Read this document carefully before using this device. The guarantee will be expired by device demages 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 □□01-□□-□□
1 2 3

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

RoHS Compliant CE

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	2.5mm² Screw-terminal power connection, 1,5mm² 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.

OUTPUTS	
Control Output OUT1,OUT2	**EM4401 : OUT1** ; 250V AC, 10A (for resistive load), NO+NC. **OUT2 :** 250V AC, 5A (for resistive load), NO. **EM7701 : OUT1**, **OUT2** ; 250V AC, 8A (for resistive load), NO+NC
SSR1, SSR2 Output	Open collector output (S.S. OUT) : Max. 30V DC, 50mA.
Auxiliary Power Supply	12V DC, max. 50mA (without regulation).
Life Expectancy for Relay	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

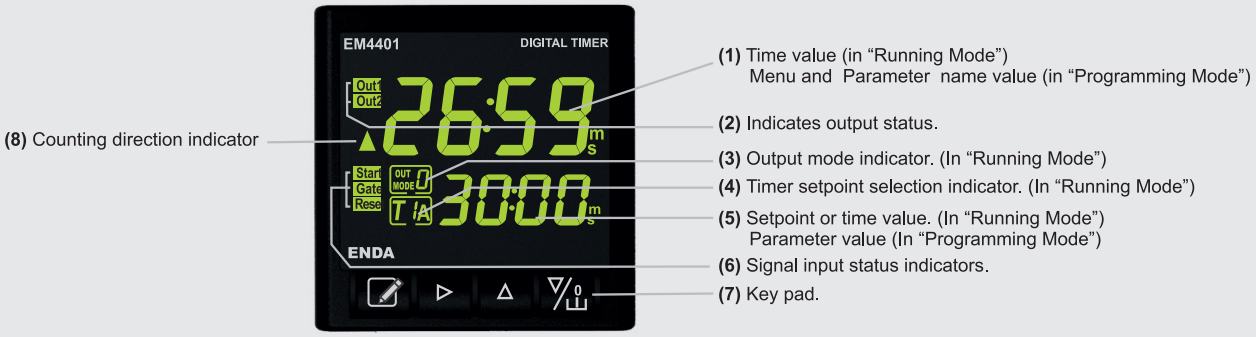
⚠ **Note :**
Relay and S.S.OUT outputs run simultaneously. ie, when the OUT 1 or OUT2 relay is energized, the SSR1 or SSR2 transistor also turns on.

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.

sisel
SİSEL MÜHENDİSLİK ELEKTRONİK SAN. VE TİC. A.Ş.
Şerifali Mah. Barbaros Cad. No:18 Y.Dudullu 34775
ÜMRANİYE/İSTANBUL-TURKEY
Tel : +90 216 499 46 64 Pbx. Fax : +90 216 365 74 01
url : www.enda.com.tr

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

RUNNING MODE

While in "Runnig Mode", by every pressing key, T1, T1A, T2 and T2A setpoints can be selected respectively. Selected value is indicated by flashing. If no key is pressed for 3 seconds, it returns to "Running Mode".

T2 and T2A set values are can be visible if o.2.cn parameter is selected as t2.on , t2.oF or "Out Mode b" is selected.

TIME VALUE SETTING POSITION

After the T1 time is selected with key, by key is pressed and to be adjusted and selected left two digits of the T1 setpoint appears by flashing. T1 time setpoint can be adjusted by using and keys for required value. By using key, toggles between right and left two digits.
By using key, T1A, T2 and T2A time setpoints can be selected and can be adjusted like T1 time value.
If no key is pressed for 3 seconds, it returns to "Running Mode".

T1A setpoint can be visible if Out Mode 9, A, and b is selected.

T2 setpoint can be visible if o.2.cn parameter is selected as t2.on , t2.oF or "Out Mode b" is selected.

T2A setpoint can be visible if o.2.cn parameter is selected as t2.on , t2.oF or "Out Mode 9", "Out Mode A" or “Out Mode b" is selected.

When changes are made in t 1r , t 1L and t 1H parameters of T1 setpoint and if T1 setpoint is not in limits, T1 will be set into the limits automatically.

When changes are made in t 1A.r , t 1A.L and t 1A.H parameters of T1A setpoint and if T1A setpoint is not in limits, T1A will be set into the limits automatically.

When changes are made in t2.r , t2.L and t2.H parameters of T2 setpoint and if T2 setpoint is not in limits, T2 will be set into the limits automatically.

