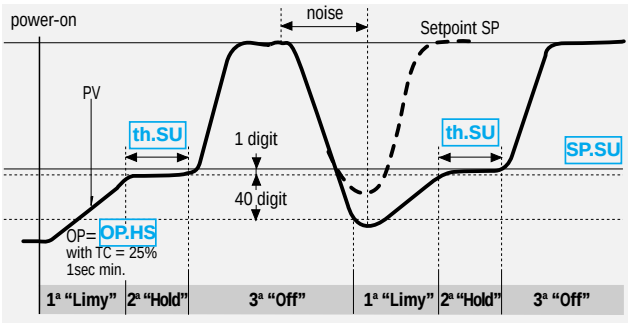
OP.HS **Control output high limit**

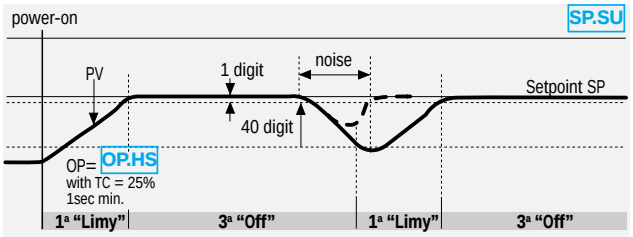
The Start-up function includes three phases:

1ª "Limy" - The control output is limited to the **OP.HS**

2ª "Hold" - The process variable is maintained to the Start-up Setpoint for the time fixed by the parameter **t.h.S.U**

3rd "Off" - When the **t.h.S.U** time is elapsed the process variable is maintained to the working Setpoint.





Whether the process variable, for any reason (e.g. load change), decreases at a value lower than (**OP.HS** - 40 digits), the Start-up function starts again from the "Limy" phase.

When the Start-up is in Hold phase, if the local Setpoint becomes lower than the Start-up Setpoint or if the operating mode changes to manual, the Start-up function passes to the "Off" phase.

There are two possibilities:

A - Start-Up Setpoint SP.SU lower thant the local Setpoint
The "Hold" phase starts when the process variable PV achieves the **SP.SU** (with a tolerance of 1 digit).

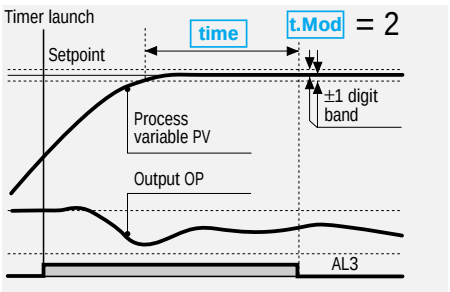
B - Start-Up Setpoint SP.SU ≥ greater or equal to the local Setpoint
When the process variable PV achieves the local Setpoint (with a tolerance of 1 digit), the Start-up function passes directly to the "Off" phase.

If, at the controller power-on, the process variable PV is greater than the lowest between the **SP.SU** and the working Setpoint , the next phase ("Hold" or "Off") will be executed instead of the "Limy" phase.

Timer counting modes

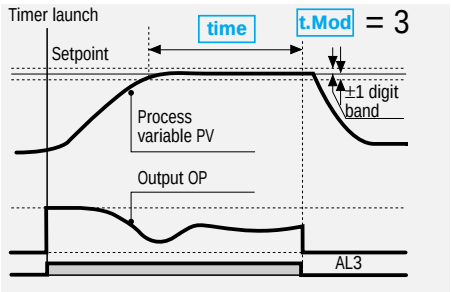
A - Counting start time inside the band, end in control mode.

The time counting starts only when the error is inside a ± 1 digit band. The control action is not affected by the Timer function.



B - Counting start time inside the band, end with control output forced to zero.

The time counting starts only when the error is inside a ± 1 digit band. At the end, the control output is forced to zero. [1]



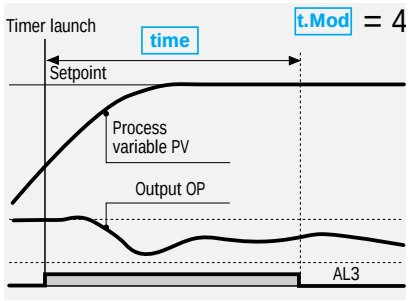
[1] When the Timer is not running the control output is forced to zero, also before the Timer launch.

