Sc30

Standard Controller
USER GUIDE

ORDEL

- Read this user manual carefully before using the device. Responsibility for accidents and damages caused by non-compliance with the warnings in this manual belongs to the user.
- This device has been produced for use by educated people in industrial enterprises, it is not suitable for use in homes and similar places for safety reasons.
- Do not use this device in the presence of flammable and explosive gases. It may cause explosion or fire due to electric arc that may occur at the contact points.
- Liquid substances and metal parts must be prevented from entering the device. Otherwise, it may cause accidents such as fire and electric shock.
- There is no fuse and circuit breaker on the device, they must be connected externally by the user.
- In case of malfunction of the device, external measures should be taken to prevent accidents and damages that may occur in the system in which it is located.
- It should be ensured that the sensor and signal cables are away from power cables or switched inductive load cables, or it must be prevented from being electrically affected.
- Before making the device connections, it should be checked whether the supply voltage is suitable for the place where it will be used by looking at the product code.
- Do not energize the device before making the connections related to the device in accordance with the wiring diagram and do not touch the terminals while the device is energized.
- The factory configuration of the device is not suitable for every system, it must be changed by the user according to the needs of the current system.
- The useful life of the device, as determined and announced by the Ministry, is 10 years.
- Do not modify or try to repair the device, the device should be repaired by authorized

EXPLANATION **Page No:**

SC30 Model devices are completely modular and each module can be configured independently, designed for the measurement and control of many process variables in industrial environments. In the design phase, compliance with international standards, reliability and ease of use are based. For this reason, they are ergonomic devices that can be used for very different controls in many sectors.

2 x 4 Digit Numeric Displays
3 LED Indicators
1 Universal Sensor Input (TC, RT, mA, mV, V)
2 Relays or Logic Outputs (24V)
100-240Vac Universal or 24Vac/dc Supply
Isolation Between Input/Output Modules

Auto-Tuning (auto-tuning of PID parameters)
Sensor Troubleshooting
9 Different Relay Functions
ON/OFF, P, PI, PD, PID Control
Linear and Time-Proportional Control Output
100ms Sampling and Control Cycle

- Before starting to use the device, make use of this user manual and perform the following operations in order.
- SC30 Model devices are completely modular devices, therefore, before using the device, check the product code to see if the supply voltage and input-output modules are suitable.
- Before making other connections of the device, only supply the supply voltage and enter the configuration page to make the most suitable configuration for your system.
- After the device is properly configured, set the set values and hysteresis of the relays you selected as alarm on the operator page.
- Cut off the power of the device and make other connections according to the connection diagram.
- Make the system to be controlled ready for operation and re-energize the system together with the device.
- If the control outputs of the device will work as PID and you have not entered the PID parameters manually, perform Auto-Tune for the device to calculate these parameters itself.
- In order to be sure that the PID parameters found by Auto-Tune are correct, enter a new set value to the device and watch its operation.
- Check all functions of the device during normal use.
- Finally, in order to prevent unauthorized interventions, enter the configuration page and set the security-related parameters and return to the Process-Screen.

This user manual has been prepared in accordance with the above procedure. How to do these operations is given in detail in the relevant sections.

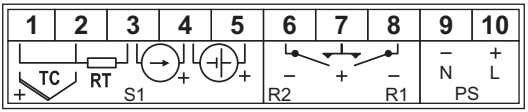
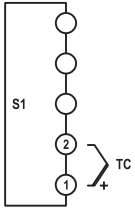


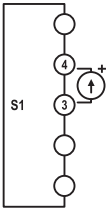
Figure-1

Module	Explanation
S1	Universal sensor input module (The sensor used for process value measurement must be connected to the terminals with the appropriate symbol in this module).
S2	Not used in this model.
R1,R2	Relay output modules (The contents of these modules are determined by the product code, and their functions are determined by the "r1F, r2F , r3F parameters on the configuration page).
PS	Supply voltage input (supply voltage is determined by the product code).

