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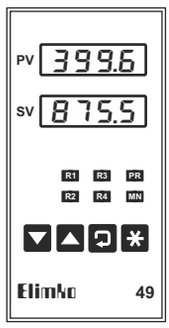
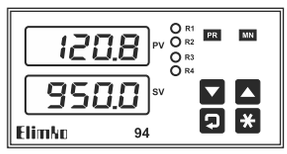


E-49 / E-94 Series Process Controllers User Manuels



CE

Manufacturer / Technical Support : Elimko Ltd. Şti.
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- E-49 / E-94 controllers are designed for panel mounting and should be used in an industrial environment.
- The packages of E-49 / E-94 controllers contains; Controller, 2 pieces of mounting clamps, User manual and Guarantee certificate
- After opening the package, please check the contents with the above list. If the delivered product is wrong type, any item is missing or there are visible defects, contact the vendor from which you purchased the product.
- Before installing and operating the controller, please read the user manual thoroughly.
- The installation and configuration of the controller must only be performed by a person qualified in instrumentation.
- Keep the unit away from flamable gases, that could cause explosion.
- Do not use alcohol or other solvents to clean the controller. Use a clean cloth soaked in water tightly squeezed to gently wipe the outer surface of the controller.
- The product life of this instrument is 10 years.

CE

- This controller complies with the European Low Voltage Directive 2006/95/EC, by the application of safety standard TS EN 61010-1. (Pollution degree 2)
- This controller complies with the EMC Directive 2004/108/EC by the application of EMC standard TS EN 61326.

1. DEFINITION

E-49 / E-94 Series Controllers are designed to use On/Off and PID Control Techniques, by using new generation microcontrollers.

The dimensions of the E-49 controllers are 48x96 mm & E-94 controllers are 96x48 mm confirming IEC/TR 60668 standard. The controllers have two 4-digit seven segment led displays each capable of displaying numeric values from -1999 to 9999 and 4-character alphanumeric values messages. The universal inputs (T/C, R/T, mV, mA) are configurable and measured with 16-bit resolution. These electronic units, have high reading accuracy with high measurement sensivity, don't contain any loose mechanical parts, and provide limitless reliability. They are calibrated in order not to be defected by time and exterior factors. High input impedance, protection of the system from loss of signal, E-49 / E-94 have two seperate, 4-digit, display to display process value and set values within the range of -1999 to 9999.

For all industrial applications for the measurement and control of; temperature pressure, level speed current-voltage, resistance and other physical features, also for areas such as; Iron-Steel, Cement, Chemistry, Food, Plastic, Petrochemistry, Rafineries, Ceramics, Glass and industries this unit is ideal.

2. TECHNICAL SPECIFICATIONS

Input Types	**Thermocouple (TC):** B, E, J, K, L, N, R, S, T, U **Resistance Thermometer (RT) :** Pt-100 **Current :** 0-20 mA, 4-20 mA (Linear) **Voltage :** 0-50 mV, 0-1 V, 0.2-1 V (Linear)
Control Output	**Relay :** SPST-NO 250V AC, 5A **Current :** 0-20 mA, 4-20 mA (Isolated) **Pulse :** 24V DC, 25 mA (for SSR)
Alarm Outputs	**Relay :** SPST-NO 250V AC, 5A
Display Type	E-49: 2 x 4 digit 7 mm 7 segment led display E-94: 2 x 4 digit 14 mm 7 segment led display
Accuracy	**Thermocouple :** (±0.5% of the reading value or ±1 °C) ±1 digit max. **Pt-100 :** (±0.5% of the reading value or ±1 °C) ±1 digit max. **Analog Input :** ±0.5% FS ±1 digit max.
Analog Digital Converter	16 bit
Digital Analog Converter	12 bit
Control Type	On / Off, PID
Operating Voltage	85-265 V AC / 85-375 V DC 20-60 V AC / 20-85 V DC

2. TECHNICAL SPECIFICATIONS

Power Consumption	10 VA
Protection Class	**Front Panel :** IP 66 (NEMA 4X) **Rear Case :** IP 20
Operating Temperature	-10 °C, +55 °C (+14 °F, +131 °F) (with no condensation or icing)
Storage Temperature	-25 °C, +65 °C (-13 °F, +149 °F) (with no condensation or icing)
Relay Mechanical Life	10.000.000 operation*
Relay Electrical Life	>1.000.000 operation (under 1/10 of load)
Memory	EEPROM (100.000 max. Write-erase)
Weight	220 gr

* The relay life differs according to the usage configuration. When the relays are old, their contacts could melt or burn out.

