OC991

Oven Controller
USER'S GUIDE

ORDEL

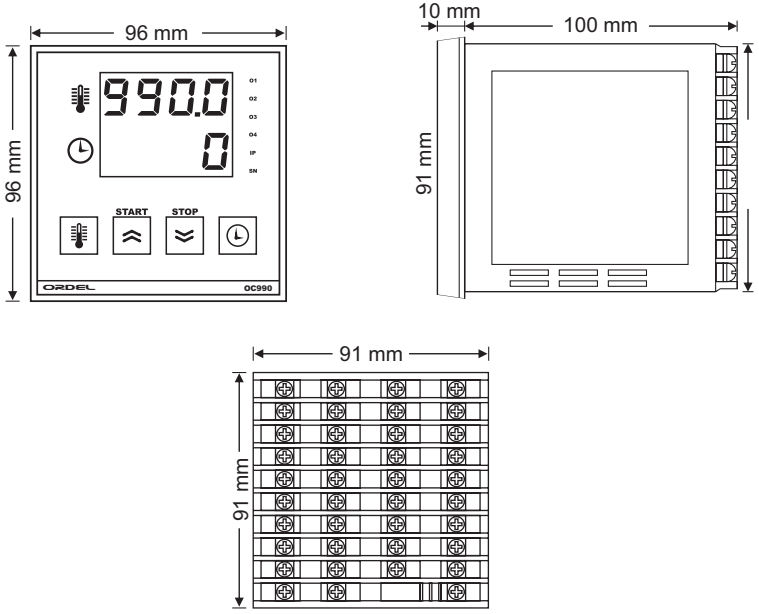
- Before using the device, please read the warnings below and this guide carefully. The accidents or damages resulting from not following the warnings included in this guide are under user's responsibility.
- This device is intended to be used by qualified personnel in industrial environments, do not 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.

Model OC991 devices are control devices specially designed for use in bakery ovens. A temperature sensor can be connected to these devices for temperature measurement. In addition, these devices have three contacts: heater, steam and warning.
Cooking temperature, cooking time and steaming time can be easily adjusted on the device.

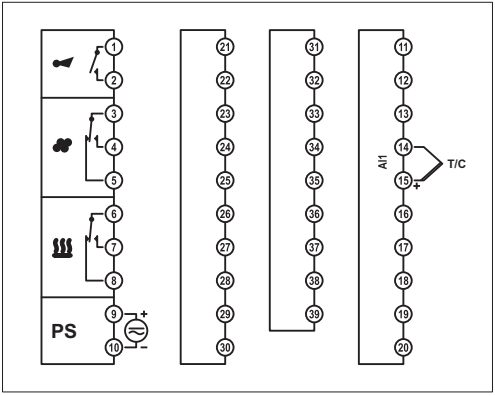
Before using the device, please follow the instructions below according to the information in this guide.

- Model OC991 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


1
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PS
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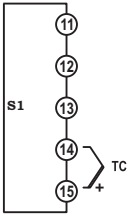
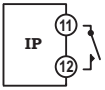
AI1
T/C
+

Diagram-1

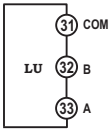
TC Input
(B,E,J,K,L,N,R,S,T,U)



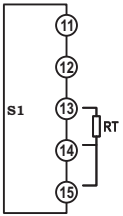
WARNING CONTACT



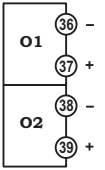
RS-485
Communication Link*
(MODBUS - RTU)



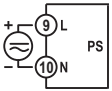
RT Input (3 Wired)



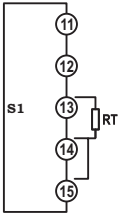
Analog Output *
(0-20mA/0-10V



Supply Connection *

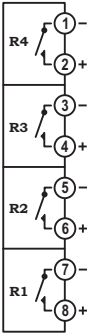


RT Input (2 Wired)

