SYSTEMATIC
CONTROLS
CORPORATION

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SERIES MX7-10

MICROPROCESSOR CONTROLLER

INSTALLATION
OPERATION
MANUAL

1. Panel Appearance

MX7-10

1.1 LED Display

P V：Process Value, 4 LED display (Red color)
S V：Set Value, 4 LED display (Green color)

1.2 Key and Lamp instruction

Symbol	Name	Symbol	Name	Symbol	Name
MODE	SET key	OUT1	Output1，Green color	AL3	Alarm 3，Red color
AUT MAN	Auto/Manual key.	OUT2	Output2，Green color	MAN	Manual，Yellow color
<	Shift key	AT	Auto Tuning，Yellow color	PRO	Program，Yellow color
V	Down key	AL1	Alarm 1，Red color	OUT%	Output percentage
^	Up key	AL2	Alarm 2，Red color		

1.3 Bar Graph indicators (Output percentage lamp instruction)

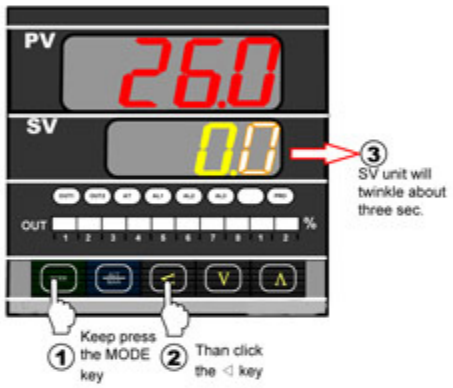
Output segment(8 segment s)　　Output pattern(2 patterns)

1.4 Auto tuning

When “AT” (USER LEVEL)　is set to” YES”，auto tuning will start.
When set to” NO”，auto tuning will close.

2 Parameters

2.1 Level switch



First Level
(USER Level)

When LOCK=0，Press the MODE + ◁ key, into third (INPUT) level

Press the MODE 5 sec.

Press the MODE + ◁ key back to first (USER) level

Second Level
(PID Level)

When LOCK=0，Press the MODE + ◁ key ,into third(INPUT) level

Third Level
(INPUT Level)

When LOCK=1111，Press the MODE + ◁ key，into fourth(SET) level

Fourth Level
(SET Level)

How to return First level:

1、The controller will return to First level If user without any operation within 60 seconds.

2、Press **AUT/MAN** key twice.

2.2 First Level list (USER Level)

PV	Process Value
SV	Set Value
↓MODE	
PV / OFF /25	Press △key to turn ON or OFF
↓MODE	
AT / YES / NO	AutoTuning
↓MODE	
ALA1 / 0	Set Alarm 1
↓MODE	
*ALA2 / 0	Set Alarm 2
↓MODE	
*ALA3 / 0	Set Alarm 3
↓MODE	
*OUTL / 0	Set Output Low Limit
↓MODE	
*OUTH / 100	Set Output High Limit
↓MODE	
Return to PV	

Note1 → *PV / 100 / — Two SV display (Need add hardware)

◎To enter PID Level
(Press MODE key 5 seconds)

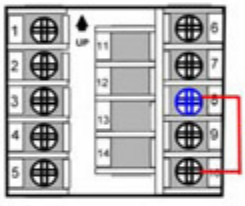
Note2 → *A 0.0 / 0.0 — HBA (CT Fault Alarm) (Need add hardware)

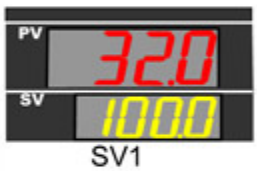
Note3 → OUTP / 100.0 — Press AUT MAN key to display Output percentage

→ PV / OFF — Press △ key to close SV display (St-4-1=1)

*** Hiding function**

Note 1: Two SV display





SV1

SV2

Note 2: CT Fault Alarm (HBA)

Heater Current Value
HBA Alarm Set Value
USER LEVEL

USER LEVEL

Note 3: Output percentage

2.3 Error information

Display		Description	Note
1NER		Input 1 error	When the" ☆ " error marked show up，please send it to the nearest sales office or retail dealer。
2NER		Temperature is too high	
INHI		PV exceeds PVHI	
INLO		PV under PVLO	
2NHI		PV2 exceeds PVHI	
2NLO		PV2 under PVLO	
ATER		Auto tuning failed.	
IFER		Interface failed.	
ADER ☆		A/D convert failed.	
CJER ☆		Cold junction compensation failed.	
RDER ☆		RAM failed.	