3. TYPE CODING

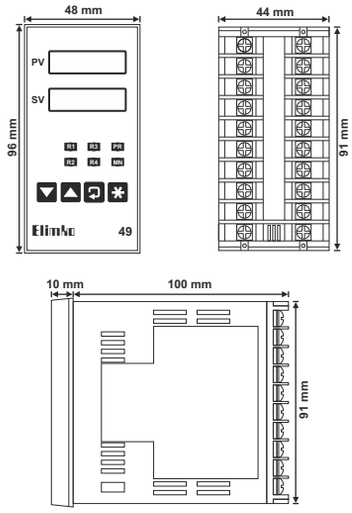
0:No Output
1:1 Analog Output

E-49 / E-94 -W - X - 0 - Z

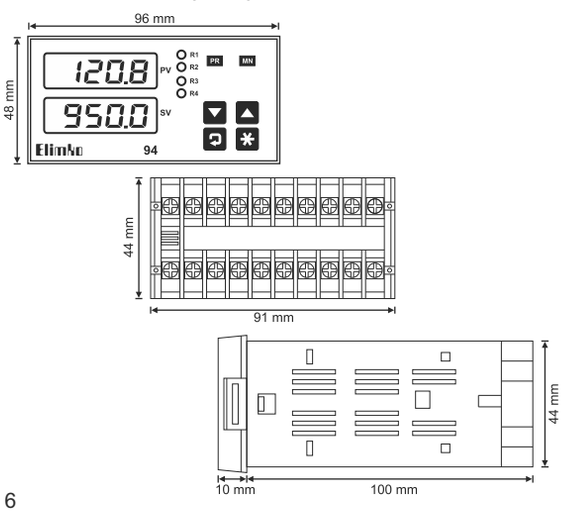
0:No Relay
1:1 Relay
2:2 Relays
3:3 Relays
4:4 Relays
5:5 Relay, 1 Pulse
6:2 Relays, 2 Pulse
7:3 Relays, 1 Pulse

0:85-265 V AC/85-375 V DC
1:20-60 V AC/20-85 V DC

4. DIMENSIONS (E-49)



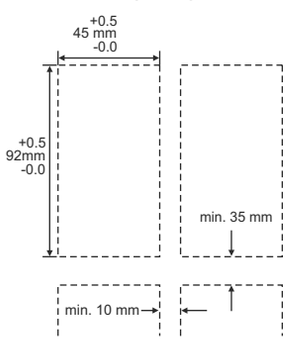
4. DIMENSIONS (E-94)



5. PANEL MOUNTING

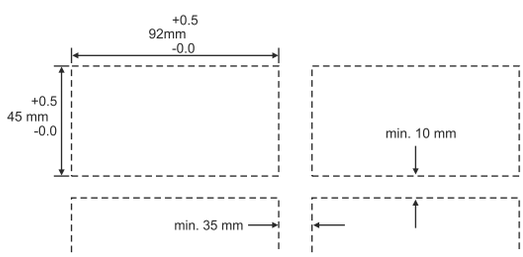
- ❍ E-49 / E-94 controllers should be installed inside a suitable grounded metal enclosure (panel). This must prevent the live parts being accessible to human hands and metal tools.
- ❍ E-49 / E-94 controllers does not include a power switch. Therefore, the power supply to the controller and power outputs must be wired through the proper fuse or circuit breaker.
- ❍ To minimize the pick-up of electrical noise, the wiring of low voltage lines, particularly the sensor input should be routed away from the high-current power cables. Where it is not possible, use shielded cables with the shield grounded at both ends.
- ❍ The cables used for powering the controller and the power outputs must conform to the standarts IEC 60245 and IEC 60227.

5. PANEL MOUNTING (E-49)



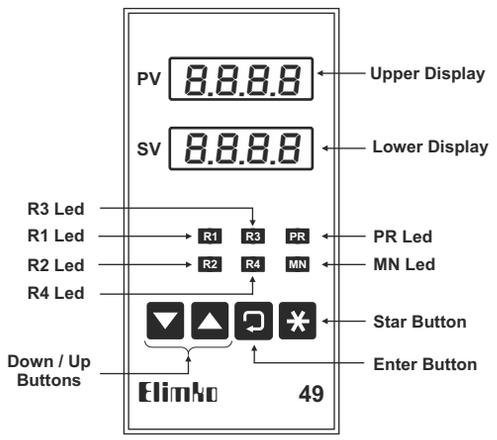
- ❑ Cut a hole in the panel. (See the figure for overall dimensions.)
- ❑ Slide the controller into the cutout from the front of the panel.
- ❑ Fit the mounting clamps to the up and down sides of controller, ensuring the lugs are located in their slots.
- ❑ Fasten the mounting clamps using the retaining screws.

5. PANEL MOUNTING (E-94)

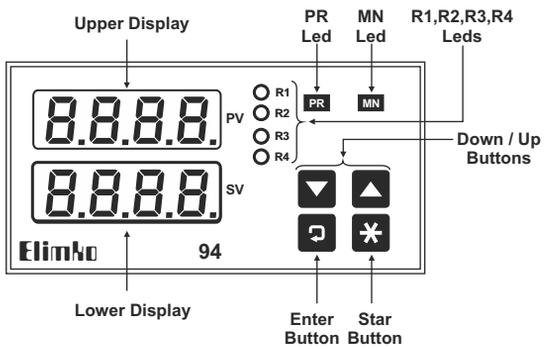


- ❑ Cut a hole in the panel. (See the figure for overall dimensions.)
- ❑ Slide the controller into the cutout from the front of the panel.
- ❑ Fit the mounting clamps to the up and down sides of controller, ensuring the lugs are located in their slots.
- ❑ Fasten the mounting clamps using the retaining screws.