When changes are made in t2A.r , t2A.L and t2A.H parameters of T2A setpoint and if T2A setpoint is not in limits, T2A will be set into the limits automatically.

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

Timer1 Configuration Menu → **Timer2 Configuration Menu** → **Output Configuration Menu** → **Device Configuration Menu**

Timer1 Configuration Menu

T1 Scale Selection
9 Different time periods can be selected (See Table 1). If this parameter changed, t1L and t1H parameters are changed automatically.

T1A Scale Selection
9 Different time periods can be selected (See Table 1). If this parameter changed, t1A.L and t1A.H parameters are changed automatically.

T1 Lower Limit Value
Timer1 setpoint lower limit can be adjusted between 0 and t1.H parameter.

T1A Lower Limit Value
Timer1A setpoint lower limit can be adjusted between 0 and t1.A parameter.

T1 Upper Limit Value
Timer1 setpoint upper limit can be adjusted between t1.L and t1.r parameters.

T1A Upper Limit Value
Timer1A setpoint upper limit can be adjusted between t1A.L and t1A.r parameters.

Timer2 Configuration Menu

If o2cn parameter is selected as t2on, t2oF or "Out Mode b" is selected, this menu can be visible.

T2 Scale Selction
9 Different time periods can be selected (See Table 1). If this parameter changed, t2L and t2H parameters are changed automatically.

T2A Scale Selction
9 Different time periods can be selected (See Table 1). If this parameter changed, t2A.L and t2A.H parameters are

T2 Lower Limit Value
Timer2 setpoint lower limit can be adjusted between 0 and t2.H parameter.

T2A Lower Limit Value
Timer2A setpoint lower limit can be adjusted between 0 and t2.A parameter.

T2 Upper Limit Value
Timer2 setpoint upper limit can be adjusted between t2.L and t2.r parameters.

T2A Upper Limit Value
Timer2A setpoint upper limit can be adjusted between t2A.L and t2A.r parameters.

Output Configuration Menu

Out mode Selection
14 Different Out Mode can be selected. (See graphic tables for output types)

Out1 Settings
May take the t1on and t1oF values. (For Out1 behavior type, see output graphic tables.)

Out2 Settings
May take the oFF, t1on, t1oF, t2on, t2oF and Pon values. (For Out2 behavior type, see output graphic tables.)

Out1 ON, timer settings
If HoLd is selected, output is continuously activated. Can be adjusted between 0.01 and 99.99 seconds. (For Out1 behavior type, see output graphic tables.)

Out2 ON, Timer Settings
If HoLd is selected, output is continuously activated. Can be adjusted between 0.01 and 99.99 seconds. (For Out2 be havior type, see output graphic tables.)

Permanent Memory Parameters
If no is selected, in case of power failure, timer and switching (contact) settings will be loss. If YES is selected, in case of power failure, last informations will be stored and process continues.

Device Configuration Menu

Timer Counting Direction
If uP is selected, the timer is counted up, if dn is selected the timer is counted down.

Input Filter
0.001, 020, 050 and 0.100 second values can be selected. Pulse and void time durations must be greater than adjusted iFLt parameters for Start, Gate and Reset inputs.

Input Type Selection
nPn or PnP values can be selected. Start, Gate and Reset input types will be changed according to this parameter.

Display Brightness Selection
Display brightness can be adjusted between 1 and 20.

Indicator Format
Sets the selection for the desired parameters from indicating on top and bottom display. (See table 2)
⚠ This parameter returns to t1-1 position when outn, o1cn and o2cn parameters are changed. It must be readjusted to the desired position.

Panel Reset Control
If oFF is selected, the reset button not work. If on is selected and reset key is pressed for 1 second, timer is reset.

Device Address
ModBus Communication address can be adjustable between 1 and 247.

Security Menu
For accessing this menu, this parameter must be entered. Security code is 4400.

In this position, first ✎ key is pressed and than ▽/0 key is pressed for 4 seconds, dPAr. is seen on display and the device is returned to factory settings.

T1 (Timer1) Menu, Security Access Level
If nonE Menu invisible.
If PYES Modification can be done.
If P. no Only visible.

T2 (Timer2) Menu, Security Access Level
If nonE Menu invisible.
If PYES Modification can be done.
If P. no Only visible.

o.cnF Menu, Security Access Level
If nonE Menu invisible.
If PYES Modification can be done.
If P. no Only visible.

d.cnF Menu, Security Access Level
If nonE Menu invisible.
If PYES Modification can be done.
If P. no Only visible.