2.4 Second Level list (PID Level)

Press MODE key for 5 seconds to enter Second Level

P-1 / 3.0	Proportional Band Time 1	Range : 0-200% Display when P1=0 → HYS1 / 0.0
I-1 / 120	Integral Time 1	Range : 0-3600 seconds
D-1 / 30	Derivative Time 1	Range : 0-900 seconds
DB-1 / 100.0	Dead-band Time 1	Range : 0-100
AT-L / 5.0	Auto tuning offset value	Range : 0-400
CY-1 / 15	Cycle Time 1	Relay 15 SSR 1 seconds SCR 0 seconds
* P-2 / 3.0	Proportional Band Time 2	Range : 0-200% Display when P2=0 → HYS2 / 0.0
* I-2 / 120	Integral Time 2	Range : 0-3600 seconds
* D-2 / 30	Derivative Time 2	Range : 0-900 seconds
* CY-2 / 15	Cycle Time2	Relay 15 SSR 1 seconds SCR 0 seconds
* GAP.1 / 0.0	Control Gap 1	Setting value of output 1 = SV - GAP.1
* GAP.2 / 0.0	Control Gap 2	Setting value of output 2 = SV+ GAP.2
LOCK / 0	Level Function Set	Change lock from 0 to 1111, than press Mode + ◁ key to enter the fourth Level

Hysteresis for output 1
ON / OFF Control
OFF: PV > SV + HYS1
ON :PV < SV - HYS1

Hysteresis for output 2
ON / OFF Control
OFF: PV > SV + HYS2
ON :PV < SV - HYS2

Display when output 2 is provided

MODE

Return to P1

*** Hiding function**

2.5 LOCK (Security)

This parameter specifies which level are protected.

LOCK Value	Available entering level				Available change parameters
	First Level (USER Level)	Second Level (PID Level)	Third Level (INPUT Level)	Fourth Level (SET Level)	
0000	O	O	O	X	All parameters(Default value)
1111	O	O	X	O	Level 1、2、4
0100	O	O	X	X	Level 1、2
0110	O	O	X	X	Only Level1
0001	O	O	X	X	SV and LOCK
0101	O	O	X	X	Only LOCK

2.6 Third Level list (INPUT Level)

Press MODE + ◁ key 5 sec. to enter Third Level (LOCK=0)

Parameter	Description	Range	Level
INPT K2 ↓MODE	Input type selection	See the step 2.6 Input selection	Third Level
* INLO 0 ↓MODE	Analog input low limit calibration	Range：-199.9 ~ 999.9	St-2-2
* INHI 5000 ↓MODE	Analog input high limit calibration	Range：0~999.9	St-2-2
* DP 000.0 ↓MODE	Decimal point position	Four Types： 0000，000.0，00.00，0.000	St-2-2
PVLO 0.0 ↓MODE	Lower set-point limit	Range：-199.9~999.9	St-2-3
PVHI 400.0 ↓MODE	Upper set-point limit	Range：-199.9~999.9	St-2-3
* 2NLO 0 ↓MODE	Remove input low limit calibration	Range：-199.9 ~ 999.9	St-2-4
* 2NHI 5000 ↓MODE	Remove input low limit calibration	Range：-199.9~999.9	St-2-4
A1D1 11 ↓MODE	Alarm mode of AL1	Refer to the step 3.4 Alarm action description	St-1-3
A1T1 99.59 ↓MODE	Alarm time of AL1		St-1-3
* A2D2 0 ↓MODE	Alarm mode of AL2	Refer to the step 3.4 Alarm action description	St-1-4
* A2T2 99.59 ↓MODE	Alarm time of AL2		St-1-4

