



Read this document carefully before using this device. The guarantee will be expired by device damages if you don't attend to the directions in the user manual. Also we don't accept any compensations for personal injury, material damage or capital disadvantages.

ENDA EM SERIES DIGITAL TIMER

Thank you for choosing ENDA EM Series Digital Timer.

- ▶ 48x48mm and 72x72mm sized.
- ▶ 2x4 line display.
- ▶ Easy to use .
- ▶ 9 Level time intervals. (Between 0-99.99sec. and 0-9999 hours).
- ▶ Sensor type selection (PNP, NPN).
- ▶ Up/Down counting selection.
- ▶ Adjustable input signal, pulse and void duration.
- ▶ With/Without memory operating feature.
- ▶ 14 Different output mode.
- ▶ Two N.O. contact outputs and two NPN 50mA current limited SSR outputs.
- ▶ Adjustable display brightness.
- ▶ Security access levels for parameters.
- ▶ Easy installation and service operations with terminal plug-in connectors.
- ▶ RS485 Modbus communication input. (Specify at order).
- ▶ CE marked according to European Norms.



Order Code : EM 0 1 - - 		
1	2	3
1 - Size 4401.....48x48x87mm 7701.....72x72x97mm	2 - Supply Voltage UV...90-250V AC LV.....10-30V DC / 8-24V AC	3 - Modbus (Optional) RSRS-485 (Specify at order)

R^oHS
Compliant

TECHNICAL SPECIFICATIONS

ENVIRONMENTAL CONDITIONS

Ambient / Storage Temperature	0 ... +50 / ° C -25... +70°C
Relative Humidity	Max. humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C.
Protection Class	According to EN60529; Front panel: IP65 Rear panel : IP20
Height	Max. 2000m

KEEP AWAY device from exposed to corrosive, volatile and flammable gases or liquids and **DO NOT USE** the device in similar hazardous locations.

ELECTRICAL CHARACTERISTICS

Supply	90-250V AC 50/60Hz ;10-30V DC / 8-24V AC SMPS
Power Consumption	Max. 5VA
Wiring	2.5mm ² Screw-terminal power connection, 1,5mm ² Terminal plug-in signal connection.
Date Retention	EEPROM (Min. 10 years)
EMC	EN 61326-1: 2013 (Performance criterion B is satisfied for EN 61000-4-3)
Safety Requirements	EN 61010-1: 2010 (Pollution degree 2, overvoltage category II)

INPUTS

Start, Gate, Reset input	Input types can be adjusted as PNP or NPN in "Programming Mode". Minimum pulse and void duration times can be adjusted between 5 and 100ms. Active level is between 4V and 30V pulse in PNP inputs, Active level is between 0V and 2V in NPN inputs.
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OUTPUTS

Control Output OUT1,OUT2	EM4401 : OUT1 ; 250V AC, 10A (for resistive load), NO+NC. OUT2 : 250V AC, 5A (for resistive load), NO.
SSR1, SSR2 Output	EM7701 : OUT1, OUT2 ; 250V AC, 8A (for resistive load), NO+NC
Auxiliary Power Supply	Open collector output (S.S. OUT) : Max. 30V DC, 50mA.
Life Expectancy for Relay	12V DC, max. 50mA (without regulation).
Accuracy	5.000.000 Switching for no-load operation; 100.000 switching for 5A resistive load at 250VAC. 30.000.000 Switching for no-load operation; 300.000 switching for 8A resistive load at 250VAC. 30.000.000 Switching for no-load operation; 100.000 switching for 10A resistive load at 250VAC.
Accuracy	±0.01% ±1ms

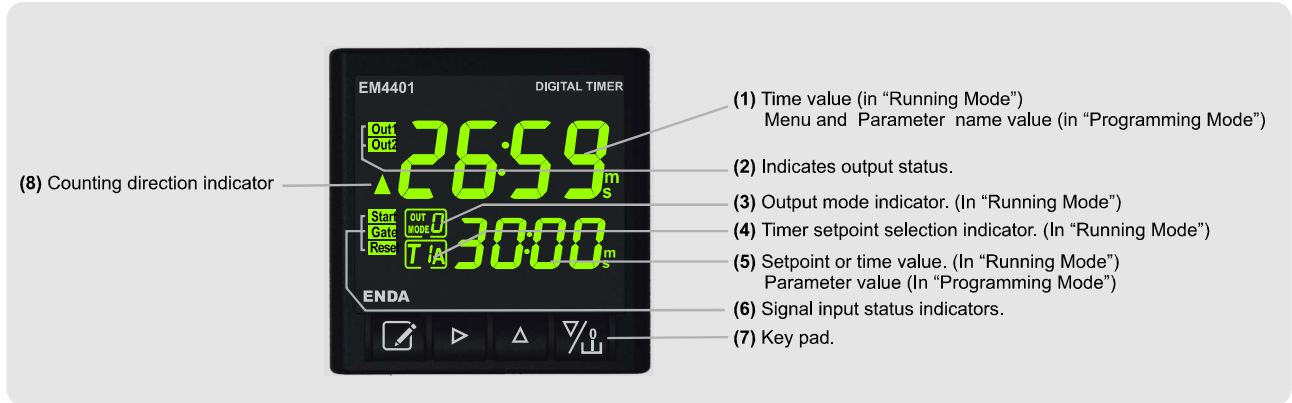
Note :
Relay and S.S.OUT outputs run simultaneously. ie, when the OUT 1 or OUT2 relay is energized, the SSR1 or SSR2 transistor also turns on.

HOUSING

Housing Type	Suitable for flush-panel mounting according to DIN 43 700.
Dimensions	EM4401 : W48xH48xD87mm, EM7701 : W72xH72xD97mm.
Weight	EM4401 : Approx. 230g, EM7701 : Approx. 380g (After packing).
Enclosure Materials	Self extinguishing plastics