TC Input (B,E,J,K,L,N,R,S,T,U)

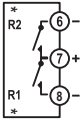


Current Input (mA)

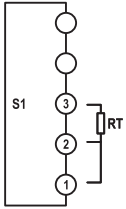


Relay /SSR Outputs *

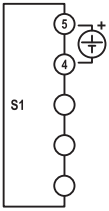
NO Contact* 2 Relays



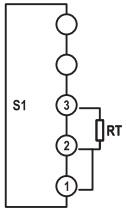
RT Input (3 Wire)



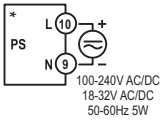
Voltage Input(V)



RT Input (2 Wire)



Supply Connection *



*** It is optional. Please refer to the Device Type Label.**

SC30 - 0 / _ / _ _

PS

Supply voltage :

0 = 100-240VDC Universal
1 = 24Vac/dc

S1

Sensor Type :

0 = TC (B,E,J,K,L,N,R,S,T,U)
RT (Pt-50,Pt-100,Ni-100,Ni-120)
V (0-50mV,0-10V,2-10V)
mA (0-20mA,4-20mA)

1 = TC (B,E,J,K,L,N,R,S,T,U)
RT (Pt-500,Pt-1000,Ni-200,Ni-500,NiFe-604,NiFe-507)
V (0-50mV,0-10V,2-10V)
mA (0-20mA,4-20mA)

R1-R2

R1,R2 Output Modules:

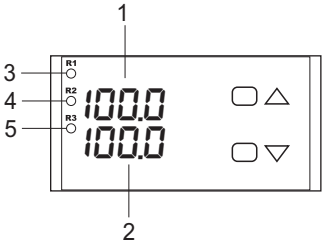
0 = None
1 = NO Contact
2 = 24V Logic Output (For Driving SSR)

Note : Since one end of each relay is common, both relay outputs must be coded the same type.

Relay output modules can be coded as contact or logic outputs in the product code, but only the term relay is used when talking about these outputs in this user manual.

Supply Voltage (PS)	100-240Vac/dc : +%10 -%15	24Vac/dc : +%10 -%20	
Power consumption	5W,8VA		
Universal Sensor Input (S1)	Thermocouple : B,E,J,K,L,N,R,S,T,U		
	Resistance Thermometer : PT100		
	Current : 0/4-20mA		
	Voltage: 0-50mV, 0/2-10V		
Transmitter Feed (TX)	No		
Analog Input Impedances	Thermocouple, mV : 10MΩ		
	Current : 10Ω		
	Voltage : 1MΩ		
Relay Outputs (R1,R2)	Circuit : 250Vac, 10A	Logic Output: 24Vdc, 20mA	
Contact Life	No-load : 10.000.000 switching		
	250V, 5A Resistive Load: 100,000 switching		
Memory	100 years, 100,000 renewals		
Accuracy	+/- %0.2		
Sampling Time	100ms		
Ambient Temperature	Working : -10...+55C	Storage : -20...+65C	
Protection Class	Front Panel : Ip54	Height : 37mm	
Dimensions	Width : 72mm	Height : 37mm	Depth : 90mm
Panel Cut Dimensions	66 +/- 0,5 mm x 32 +/- 0,5 mm		
Weight	292gr		

Sensor Type	Standard	Temperature Range	
		(°C)	(°F)
Type-B Thermocouple (Pt%18Rh-	IEC584-1	60, 1820	140, 3308
Type-E Thermocouple (Cr-Const)	IEC584-1	-200, 840	-328, 1544
Type-J Thermocouple (Fe-Const)	IEC584-1	-200, 1120	-328, 1562
Type-K Thermocouple (NiCr-Ni)	IEC584-1	-200, 1360	-328, 2480
Type-L Thermocouple (Fe-Const)	DIN43710	-200, 900	-328, 1652
Type-N Thermocouple (Nicrosil-Nisil)	IEC584-1	-200, 1300	-328, 2372
Type-R Thermocouple (Pt%13Rh-Pt)	IEC584-1	-40, 1760	104, 3200
Type-S Thermocouple (Pt%10Rh-Pt)	IEC584-1	-40, 1760	104, 3200
Type-T Thermocouple (Cu-Const)	IEC584-1	-200, 400	-328, 752
Type-U Thermocouple(Cu-Const)	DIN43710	-200, 600	-328, 1112
Pt-100 Resistance Thermometer	IEC751	-200, 840	-328, 1544