Parameter	Description	Range	Level
* A3D3 0 ↓MODE	Alarm mode of AL3	Refer to the step 3.4 Alarm action description	St-2-1
* A3T3 99.59 ↓MODE	Alarm time of AL3		St-2-1
HYSA 0.0 ↓MODE	Hystersis of all alarm	Range：0~100	St-4-3
LO01 200 ↓MODE	Output 1 low limit calibration	Range：0~9999	St-4-4
HI01 3400 ↓MODE	Output 1 high limit calibration	Range：0~9999	St-4-4
* LO02 200 ↓MODE	Output 2 low limit calibration	Range：0~9999	St-5-1
* HI02 3400 ↓MODE	Output 2 high limit calibration	Range：0~9999	St-5-1
* LO03 0 ↓MODE	Retransmission low limit calibration	Range：0~9999	St-5-2
* HI03 5000 ↓MODE	Retransmission high limit calibration	Range：0~9999	St-5-2
* R-Y 5 ↓MODE	Full run time of proportional motor	Range：5~200 Seconds	St-5-3
* W-T 0.0 ↓MODE	Wait for continued operation(Used for programmable controller)	0=No wait Others=Wait value	St-5-3
* STAL 0000 ↓MODE	When need the alarm of " b point" , can use this function	Range：0~1111	St-5-3

Parameter	Description	Range	Level
* ID. 2 ↓MODE	ID number	Range:0~255	St-5-4
* STOP 0-81 ↓MODE	MODBUS	O-81，E-81，N-81 O-82，E-82，N-82	St-5-4
* BAUD 9600 ↓MODE	Baudrate	Selection:110，300，1200，2400，4800，9600，19200，38900bps	St-5-4
SVOS 0.0 ↓MODE	SV compensation	Range:-100~100	St-6-1
PVHS 0.0 ↓MODE	PV low compensation	Range:-100~100	St-6-1
* C-F C. ↓MODE	Unit of PV & SV	C，F，A (Analog)	St-6-3
S-F 600 ↓MODE	Soft Filter	Range: 50~5000 Output response adjustment (slower If Soft Filter is lower)	St-6-4
PVHS 0.0 ↓MODE	PV high compensation	Range:-50~50	St-6-1
* H-C HEAT ↓MODE	Control mode	Heating / Cooling	St-7-2
+- 0.0 ↓MODE	Digital Filter offset value		St-7-4
FILT 2000 ↓MODE	Digital Filter		St-7-4