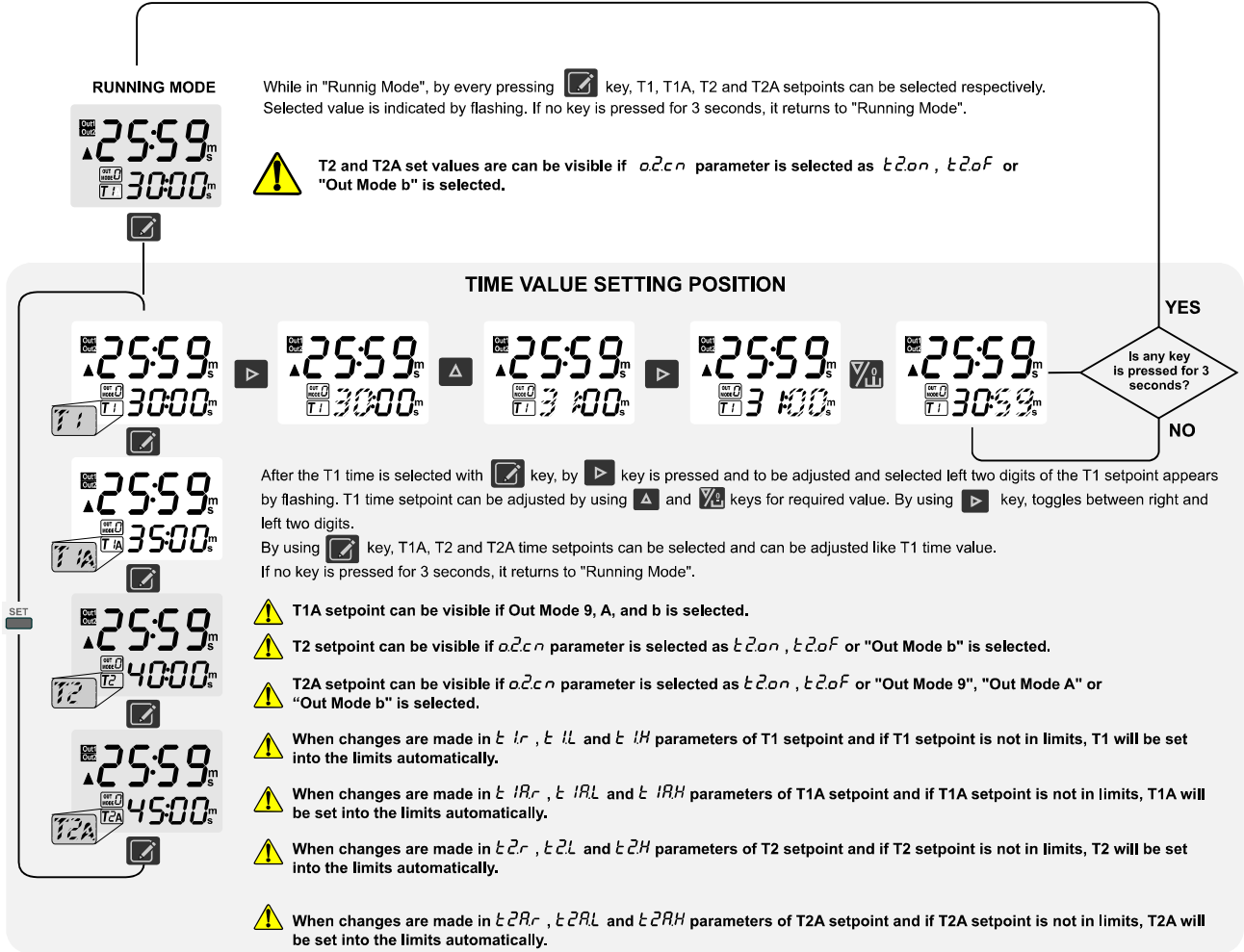
Avoid any liquid contact when the device is switched on.
DO NOT clean the device with solvent (thinner, gasoline, acid etc.) and / or abrasive cleaning agents.

TERMS



(1) PV Display	7 Segment, 4 digits green LCD indicator (Character height 10mm)
(5) SV Display	7 Segment, 4 digits green LCD indicator (Character height 7mm)
(2) Output indicators	Two pieces (Green)
(6) Input indicators	Three pieces (Green)
(3) Output mode indicator	Indicates selected output mode number (Green)
(7) Key pad	Micro switch
(4) setpoint information	Indicates setpoint name in SV indicator (Green)

