OC990

Oven Controller
USER'S GUIDE

ORDEL

- Before using the device, please read the warnings below and this guide carefully. The accidents or damages resulting from not following the warnings included in this guide are under user's responsibility.

- This device is intended to be used by qualified personnel in industrial environments, do not use in houselike environments.

- Do not use the device at places where corrosive, flammable and explosive gases exist. Contact points may create electrical discharge and this may cause explosion or fire.

- Do not allow metal fragments or lead wire scraps or liquid matters to fall inside this device. Otherwise fire or electrical shck may happen.

- Take the neceessary precautions in order to prevent accidents and damages that may result in case the device gets faulty.

- There is no fuse or switch that brings the device in power down state, these should be added to the system by the user.

- Sensor and signalling cables should not be routed close to the power cables or inductive load cables.

- Do not power up the device before the connections related with the device are performed in accordance with connection diagram.

- Do not power up the device before the connections related with the device are performed in accordance with the connection diagram. While the device is powered, do not touch on the terminals.

- Configuration settings at factory out should be changed according to the user's preferences. The accidents and damages resulting from incorrect configuration settings are under users' responsibility.

- Never disassemble, repair and modify the device. These should be carried out by authorized service.

OC990 Model devices are designed for the applications which requires synchronous temperature control and timing. They are reliable, hi tech devices in dimension of 96 x 96 mm and adapted to international standards.

They offer advanced (PID/ON/OFF) control, hi accuracy and stability, alternative hardware, all-purpose programming and easy use features.

They can be used with all kinds of power supply by the feature of Universal Power Supply.

They can connect MODBUS connection network via RS485 Communication Module. They can be controlled in network, send and receive data.

Before using the device, please follow the instructions below according to the information in this guide.

- Model OC990 devices are modular devices, so that before using the device, control supply voltage and input/output modules if they are appropriate or not by the help of product code

- First of all, connect device to power supply and by using the configuration page, configure the device.

- After configuring the device, adjust set and hysterisis values of the relays which are selected as alarm in operator page.

- Power down the device and according to the connection diagram, apply other connections.

- Prepare the system which will be controlled to be run and power up the system and the device.

- If the control outputs of device will use PID and PID parameters are not entered manually, Run Auto-Tune in order to have the device to calculate these parameters automatically.

- In order to be sure that PID parameters are correct, use a new set value for device and observe the operation.

- Control all functions of the device by stepping through other operating modes.

- Finally, in order to prevent the unauthorized people to observe the system, make the neccesary operation for security by entering the configuration page and return to the Process Screen.

This user guide is prepared by following the instruction order above. How these operations are made are explained in detailed in related sections.
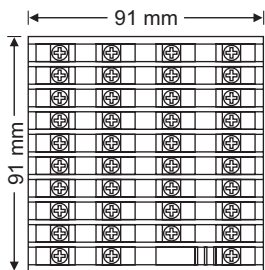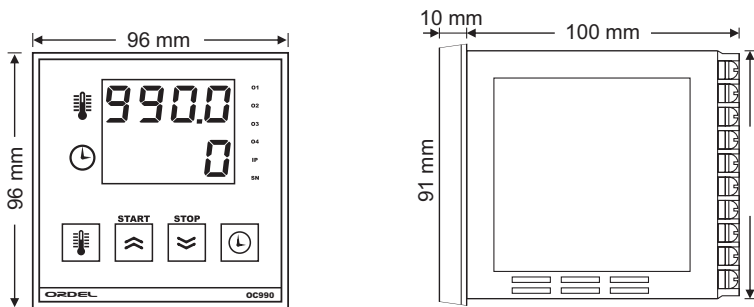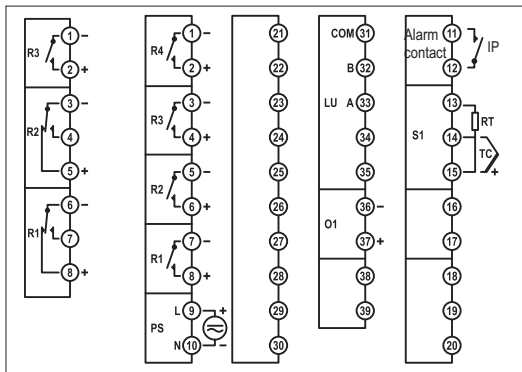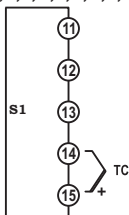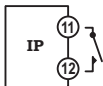
Panel Cutting Dimension= 92 ± 0,5 mm x 92 ± 0,5 mm