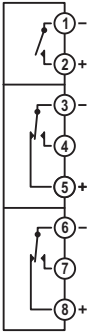


Relay/SSR Outputs *

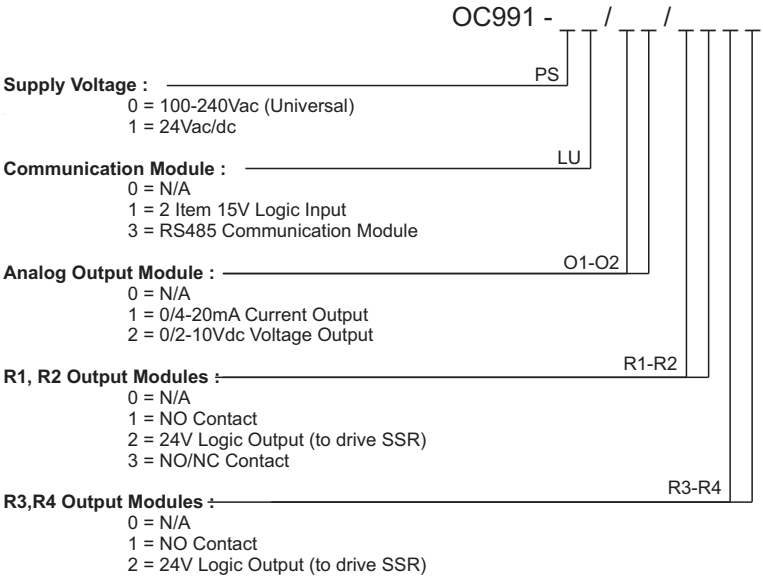
NO
Contact *



NO/NC
Contact *



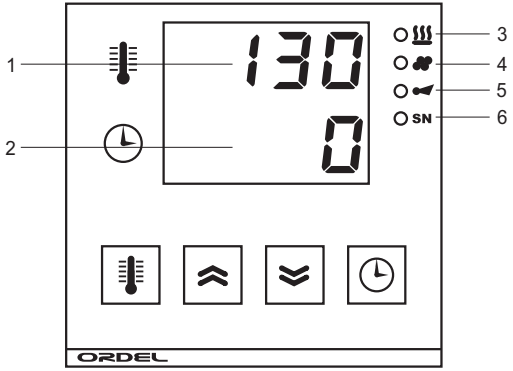
*** This optional modules. Look device sticker.**



Note : *If the R1 relay is coded as 3 (NO/NC), it should be coded as NO/NC when the R2 relay is selected as a contact.*
If R2 relay is coded as 3 (NO/NC), it should be coded as NO/NC when R1 relay is selected as contact.
If R1,R2 module is selected as 3, R4 module should be coded as 0.

Supply Voltage	100-240Vac/dc: +%10 -%15	24Vac/dc: +%10 -%20
Power Consumption	4W,6VA	
Analog Input (S1)	Type-J (Fe-Const)	
Analog Input Impedance	Thermocouple : 10MΩ	
Relay Contacts	250Vac, 10A	
Contact Lifetime	Loadless: 10.000.000 times With 250V 3A res. load: 100.000 times	
Memory	100 years, 100.000 renewals	
Accuracy	+/- %0,2	
Sampling Period	100ms	
Environment Temp.	Operation: -10...+55C, Storage: -20...+65C	
Dimensions	Width: 96mm, Height: 96mm, Depth: 110mm	
Panel Cut-Out Dimns.	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	**1. INDICATOR**	It shows your temperature, temperature setting measure and steam value.
2	**2. INDICATOR**	It shows the cooking time set value and the remaining cooking time.
3	**LED**	It lights up when the heater is on.
4	**LED**	t lights up during the steaming process.
5	**LED**	It lights when the warning output is energized.
6	**SN LED**	It flashes every two seconds during the cooking process.

SYMBOLISATION OF ALPHABETICAL 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	
	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.

Adjusting the Temperature Set Value:

When the key is pressed while the measured temperature value is visible on the temperature display, the temperature set value starts to flash on this display and this value is adjusted with the and keys. When the adjustment process is finished, this indicator automatically starts to show the measured temperature value again after three seconds.

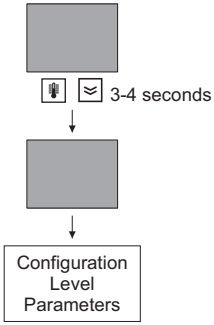
Setting and starting the steam timer :

When the key is pressed while the measured temperature value is visible on the temperature display, the temperature set value starts to flash on this display. If the key is pressed again at this time, the steam time starts to appear on this indicator and it flashes. This value is set with the and keys. When the setting process is finished, the flash process is terminated after three seconds and the steaming process begins. While steaming is in progress, the led lights up and the remaining steam time appears on the temperature indicator. When steam is finished, the temperature indicator starts to show the measured temperature value again.