TIME VALUE SETTINGS

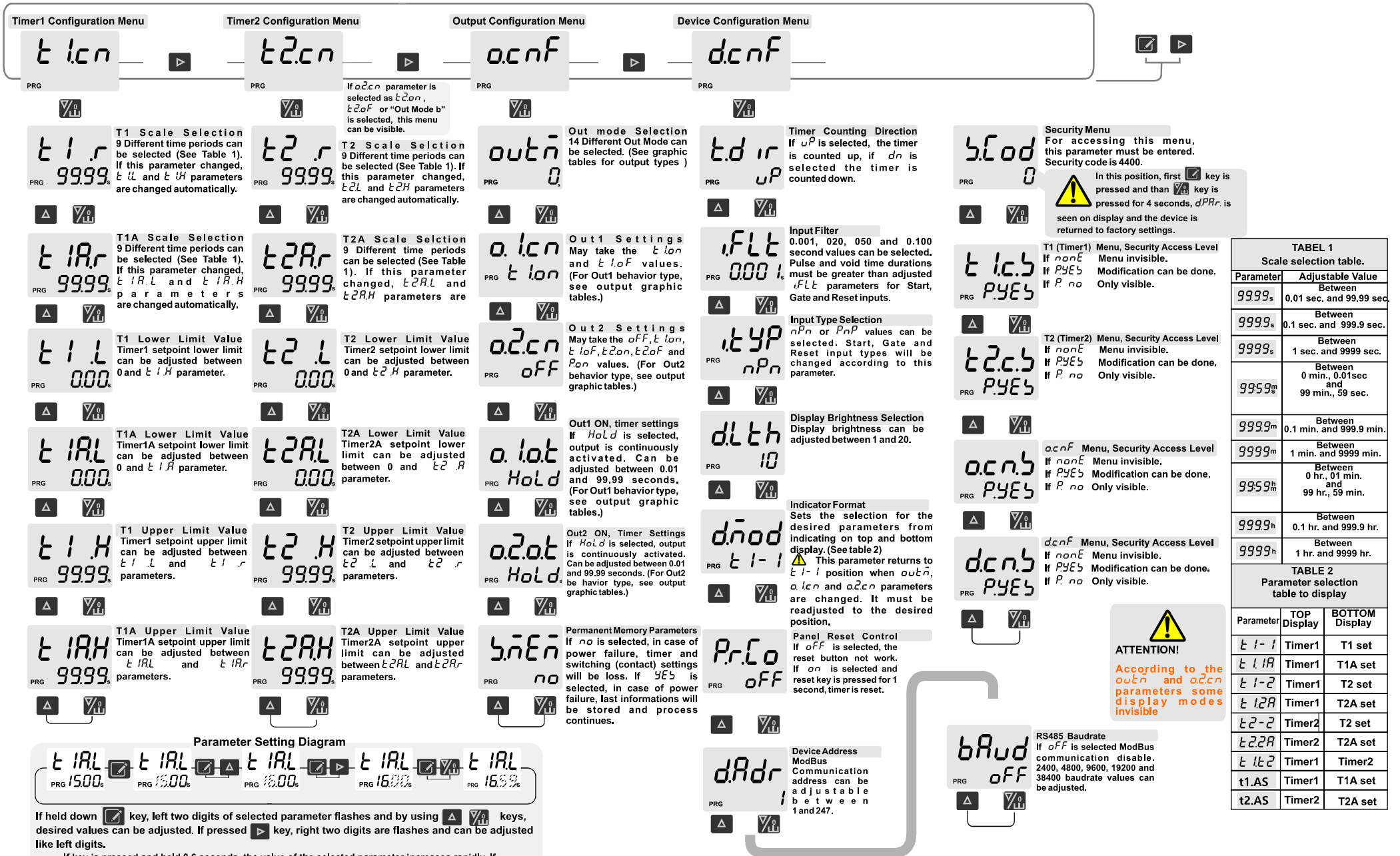


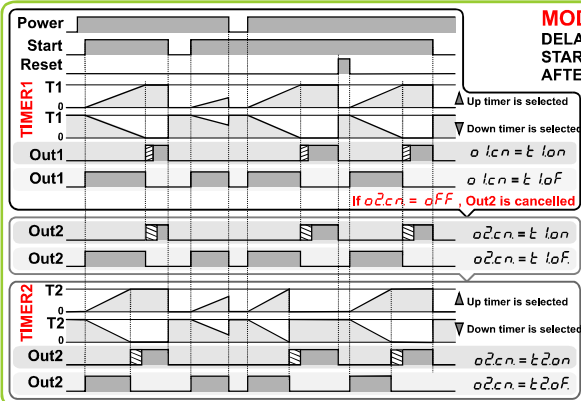
PROGRAMMING DIAGRAM

if key is pressed while holding down to the key, Programming Mode is entered.

Entering from the Programming Mode to the Running Mode:

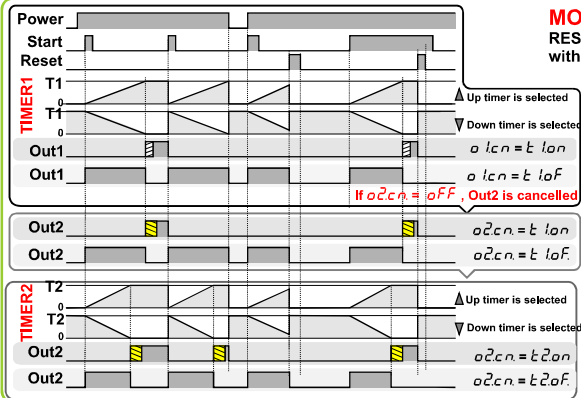
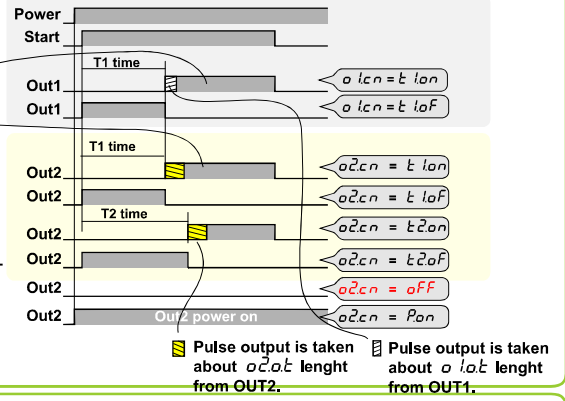
If no key is pressed within 20 seconds during Programming Mode, the data is stored automatically and the Running Mode is entered. Alternatively, the same function occurs first pressing key, Programming Mode is entered. Then keys are pressed, data is recorded and "Running Mode" is entered





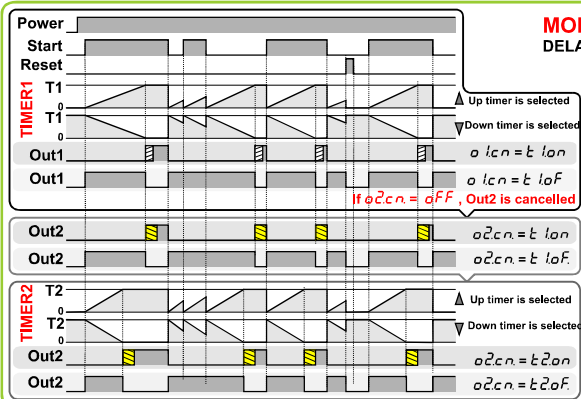
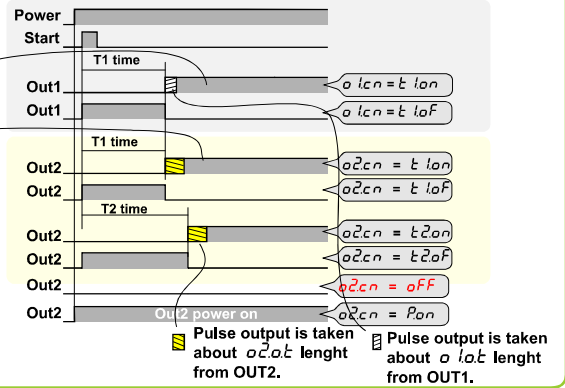
MODE 0
 DELAY with CONSTANT START ON and RESET AFTER START

If $o1ot$ or $o2ot$ is selected Hold, output is generated constantly until OFF START Input or RESET Input is taken from OUT1 or OUT2.



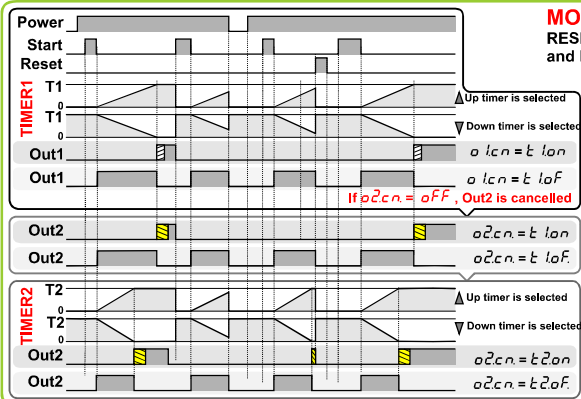
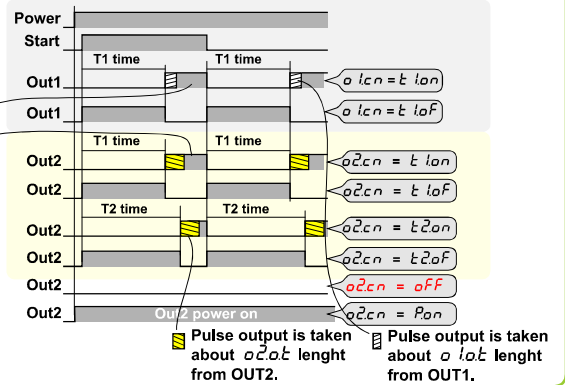
MODE 1
 RESET and DELAY with PULSE START ON

If $o1ot$ or $o2ot$ is selected Hold, output is generated constantly until OFF START Input or RESET Input is taken from OUT1 or OUT2.