Diagram-1

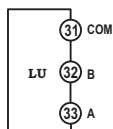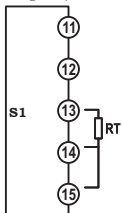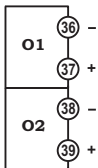| Module	Explanation
S1	Universal sensor input module (This sensor that is used to measure process value should be connected to the terminal which is identified with suitable symbols in this module).
O1	Analog Output Module (Content of this module is determined by product code and the function of this module is determined by "*o 1F*"parameter that can be accessed from
R1,R2.R3	Relay Output Modules (Content of this module is determined by product code and the function of this module is determined by "*r 1F, r 2F, r 3F* parameters that can be accessed
IP	Used when the start signal wants to start by giving dry contact information from the outside.
PS	Supply voltage input (Supply voltage is determined by product code).

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

S1
- 11
- 12
- 13
- 14
- 15

TC +

Alarm Contact

IP
- 11
- 12

RS-485
Connection *
(MODBUS - RTU)

LU
- 31 COM
- 32 B
- 33 A

RT Input (3 Wire)

S1
- 11
- 12
- 13
- 14
- 15

RT

Analog Output*
(0-20mA/0-10V)

O1
- 36 −
- 37 +

O2
- 38 −
- 39 +

Power Connection *

PS
- 9 L
- 10 N

+
−

RT Input (2 Wire)

S1
- 11
- 12
- 13
- 14
- 15

RT

Relays/SSR Outputs*

NO
Contact*

R4
- 1 −
- 2 +

R3
- 3 −
- 4 +

R2
- 5 −
- 6 +

R1
- 7 −
- 8 +

NO/NC
Contact*

- 1 −
- 2 +
- 3 −
- 4 +
- 5 +
- 6 −
- 7 +
- 8 +
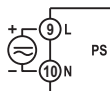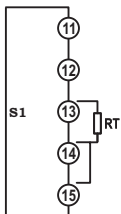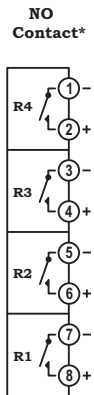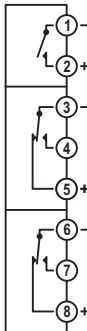
* This optional modules. Look device sticker.

OC990 - _ _ / _ 0 / _ _ _ _

PS

Supply Voltage :
    0 = 100-240Vac (Universal)
    1 = 24Vac/dc

LU

Logic Input Module :
    0 = N/A
    1 = 2 Item 15V Logic Input
    3 = RS485 Communication Unit

O1

Analog Output Module :
    0 = N/A
    1 = 0/4-20mA Current Output
    2 = 0/2-10Vdc Voltage Output

R1-R2

R1, R2 Output Modules :
    0 = N/A
    1 = NO Contact
    2 = 24V Logic Output (to drive SSR)
    3 = NO/NC Contact

R3-R4

R3,R4 Output Modules :
    0 = N/A
    1 = NO Contact
    2 = 24V Logic Output (to drive SSR)

| Supply Voltage	100-240Vac/dc: +%10 -%15		24Vac/dc: +%10 -%20	
Power Consumption	5W,8VA			
Analog Input (AI1)	Thermocouple (B,E,J,K,L,N,R,S,T,U), Res. Thermometer (Pt100)			
Analog Input	Thermocouple: 10MΩ			
Analog Output (AO1)	Current: 0/4-20mA, 20-4/0mA (RL	Vol.: 0/2-10V, 10-2/0V (RL $\geq$ 1MΩ)		
Digital Outputs (	NO Contact: 250Vac	NC Contact: 250Vac	Pulse: 24Vdc 20mA	
Contact Lifetime	Loadless: 10.000.000 times With 250V 3A res. load: 100.000 times			
Memory	100 year, 100.000 renewals			
Accuracy	+/- %0,2			
Sampling Period	100ms			
Environment	Operation: -10...+55C, Storage: -20...+65C			
Protection	IP20			
Dimensions	Width: 96mm, Height: 96mm, Depth: 110mm			
Panel Cut-Out	92+/-0,5 mm x 92+/-0,5 mm			
Weight	430gr			