Setting and starting the cooking time :

When the key is pressed while the time indicator is dark, the cooking time starts to flash on this indicator, while the cooking time can be adjusted with the and keys. When the setting process is finished, the flash will stop after three seconds and the remaining cooking time will appear on the time display. While the cooking time is in progress, the **SN** led flashes with two second intervals. When the cooking time falls below 1 minute, the remaining time appears in seconds on the time display.When the cooking time is over, the contact is energized and the led lights up. If the key is pressed while in this position, the contact is de-energized and the time indicator turns black.

Configuration Level



In order to access the configuration parameters, press the ⇧ and ⇊ keys together within the first 2 seconds and hold them for 3-4 seconds when the device is energized.

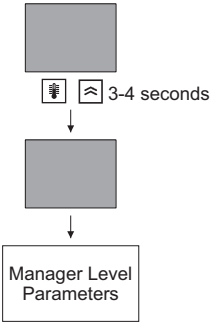
Screen	Description	Monitoring Condition	
	Universal Analog Input (AI1) Type		
	Setting Range: Table-1	Unit : Table-1	
	Temperature Unit (EU)		
	Setting Range: Table-3	Unit : Table-3	
	Measurement Decimal Degree (DP)(1)		
	Setting Range: 0 - 1		
	Sensor Disconnected Behavior		
	Setting Range: Table-4	Unit : Table-4	
	First Digital Output (DO1) Function		
	Setting Range: Table-8	Unit : Table-8	
	First Digital Output (DO1) Lock	Unit : Table-5	If DO1 is Used as an Alarm
	Setting Range: Table-5		
	Second Digital Output (DO2) Function		
	Setting Range: Table-8	Unit : Table-8	
	Second Digital Output (DO2) Lock	Unit : Table-5	If DO2 is Used as an Alarm
	Setting Range: Table-5		

(1) When the DP Parameter is changed, all parameters with EU units must be re-set.

	First Analog Output (AO1) Function		
	Setting Range: Table-2	Unit : Table-2	
	First Analog Output (AO1) Type	Unit : Table-9	If AO1 is used
	Setting Range: Table-9		
	Control Form	Unit : Table-10	If PID Control is Active
	Setting Range: Table-10		
	Continuous Control	Unit : Table-7	If PID Control is Active
	Setting Range: Table-7		

	Time Unit		
	Setting Range: Table-11	Unit : Table-11	
	Energizing Behavior		
	Setting Range: Table-12	Unit : Table-12	
	Contact Address (OFF = Comn. Off) (1)		
	Setting Range: off,1 - 127		
	Communication Speed (4.8,9.6,19.2,38.4)		If Communication Is Not Closed
	Setting Range: 4.8, 9.6, 19.2, 38.4	Unit: Kb/s	
	Communication Parity Type	Unit: Table-6	If Communication Is Not Closed
	Setting Range: Table-6		
	Factory Reset		
	Setting Range: Table-7	Unit: Table-7	

Manager Level



In order to access the administrator level parameters, press the and keys together in the first 2 seconds when the device is energized and hold them for 3-4 seconds.

Screen	Description		Monitoring Condition
	Converter Scale Lower Value		If Inverter Function is Active
	Setting Range: A$99.9 - THL	Unit: EU	
	Converter Scale Upper Value		If Inverter Function is Active
	Setting Range: TLL - 999.9	Unit: EU	
	Temperature Error Clearance Value		If a Temperature Sensor is Used
	Setting Range: $00.0 - 100.0	Unit: EU	
	Filter Time Constant		
	Setting Range: 0.1 - 10.0	Unit: s	
	Valve Full Scale Travel Time		If the Non-Feedback Valve Control is Active
	Setting Range: 10 - 2500	Unit: s	
	One Way (+) Control Output Lower Limit		Only If Positive PID Control Is Active
	Setting Range: 0.0 - SOMR	Unit: %	
	Unidirectional (+) Control Output Upper Limit		Only If Positive PID Control Is Active
	Setting Range: SOMR - 100.0	Unit: %	
	One Way (+) Control Output M.R Value		Only If Positive PID Control Is Active
	Setting Range: SOLL - SOHL	Unit: %	
BIAS	Upper limit of Control Output when set value is “0”		Only If Positive PID Control Is Active
	Setting Range: OFF, 0.1 - 100.0	Unit: %	
	Bidirectional (+/-) Control Output Low Limit		If Negative PID Control is Active
	Setting Range: $00.0 - DOMR	Unit: %	
	Bidirectional (+/-) Control Output Upper Limit		If Negative PID Control is Active
	Setting Range: DOMR - 100.0	Unit: %	
	Bidirectional (+/-)Control Output M.R. value		If Negative PID Control is Active
	Setting Range: DOLL - DOHL	Unit: %	