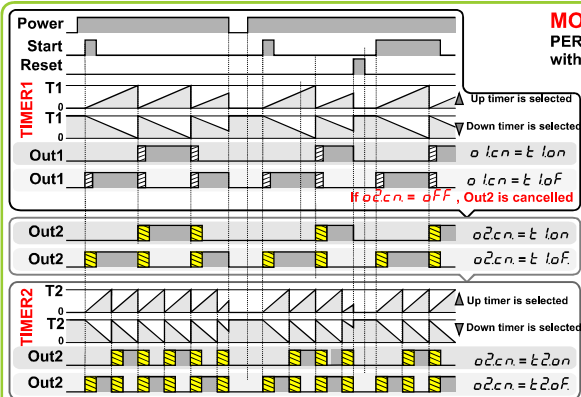
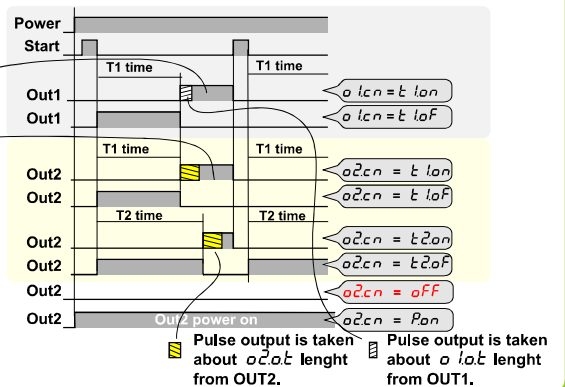
MODE 2
 DELAY with START ON/OFF

If $o1ot$ or $o2ot$ is selected Hold, output is generated constantly until OFF START Input or RESET Input is taken from OUT1 or OUT2.



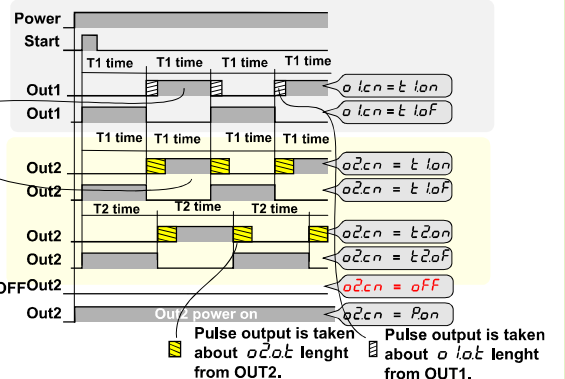
MODE 3
 RESET with START and DELAY with START OFF

If $o1ot$ or $o2ot$ is selected Hold, output is generated constantly until OFF START Input or RESET Input is taken from OUT1 or OUT2.

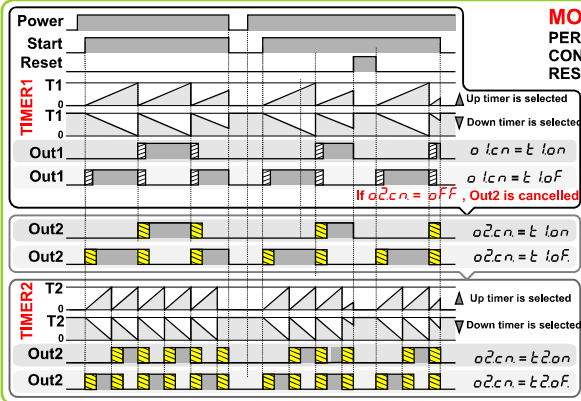


MODE 4
 PERIODIC PROCESS with START PULSE

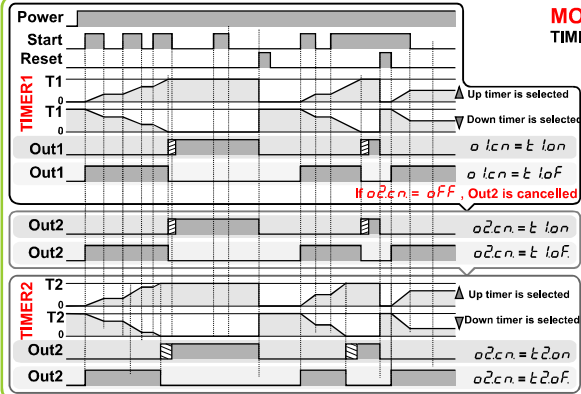
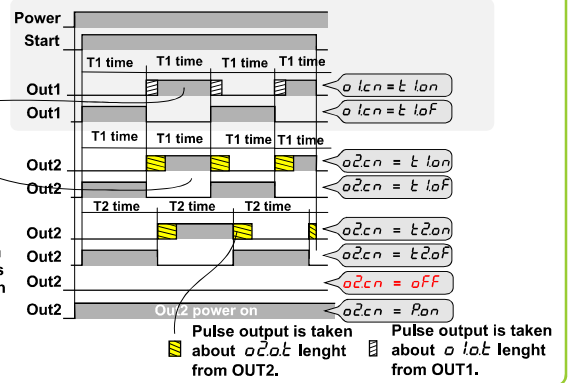
If $o1ot$ or $o2ot$ is selected Hold, Periodically OUT1 is set to ON or OFF with every T1 time, OUT2 is set to ON or OFF with every T2 time.



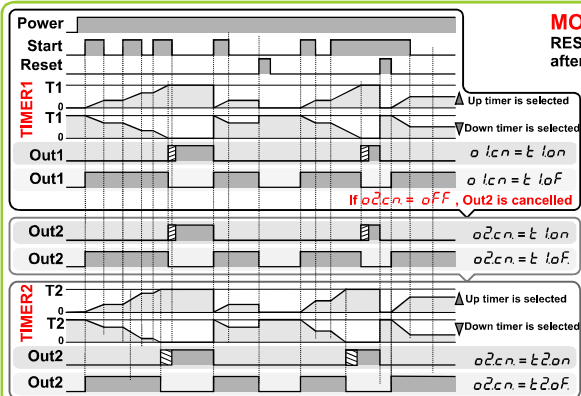
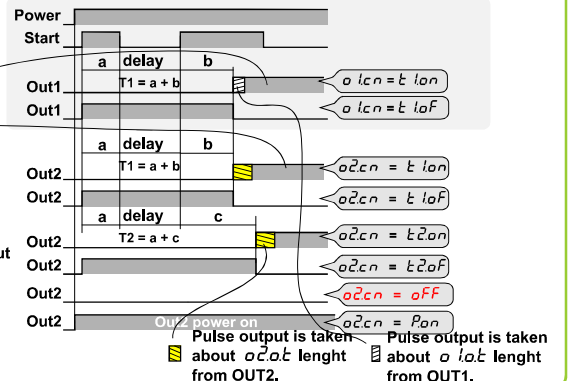
NOTE : All operations will be switched to standby if the Gate input is active.