6. FRONT PANEL (E-49)



6. FRONT PANEL (E-94)



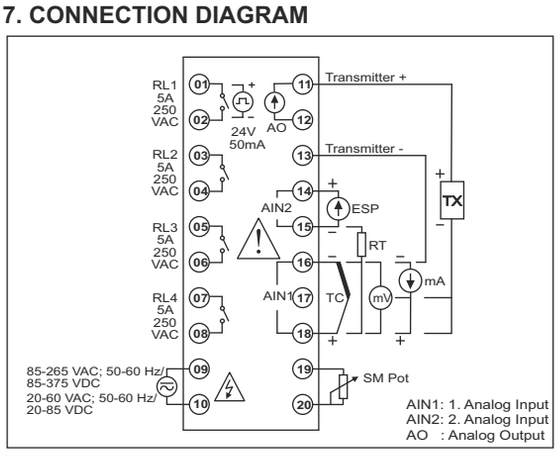
6. FRONT PANEL

R1 Led	When lit, it indicates that RL1 output is active.
R2 Led	When lit, it indicates that RL2 output is active.
R3 Led	When lit, it indicates that RL3 output is active.
R4 Led	When lit, it indicates that RL4 output is active.
PR Led	When lit, it indicates that the controller is in the configuration mode.
MN Led	- When lit, it indicates that the controller is in manual mode. - MN led will also flash when the auto-tuning is in progress.
Upper Display	- While in normal operation, it displays the process value or error message. - While in configuration pages, it displays the name of the parameters.
Lower Display	- While in normal operation, it displays the control set point (Automatic mode) or manual output (Manual mode). - While in configuration pages, it displays the parameter value.

6. FRONT PANEL

✳ **Star Button**	- When pressed together with ⏎ button, password is asked for entering the configuration page. - While in configuration pages, pressing this button reverts to normal operation. - While in normal operation, pressing this button for duration 3 seconds, toggles between automatic and manual mode. This operation is disabled if the *AnPr* parameter in page *oCnF* is set to *dSb* or if the *CtYP* parameter in *oCnF* page is set *nonE*. - While in normal operation, pressing this button acknowledges the latched alarms if configured (*AXLt = Enb*).
⏎ **Enter Button**	- When pressed together with ✳ button, password is asked for entering the configuration page. - While in configuration pages, pressing this button selects the next parameter. - While in configuration pages, pressing this button for duration 2 seconds, returns to the top of the page. - While in normal operation, pressing this button selects the next parameter in operator page.
▼ **Down** ▲ **Up Buttons**	- While in normal operation, these buttons can be used to edit the control set point (Automatic mode) or manual output (Manual mode). - While in configuration, these buttons can be used to select the configuration pages and to edit the parameters.

7. CONNECTION DIAGRAM



The labels on the sides of the controller identify the ordering code (Type), serial number and wiring connections. The controller options are also indicated on the wiring diagram.

7. CONNECTION DIAGRAM

- The terminals 01 to 10 are electrically live. While the instrument is powered, never touch to these terminals.
- Before operating the controller, ensure that the controller is correctly configured. Incorrect configuration could result in damage to the process being controlled.

8. OPERATING PAGES

- When the controller power is switched on, it runs through a self-test sequence for about 2 seconds and displays the version number and then enters into normal operation.
- The controller has two basic modes of operation:
  - Automatic mode in which the output is automatically adjusted to maintain the process value at the control set point.
  - Manual mode in which one can adjust the output independently of the control set point.
- MN led indicates the operation mode of the controller. It lights while controller is in manual mode.

8. OPERATING PAGES

- While in normal operation, pressing ✱ button for duration 3 seconds, toggles between automatic and manual mode. This operation is disabled if the *AnPr* parameter in page *oCnF* is set to *dSb* or if the *CtYP* parameter in *oCnF* page is set *nonE*.
- In normal operation the process value is displayed in the upper display, the control set point (Automatic mode) or manual output (Manual mode) is displayed in the lower display.
- The normal operation state and the frequently used parameters are in the operator page.These parameters can be accessed by ⏎ button.
- The parameters in the operator page differ according to the operation mode.

9. AUTOMATIC MODE

Display	Explanation	Unit	Access Conditions	Button	Key Function / Setting Interval
23.4	Process Value	EU			
0.0	Control Set Point	EU		▼/ ▲	SPLL - SPHL (1)
oUt 0.0	Manual Output (2)	%	CtYP ≠ nonE	▼/ ▲	
PSP 0.0	Progressive Set Point	EU	SPrr ≠ oFF	▼/ ▲	
A1SP 0.0	Alarm-1 Set Point	EU	A1tP ≠ oFF	▼/ ▲	-1999 - 9999
A2SP 0.0	Alarm-2 Set Point	EU	A2tP ≠ oFF	▼/ ▲	-1999 - 9999
A3SP 0.0	Alarm-3 Set Point	EU	A3tP ≠ oFF	▼/ ▲	-1999 - 9999
A4SP 0.0	Alarm-4 Set Point	EU	A4tP ≠ oFF	▼/ ▲	-1999 - 9999

(1) If the set point source is external (*SPSr* ≠ *Int*), this adjustment is not valid.

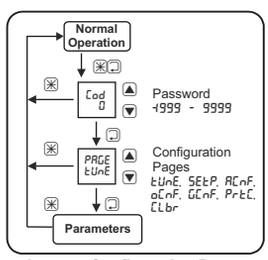
(2) With the control type as open loop valve control (*CtYP* = *bnd*), this screen is used for valve direction, instead of manual output value. (*StP* = Valve inactive, *CLS* = Closing Valve, *oPn* = Opening Valve)