PROCESS-SCREEN:
When the device is energized, the measured process value or error message is displayed on the "PV" display, and the control set value is displayed on the "SP" display, after the program version is displayed on the gesterges for about 2 seconds. This screen is called the **Process-Screen.** This screen is used continuously during normal operation.

1	**PV DISPLAY**	It shows the process value or error messages on the Process-Screen, and the parameter name on the other screens.
2	**SP DISPLAY**	It shows the control set value on the Process-Screen, and the parameter value on the other screens.
3	**R1 LED**	"R1" It lights when the relay module is energized.
4	**R2 LED**	It lights when the "R2" Relay module is energized.
5	**R3 LED**	"R3" It lights when the relay module is energized.

DISPLAY OF ALPHABETIC CHARACTERS												
A	B	C	D	E	F	G	H	I	J	K	L	M
												
N	O	P	Q	R	S	T	U	V	W	X	Y	Z
												

ERROR MESSAGES	
	The sensor at Input “S1” cannot be detected.
	A value too high to be displayed on the screen.
	A value too low to be displayed on the screen.

KEY FUNCTIONS	
	Short press returns to the beginning of the page, When pressed for 2 seconds, the Process-Screen is returned.
	Used to change parameter option or values.
	Used to change parameter option or values.
	A short press on any screen will move to the next parameter. When pressed for 5 seconds while on the Process-Screen, Auto-Tune process is started. Press and hold for 2 seconds to confirm the conditions that require confirmation.

SC30 Series devices are control devices designed for multi-purpose use. For this reason, they are devices with input/output modules suitable for all kinds of processes and can be used in accordance with all operating conditions. These devices can work with many different sensors and input signals, and each output can be used for a separate control. Therefore, before the SC30 device can be used, the input/output types and functions, control type and usage characteristics should be set in the most appropriate way.

Depending on the order code, SC30 series devices may have one analog input, one analog output, one RS485 communication and two relay output modules. The types, functions and scales of these modules are determined by the parameters in the configuration page.

In addition, the basic parameters that determine the control type and operation of the device and the necessary settings for the control algorithm are also on the configuration page.

Before connecting an unconfigured device to your system, supply only the supply voltage and configure it according to the instructions below.

Entering the configuration page and setting the parameters:

- To enter the configuration page, press and hold both the "[*]" and "[⟲]" keys together until the "C.2" message appears on the "PV" indicator while the device is energized.
- While there is a "C.2" message on the PV display, set the value in the "C.2" display to the login password of the configuration page with the "A" and "B" keys (The factory setting of this password is"0").
- If the password you entered is incorrect when you press the "[⟲]" key, the Process-Screen is returned, and if it is correct, the first parameter on the configuration page is accessed.
- The name of the parameter appears on the "PV" display on the parameter screen, and the setting option of the parameter appears on the "SP" display.
- Now you can access the other configuration parameters in sequence by pressing the "[⟲]" key.
- Use the "[⩓]" and "[⩔]" keys to change the setting option of the parameter, and the "[⟲]" key to move to the next parameter. Pressing the "[*]" key for a short time will return to the beginning of the page, while pressing the "[*]" key for a long time will return to the Process-Screen.
- **Figure-3** below is a graphical representation of these processes.