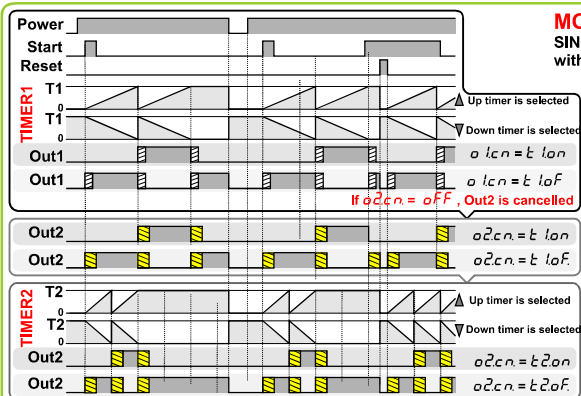
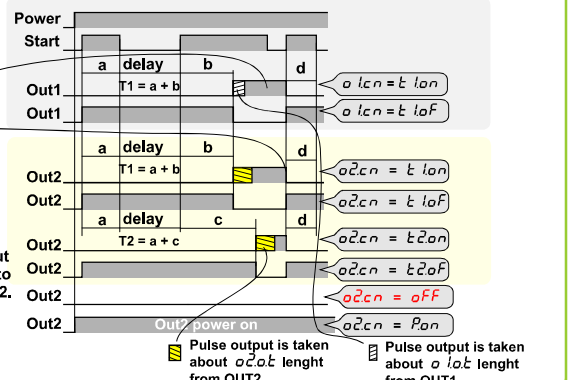
If $a\ \text{lat}$ or $a\bar{2}at$ is selected Hold, Periodically OUT1 is set to ON or OFF with every T1 time, OUT2 is set to ON or OFF with every T2 time while START signal is ON.



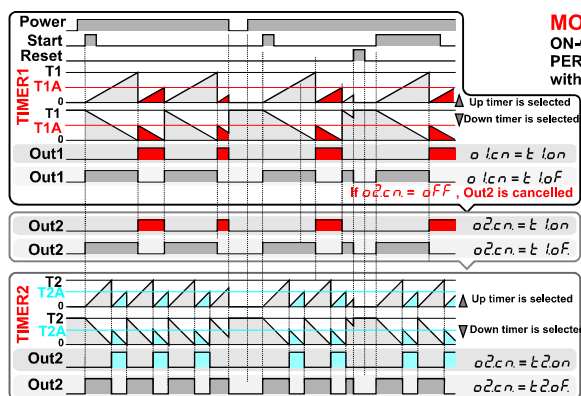
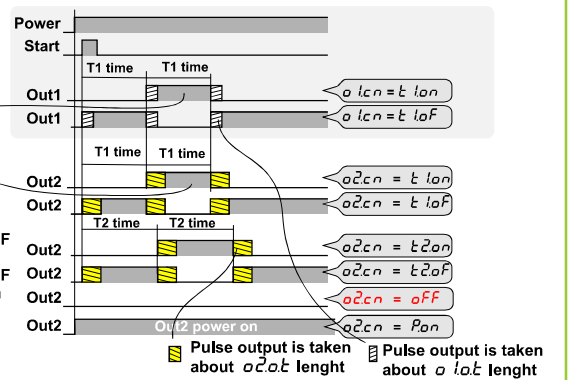
If $a\ \text{lat}$ or $a\bar{2}at$ is selected Hold, Constant output is taken until RESET Input is set to ON from OUT1 or OUT2.



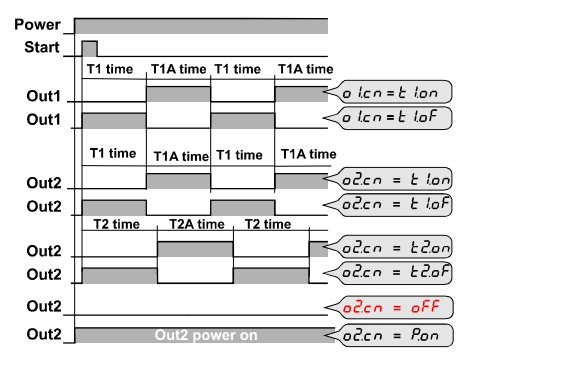
If $a\ \text{lat}$ or $a\bar{2}at$ is selected Hold, Constant output is taken until START Input or RESET Input is set to ON from OUT1 or OUT2.



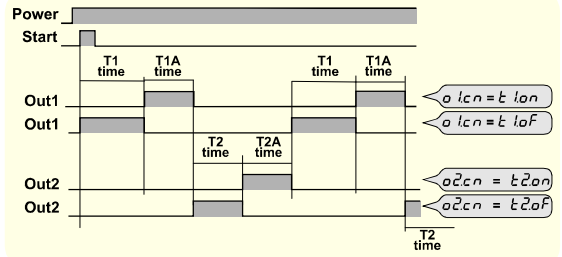
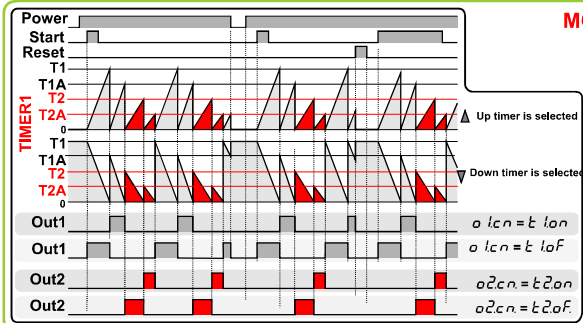
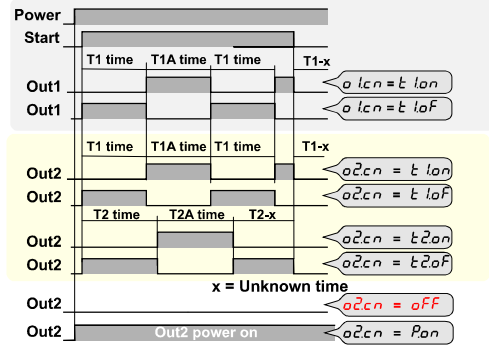
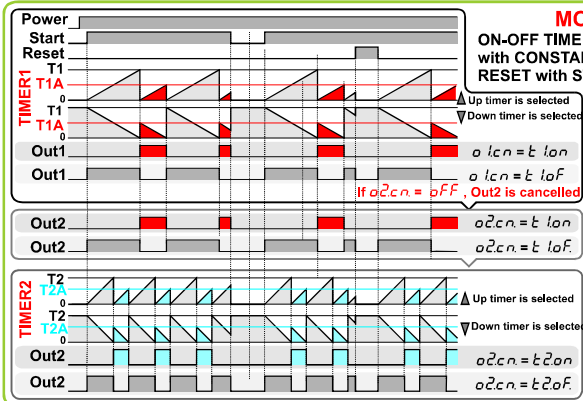
If $a\ \text{lat}$ or $a\bar{2}at$ is selected Hold, OUT1 is set ON or OFF about T1 length, OUT2 is set ON or OFF about T2 length when START Input is set to ON.