10. MANUEL MODE

Display	Explanation	Unit	Access Conditions	Button	Key Function / Setting Interval
23.4	Process Value	EU	CtYP = SCo Single Sided (+) PID Control		
50.0	Manual Output	%		▼/ ▲	SoLL - SoHL
23.4	Process Value	EU	CtYP = dCo Double Sided(+/-) PID Control		
50.0	Manual Output	%		▼/ ▲	doLL - doHL
23.4	Process Value	EU	CtYP = PFb Feedback Valve Control		
50.0	Manual Output	%		▼/ ▲	SoLL - SoHL
23.4	Process Value	EU	CtYP = bnd Open-Loop Valve Control		
StP	Valve Direction (1)			▼/ ▲	Vana Kıs / Aç
A1SP 0.0	Alarm-1 Set Point	EU	A1tP ≠ oFF	▼/ ▲	-1999 - 9999
A2SP 0.0	Alarm-2 Set Point	EU	A2tP ≠ oFF	▼/ ▲	-1999 - 9999
A3SP 0.0	Alarm-3 Set Point	EU	A3tP ≠ oFF	▼/ ▲	-1999 - 9999
A4SP 0.0	Alarm-4 Set Point	EU	A4tP ≠ oFF	▼/ ▲	-1999 - 9999

(1) *StP* = Valve inactive, *CLS* = Closing Valve, *oPn* = Opening Valve

11. CONFIGURATION PAGES



Input to Configuration Pages

- The fundamental characteristics of the controller are specified in configuration pages. These pages:
  - *tUnE* = PID Tuning Page
  - *StEP* = Set Points Configuration Page
  - *ACnF* = Alarm Configuration Page
  - *oCnF* = Control and Output Configuration Page
  - *GCnF* = General Configuration Page
  - *PrtC* = Security Adjustments Page
  - *CLbr* = Calibration Page
- In order to access the configuration pages, ✱ and ⏎ buttons are pressed simultaneously.
- After this operation PR led lights and *Cod* message and *0* are displayed in the upper and lower displays respectively.
- ▼ and ▲ buttons are used to adjust the security code in the lower display. When ⏎ button is pressed *tUnE* page is accessed.
- The factory setting of the security code is "10".
- The security code is defined by the parameter *SCod* in *PrtC* page.

11. CONFIGURATION PAGES

- If the entered security code is correct all the configuration pages can be accessed and all the parameters in the configuration pages can be edited. Otherwise *dPrL* and *APrL* parameters in *PrtC* page define the access and edit levels of parameters.
- ▼ and ▲ buttons are used to select the configuration pages while *PAGE* message is displayed in the upper display. ⏎ button select the parameters in a page sequentially. ⏎ button returns to the top of the page if it pressed for duration of 2 seconds, while in configuration pages. ✱ button reverts to normal operation, while in configuration pages.

PID Tuning Page (*PAGE=tUnE*)

Display	Explanation	Unit	Access Conditions	Button	Key Function / Setting Interval
At oFF	Auto-Tune (1)	Table 4	CtYP ≠ nonE CtYP ≠ bnd	▼ / ▲	Table 4
Pb-1 20.0	Proportional Band-1 (For "+" Directed Control Outputs)	EU	CtYP ≠ nonE	▼ / ▲	0.1 - 9999
Pb-2 20.0	Proportional Band-2 (For "-" Directed Control Output)	EU	CtYP = dCo	▼ / ▲	0.1 - 9999
It 28	Integral Time (If "oFF", integral is inactive)	s	CtYP ≠ nonE	▼ / ▲	oFF, 1-9999
dt 7	Derivative Time (If "oFF", derivative is inactive)	s	CtYP ≠ nonE	▼ / ▲	oFF, 1-2500
HYS 0.1	Hysteresis	EU		▼ / ▲	0.0 - 9999

(1) Auto-tune operation is inhibited in manual mode.

Set Point Configuration Page (PAGE=SEtP)

Display	Explanation	Unit	Access Conditions	Button	Key Function / Setting Interval
SPSr Int	Set Point Source	Table 10		▼ / ▲	Table 10
SPLL -999	Set Point Lower Limit	EU		▼ / ▲	-999 - SPHL
SPHL 9999	Set Point Upper Limit	EU		▼ / ▲	SPLL - 9999
SPrr 0.0	Set Point Ramping Rate (For fastest change,enter "oFF")	EU/ min		▼ / ▲	oFF, 0.1-60.0

Alarm Configuration Page (PAGE=ALnF)

Display	Explanation	Unit	Access Conditions	Button	Key Function / Setting Interval
A1tP oFF	Alarm-1 Type	Table 8		▼ / ▲	Table 8
A1HY 0.5	Alarm-1 Hysteresis	EU	A1tP≠ oFF	▼ / ▲	0.0 - 9999
A1Lt dSb	Alarm-1 Lock (1)	Table 3	A1tP≠ oFF	▼ / ▲	Table 3

Alarm Configuration Page (PAGE=ALnF)

Display	Explanation	Unit	Access Conditions	Button	Key Function / Setting Interval
A2tP oFF	Alarm-2 Type	Table 8		▼ / ▲	Table 8
A2HY 0.5	Alarm-2 Hysteresis	EU	A2tP ≠ oFF	▼ / ▲	0.0 - 9999
A2Lt dSb	Alarm-2 Lock (1)	Table 3	A2tP ≠ oFF	▼ / ▲	Table 3
A3tP oFF	Alarm-3 Type	Table 8		▼ / ▲	Table 8
A3HY 0.5	Alarm-3 Hysteresis	EU	A3tP ≠ oFF	▼ / ▲	0.0 - 9999
A3Lt dSb	Alarm-3 Lock (1)	Table 3	A3tP ≠ oFF	▼ / ▲	Table 3
A4tP oFF	Alarm-4 Type	Table 8		▼ / ▲	Table 8
A4HY 0.5	Alarm-4 Hysteresis	EU	A4tP ≠ oFF	▼ / ▲	0.0 - 9999
A4Lt dSb	Alarm-4 Lock (1)	Table 3	A4tP ≠ oFF	▼ / ▲	Table 3

(1) Pressing ✱ button acknowledges the latched alarms if AXLt is Enb while in normal operation.