Sensor Type	Standard	Temperature	
		(°C)	(°F)
Type-B Thermocouple(Pt%18Rh-Pt)	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
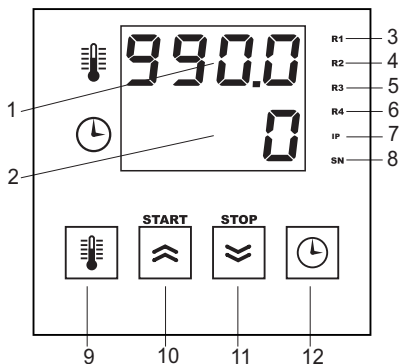
1	**TEMPERATURE DISPLAY**	It displays the oven temperature and error messages.
2	**TIME DISPLAY**	While timing operation continues, it displays the remaining time and after the time fininshes, it displays "0".
3	**R1 LED**	It indicates the state of first output (R1F).
4	**R2 LED**	It indicates the state of second output (R2F).
5	**R3 LED**	It indicates the state of second output (R3F).
6	**R4 LED**	It indicates the state of second output (R4F).
7	**IP LED**	It indicates the state of alarm contact (DI).
8	**SN LED**	It blinks with a periode of 1 second while the time passes.
9	**TEMPERATURE SETTING BUTTON**	It is used to enter the Temperature-Setting Mode.
10	**UPWARDS ARROW BUTTON**	It is used to start the timing operation (START) and to increase the setting values.
11	**DOWNWARDS ARROW BUTTON**	It is used to stop the timing operation (STOP) and to decrease the setting values.
12	**TIME SETTING BUTTON**	It is used to enter the Time-Setting Mode.

SYMBOLISATION OF ALPHABETICAL CHARACTERS												
A	B	C	D	E	F	G	H	I	J	K	L	M
A	b	C	d	E	F	G	H	I	J	P	L	$\bar{n}$
N	O	P	Q	R	S	T	U	V	W	X	Y	Z
n	o	P	q	r	5	t	U	u	Y	r	Y	$\bar{c}$

ERROR MESSAGES	
$Err.1$	Sensor connection is broken at "S1" input.
‾ ‾ ‾ ‾	Process value is above the display scale.
_ _ _ _	Process value is below the display scale.

KEY FUNCTIONS	
✳	While in Process-Screen, if it is pressed shortly, locked relays are resetted. Pressing for 5 seconds will change the operating mode. While in other screens, it is used to revert to the first page. Pressing for 2 seconds will activate the Process-Screen.
⌃	It is used to change the parameter option or parameter value.
⌄	It is used to change the parameter option or parameter value.
↻	In any page, pressing for a while activates the next parameter. While in Process-Screen, pressing for 5 seconds will start the Auto-Tune operation. For submit operations, it must be pressed for 2 seconds.

Setting Temperature Value:

Key is pressed. When "----" is viewed on time indicator, value on temperature indicator is set using ⌃ and ⌄ keys.

Setting Time Value:

Key is pressed. Just after "----" is displayed on temperature display, by using the ⌃ and ⌄ keys, value in time display can be set to neccesary value.

Starting the Timing Operation:

In order to start timing operation, it is enough to press ⌃ **(START)** key or set the state of the Alarm-Contact to close position. When timing operation starts, "SN" led blink for a period of 1sec. If temperature display has an **Error-Message** (Ref:Page-11), timing operation cannot be started.

Terminating the Timing Operation:

In order to terminate the timing operation, it is enough to press the ⌄ (**STOP**) key or set the state of **Alarm-Contact** to Open.

Other Settings:

For other settings, and keys are pressed simultaneously and Operator-Page parameters are accessed. Explanation of these parameters can be found in the next section.