Special function parameters description

Timer function mode

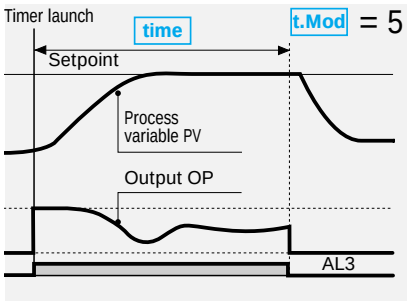
C - Counting start time = timer launch time, end in control mode.

The time counting starts when the timer is launched. The control action is not affected by the Timer function.



D - Counting start time = timer launch time, end with control output forced to zero.

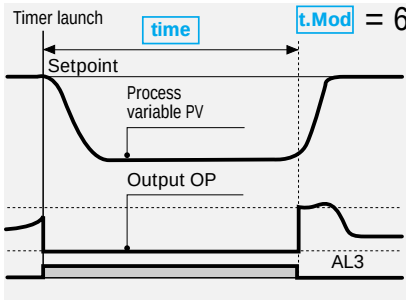
The time counting starts when the timer is launched. At the end, the control output is forced to zero. [1]



[1] When the Timer is not running the control output is forced to zero, also before the Timer launch.

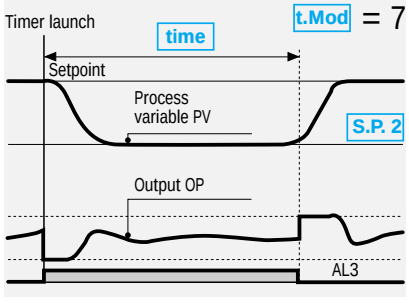
E - No control action during the counting time.

The time counting starts when the timer is launched and the control output is forced to zero. At the end, the control action starts.



F - Control action with stand-by Setpoint during the counting time

The time counting starts when the timer is launched and the control action use the Stand-by Setpoint. At the end, the control action use the working Setpoint.



Technical specifications

Features (at 25°C T. envir. temp)	Description			
Total configurability	By means of the confiurguration tools is possible to choose: - the type of input - the type of control input - the type of output - the type and functionality of the alarms - the type of Setpoint - control parameter values			
PV Input	Common characteristics	A/D converter with resolution of 50.000 points; Update measurement time: 0.2 sec; Sampling time: 0.5 sec; Input bias: - 60…+ 60 digit; input filter: 1…30 sec. OFF = 0		
	Accuracy	0,25% ± 1 digit (per termoelementi) 0,1% ± 1 digit (per mA e mV)		Between 100…240V~ the error is minumal
	Resistance thermometer (for ΔT: R1+R2 must be < 320 Ω)	Pt100Ω a 0°C (IEC 751) °C/°F selectable	2 or 3 wires connection Burnout (with any combination)	Max. wire Res: 20Ω max (3 wires) Sensitivity: 0.35°C/10° E. T. <0.35°C / 10Ω Wire Res.
	Thermocouple	L,J,T,K,S, R, B, N, E, W3, W5 (IEC 584) Rj >10MΩ °C/°F selectable	Internal cold junction compensation con NTC Error 1°C/20°C ±0.5°C Burnout	Line: 150Ω max Input drift: <2µV/°C.Env. Temp <5µV / 10Ω Wire Res.
	DC input (current)	4…20mA,0-20mA with external shunt 2.5Ω Rj >10MΩ	Burnout. Engineering units Conf. decimal point position Init. Scale -999…9999 Full Scale -999…9999 (min. range of 100 digits)	Input drift: <0.1% / 20°C Env. Temp. <5µV / 10Ω Wire Res.
	DC input (voltage)	10…50mV, 0-50mV Rj >10MΩ		
Digital input	The closure of the external contact produces any of the following actions		Auto/Man mode change, Stored Setpoints activation, measure hold . Timer activation (if options installed)	
Mode of operation	1 single or double action P.I.D. loop or ON/OFF with 1, 2 or 3 alarms			
Control mode	Algorithm	PID with overshoot control or On-off - PID with valve drive algorithm, for controlling motorised positioners		
	Proportional band (P)	0.5...999.9%		Single action PID algorithm
	Integral time (I)	01...100.0 min	OFF = 0	
	Derivative time (D)	0.01...10.00 min	OFF = 0	
	Error dead band	0.1...10.0 digit		
	Overshoot control	0.01...1.0		
	Manual reset	0.0...100.0%		
	Cycle time (Time proportional only)	1...200 sec		
	Control output high limit	10.0...100%		
	Soft-start output value	0.1...100.0%	OFF = 0	
	Output safety value	0.0...100.0% (-100.0...100.0% for Heat / Cool)		
	Control output hysteresis	0.1...10.0%		On-Off algorithm
	Dead band	-10.0...10.0%		Double action PID algorithm (Heat / Cool) with overlap
	Relative cool gain	0.1...10.0		
	Cycle time (Time proportional only)	1...200 sec		
	Control output high limit	10.0...100.0%		
	Cool output hysteresis	0.1...10.0%		
	Motor travel time	15...600 sec		Valve drive PID algorithm without feedback potentiometer
	Motor minimum step	da 0.1...5.0%		