Control and Output Configuration Page (PAGE=oCnF)

Display	Explanation	Unit	Access Conditions	Button	Key Function / Setting Interval
CtYP SCo	Control Type	Table 9		▼ / ▲	Table 9
CFrn rEv	Control Form	Table 5	CtYP≠ nonE	▼ / ▲	Table 5
CPrd 2	Control Period	s	CtYP≠ nonE	▼ / ▲	1 - 250
mnPr dSb	Manual Mode Select	Table 3	CtYP≠ nonE	▼ / ▲	Table 3
trtn 100	Motor Valve Travel Time	s	CtYP= bnd	▼ / ▲	10 - 2500
dbnd 0.5	Control Output Death Band	%	CtYP≠ nonE	▼ / ▲	0.1 - 25.0
SoLL 0.0	Single Sided(+) Control Output Lower Limit	%	CtYP≠ nonE CtYP≠ dCo	▼ / ▲	0.0 - Sonr
SoHL 100.0	Single Sided (+) Control Output Upper Limit	%	CtYP≠ nonE CtYP≠ dCo	▼ / ▲	Sonr - 100.0
Sonr 50.0	Single Sided (+) Control Output Manuel-Reset Value	%	CtYP≠ nonE CtYP≠ dCo	▼ / ▲	SoLL - SoHL
doLL -100.0	Double Sided (+/-) Control Output Lower Limit	%	CtYP = dCo	▼ / ▲	-100.0 - donr

Control and Output Configuration Page (PAGE=oCnF)

Display	Explanation	Unit	Access Conditions	Button	Key Function / Setting Interval
doHL 100.0	Double Sided (+/-) Control Output Upper Limit	%	CtYP = dCo	▼ / ▲	donr - 100.0
donr 0.0	Double Sided (+/-) Control Output Manuel-Reset Value	%	CtYP = dCo	▼ / ▲	doLL - doHL
PonC 0	PID Control Power-On Behaviour	Table 13	CtYP≠ nonE	▼ / ▲	Table 13
rL1d Fo-1	1.Relay (RL1) Function	Table 7		▼ / ▲	Table 7
rL2d Fo-2	2.Relay (RL2) Function	Table 7		▼ / ▲	Table 7
rL3d RL-3	3.Relay (RL3) Function	Table 7		▼ / ▲	Table 7
rL4d RL-4	4.Relay (RL4) Function	Table 7		▼ / ▲	Table 7
Ao1d Fo-1	1.Analog Output (AO1) Function	Table 11		▼ / ▲	Table 11
Ao1r 4-20	1.Analog Output (AO1) Scalar	Table 12		▼ / ▲	Table 12

Control and Output Configuration Page (PAGE=oCnF)

Display	Explanation	Unit	Access Conditions	Button	Key Function / Setting Interval
SrvL 1889	Motor-Valve Fully-Closed Position		CtYP = PFb	▼ / ▲ ✱▼	Valve Close / Valve Open Save Position
SrvH 3756	Motor-Valve Fully-Open Position		CtYP = PFb	▼ / ▲ ✱▼	Valve Close / Valve Open Save Position

General Configuration Page (PAGE=GCnF)

Display	Explanation	Unit	Access Conditions	Button	Key Function / Setting Interval
inP1 J	1.Analog Input (AIN1) Type (For Process Value Measurement)	Table 14		▼ / ▲	Table 14
inP2 4-20	2.Analog Input (AIN2) Type (External Set Point Input)	Table 2		▼ / ▲	Table 2
dP 1	Decimal Point (1)			▼ / ▲	0 - 3
ZEro 0.0	Analog Input Scale Lower Value (Linear Input types)	EU		▼ / ▲	-999 - 9999

General Configuration Page (PAGE=GCnF)

Display	Explanation	Unit	Access Conditions	Button	Key Function / Setting Interval
SPAn 400.0	Analog Input Scale Upper Value (Linear Input types)	EU		▼ / ▲	-999 - 9999
trLL 0.0	Retransmission Low Limit	EU		▼ / ▲	-999 - trHL
trHL 400.0	Retransmission High Limit	EU		▼ / ▲	trLL - 9999
Un it °C	Temperature Unit (2)	Table 6	inP != TC / RT	▼ / ▲	Table 6
oFSt 0.0	Temperature Offset Value	EU	inP != TC / RT	▼ / ▲	-100.0 - 100.0
FLtr 0.5	Measurement Filter Coefficient	EU		▼ / ▲	0.1 - 10.0
Snbr H1	Sensor Broken Behaviour	Table 1		▼ / ▲	Table 1

(1) Decimal Point is specified by the *dP* parameter. But if 1.Analog Input Type (inP1) is TC or RT and the *dP* parameter is greater than "1", Decimal Point = 1 assumed. When the *dP* parameter is edited, all the parameters with EU unit should be readjusted.

(2) The EU (Engineering Unit) used in tables, thermocouples and resistance thermometer input type units °C or °F, and for linear inputs types, are the controlled measurement unit.