To pass configuration page

```
27.2
   0
```
While at the main menu

⟨≋⟩ ⟨≋⟩ Press these keys at the same time

↓

```
C.2
  0
```
If there is a password enter it.
Fabric value (0)

↓ ⟨🕐⟩ press to continue parameters

```
Configuration page
parameters
```

Screen	Description
Par.01 — `C.2` `0`	In order to restore the settings to the factory default, this parameter should be set to "ON" and "⟲" key should be pressed for two seconds. *Setting Preferences:* `1999 - 9999`
Par.02 — `F5` `oFF`	It is used to pass to turn fabric parameters. Firstly do on this parameter. Than Press `🌡` and `≽` keys at the same time. Device is became reset and turn off and on. All the parameters are on fabric values.
Par.03 — `dP` `0`	It determines the decimal level After change control set and hysterisis parameters. *Setting Range :* `0 - 1`
Par.04 — `5 1.t` `tC-J`	"S1" determines the sensor type which is connected to the universal sensor input. This sensor is used to measure the process value. *Setting Preferences :* Table 1

Table-1

AI1.T	Sensor Type	Standard	Temperature Range	
			(°C)	(°F)
`tC-b`	Type B Thermocouple	IEC584-1	60, 1820	140, 3308
`tC-E`	Type E Thermocouple	IEC584-1	-200, 840	-328, 1544
`tC-J`	Type J Thermocouple	IEC584-1	-200, 1120	-328, 1562
`tC-P`	Type K Thermocouple	IEC584-1	-200, 1360	-328, 2480
`tC-L`	Type L Thermocouple	DIN43710	-200, 900	-328, 1652
`tC-n`	Type N Thermocouple	IEC584-1	-200, 1300	-328, 2372
`tC-r`	Type R Thermocouple	IEC584-1	-40, 1760	104, 3200
`tC-5`	Type S Thermocouple	IEC584-1	-40, 1760	104, 3200
`tC-t`	Type T Thermocouple	IEC584-1	-200, 400	-328, 752
`tC-U`	Type U Thermocouple	DIN43710	-200, 600	-328, 1112
`rt`	Pt100 Resistance Thermometer	IEC751	-200, 840	-328, 1544

Screen	Description
Par.05 — `5 1.bL` `HC`	When the universal sensor input connection is broken. Set high or low value. *Setting Preferences :* `Lo - HC`

Par.06	EU / °C	Temperature unit.
		Setting Preferences : °C - °F

Par.07	ESU / 0.0	If there is an input error this value is added.
		Setting Preferences : - 100 - 100 Unit °C

Par.08	FEC / 1.0	Filter time adjustment.
		Setting Preferences : 0.1 - 10.0 Unit Sec

Par.09	r 1F / roC	"R1" Relay running function type selection.
		Setting Preferences: Table 2-3

Table-2

0	oFF	No relay function.
1	roC	On / Off heating ouput.
2	doC	On / Off cooling output.
3	AHA	Absolute Upper Deviation Alarm
4	ALA	Absolute Lower Deviation Alarm
5	HdA	Relative Upper Deviation Alarm
6	LdA	Relative Lower Deviation Alarm
7	obA	Outside Band Alarm
8	ibA	Inside Band Alarm
9	PPC	Positive directed PID control
10	nPC	Negative directed PID control
11	oPn	Open valve
12	CLb	Close valve
13	APr	Inside of approach band
14	odu	Outside of approach band
15	rUn	active If time is running
16	LEU	active when before time is finished
17	EoP	active when time is finished

Table-3

Alarm Type	Abb.	Graphical Representation
ON/OFF Heating	roC	
ON/OFF Cooling	doC	
Absolute High Deviation Alarm	AHA	
Absolute Low Deviation Alarm	ALA	
Relative High Deviation Alarm	HdA	
Relative Low Deviation Alarm	LdA	
Outside Band Alarm	obA	
Inside Band Alarm	CbA	

CSP value in the table is the Control Set Point. **ASP** value is the set value of Control-Output itself that is selected as being alarm (DO1.S, DO2.S).

"**1**" in the table means Alarm exists and "**0**" means Alarm does not exists. Hatched fields are the **Hysterisis** fields and their width is HYS.