RS485 Baudrate
If oFF is selected ModBus communication disable. 2400, 4800, 9600, 19200 and 38400 baudrate values can be adjusted.

ATTENTION!
According to the outn and o2cn parameters some display modes invisible

Parameter Setting Diagram

If held down ✎ key, left two digits of selected parameter flashes and by using △ ▽/0 keys, desired values can be adjusted. If pressed ▷ key, right two digits are flashes and can be adjusted like left digits.

△ If key is pressed and held 0.6 seconds, the value of the selected parameter increases rapidly. If waited enough,the value increases a hundred at each step. After 1 second, following the release of the key, initial increasing condition is returned. Same procedure is valid for the decrementing.

TABEL 1
Scale selection table.

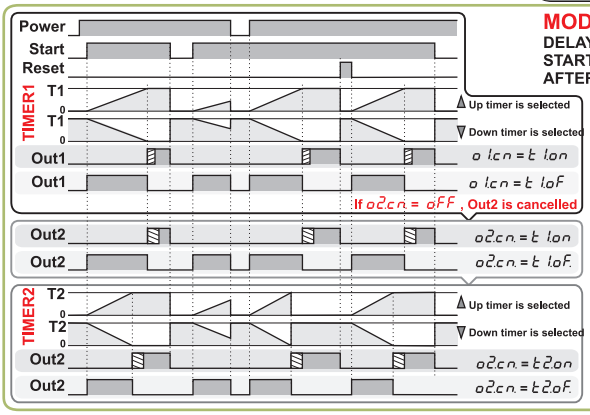
Parameter	Adjustable Value
99.99s	Between 0.01 sec. and 99.99 sec.
999.9s	Between 0.1 sec. and 999.9 sec.
9999s	Between 1 sec. and 9999 sec.
99:59ms	Between 0 min., 0.01sec and 99 min., 59 sec.
999.9m	Between 0.1 min. and 999.9 min.
9999m	Between 1 min. and 9999 min.
99:59hm	Between 0 hr., 01 min. and 99 hr., 59 min.
999.9h	Between 0.1 hr. and 999.9 hr.
9999h	Between 1 hr. and 9999 hr.

TABLE 2
Parameter selection table to display

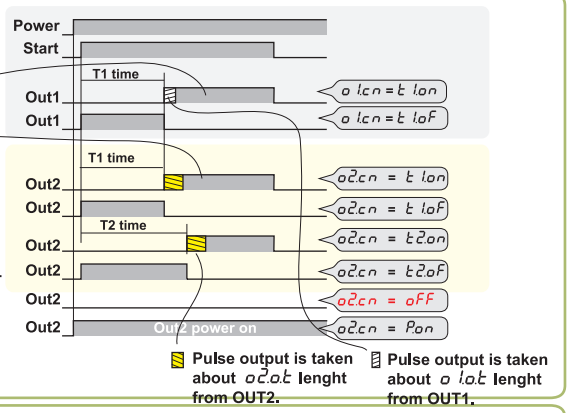
Parameter	TOP Display	BOTTOM Display
t1-1	Timer1	T1 set
t1.1A	Timer1	T1A set
t1-2	Timer1	T2 set
t1.2A	Timer1	T2A set
t2-2	Timer2	T2 set
t2.2A	Timer2	T2A set
t1t2	Timer1	Timer2
t1.AS	Timer1	T1A set
t2.AS	Timer2	T2A set

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.

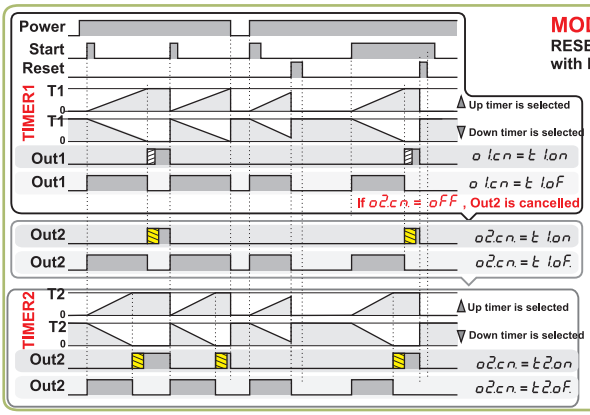


Pulse output is taken about o2ot lenght from OUT2.