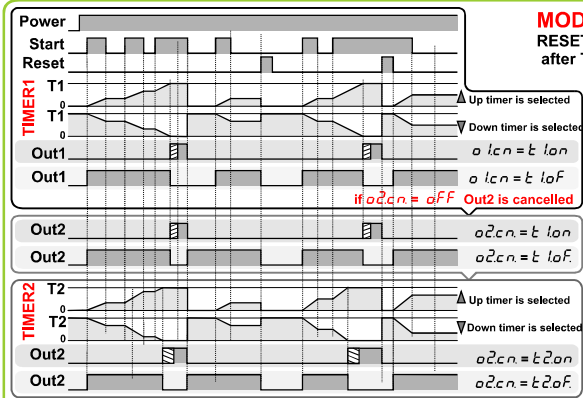
If $a\ \text{lat}$ or $a\bar{2}at$ is selected Hold, OUT1 is set ON or OFF about T1A length, OUT2 is set ON or OFF about T2A length when START Input is set to ON.



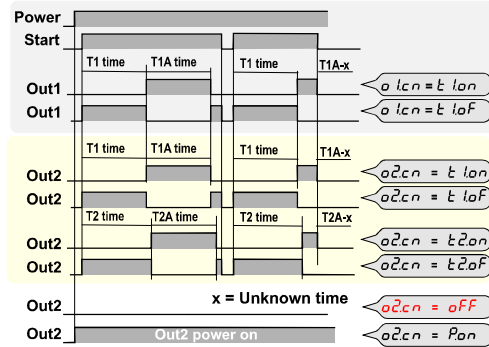
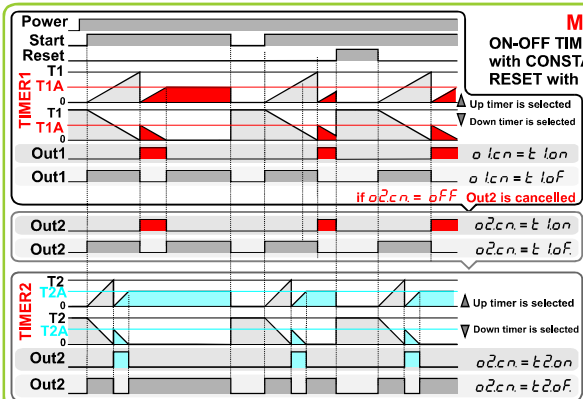
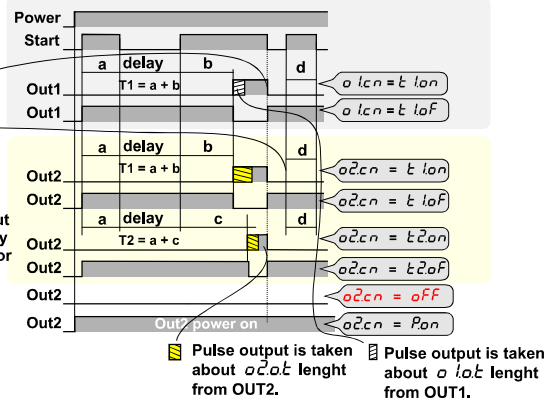
NOTE : All operations will be switched to standby if the Gate input is active.



ATTENTION! In order to choose this mode, $a\ dcn$ parameter must be set to $t\ lon$ or $t\ lof$.



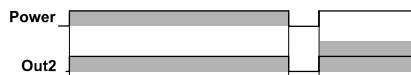
If $a\ loat$ or $a\ dot$ is selected Hold output is generated constantly until ON START Input or RESET Input is taken from OUT1 or OUT2.



NOTE 1 : All operations will be switched to standby if the Gate input is active.

NOTE 2 : If $a\ dcn$ parameter is set to $P\ on$, then Out2 output is activated and remains until power down.

In this selection, the Out2 output is only used to monitor whether the timer is energized. All other Out2 functions cannot be used.

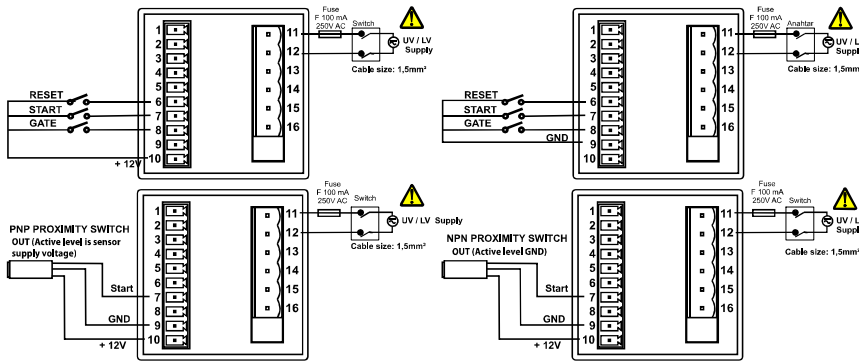


CONNECTION DIAGRAM

SENSOR CONNECTION SAMPLES

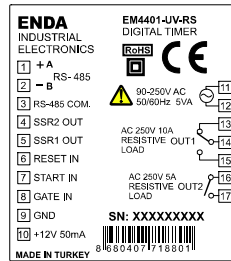
Typical connections for PNP sensor type

Typical connections for NPN sensor type



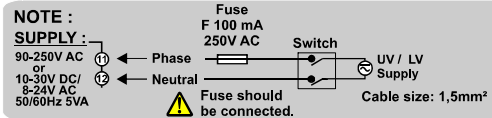
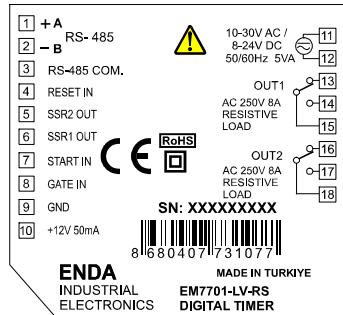
! Logic output of the device is not electrically isolated. Therefore, the logic output terminals should not be grounded when using grounded thermocouples.

Note : 1) Mains supply cords shall meet the requirements of IEC60227 or IEC60245.
2) In accordance with the safety regulations, the power supply switch shall bring the identification of the relevant instrument and it should be easily accessible by the operator.