Par.	Display	Description
Par.10	r 1.L / dЅb	"R1" Relay lock output. If it is used as alarm select enb and relay is active upto STOP key is pressed.
		Setting Preferences : dЅb - Enb
Par.11	r 2.F / EoP	"R2" Relay running function type selection.
		Setting Preferences : Table 2-3
Par.12	r 2.L / dЅb	"R2" Relay lock output. If it is used as alarm select enb and relay is active upto STOP key is pressed.
		Setting Preferences: dЅb - Enb
Par.13	r 3.F / oFF	"R3" Relay running function type selection.
		Setting Preferences : Table 2-3
Par.14	r 3.L / dЅb	"R3" Relay lock output. If it is used as alarm select enb and relay is active upto STOP key is pressed.
		Setting Preferences : dЅb - Enb
Par.15	r 4.F / oFF	"R4" Relay running function type selection.
		Setting Preferences : Table 2-3
Par.16	r 4.L / dЅb	"R4" Relay lock output. If it is used as alarm select enb and relay is active upto STOP key is pressed.
		Setting Preferences : dЅb - Enb
Par.17	o 1.F / oFF	"O1" Analog output module function selection.
		Setting Preferences: Table 4

Table-4

0	oFF	No function
1	PЕr	Send process value
2	ЅЕr	Send set value
3	PPC	"+" directed control output
4	nPC	"-" directed control output

Par.18--- `o 1.t` `4-20` "O1" Analog output type selection.

Setting Preferences : Table 5

Table-5

0	`0-20`	0-20mA
1	`20-0`	20-0mA
2	`4-20`	4-20mA
3	`20-4`	20-4mA
4	`0-10`	0-10V
5	`10-0`	10-0V
6	`2-10`	2-10V
7	`10-2`	10-2V

Par.19--- `o 1LL` `0.0` It determines the lower value of output scale when "O1" analog ouput module is used as a transmitter.

Setting Preferences : `1999 - 9999` *Unit* °C

Par.20--- `o 1HL` `0.0` It determines the upper value of output scale when "O1" analog ouput module is used as a transmitter.

Setting Preferences : `1999 - 9999` *Unit* °C

Par.21--- `SPLL` `0.0` It determines the lower limit value of all set values.

Setting Preferences : `1999 - SPHL` *Unit* °C

Par.22--- `SPHL` `400.0` It determines the upper limit value of all set values.

Setting Preferences : `SPLL - 9999` *Unit* °C

Par.23--- `CF` `rEU` Output is reversed when reverse is selected.

Setting Preferences: `rEU` (Reverse) - `dCr` (Normal)

Par.24--- `CCnt` `oFF` Continious Control: Heating is controlled continiously as time independent.

Setting Preferences : `on - oFF`

Par.	Display	Description
Par.25	`tU` `n̄ɛn`	Time Unit Selection
		Setting Preferences : `5EE`(second) - `n̄ɛn`(minute) - `HoUr`(hour)
Par.26	`PoA` `ɛnt`	Energizing Action
		Setting Preferences: `ɛnt`(continue while running) - `brP`(break run)
Par.27	`Utt` `100`	Time period to enter from closed position to open position for non feed back proportional valve (This periode should be measured)
		Setting Preferences : `10 - 2500` Unit Sec
Par.28	`5oLL` `0.0`	Only for positive PID control active than one way (+) control output lower value is set.
		Setting Preferences : `0.0 - 5on̄r` Unit %
Par.29	`5oHL` `100.0`	Only for positive PID control active than one way (+) control output upper value is set.
		Setting Preferences : `5on̄r - 100.0` Unit %
Par.30	`5on̄r` `0.0`	Only for positive PID control active than one way (+) control output M.R value is set.
		Setting Preferences: `5oLL - 5oHL` Unit %
Par.31	`bɛ˜A5` `oFF`	Only for positive PID control active and set value is "0" control output upper value is set.
		Setting Preferences : `oFF`(Closed) , `0.1 - 100.0` Unit %
Par.32	`doLL` `-100.0`	Only for negative PID control active than two way (+/-) control output lower value is set.
		Setting Preferences : `100.0 - don̄r` Unit %
Par.33	`doHL` `100.0`	Only for negative PID control active than two way (+/-) control output upper value is set.
		Setting Preferences: `don̄r - 100.0` Unit %
Par.34	`don̄r` `0.0`	Only for negative PID control active than two way (+/-) control output M.R value is set.
		Setting Preferences : `doLL - doHL` Unit %

Par.35 — `AtSP` `0.0`

Auto-Tune Set Pointı: If user wants the Auto-Tune operation to make for a certain set value, it determines this set value.