	Set Point Lower Limit		
	Setting Range: $99.9 - SPHL	Unit: EU	
	Set Point Upper Limit		
	Setting Range: SPLL - 999.9	Unit: EU	

Table-1

0	TC-B	Type-B Thermocouple
1	TC-E	Type-E Thermocouple
2	TC-J	Type-J Thermocouple
3	TC-K	Type-K Thermocouple
4	TC-L	Type-L Thermocouple
5	TC-N	Type-N Thermocouple
6	TC-R	Type-R Thermocouple
7	TC-S	Type-S Thermocouple
8	TC-T	Type-T Thermocouple
9	TC-U	Type-U Thermocouple
10	RT	Pt-100 Resistance Thermometer

Table-2

0	off	Not used
1	PTR	Send Process Value
2	STR	Send Setpoint
3	PPC	“+” Direction Control Output
4	NPC	“-” Direction Control Output

Table-3

0	*C	ºC
1	*F	ºF

Table-4

0	LO	Take Down Process Value
1	HI	Pull Up Process Value

Table-5

0	DSB	None / Invalid
1	ENB	Yes / Valid

Table-6

0	NONE	No
1	ODD	Odd
2	EVN	Even

Table-7

0	OFF	Off
1	ON	On

Table-8

0	OFF	Not used
1	ROC	On / Off Heating Output
2	DOC	On / Off Cooling Output
3	AHA	Absolute Up Deviation Alarm
4	ALA	Absolute Down Deviation Alarm
5	HDA	Relative Up Deviation Alarm
6	LDA	Relative Down Deviation Alarm
7	OBA	Out of Band Alarm
8	IBA	In-Band Alarm
9	PPC	“+” Direction Control Output
10	NPC	“-” Direction Control Output
11	OPN	Open Valve
12	CLS	Shut Valve
13	APR	If within the approach band
14	ODV	If outside the approach band
15	RUN	If time goes on
16	LTU	in last time unit
17	EOP	From the end of time

Table-9

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

Table-10

0	DIR	Direct
1	REV	Reverse

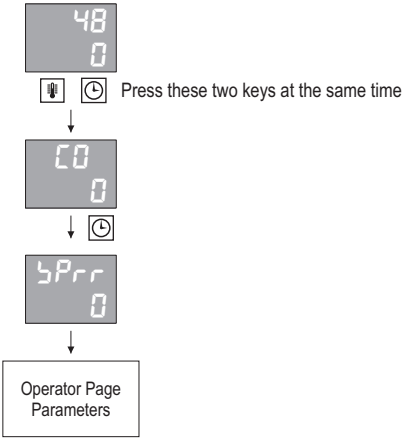
Table-11

0	SEC	Second
1	MIN	Minute
2	HOUR	Hour

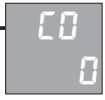
Table-12

0	CNT	Continue where you left off
1	Brk	Wait

To Pass Operator Page

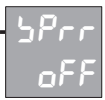


To Enter Operater page press at the same time and keys. you will see 0 on screen. If there is password enter password. İf not Fabric code is “0” .

Par.43--- 

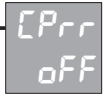
Oparator Password SCO value sholud be entered to pass operator page.

Setting Preferences : 1999 - 9999

Par.44--- 

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.45--- 

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.46--- 

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.47--- 

R1 Relay set value

Setting Preferences : SPLL-SPHL *Unit °C*

⋮

Par.50--- 

R4 Relay set value

Setting Preferences: SPLL-SPHL *Unit °C*

Par.51--- 

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.55--- 

R4 Relay hysterysis value

Setting Preferences: 1 - 9999 *Unit °C*

Auto-Tune:

After setting the HYS and ATSP parameters to the required value, while this parameter is displayed,Auto-Tune operation is started by pressing the [⇞] and [⇑] keys. While operation continues, AT 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 AT message is displayed, [⇟] (STOP) key must be pressed.

Model OC991 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 Degree of Measurement Used (DP)			No		
1		Process Value	EU	10^DP	No		
3		Time Remaining	TU		No		
6		Temperature Set Value	EU	10^DP	Yes	-1999	9999

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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