Digital input commands

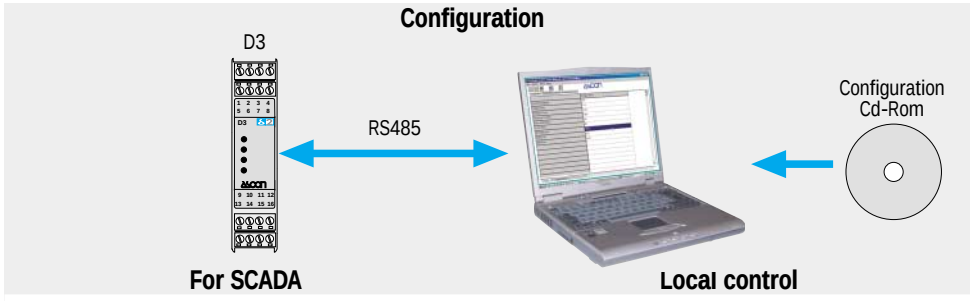
Function		Performed operation: Off	Performed operation: On	Notes
None		—	—	Not used
PV measure hold		Normal operation	PV is hold	The value of PV is "frozen" at the time the digital input goes to the close state
Set manual mode		Automatic	Manual	
Standard Setpoint	1st stored Setpoint	Local	1st SP	The permanent closure **forces** the chosen stored value. Setpoint modification is not possible.
Standard Setpoint	2nd stored Setpoint	Local	2nd SP	The impulsive closure, **selects** the stored value. Setpoint modification is allowed.
Timer		—	Timer start	The impulsive closure is enough to start the Timer

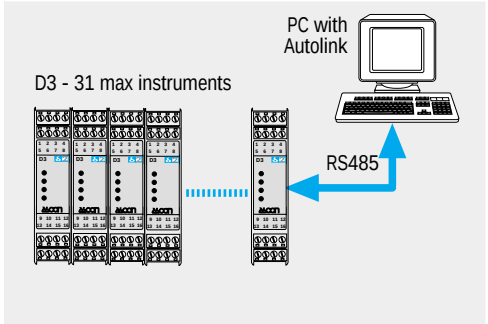
A function is assigned, through the configuration procedure to digital input.
The configured function is activated when the digital input (free voltage contact or open collector output) is in the On state (closed).
It is deactivated by setting the input to the Off state (open).
The activation of the function through the digital input has the highest priority than through the keypad or through the serial communications.