Setting Preferences : 1 - 9999   *Unit °C*

NOT: *Auto--Tune can be done if PID control should be selected.*

Par.36 — `Pb-P` `0.1`

P = Pozitive Proportional Band

Setting Preferences : 1 - 9999   *Unit °C*

NOT: *If PID control is active.*

Par.37 — `Pb-n` `0.1`

N = Negative Proportional Band

Setting Preferences : 1 - 9999   *Unit °C*

NOT: *If PID control is active.*

Par.38 — `it` `oFF`

I = Integral time constant.

Setting Preferences: 1 - 9999   *Unit Sec*

NOT: *If PID control is active.*

Par.39 — `dt` `oFF`

D = Differrantial time constant.

Setting Preferences : 1 - 9999   *Unit Sec*

NOT: *If PID control is active.*

Par.40 — `CP` `2`

Control Period: It determines the period of a control cycle for Analog Output Module.

Setting Preferences: 1 - 250   *Unit Sec*

NOT: *If PID control is active.*

Par.41 — `udb` `1.0`

It determines the dead band of proportional valve. If this value is increased, valve movement becomes stable but sensitivity decreases.

Setting Preferences : 0.1 - 25.0   *Unit %*

Par.42 ---- Addr	It determines the serial communication address. All addresses should be unique that are connected to a serial communication line.	
oFF	*Setting Preferences :* oFF(Closed) , 1 - 127	
Par.43 ---- bAUd	It determines the serial connection speed.	
9.6	*Setting Preferences :* 4.8 - 9.6 - 19.2 - 38.4	
Par.44 ---- PrtY	It determines the parity type in serial communication.	
Eun	*Setting Preferences :* nonE(None) - odd(Odd) - Eun(Even)	
Par.45 ---- SC.0	It determines the security code for Operator page.	
0	*Setting Preferences :* 1999 - 9999	
Par.46 ---- SC.2	It determines the security code for Configuration page.	
0	*Setting Preferences:* 1999 - 9999	

To Pass Operator Page

```
 48
  0
```

🌡️ 🕐 Press these two keys at the same time

↓

```
 CO
  0
```

↓ 🕐

```
 SPrr
   0
```

↓

```
Operator Page
Parameters
```
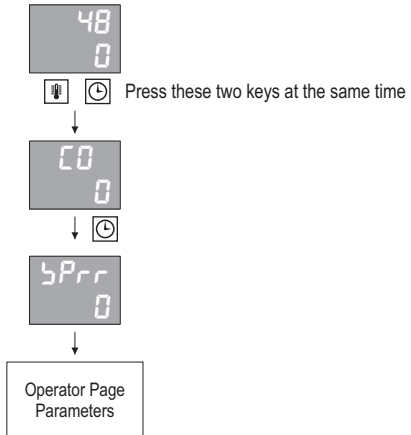
To Enter Operater page press at the same
time 🌡️ and 🕐 keys. you will see 0
on screen. If there is password enter
password. İf not Fabric code is "0" .

Par.47	`CO` `0`	**Oparator Password** SCO value sholud be entered to pass operator page.
		Setting Preferences : `1999 - 9999`
Par.48	`bPrr` `oFF`	It determines the progress value per minute if user wants control set value progressed as a ramp. When this paremeter is set appr parameter should be off.
		Setting Preferences: `oFF` (Closed) `0 - 100` *Unit* *Minute*
Par.49	`CPrr` `oFF`	If Proses value reached to set value, Than Time is started up to time finished. This parameter should be on. When this parapeter is `on` .`RPPr` parameteter should be `oFF` .
		Setting Preferences: `on - oFF`
Par.50	`RPPr` `oFF`	**Approach Value:** When set value and prosess value difference is greater than this value time is not start and time display is blinking.
		Setting Preferences: `oFF = 1 - 9999` *Unit* *°C*
Par.51	`SEt 1` `0`	R1 Relay set value
		Setting Preferences : `bPLL - bPHL` *Unit* *°C*
⋮		
Par.54	`SEt4` `0`	R4 Relay set value
		Setting Preferences: spll-sphl *Unit* *°C*
Par.55	`HYb` `20`	Hhysteresis: These values are used for ON/OFF control and Auto-Tune operations. (For Auto_Tune operation, choose the smallest value that is bigger than the system uncertainty.)
		Setting Preferences `1 - 9999` *Unit* *°C*
⋮		
Par.59	`HYb4` `20`	R4 Relay hysterysis value
		Setting Preferences: `1 - 9999` *Unit* *°C*

Auto-Tune:

After setting the ⊦ЧБ and ⱤⱢБⱢ parameters to the required value,
while this parameter is displayed,Auto-Tune operation is started

by pressing the 🌡 and ⌃ keys. While operation continues,
ȺⱢ message blinks on time display. When the operation
finished, **P,I,D,** ᵥₑ CP parameters are set to new values.