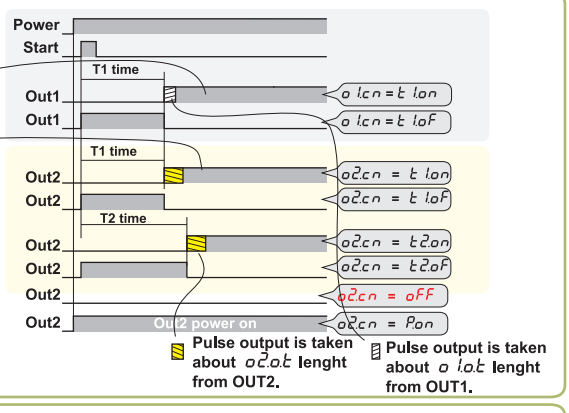
Pulse output is taken about o1ot lenght from OUT1.

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.

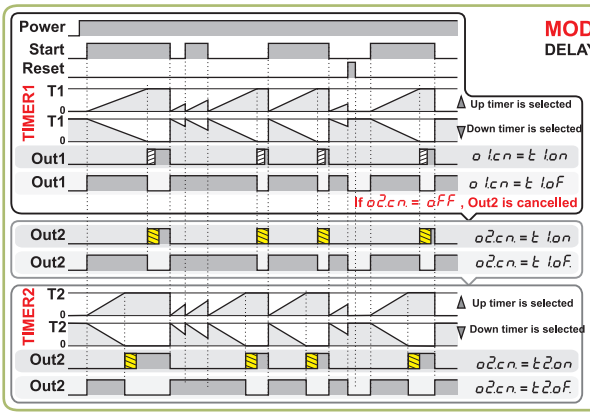


Pulse output is taken about o2ot lenght from OUT2.

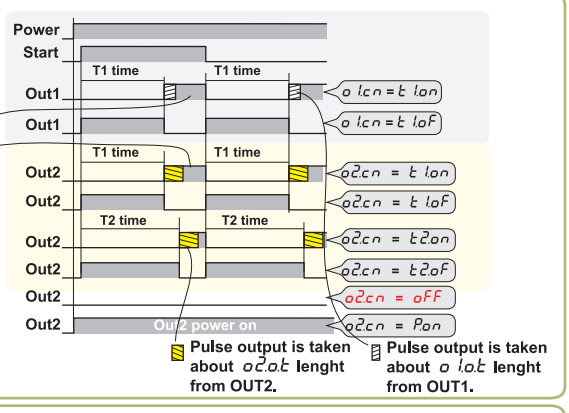
Pulse output is taken about o1ot lenght from OUT1.

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.

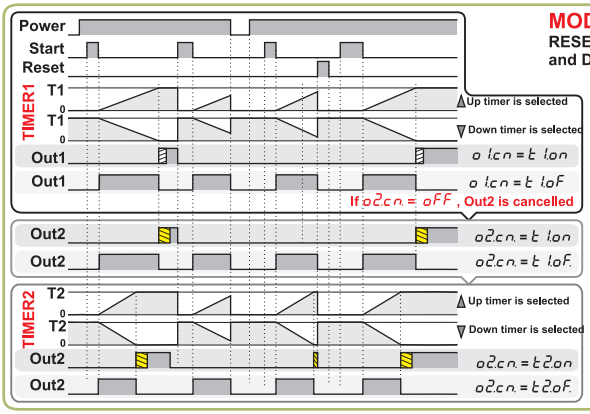


Pulse output is taken about o2ot lenght from OUT2.

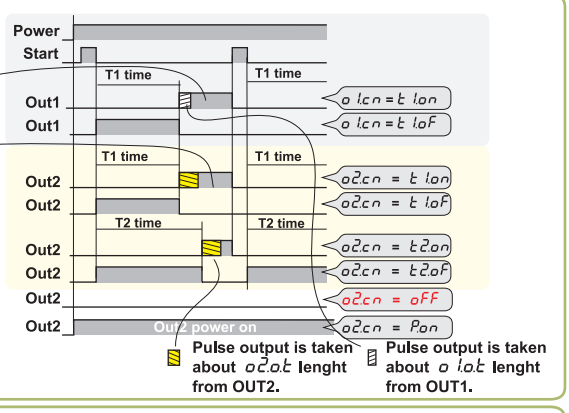
Pulse output is taken about o1ot lenght from OUT1.

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.