Security Adjustments Page (PAGE=PrtC)

Display	Explanation	Unit	Access Conditions	Button	Key Function / Setting Interval
SCod 10	Password Set Value (1)			▼ / ▲	-199.9 - 999.9
Rtn oFF	Auto Return Time (2) (cancelled if oFF)	s		▼ / ▲	oFF, 5 - 25
dPrL 5	Parameter Access Level	Table 15		▼ / ▲	Table 15
APrL 2	Parameter Edit Level	Table 16		▼ / ▲	Table 16
CPrL d5b	Calibration Page Access	Table 3		▼ / ▲	Table 3
FCSt oFF	Return to Factory Settings (3)	Table 4		▼ / ▲ ✱▼	Table 4 Approval

(1) Factory setting of password is "10".

(2) The value of Rtn parameter defines the auto return time to normal operation, if there is no button operation. If it is set the oFF, auto return is disabled.

(3) The factory settings of the parameters are given in "Display" column (except the CALb page). The parameter values in the CALb page are the typical.

Calibration Page (PAGE=CLbr)

Display	Explanation	Unit	Access Conditions	Button	Key Function / Setting Interval
50.00 6832	1. Analog Input (AIN1) 50 mV Calibration (1)			✱▼	Save Calibration Value
0.0°C 83	1. Analog Input (AIN1) 0.0°C Calibration (with Type K TC) (2)			✱▼	Save Calibration Value
390.0 6545	1. Analog Input (AIN1) 390 Ω Calibration (3)			✱▼	Save Calibration Value
20.00 8845	1. Analog Input (AIN1) 20 mA Calibration (4)			✱▼	Save Calibration Value
In2H 8845	2. Analog Input (AIN2) 20 mA Calibration (4)			✱▼	Save Calibration Value
Ro1L 1600	1. Analog Output (AO1) 4 mA Calibration (5)			▼ / ▲	1300 - 3000
Ro1H 7400	1. Analog Output (AO1) 20 mA Calibration (6)			▼ / ▲	6500 - 8191

❍ The basic calibration of the controller is highly stable and set in the factory. Any erroneous operation in the CALb page will corrupt the calibration parameter, and measurements will be faulty.
The calibration parameters of the controller can be reinstalled in the CALb page. If accurate calibration devices are not avaible, entering to the CALb page is not advised.

Calibration Page (PAGE=CLbr)

(1) Set the calibrator as a milivolt source and adjust the calibrator output 50.000 mV. Apply the calibrator output to the input terminals 16(-) and 18(+) of the controller. Select this parameter and press ✱ and ▼ buttons simultaneously to store the parameter.

(2) Set the calibrator to Type K thermocouple and adjust the calibrator output 0.00 °C. Apply the calibrator output to the input terminals 16(-) and 18(+) of the controller. Select this parameter and press ✱ and ▼ buttons simultaneously to store the parameter.

(3) Set the calibrator as a resistance source and adjust the calibrator output 390.00 Ω . Short circuit the terminals 16 and 18 of the controller. Apply the calibrator output to the input terminals 15 and 16 of the controller. Select this parameter and press ✱ and ▼ buttons simultaneously to store the parameter.

(4) Set the calibrator as a miliamper source and adjust the calibrator output 20.00 mA. For 1.Analog Input, short circuit the terminals 17 and 18 of the controller and apply the calibrator output to the input terminals 16(-) and 17(+) of the controller. For 2.Analog Input, apply the calibrator output to the input terminals 14(+) and 15(-) of the controller. Select this parameter and press ✱ and ▼ buttons simultaneously to store the parameter.

(5) Set the calibrator as a miliamper meter. Connect the output terminals 11(+) and 12(-) of the controller to the calibrator input. Select this parameter and using ▼ and ▲ buttons adjust the parameter until the calibrator reading is equal to 4.00 mA. Press ↵ or ✱ button to store the parameter.

(6) Set the calibrator as a miliamper meter. Connect the output terminals 11(+) and 12(-) of the controller to the calibrator input. Select this parameter and using ▼ and ▲ buttons adjust the parameter until the calibrator reading is equal to 20.00 mA. Press ↵ or ✱ button to store the parameter.

12. TABLES

Table 1

Lo	Lower The Process Value
Hi	Higher The Process Value

Table 2

0A20	0-20mA (Linear)
4A20	4-20mA (Linear)

Table 3

d5b	Disable
End	Enable

Table 4

oFF	Off
on	On

Table 5

dir	Direct
rEv	Revers

Table 6

°C	°C
°F	°F

Table 7

Co-1	"+" Directed Control Output
Co-2	"-" Directed Control Output
do-1	On / Off Heater Output
do-2	On / Off Cooler Output
AL-1	Alarm-1
AL-2	Alarm-2
AL-3	Alarm-3
AL-4	Alarm-4
AL-A	Reserve
AL-b	Reserve
AL-C	Reserve
AL-d	Reserve
AL-o	Reserve
AL-H	Reserve
AL-E	Reserve

Table 8

oFF	Off
Lo	Low Alarm (Absolute)
Hi	High Alarm (Absolute)
Lod	Low Deviation (Relative)
Hid	High Deviation (Relative)
Lob	Band Alarm (In)
Hib	Band Alarm (Out)

12. TABLOLAR

Table 9

nonE	No Control
SCo	Single-Sided (+) PID Control
dCo	Double-Sided (+/-) PID Control
PFb	Feedback Valve Control
bnd	Open-Loop Valve Control

Table 10

Int	Over The Unit
Ert	Over The 2.Analog Input (AIN2)

Table 11

Co-1	"+"Directed Control Output
Co-2	"-" Directed Control Output
PuEr	Process Value Transmitter
SPEr	Set Point Transmitter