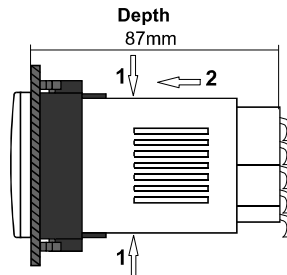
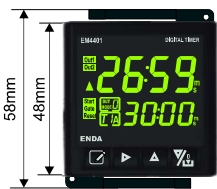


□ Equipment is protected throughout by DOUBLE INSULATION.

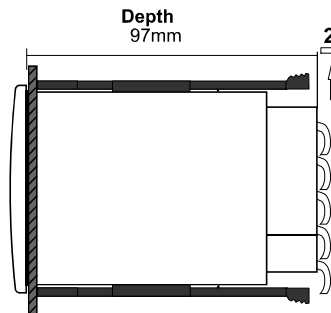
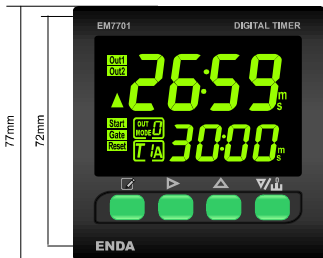
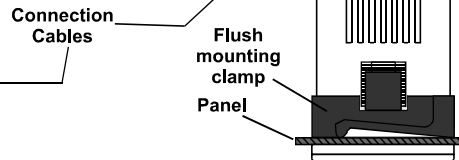
⊖ Holding screw 0.4-0.5Nm



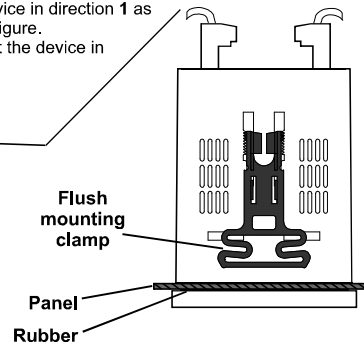
DIMENSIONS



To removing the mounting clamps ;
- Push the device in direction 1 as shown in the figure.
- Then pull out the device in direction 2 .

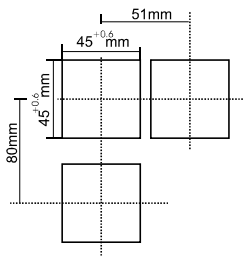


To removing the mounting clamps ;
- Push the device in direction 1 as shown in the figure.
- Then pull out the device in direction 2 .

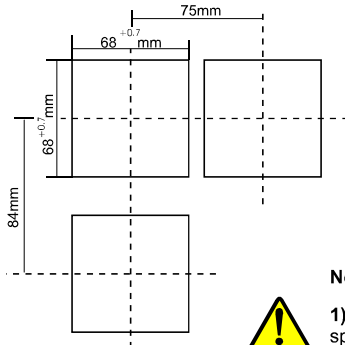


PANEL CUT OUT

EM4401



EM7701



Note :

- 1) While performing panel mounting, additional space should be allocated for cables.
- 2) Panel thickness should be maximum 9mm.
- 3) If there is no 100mm free space at back side of the device, it would be difficult to remove it from the panel.



ENDA EM Series is intended for installation within control panels. Make sure that the device is used only for intended purpose. The shielding must be grounded on the instrument side. During an installation, all of the cables that are connected to the device must be free of electrical power. The device must be protected against inadmissible humidity, vibrations, severe soiling. Make sure that the operation temperature is not exceeded. All input and output lines that are not connected to the supply network must be laid out as shielded and twisted cables. These cables should not be close to the power cables or components. The installation and electrical connections must be carried out by a qualified staff and must be according to the relevant locally applicable regulations.

ENDA EM SERIES DIGITAL TIMER MODBUS ADDRESS MAP

1.1 Memory Map for Timer Holding Registers

Parameter Number	Holding Register addresses Decimal (Hex)	Data Type	Data Content	Read / Write Permission	Factory Defaults	
Timer1 Configuration Parameters	H0	0000d (0000h)	Word	Setpoint for T1 time (Adjustable between 0-9999d. Format : BCD = 0-9999d) E.g. : Adjusting for 259 seconds MSB = 02h, LSB = 59h	R W	10
	H1	0001d (0001h)	Word	Setpoint for T1A time (Format must be as in the H0 parameter)	R W	15
	H2	0002d (0002h)	Word	Setpoint for T1 time base 0 = 99.99sec, 1 = 999.9sec, 2 = 9999sec, 3 = 99m59sec, 4 = 999.9min 5 = 9999min, 6 = 99h59min, 7 = 999.9hr, 8 = 9999hr.	R W	1
	H3	0003d (0003h)	Word	Setpoint for T1A time base. (Format must be as in the H2 parameter).	R W	0
	H4	0004d (0004h)	Word	Minimum setpoint value limit for T1 time. (Format must be as in the H0 parameter)	R W	0
	H5	0005d (0005h)	Word	Maximum setpoint value limit for T1 time. (Format must be as in the H0 parameter)	R W	9999
	H6	0006d (0006h)	Word	Minimum setpoint value limit for T1A time. (Format must be as in the H0 parameter)	R W	0
Timer2 Configuration Parameters	H7	0007d (0007h)	Word	Maximum setpoint value limit for T1A time. (Format must be as in the H0 parameter)	R W	9999
	H8	0008d (0008h)	Word	Setpoint for T2 time (Format must be as in the H0 parameter)	R W	30
	H9	0009d (0009h)	Word	Setpoint for T2A time (Format must be as in the H0 parameter)	R W	100
	H10	0010d (000Ah)	Word	Setpoint for T2 time base. (Format must be as in the H2 parameter).	R W	1
	H11	0011d (000Bh)	Word	Setpoint for T2A time base. (Format must be as in the H2 parameter).	R W	0
	H12	0012d (000Ch)	Word	Minimum setpoint value limit for T2 time. (Format must be as in the H0 parameter)	R W	0
	H13	0013d (000Dh)	Word	Maximum setpoint value limit for T2 time. (Format must be as in the H0 parameter)	R W	9999
Output Parameters	H14	0014d (000Eh)	Word	Minimum setpoint value limit for T2A time. (Format must be as in the H0 parameter)	R W	0
	H15	0015d (000Fh)	Word	Maximum setpoint value limit for T2A time. (Format must be as in the H0 parameter)	R W	9999
	H16	0016d (0010h)	Word	Output type parameter. Can be adjusted between 0 and 11. See graphic tables for output types	R W	0
	H17	0017d (0011h)	Word	OUT1 Configuration parameter. Can be adjusted between 0 and 2. See graphic tables for output types	R W	1
	H18	0018d (0012h)	Word	OUT2 Configuration parameter. Can be adjusted between 0 and 4. See graphic tables for output types	R W	0
	H19	0019d (0013h)	Word	OUT1 Contact output duration. Adjustable between 0.00 and 99.99 sec. (0 = Hold) Format: BCD = 99h, MSB = 99h E.g. : Adjusting for 12.50sec., MSB 12hr, LSB = 50hr	R W	0
	H20	0020d (0014h)	Word	OUT2 Contact output duration. Adjustable between 0.00 and 99.99 sec. (0 = Hold) (Format must be as in the H19 parameter)	R W	0
Device Configuration	H21	0021d (0015h)	Word	Minimum puls duration time parameters for RESET, START and GATE inputs. 0 = 1ms, 1 = 20ms, 2 = 50ms, 3 = 100ms	R W	1
	H22	0022d (0016h)	Word	Display luminous intensity setting parameter. Can be adjusted between 1 and 20.	R W	10
	H23	0023d (0017h)	Word	Display configuration parameter. Adjustable between 0 and 6. See TABLE 2 for selection.	R W	0
	H24	0024d (0018h)	Word	Device address values for Modbus. (Adjustable between 1 and 247)	R W	1
	H25	0025d (0019h)	Word	Communication speed for : 0 = 1200 bps, 1 = 2400 bps, 2 = 4800 bps, 3 = 9600 bps, 4 = 14400 bps, 5 = 19200 bps, 6 = 38400 bps, 7 = 57600 bps	R W	3
Security Parameters	H26	0026d (001Ah)	Word	T1 (Timer1) Menu, security access level parameter. Adjustable between 0 and 2. 0 = Menu invisible, 1 = Modification can be done, 2 = Menu parameters only visible.	R W	1
	H27	0027d (001Bh)	Word	T2 (Timer2) Menu, security access level parameter. Adjustable between 0 and 2. 0 = Menu invisible, 1 = Modification can be done, 2 = Menu parameters only visible.	R W	1
	H28	0028d (001Ch)	Word	Output configuration menu, security access level parameter. Adjustable between 0 and 2. 0 = Menu invisible, 1 = Modification can be done, 2 = Menu parameters only visible.	R W	1
	H29	0029d (001Dh)	Word	Device configuration menu, security access level parameter. Adjustable between 0 and 2. 0 = Menu invisible, 1 = Modification can be done, 2 = Menu parameters only visible.	R W	1
	H30	0030d (001Eh)	Word	Function control parameter. If 23040d (5A00h) value is entered, device is returned to factory settings.	R W	0