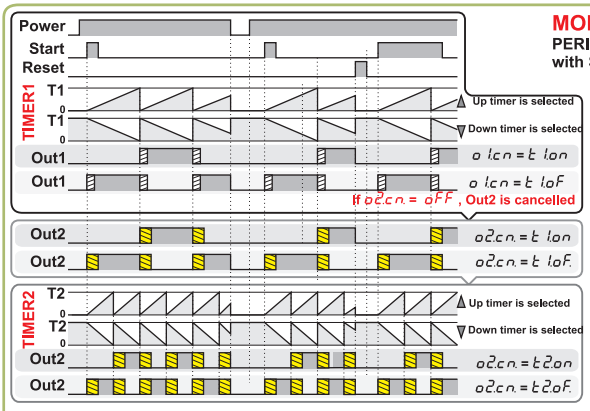


Pulse output is taken about o2ot lenght from OUT2.

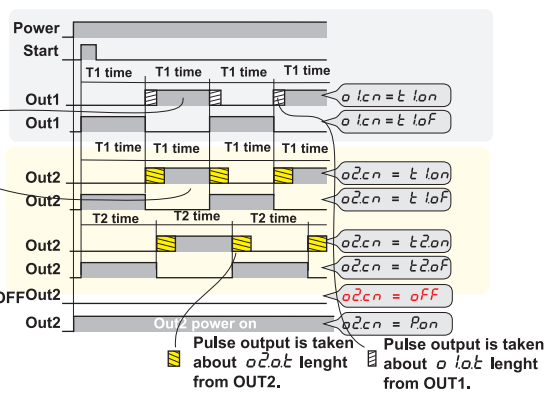
Pulse output is taken about o1ot lenght from OUT1.

MODE 4

PERIODIC PROCESS with START PULSE



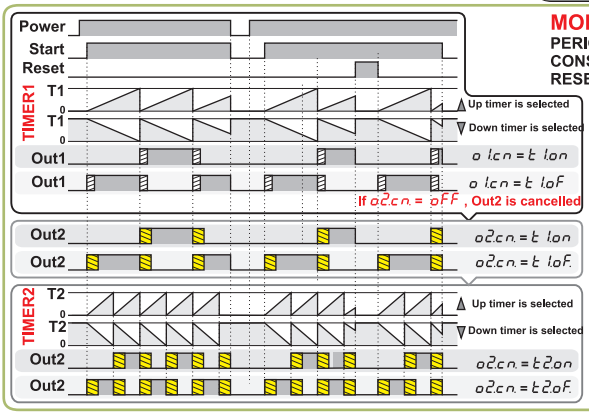
If o1ot or o2ot is selected Hold, Periodically OUT1 is set to ON or OFF with every T1 time , OUT2 is set to ON or OFF with every T2 time.



Pulse output is taken about o2ot lenght from OUT2.

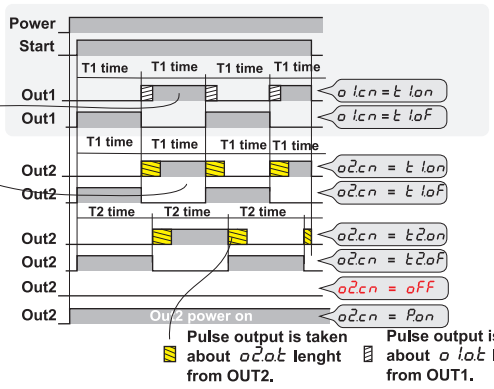
Pulse output is taken about o1ot lenght from OUT1.

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



MODE 5

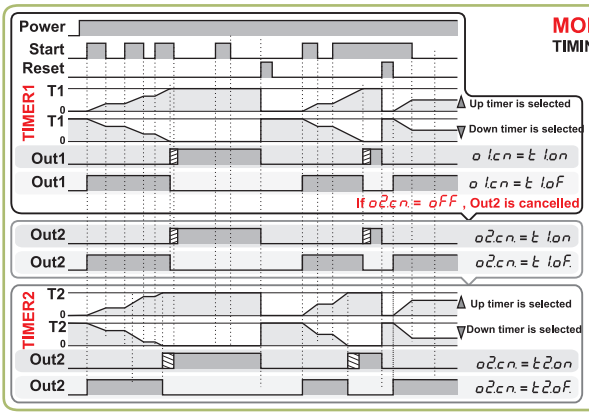
PERIODIC PROCESS with CONSTANT START and RESET AFTER START



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 while START signal is ON.