Table 12

0-20	0-20mA
20-0	20-0mA
4-20	4-20mA
20-4	20-4mA

Table 13

0	Run with the latest Control Values
1	Switch to Automatic Mode
2	Switch to Automatic Mode and make"Int=0"
3	Switch to Manuel Mode
4	Switch to Manuel Mode and make"Out = 0"

Table 14

b	Type B (TC)
E	Type E (TC)
J	Type J (TC)
K	Type K (TC)
L	Type L (TC)
n	Type N (TC)
r	Type R (TC)
S	Type S (TC)
t	Type T (TC)
U	Type U (TC)
Pt	Pt-100 (RT)
0A20	0-20mA (Linear)
4A20	4-20mA (Linear)
0u50	0-50mV (Linear)
0.0u1	0.0-1.0V (Linear)
0.2u1	0.2-1.0V (Linear)

12. TABLES

Table 15

0	Only Process Value can be accessed
1	Process and Set Values can be accessed
2	Operation Screen Parameters can be accessed
3	Reserve
4	Reserve
5	tUnE Page Parameters can be accessed
6	SEtP Page Parameters can be accessed
7	RCnF Page Parameters can be accessed
8	oCnF Page Parameters can be accessed
9	GCnF Page Parameters can be accessed

Table 16

0	None of the Parameters can be edited
1	Only Set Value can be edited
2	Operation Screen Parameters can be edited
3	Reserve
4	Reserve
5	tUnE Page Parameters can be edited
6	SEtP Page Parameters can be edited
7	RCnF Page Parameters can be edited
8	oCnF Page Parameters can be edited
9	GCnF Page Parameters can be edited

Levels with large numerals in Tables-15 and Tables-16 contains previous levels

13. INPUT TYPES - RANGES

TEMPERATURE SENSORS

Sensor Type		Standart	Temperature Range (°C)	Temperature Range (°F)
Type B	b	IEC60584-1	100 , 1820	140 , 3308
Type E	E	IEC60584-1	-200 , 840	-328 , 1544
Type J	J	IEC60584-1	-200 , 1120	-328 , 1562
Type K	K	IEC60584-1	-200 , 1360	-328 , 2480
Type L	L	DIN43710	-200 , 900	-328 , 1652
Type N	n	IEC60584-1	-200 , 1300	-328 , 2372
Type R	r	IEC60584-1	-40 , 1760	104 , 3200
Type S	S	IEC60584-1	-40 , 1760	104 , 3200
Type T	t	IEC60584-1	-200 , 400	-328 , 752
Type U	U	DIN43710	-200 , 600	-328 , 1112
Pt-100	Pt	IEC60751	-200 , 840	-328 , 1544

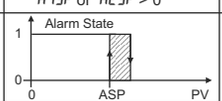
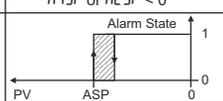
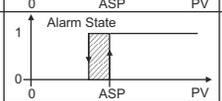
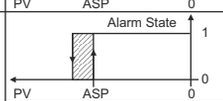
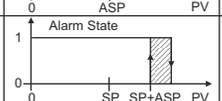
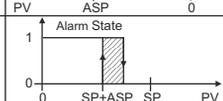
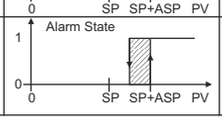
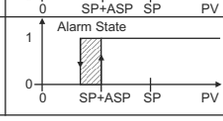
14. LINEAR INPUTS

Type		Range
Current	0R20	0-20 mA DC
Current	4R20	4-20 mA DC
Voltage	0u50	0-50 mV DC
Voltage	00u1	0-1 V DC
Voltage	02u1	0.2-1 V DC

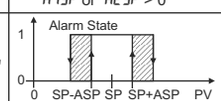
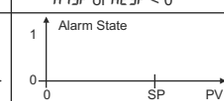
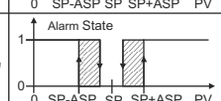
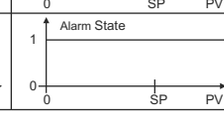
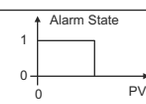
15. ERROR MESSAGES

Message	Meaning	Remedy
oPEn	The connection of the sensor is broken.	Check the sensor and the sensor connections.
UFL	The process value is below the sensor type-temperature interval.	Check the sensor and the input type specified by the InPt parameter.
oFL	The process value is above the sensor type- temperature interval.	
nnnn	The process value is above the value that can be displayed.	Check the analog value on the input terminal and the scalar specified by the dP, Zero and SPAn parameters.
uuuu	The process value is below the value that can be displayed.	

16. ALARM TYPES

A ltP or A2tP	EXPLANATION: A1SP or A2SP > 0	EXPLANATION: A1SP or A2SP < 0	
Lo			Low Alarm (Absolute)
Hi			High Alarm (Absolute)
Lod			Low Deviation (Relative)
Hid			High Deviation (Relative)

16. ALARM TYPES

A ltP or A2tP	EXPLANATION: A1SP or A2SP > 0	EXPLANATION: A1SP or A2SP < 0	
Lob			Band Alarm (In)
Hib			Band Alarm (Out)
oFF	Alarm function is cancelled when AXtP parameters are oFF.		
	Shaded areas show the hysteresis.		When alarm state is "1" the output (relay) is active.