1.2 Memory Map for Control Coils

Parameter Number	Coil Addresses Decimal (Hex)	Data Type	Data Content	Read / Write Permission	Factory Defaults
C0	0000d (0000h)	Bit	Timer counting direction (0 = Count UP , 1 = Count DOWN)	R W	0
C1	0001d (0001h)	Bit	Data storage in case of power failure (Permanent memory parameters) 0 = Storing data enabled (Possible), 1 = Storing data disabled (Not Possible).	R W	0
C2	0002d (0002h)	Bit	Sensor type selection. (0 = NPN , 1 = PNP)	R W	0
C3	0003d (0003h)	Bit	Panel RESET activation. (0 = Reset key inactive, 1 = Reset key is active)	R W	0
C4	0004d (0004h)	Bit	Reserve	R W	0
C5-C15	0005d (0005h) 0015d (000Fh)	Bit	Reserve	R W	X

ENDA EM SERIES DIGITAL TIMER MODBUS ADDRESS MAP

1.3 Memory Map for Input Registerlers

Parameter Number	Holding Register addresses Decimal (Hex)	Data Type	Data Content	Read / Write Permission
I0	0000d (0000h)	Word	Timer1 time value (Must be read according to BCD format)	R
I1	0001d (0001h)	Word	Timer2 time value (Format is as in the I0 parameter)	R
I2	0002d (0002h)	Word	Out1 puls time value (Must be read according to BCD format. Sensitivity 0.00sn)	R
I3	0003d (0003h)	Word	Out2 puls time value (Format is as in the I2 parameter)	R

1.4 Memory Map for Output Status Indicator Bits

Parameter Number	Discrete input addresses	Data Type	Data Content	Read / Write Permission
D0	(0000)h	Bit	OUT1 Output status (0 = OFF ,1 = ON)	R
D1	(0001)h	Bit	OUT2 Output status (0 = OFF ,1 = ON)	R
D2	(0002)h	Bit	Panel reset key status (0 = Reset key inactive, 1 = Reset key is active)	R
D3	(0003)h	Bit	Reserve	R
D4	(0004)h	Bit	Reset input status (0 = Reset input inactive, 1 = Reset input is active)	R
D5	(0005)h	Bit	Gate input status (0 = Gate input inactive, 1 = Gate input is active)	R
D6	(0006)h	Bit	Start input status (0 = Start input inactive, 1 = Start input is active)	R
D7-D15	0007d (0007h) 0015d (000Fh)	Bit	Reserve	R

1.5 Memory Map for Software Revision Input Registers

Software Revision	0920d (0398h)	14 Word	Software name and update date is in ASCII format and 14 word. Example : EM4401-01 25 March 2016. Memory Format : <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 5px auto;"> Word Word Word Word Word Word Word Word Word Word Word Word Word Word Word 1 2 3 4 5 6 7 8 9 10 11 12 13 14 ME44010-1 52Mar210.6 </div> NOTE : To view each word correctly by changing the byte sequences should be displayed as ASCII TEXT	R
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MODBUS ERROR MESSAGES

Modbus protocol has two types error, communication error and operating error. Reason of the communication error is data corruption in transmission. Parity and CRC control should be done to prevent communication error. Receiver side checks parity and CRC of the data. If they are wrong, the message will be ignored. If format of the data is true but function doesn't perform for any reason, operating error occurs. Slave realizes error and sends error message. Most significant bit of function is changed '1' to indicate error in error message by slave. Error code is sent in data section. Master realizes error type via this message.

ModBus Error Codes

Error Code	Name	Meaning
{01}	ILLEGAL FUNCTION	The function code received in the query is not an allowable action for the slave. If a Poll Program Complete command was issued, this code indicates that no program function preceded it.
{02}	ILLEGAL DATA ADDRESS	The data address received in the query is not an allowable address for the slave.
{03}	ILLEGAL DATA VALUE	A value contained in the query data field is not an allowable value for the slave.

Message Sample ;
Structure of command message (Byte Format)

Device Address	(0A)h
Function Code	(01)h
Beginning address of coils.	MSB (04)h
	LSB (A1)h
Number of coils (N)	MSB (00)h
	LSB (01)h
CRC DATA	LSB (AC)h
	MSB (63)h

Structure of response message (Byte Format)

Device Address	(0A)h
Function Code	(81)h
Error Code	(02)h
CRC DATA	LSB (B0)h
	MSB (53)h

As you see in command message, coil information of (4A1)h = 1185 is required but there isn't any coil with 1185 address. Therefore error code with number (02) (Illegal Data Address) sends.

* MODBUS CONNECTION DIAGRAM