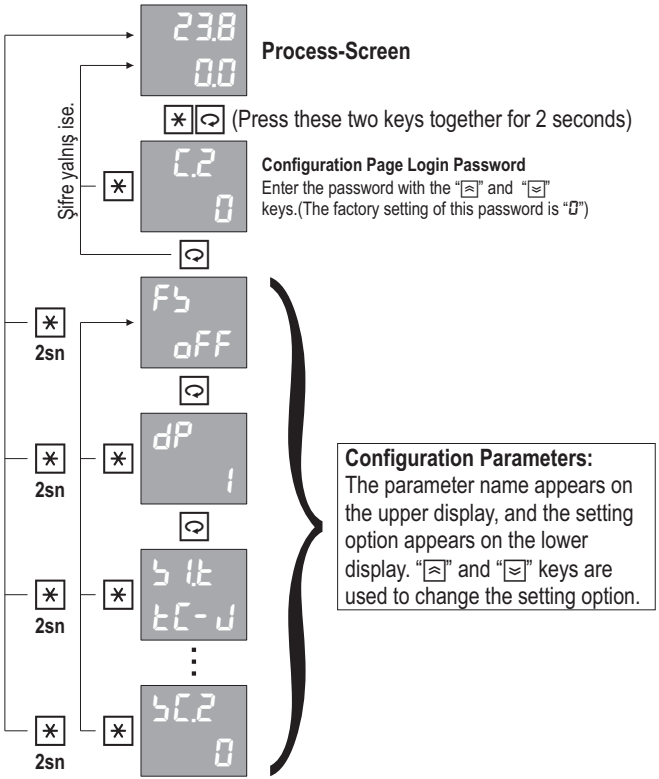


Figure-3

Detailed descriptions of the configuration page parameters are given in the next section.

Par. 01

To return to the factory settings, this parameter must be set to "on" and the "⊙" key must be pressed for two seconds.

Setting Options: oFF, on

Par. 02

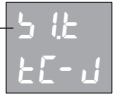
It determines the decimal degree (number of digits after the dot) in the display of all parameters whose unit is "EU".

Setting Options : 0 - 3

Warning: When this parameter is changed, all parameters with unit "EU" must be set again.

Note: "EU" *is the temperature unit determined by the "HU" parameter for temperature measurements with a thermocouple or resistance thermometer. In other cases, it is the engineering unit of the variable being measured.*

Par. 03



It determines the type of sensor connected to the universal sensor input "S1". This sensor is used for process value measurement.

Setting Options : Table-1

Table-1	No	Sensor Type
tC-b	0	Type-B Thermocouple (Pt%18Rh-Pt)
tC-E	1	Type-E Thermocouple (Cr-Const)
tC-J	2	Type-J Thermocouple (Fe-Const)
tC-K	3	Type-K Thermocouple (NiCr-Ni)
tC-L	4	Type-L Thermocouple (Fe-Const)
tC-n	5	Type-N Thermocouple (Nicrosil-Nisil)
tC-r	6	Type-R Thermocouple (Pt%13Rh-Pt)
tC-S	7	Type-S Thermocouple (Pt%10Rh-Pt)
tC-t	8	Type-T Thermocouple (Cu-Const)
tC-U	9	Type-U Thermocouple (Cu-Const)
rt	10	Pt-100 Resistance Thermometer
0-50	11	0-50mV
0-20	12	0-20mA
4-20	13	4-20mA
0- 10	14	0-10V
2- 10	15	2-10V

Par. 04 — S1.LL / 0.0

"S1" It determines the lower scale value of the universal sensor input module.

Setting Range: -199.9 - 999.9 | *Unit :* EU

Par. 05 — S1.HL / 800.0

"S1" It determines the upper scale value of the universal sensor input module.

Setting Range : -199.9 - 999.9 | *Unit :* EU

Par. 06 — S1.bL / H

It determines the value of the scale if the sensor connected to the "S1" universal sensor input does not detect it.

Setting Options: L (lower value) , H (upper value)

Par. 07 — HU / °C

It determines the temperature unit in temperature measurements with a thermocouple or resistance thermometer.

Setting Options: °C (°C), °F (°F)

Par. 08 — tbu / 0.0

It is added to the measured value to correct an error in temperature measurements with a thermocouple and resistance thermometer.