17. AUTO-TUNE

- Auto-tuning matches the characteristics of the controller to the process being controlled in order to obtain good control. Tuning involves calculating and setting the values of the PID parameters. The Auto-tuner works by switching the output on and off to induce an oscillation in the process value. From the amplitude and period of oscillations PID parameters are calculated.
- Auto-tune can be performed at any time, but normally it is performed only once during the initial commissioning of the process. However, if the process under control subsequently becomes unstable (because its characteristics have changed), you can re-tune again for the new conditions.
- In order to start Auto-tune process:
  1- Set the CtYP parameter in oCnF page as SCo.
  2- Set the output that control the process to Co- 1.
  3- Set the control set point to the value at which you will normally operate the process. Consider also the process value may exceed the control set point while in Auto-tuning.
  4- Set the HYS parameter in tUnE page as 0.1 (if dP=1) or 1 (if dP=0).
  5- Set the At parameter in tUnE page as on to commence Auto-tuning process. Press ✳ button to revert the normal operation.
- The lower display and MN led will flash to indicate that tuning is in progress.

17. AUTO-TUNE

- After a few cycles of oscillation the tuning is completed and the calculated PID parameters Pb- 1, It and dt are stored.
- While the Auto-tuning in progress if At parameter is set the oFF or operating power of the controller is interrupted Auto-tune progress is stopped and old PID values are retained.

18. MANUAL TUNING

If for any reason Auto-tuning gives unsatisfactory results, the controller can be tuned manually. There are a number of standard methods for manual tuning. The one described here is the Ziegler-Nichols method. With the process at its normal running temperature:

1- Set the CtYP parameter in oCnF page as SCo.

2- Set the output that control the process to Co- 1.

3- If the control output is relay, set the CPrd parameter in oCnF page as 2.

4- Set the It, dt and HYS parameters in tUnE page as 0.

5- Ignore the fact that the temperature may not settle precisely at the set point.

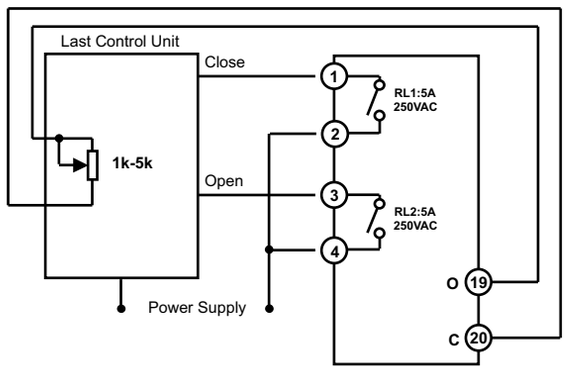
18. MANUAL TUNING

6- If the temperature is stable, reduce the proportional band Pb-1 so that the temperature just starts to oscillate. If the temperature is already oscillating, increase the proportional band until it just stops oscillating Allow enough time between each adjustment for the loop to stabilize. Make a note of the proportional band value (B) and the period of oscillation (T).

7- Set the Pb-1, it and dt parameters values according to the calculations given below.

Control Type	Proportional Band (Pb-1)	Integral Time (it)	Derivative Time (dt)
P	2xB	0	0
PI	2.2xB	0.8xT	0
PID	1.7xB	0.5xT	0.12xT

19. FEEDBACK VALVE CONTROL



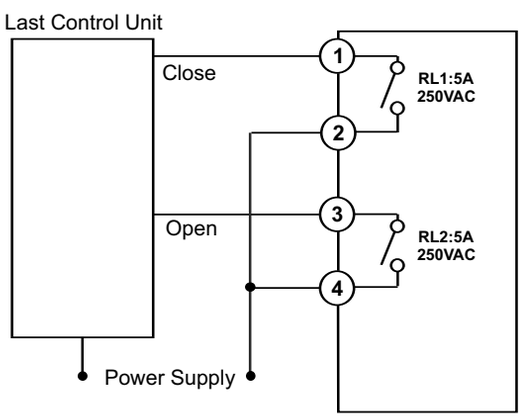
19. FEEDBACK VALVE CONTROL

As shown in figure, control of the feedback controlled valve can be made with a servomotor connected to the relays and the 19-20th terminals on E-49 & E-94, and a potantiometer (1k-5k).

The parameters of this control, are the CtYP, dbnd, SruL and SruH parameters, in the output configurations page oCnF. These parameters are as follows;

- The CtYP parameter should be set to PFb, for this control.
- The dbnd parameter is used to prevent relays from opening and closing frequently, during the control. Its unit is given as a percentage of the location data. Its value determines the death band value for both to stay open.
- The SruL parameter, keeps the location data of the controlled valve in the fully closed state. With this parameter on the display, ▼ key starts the action in motor-active direction. In the fully closed state, the value shown on the display can be saved by pressing ✱▼ keys.
- The SruH parameter, keeps the location data of the controlled valve in the fully open state. With this parameter on the display, ▲ key stats the action in the motor-active direction. In the fully active state, the value shown on the display can be saved by pressing ✱▼ keys.

20. OPEN - LOOP VALVE CONTROL



20. OPEN - LOOP VALVE CONTROL

Using the relays on E-49 & E-94, an open-loop valve control can be made, as shown in figure. Parameters related with this control, are the CtYP, dbnd ve trtñ parameters in the oCnF page.
The explanation for the parameters are;

- For this control to be made, the CtYP parameters should be set to bnd.
- The dbnd parameter is used to prevent the relays from opening and closing frequently, during the control. Its unit is given as percentage of the location data. Its value determines the death band value for both relays to stay open.
- The trtñ parameter is the time, in which the valve switches to full-closed from full-open state, when energized. Its unit is seconds.

K - Q
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9000

TS EN ISO 9001
Quality Management System Certificate

KY-49-1216-0
KY-94-1216-0