Return to INPT

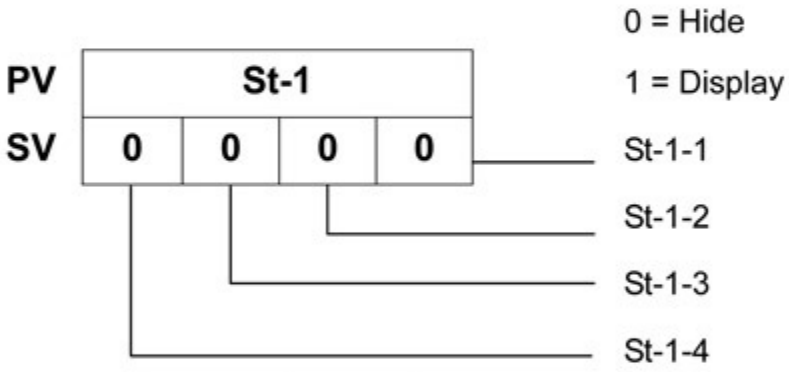
*** Hiding function**

2.7 INPT Code (Input type selection)

Type	1	2	3	4	5	6
K	K1,200.0℃	K2,400.0℃	K3,600℃	K4, 800℃	K5, 1000℃	K6, 1200℃
J	J1,200.0℃	J2,400.0℃	J3,600℃	J4,800℃	J5,1000℃	J6,1200℃
R	R1,1600℃	R2,1769℃				
S	S1,1600℃	S2,1769℃				
B	B1,1820℃					
E	E1,800℃	E2,1000℃				
N	N1,1200℃	N2,1300℃				
T	T1,400.0℃	T2,200.0℃	T3,350.0℃			
W	W1,2000℃	W2,2320℃				
PL	PL1,1300℃	PL2,1390℃				
U	U1,-199.9-600.0℃	U2,-199.9-200.0℃	U3,400.0℃			
L	L1,400℃	L2,800℃				
JP 100Ω	JP1,-199.9 600.0℃	JP2,-199.9 400.0℃	JP3,-199.9 200.0℃	JP4,200℃	JP5,400℃	JP6,600℃
DPT 100Ω	dP1,-199.9 600.0℃	dP2,-199.9 400.0℃	dP3,-199.9 200.0℃	dP4,200℃	dP5,400℃	dP6,600℃
JP. 50Ω	JP1,-199.9 600.0℃	JP2,-199.9 400.0℃	JP3,-199.9 200.0℃	JP4,200℃	JP5,400℃	JP6,600℃
AN1-5	**AN1-5**	An1/ -10~10mv -1999~-9999	An2/ 0~10mv × 2 -1999~9999	An3/ 0-20mv × 2 -1999~9999	An4/0~50mv 0~20mA 0~5V -1999-9999	

2.8 Fourth Level list (SET Level)

Press MODE + ◁ Key to enter the fourth level (LOCK =1111)



Description	Default value	MODE	4	3	2	1
Display/Hiding Parameters	0110	St-1	ALA2 · A2D2 · A2T2	ALA1 · A1D1 · A1T1	AT	OUTP · OUTL · OUTH
	0100	St-2	2NLO · 2NHI	PVLO · PVHI	1NLO · 1NHI · DP	ALA3 · A3D3 · A3T3
	0000	St-3	*	*	*	*
	1100	St-4	LO01 · HI01	HYSA (Hysterics of all alarm)	SV1 / SV2 (Event)	ON-OFF (OUT1 Controller switch)
	0000	St-5	ID · BAUD · STOP	R-Y · W-T · STAL	LO03 · HI03	LO02 · HI02
	1001	St-6	S-F (1= Automatic 0= Manual)	C-F (UNIT= C · F · A)	1=MODBUS 0= None	PVOS · PVHS · SVOS
	1000	St-7	FILT (Error value +1 or -1)	Power ON -Run AT	H-C(Heat / Cool)	OUT2 4-20mA Re-Transmission
Special Functions	0000	St-8	**Program Function** (Only available for programmable controller, refer to the step 2.11)			
	0000	St-9				
	1000	St-10				
Remote SV Setting	0	INP2	0 = None 2 = 0~50mV/0~20mA/0~5V/0~10V		1 = 10~50mV/4~20 mV/1~5v/2~10v 4 = CT input	
	0	OUTY	0 = Single output(OUT1) 2 = None 4 = 1 Phase angle control (1 ϕ SCR)		1 = Dual output(OUT1/ OUT2) 3 = Motor valve control 5 = 3 Phase angle control (3 ϕ SCR)	

(*=None function)

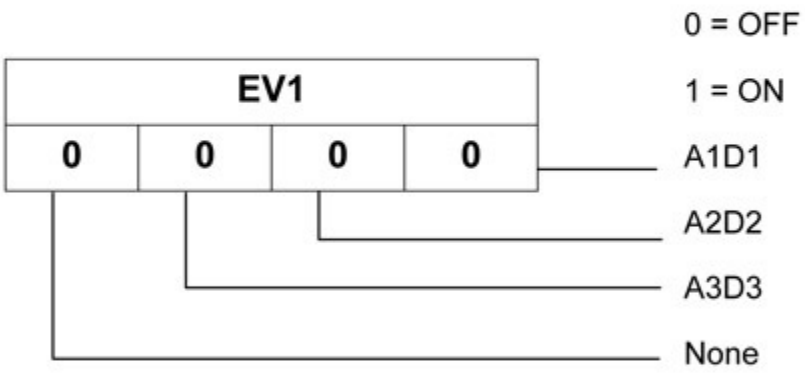
2.9 Program Level list (Display in programmable controller)