Setting Range: -100.0 - 100.0 | *Unit :* EU

Par. 09 — FtC / 2.0

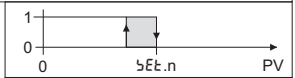
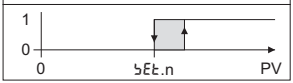
Analog girişlere uygulan sayısal filtrenin zaman sabitini belirler. Bu değer artırıldığında okuma kararlılığı artar, fakat okuma hızı düşer.

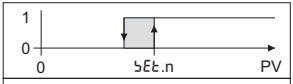
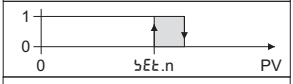
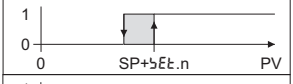
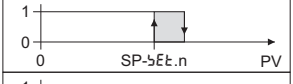
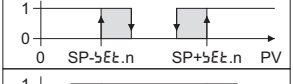
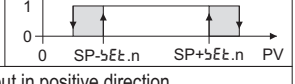
Setting Range : 0.1 - 10.0 | *Unit :* sn

Par. 10 — r1F / PCo

It determines the function of "R1" Relay output module.

Setting Options : Table-6

Table-6	No	Relay Function		
oFF	0	No		
ULC	1	Upper limit Control	ALARMS	
LLC	2	Lower Limit Control		

ULA	3	Upper limit Alarm	
LLA	4	Lower Limit Alarm	
UdA	5	Upper Deviation Alarm	
LdA	6	Lower Deviation Alarm	
obA	7	Out of Band Alarm	
IbA	8	In-Band Alarm	
PCo	9	PID control output in positive direction	

ALARMS

Note: *The shaded regions in the alarm drawings are hysteresis regions and the hysteresis of each relay is determined by its own "HYS.n" parameter.* ***(Here, the value indicated by "n" is the relay number).***
"1"s in the alarm drawings indicate that the relevant relay is energized and "0"s mean that it is de-energized.

Par. 11 — r2F / ULC

It determines the function of "R2" Relay output module.
Setting Options : Tablo-6

Par. 12 — r1t / 0

"R1" Röle çıkış modülünün belirli bir süre sonra gecikmeli olarak çekmesi yada bırakması isteniyorsa kullanılır.	
Setting Range : 0.0 - 999.9]	*Unit:* SC

Par. 13 — r2t / 0

It is used if the relay output module "R2" is required to delay or release it after a certain period of time.	
Setting Range : 0.0 - 999.9	*Unit :* SC

Par. 14

It determines the lower limit of all set values.

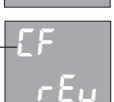
Setting Range : -199.9 - [SPHL] | *Unit :* EU

Par. 15

It determines the upper limit of all set values.

Setting Range : [SPLL] - 999.9 | *Unit :* EU

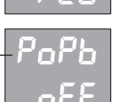
Par. 16



It determines the control form (Direction).

Setting Options : dir (As the process increases, the output also increases),

Par. 17



It determines the proportional band of the PID control output in the positive direction.

Setting Range : oFF(ON/OFF control) , 0.1 - | *Unit :* EU

Par. 18

Integral time constant.

Setting Range : oFF(Close) , 1 - 6000 | *Unit :* sn

Par. 19

Differential time constant.

Setting Range : oFF(Close) , 0.1 - 999.9 | *Unit :* sn

Par. 20

Determines the duration of a control cycle. (Control Period)

Setting Range : 0.1 - 60.0 | *Unit :* sn

***Warning**: In PID Control applications, the control period should be chosen very small compared to the system dead time in order to avoid oscillations caused by the control period.*

Par. 21

It determines the lower limit of the PID control output.