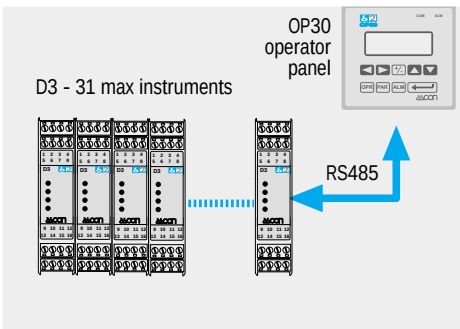
Technical specifications

Features (at 25°C T. envir. temp)	Description				
OP1-OP2 outputs	SPST Relay N.O., 2A/250V~ for resistive load SSR, 1A/250V~ for resistive load Too meet the double isolation requirements OP1 and OP2 must have the same load voltage				
OP3 output	SPST Relay N.O. 2A/150V~ for resistive load				
OP4 output	Logic not isolated: 0/5V-, ±10% 30 mA max				
OP5 output (opt.)	Control or PV/SP retr.; Galvanic isolation: 500 V~/1 min; Res. 12bit (0.025%); Accuracy 0.1%; 4/20 mA 750 Ω 15 V max				
AL1 - AL2 - AL3 Alarms	Hysteresys 0.1...10.%				
	Action	Active high	Action type	Deviation threshold	± range
		Active low		Band threshold	0...range
				Absolute threshold	whole range
		Special functions	Sensor break, Heater break and Loop break detection		
			Acknowledge (latching), activation inhibit (blocking)		
			Connected to Timer or program (if options installed)		
Setpoint	Local		Up and down ramps 0.1…999.9 digit/min. (OFF=0) Low limit: from low range to high limit High limit: from low limit to high range		
	Local plus 2 stored with tracking or Stand-by				
Special functions (option)	**Timer**		Automatic start at the power on, Digital inputs or serial comm.s Setting time: 1…9999 sec/min Stand-by Setpoint: SCLO <= SP >= SLH I		
	Start-up		Start-up Setpoint: SCLO <= SP >= SLH I Hold time : 0...500 min Control output high limit: 5.0...100.0%		
Fuzzy-Tuning one shot	The controller selects automatically the best method according to the process conditions		One shot Auto tuning One shot Natural frequency		
Auto/Man station	Standard with bumpless function, digital input or serial communications				
Serial comm.s	RS485 isolated, Modbus/Jbus protocol, 1200, 2400, 4800, 9600 bit/sec, 3 wires				
Auxiliary Supply	+24V– ± 20% 30mA max - for external transmitter supply				
Operational Safety	Measure input	Detection of out of range, short circuit or sensor break with automatic activation of the safety strategies and alerts on display			
	Control output	Safety value: -100%…100%			
	Parameters	Parameter and configuration data are stored in a non volatile memory for an unlimited time			
	Outputs lock				
General characteristics	Power supply (PTC protected)	24V~ (-15% +25%) 50/60Hz e 24V-(dc voltage) (-15% +25%)	Power consumption 3W max		
	Safety	EN61010-1 (IEC1010-1). installation class 2 (2500V), pollution class 2, **instrument class II**			
	Electromagnetic compatibility	Compliance to the CE standards			
	Protection	Terminal strip IP20			
	Dimensions	Pitch: 22.5 mm - depth: 114.5 mm - with: 53			

Serial communications connection example



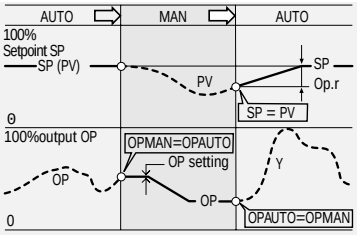




Commands

Auto/Manual

The bumpless action is present switching between AUTO, MAN and vice versa with the parameter **A.Man**.



⚠ In case of power failure, the AUTO/MAN status and the output value remain stored in the controller memory

Timer starting

Depending on the Timer action **t.Act** selection, there can be two different starting ways:
- Automatic at the power on
- Manual by digital inputs or serial communications.

The Timer function can be started or stopped any time.

Output lock

The outputs are switched to the OFF via serial communications.

⚠ The outputs lock/unlock is maintained in case of power failure.

Warranty

We warrant that the products will be free from defects in material and workmanship for 3 years from the date of delivery.
The warranty above shall not apply for any failure caused by the use of the product not in line with the instructions reported on this manual.