LEVEL 1	
↓ MODE	
PROG 1	Program Pattern setting Range: 0~2
↓ MODE	
SET 1-0	Display program segment (Pattern _Segment _)
↓ MODE	
TIMR 00.00	Display program countdown Range: 0~99 hour 59 min
↓ MODE	
SV01	Seg.1 SV value setting Range: PVLO~PVHI
↓ MODE	
TM01 00.00	Seg.1 time setting Range: 0~99 hour 59 min (Change Unit "min .sec." at St-9-2)
↓ MODE	
OUT1 100	Seg.1 output limit setting Range:0~100%
↓ MODE	
EVI	Seg.1 event setting
↓ MODE	**(Seg.2~7 same as above)**
SV08	Seg.8 SV value setting Range: PVLO~PVHI
↓ MODE	
TM08 00.00	Seg.8 time setting Range: 0~99 hour 59 min
↓ MODE	
OUT8 100	Seg.8 output limit setting Range:0~100%
↓ MODE	
EV8	Seg.8 event setting
↓ MODE	

Return to LEVEL 1

2.10 Event (Display in programmable controller)

Alarm mode select " b" (refer to the step 3.5 Alarm mode)



2.10 Special Functions(Display in programmable controller)

If the LEVEL 4 St-8-4 = 1, reopen will run from Seg.1

2.11 Functions St 8 ~ 10 (Display in programmable controller)

MODE	4	3	2	1
St-8	0 = OFF 1 = Run from Seg.1	0 = Seg.1 run from 0 1= Seg.1 run from PV	0= No power failure option 1= With power failure option	0 =Program not repeat 1 = Program repeat
St-9	0 = 4 - 20 mA Transmission 1 = 20 - 4mA Transmission	0 = PV Transmission 1 = SV Transmission ※Need to add Transmission function	0 = TM Unit "Hour : Min." 1 = TM Unit " Min : Sec."	0 = Manual Output percentage 1 = Automatic Output percentage
St-10	0 = Motor valve closed and output relay use"b" contact (Default value) 1 = Motor valve closed and output relay use"a" contact	0 = Disable Remote SV function 1 = Enable Remote SV function	0 = Hide parameter "RATE" 1 = Display parameter "RATE" at LEVEL 1 ※Parameter ALA3 will be hide	0 = TTL Communication (Slave) 1 = TTL Communication (Master) ※ Used for TTL Communication