Setting Range : -100.0 - [CoHL] | *Unit :* %

Par. 22

Sets the upper limit of the PID control output.	
Setting Range : [CoLL] - 100.0	*Unit :* %

Par. 23

It determines the default value of the PID control output. (When the integral is closed, it is the control output value when the process value and the set value are equal)	
Setting Range : -100.0 - 100.0	*Unit :* %

Par. 24

It determines which control type the Auto-Tune operation will be made according to.
Setting Range : P, PI, PId (P, PI, PID)

Par. 25

It enables the control period to be determined automatically by Auto-Tune operation
Setting Options : oFF(No) , on(Yes)

Par. 26

If Auto-Tune operation is desired to be performed at a certain set value, this set value is determined.	
Setting Range : oFF(Kapalı) , -199.9 - 999.9	*Unit :* EU

Par. 27

It determines the hysteresis value used during Auto-Tune operation. It should be entered as 5-20 times the system instability.	
Setting Range : 0.1 - 100.0	*Unit :* EU

Par. 26

Sets the upper limit of the PID control output.

Setting Range : [CoLL] - 100.0 | *Unit :* %

Par. 27

It determines the default value of the PID control output. (When the integral is closed, it is the control output value when the process value and the set value are equal)

Setting Range : -100.0 - 100.0 | *Unit:* %

Par. 28

It determines which control type the Auto-Tune operation will be made according to.

Setting Options : P, PI, PId (P, PI, PID)

Par. 29

It enables the control period to be determined automatically by Auto-Tune operation.

Setting Options : oFF(No) , on(Yes)

Par. 30

If Auto-Tune operation is desired to be performed at a certain set value, this set value is determined.

Setting Range : oFF(No) , -199.9 - 999.9 | *Unit :* EU

Par. 31

It determines the hysteresis value used during Auto-Tune operation. It should be entered as 5-20 times the system instability.

Setting Range : 0.1 - 100.0 | *Unit :* EU

Par. 32

It is the permission to change the control set value by the operator.

Setting Options : oFF(No) , on(Yes)

Par. 33

It is the permission to change the "SEtn" set values of the relays by the operator.

Setting Options : oFF(No) , on(Yes)

Par. 34

It is the permission to change the hysteresis values by the "HYSn" operator.

Setting Options : oFF(No) , on(Yes)

Par. 35

It is permission to start Auto-Tune operation.
Setting Options : oFF (No) , on (Yes)

Par. 36

It determines whether the "CoL" parameter, which indicates the PID control output level, will appear on the operator page.
Setting Options : oFF (No) , on (Yes)

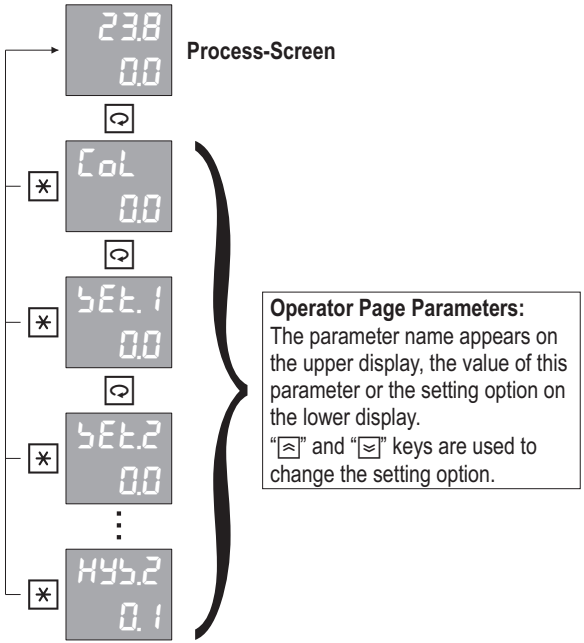
Par. 37

It automatically determines the return time to the Process-Screen while in the operator parameters.	
Setting Range : oFF (No) , 1 - 25	*Unit :* sc

Par. 38

Sets the login password of the configuration page.
Setting Range : -999 - 9999

Which of the parameters on the operator page will be used is determined according to the configuration and only the parameters to be used are displayed. These parameters, which are determined as a result of the configuration, are the parameters that are used continuously during normal operation, therefore, these parameters can be accessed by pressing the "⟲" key at any time while on the Process-Screen, and by pressing the "✱" key, it is returned to the Process-Screen. If the setting permission of the adjustable ones of these parameters is desired, they can be removed with the relevant parameters in the configuration page. If no key is pressed while in any parameter on the operator page, the Process-Screen is automatically returned when the time specified with the "Rrt" parameter expires.