In order to cancel the Auto-Tune operation, while ȺⱢ message is

displayed, ⌄ (STOP) key must be pressed.

OC990 series devices can operate with many kinds of sensor types and each output of the device can be used as a seperate alarm or control. Therefore, before using this device, input/output types and basic functions should be set properly.

Model OC990 has 1 Item Analog-Input as standard. In addition, 2 Item Digital-Output and 1 Item Analog-Output may be added to system optionally. Analog-Input types, Analog-Output Types and functions, Digital-Output functions are determined with parameters seperately. These parameters can be found in Configuration-Page.

Analog-Input is used to measure the temperature value. Sensor type that will be connected to this input is determined by "AI.T" parameter (Table-1).

Unit of Temperature-Value is determined as being ºC or ºF with "EU" parameter and parameters that related to Temperature-Value uses this unit.

Decimal point of Temperature-Value or other parameters that has a unit of EU is determined by "dP" parameter. Each time that "dP" changes, these parameters should be reset.

Which value will the process value have is determined by "SBA" parameter when temperature sensor is broken or sensor cables break off.

Each Digital-Output of device can be used as being alarm or some control purposes. Each **Digital-Output** has its parameter that determines its own function. Preferences of these parameters are explained in detail in Table-8. Explanations of **ON/OFF Control** and **Alarm-Types** can be found in the next page. **Alarm-Set-Values** of Digital-Outputs that are selected as being alarm are determined with "do 1.b, do2.b" parameters.

If any Digital-Output is selected as being Alarm, **Alarm-Lock** parameter (do 1.L, do2.L) of this Digital-Output determines if the Alarm will be locked or not when an Alarm condition happens or lost. When an output enters in **alarm** state and its alarm lock is selected as being "Enb", it can only be **reset by the user**.

If **Servo-Motorized-Valve-Control** will be done, one of the Digital-Outputs' or Relays' function should be selected as being "oPn" and the other should be "CLb". To open or close the valve, these outputs should be used.

Model OC990 is designed for serial communication in slave mode with standard MODBUS RTU protocol. With this communication, all parameters and variables can be accessed. These parameters can be read and set.

Serial communication is done via the Half-Duplex RS485 line. Up to 32 devices can be connected on one line.

The cable used in the communication line must be a shielded data cable for Half-Duplex RS485 communication and this cable is connected to all devices in parallel as a single line. There must be a suitable terminating resistor at the beginning and end of the line. A line can be extended up to 1000 meters with a suitably prepared 9600 Bps communication.

Each of the devices on the serial communication line must be assigned a separate communication address between 1 and 255, but the communication speed and parity type of all devices on a line must be the same. The communication address of these devices is determined by the parameters "ADDR, BAUD and PRTY ındaki on the configuration page.

Supported functions, parameter addresses and other information required for communication in the standard MODBUS RTU protocol are given in the following tables.

Supported Standard MODBUS RTU Functions:

Function 01 = Read Coils

Function 03 = Read Holding Registers

Function 05 = Write Single Coil

Function 06 = Write Single Register

Function 16 = Write Multiple Registers

Adress	Abr.	Explanation	Unit	Multiplier	Setting	Min.	Max.
0		Decimal Point (DP)					
1		Process Value	EU	10^DP			
2		Remaining Time	TU				
3		Instantaneous Set Value	EU	10^DP			
4		PID Control Output Value	%	10			
5		Temperature Set Value	EU	10^DP	Yes	-1999	9999
6		Time Set Value	TU		Yes	0	9999
20	Set.1	First Digital Output (DO1) Set Point	EU	10^DP	Yes	-1999	9999
21	Set.2	Second Digital Output (DO2) Set Point	EU	10^DP	Yes	-1999	9999
22	Set.3	Third Digital Output (DO3) Set Point	EU	10^DP	Yes	-1999	9999
23	Set.4	Fourth Digital Output (DO4) Set Point	EU	10^DP	Yes	-1999	9999
24	APPR	Approach Value	EU	10^DP	Yes	0	9999
25	HYS	Hysterisis	EU	10^DP	Yes	1	9999
26	ATSP	Auto-Tune Set Point	EU	10^DP	Yes	-1999	9999
27	PB-P	Proportional Band for "+" Output	EU	10^DP	Yes	1	9999
28	PB-N	Proportional Band for "-" Output	EU	10^DP	Yes	1	9999
29	IT	Integral Time (0 = Off)	s		Yes	0	9999
30	DT	Derivative Time (0 = Off)	s		Yes	0	9999
31	CP	Control Period	s		Yes	-1999	9999
32	DB	Dead Band of Control Output	%	10	Yes	-1999	9999
40	O1LL	Transmitter Scale Low Value	EU	10^DP	Yes	-1000	1000
41	O1HL	Transmitter Scale High Value	EU	10^DP	Yes	1	100
42	TSV	Temperature Error Correction Value	EU	10^DP	Yes	10	2500
43	FTC	Filter Time Contant	s	10	Yes	0	1000
44	VTT	Full Scale Movement Duration of Valve	s		Yes	0	1000
45	SOLL	Low Limit of Single Sided (+) Control Output	%	10	Yes	0	1000
46	SOHL	High Limit of Single Sided (+) Output	%	10	Yes	-1000	1000
47	SOMR	Manual-Reset Directed (+) Control Output	%	10	Yes	-1000	1000
48	DOLL	Low Limit of Double Sided (+/-) Output	%	10	Yes	-1000	1000
49	DOHL	High Limit of Double Sided (+/-) Output	%	10	Yes	-1999	9999
50	DOMR	Manual-Reset Double Sided (+/-) Output	%	10	Yes	-1999	9999

Adress	Abr.	Explanation	Unit	Multiplier	Setting	Min.	Max.
51	SPLL	Low Limit of Set Point	EU	10^DP	Yes	-1999	9999
52	SPHL	High Limit of Set Point	EU	10^DP	Yes	-1999	9999
60	S1..T	Universal Analog Input (AI1) Type	Table-1		Yes	0	10
61	Eu	Temperature Unit (EU)			Yes	0	1
62	DP	Measurement Decimal Point (DP) $^{(1)}$			Yes	0	1
63	s1bL	Sensor Connection is Broken Action			Yes	0	1
64	R1.f	R1 Function	Tables 2-3		Yes	0	17
65	R1.l	R1 Lock			Yes	0	1
66	R2.f	R2 Function	Tables 2-3		Yes	0	17
67	R2.l	R2 Lock			Yes	0	1
68	R3.f	R3 Function	Tables 2-3		Yes	0	17
69	R3.l	R3 Lock			Yes	0	1
70	R4.f	R4 Function	Tables 2-3		Yes	0	17
71	R4.l	R4 Lock			Yes	0	1
72		Position Feedback			Yes	0	1
73	O1.f	First Analog Output (AO1) Function	Table-4		Yes	0	4
74	O1.t	First Analog Output (AO1) Type	Table-5		Yes	0	7
75	O2.f	Second Analog Output (AO2) Function	Table-4		Yes	0	4
76	O2.t	Second Analog Output (AO2) Type	Table-5		Yes	0	7
77	CF	Control Form			Yes	0	1
78	CCNT	Continious Control			Yes	0	1
79	TU	Time Unit			Yes	0	2

Bit Type Parameters Communication Addresses		
Address	**Setting Permission**	**Description (1 / 0)**
0	N/A	First Digital Output (DO1) (ON / OFF)
1	N/A	Second Digital Output (DO2) (ON / OFF)
2	N/A	Third Digital Output (DO3) (ON / OFF)
3	N/A	Fourth Digital Output (DO4) (ON / OFF)
4	N/A	Error Under The Scale (Yes / No)
5	N/A	Error On The Scale (Yes / No)
6	N/A	Sensor Broken Error (Yes / No)
7	N/A	Process Measurement Error (Yes / No)
8	Yes	Auto-Tune (Start / Stop)
9	Yes	Execution (Start / Stop)

Error Message	Meaning
-SB-	Sensor connection is broken.
-Uf-	Process value is below the sensor scale.
-Of-	Process value is above the sensor scale.
_nn_	Process value is too high that it cannot be displayed.
-vv-	Process value is too low that it cannot be displayed.

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