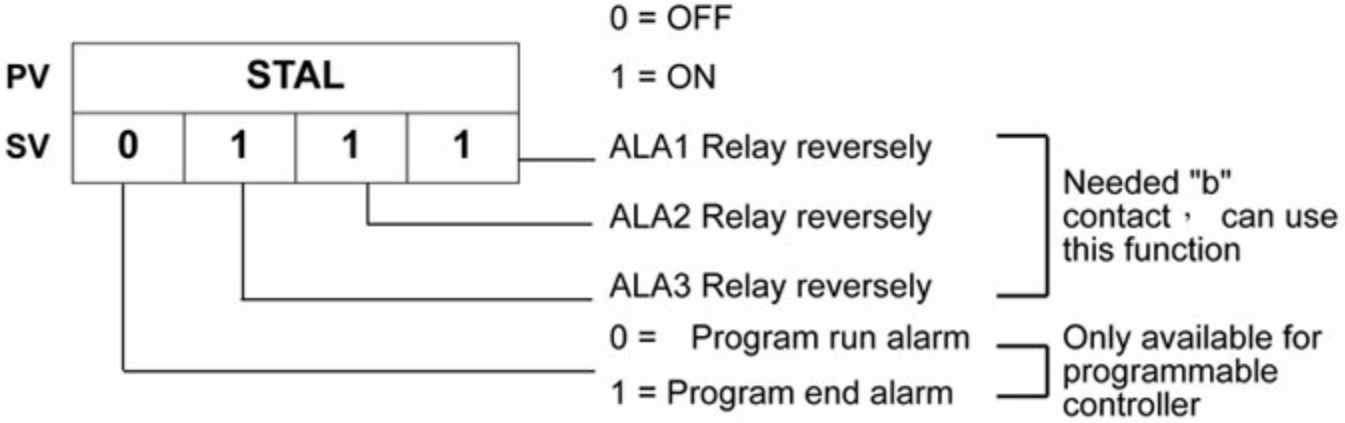
3 Applications

3.1 Alarm time (ALA1/ALA2/ALA3)

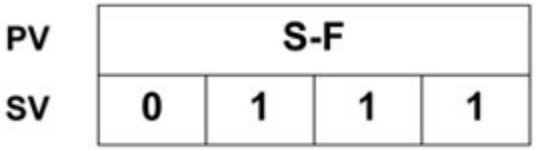
ALA1=0	Flicker alarm
ALA1=99.59	Continued alarm
ALA1=000.01~99.58	Delay Alarm time setting

3.2 STAL

STAL (When LEVEL 4 St-5-3 =1, display in LEVEL 3)



3.3 Soft Filter (Available for output type SCR)



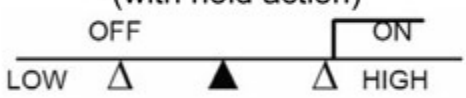
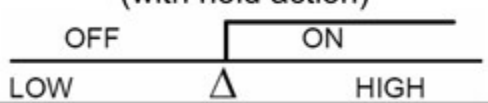
LEVEL 4 St-6-4 = 1 ON (Default value = 600 , Range: 50-5000)
= 0 OFF

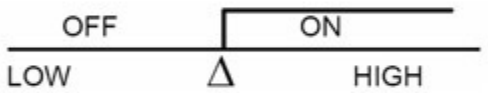
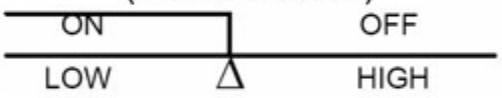
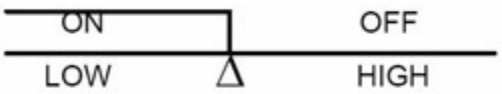
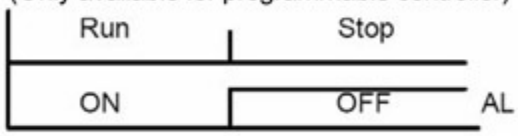
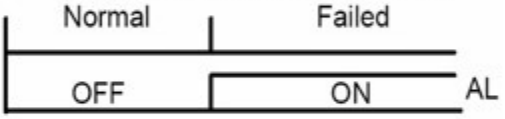
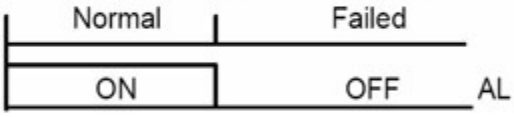
◎ When the value is low and the sensitivity will be diluted, suitable for slowly heating and equable environment.

◎ When the value is high and the sensitivity will be augmented, suitable for quickly heating and instability environment.
(If AT run once , S-F value will auto-add 200. The value will start from 200 when arrive to 1000.)

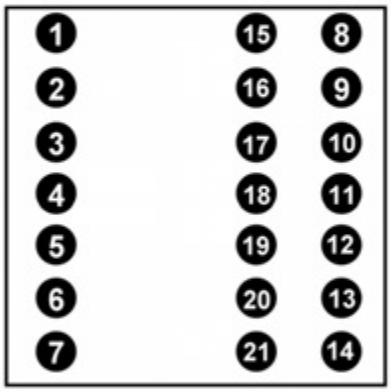
3.4 Alarm mode (ALA1/ALA2/ALA3)