Detailed descriptions of the operator page parameters are given in the next section.

Indicates the PID control output level. In order for this parameter to appear, the "CoP" parameter in the configuration page must be set to "oo"

Unit : %

It determines the set value of "R1" Module. In order for this parameter to appear, "r 1F"parameter must be ALARM selected.

Setting Range: [SPLL] - [SPHL] | *Unit :* EU

It determines the set value of the "R2" Module. In order for this parameter to appear, "r2F"parameter must be ALARM selected.

Setting Range : [SPLL] - [SPHL] | *Unit :* EU

Sets the control hysteresis value. In order for this parameter to appear, one of the proportional bands must be "oFF"

Setting Range: 0.1 - 100.0 | *Unit :* EU

It determines the hysteresis value of the "R1" Module. In order for this parameter to be visible, the "r 1F" parameter must be ALARM selected.

Setting Range: 0.1 - 100.0 | *Unit :* EU

It determines the hysteresis value of the "R2" Module. In order for this parameter to appear, "r2F" parameter must be ALARM selected.

Setting Range : 0.1 - 100.0 | *Unit :* EU

When configuring SC30 model devices, if the PID parameters(PoPb , noPb , ct , dt , CP) are left in their factory settings, the control outputs operate as ON/OFF. To start working as PID, these parameters must either be entered manually or Auto-Tune must be performed.

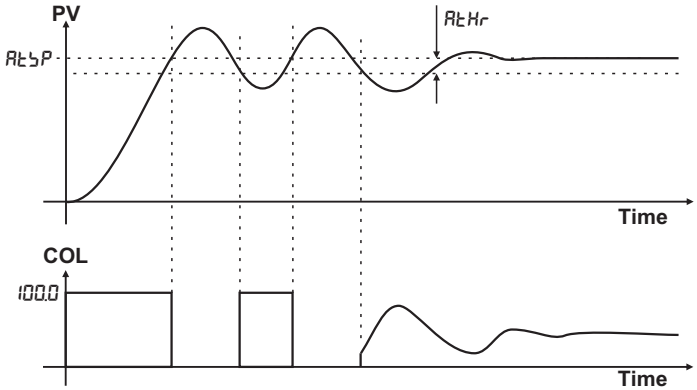
Since the characteristics of each process are different, the PID parameters should also be different. The Auto-Tune operation calculates and saves the most appropriate PID parameters for a process.

Before starting the Auto-Tune process, the "AtSP" and "AtHr" parameters in the configuration page should be set appropriately and the "At" parameter should be set to "on". If the "AtSP"parameter is left in the "oFF" state, Auto-Tune operation will be performed according to the current set value, so select a suitable set value. To obtain optimal PID parameters, the selected setpoint should correspond to the middle of the full power of the process.

After making the appropriate settings, start the Auto-Tune process by pressing the "⟲" key for about 5 seconds while on the Process-Screen. "At" message flashes on "ST" indicator when Auto-Tune operation is started. In order for the results to be calculated properly, the device and the controlled system should not be interfered with during the Auto-Tune process. During the Auto-Tune process, the device calculates and saves the new PID parameters after performing an ON/OFF control of 2-3 oscillations according to the set value and hysteresis. When the Auto-Tune process is finished, the "At" message on the screen disappears and the device starts to control the system as PID with new parameters. After the auto tune process is completed, the "At" parameter in the configuration page should be set to "oFF" again.

If the "✱" key is pressed while the Auto-Tune process is in progress, the process is canceled.

If a device that works as PID is wanted to be operated as ON/OFF again, PID parameters must be set to factory settings.



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