▲ : SV Δ : Alarm start value

00 10	**No alarm**
01	**Deviation high alarm** (with hold action) 
11	**Deviation high alarm** 
02	**Deviation low alarm** (with hold action) 
12	**Deviation low alarm** 
03	**Deviation high/low alarm** (with hold action) 
13	**Deviation high/low alarm** 
04 14	**Band alarm** 
05	**Process high alarm** (with hold action) 
a	**Heater Break Alarm(HBA)**
b	**Programmable**
c d e f	**The function is expanded**

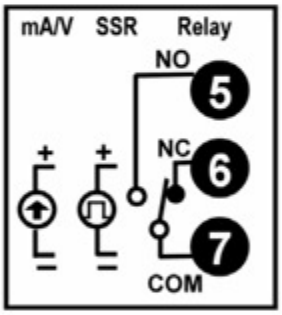
15	**Process high alarm** 
06	**Process low alarm** (with hold action) 
16	**Process low alarm** 
07	**Segment end alarm** (Only available for programmable controller) 1. A1D1~3 set = 07 2. ALA1~3=Alarm Segment 3. ALT1~3 set as follows: = 0 Flicker alarm = 99.59 Continued alarm = others Alarm ON time
17	**Program run alarm** (Only available for programmable controller) 
08	**System failed alarm (ON)** 
18	**System failed alarm (OFF)** 
09	**RAMP**
19	**SOAK**

Terminals arrangement

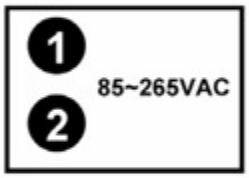


Output

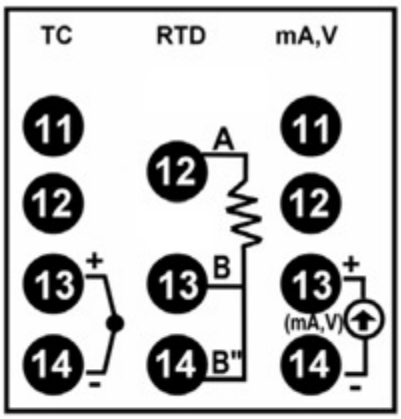
OUTI



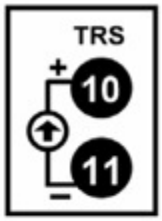
Power



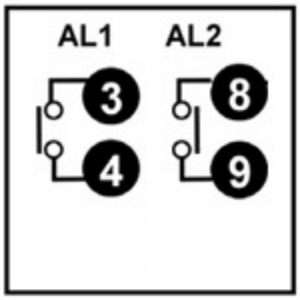
Input



Transmission (TRS)



Alarm



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MX7-10 CALIBRATION INSTRUCTIONS

To change any settings first press the left arrow to open it then use the 3 arrow keys to change setting then press MODE to lock it in. Do not change any settings that have the word CALIBRATION in the description.

Level 1 Press and release MODE to get	AT	YES	for Auto Tune
		no	for PID
Press and release MODE to get	ALA1	500	High Alarm
Press and release MODE to get	ALA2	0	Low Alarm
Level 2 Press and hold MODE to get	P-1	3.0	
Press and release MODE to get	I-1	120	
Press and release MODE to get	d-1	30	
Press and release MODE to get	db-1	0.0	
Press and release MODE to get	AT-L	0.0	
Press and release MODE to get	CY-1	0	
Press and release MODE to get	LocK	0	
Level 3 Press and hold MODE and Left Arrow Keys to get	InPt	J2 dP5	(0-752° F) Type J Thermocouple (0-752° F) RTD
Press and release MODE to get	P1_Lo	0	
Press and release MODE to get	P1_Ho	752	
Press and release MODE to get	A1d1	15	High Alarm
Press and release MODE to get	A1t1	99.59	
Press and release MODE to get	A2d2	16	Low Alarm
Press and release MODE to get	A2t2	99.59	
Press and release MODE to get	HYSA	2	
Press and release MODE to get	S1_oS	0	
Press and release MODE to get	P1_oS	0	
Press and release MODE to get	C-F	F	
Press and release MODE to get	P1_HS	0	
Press and release MODE to get	H-C	H	