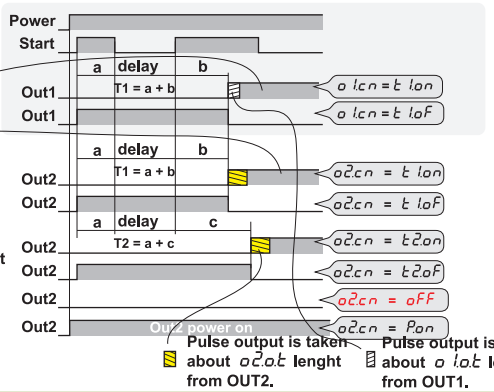
Pulse output is taken about o2ot lenght from OUT2.

Pulse output is taken about o1ot lenght from OUT1.



MODE 6

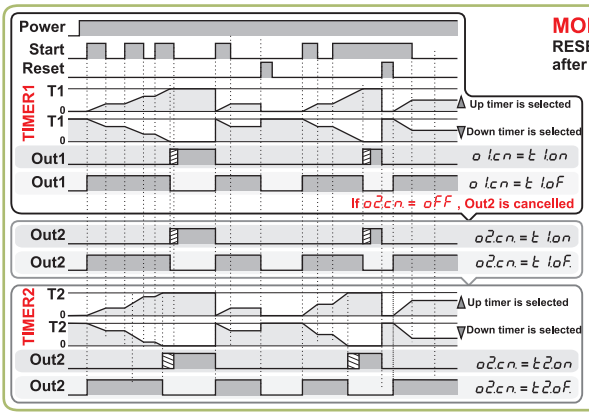
TIMING with START



If o1ot or o2ot is selected Hold, Constant output is taken until RESET Input is set to ON from OUT1 or OUT2.

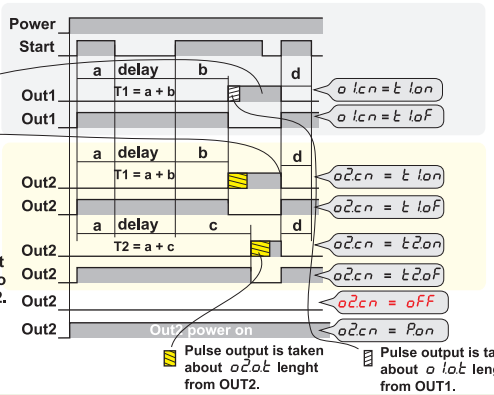
Pulse output is taken about o2ot lenght from OUT2.

Pulse output is taken about o1ot lenght from OUT1.



MODE 7

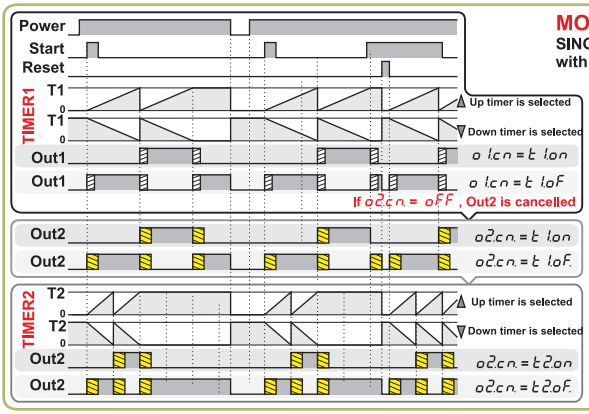
RESET with START after TIMING with START



If o1ot or o2ot is selected Hold, Constant output is taken until START Input or RESET Input is set to ON from OUT1 or OUT2.

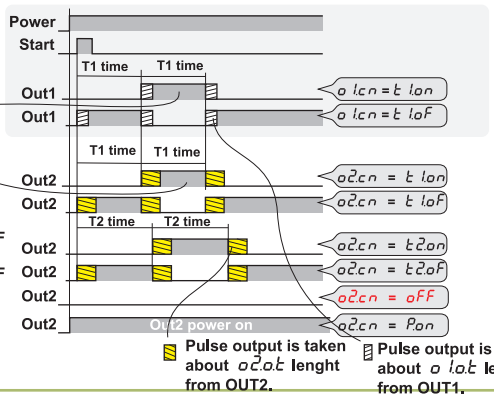
Pulse output is taken about o2ot lenght from OUT2.

Pulse output is taken about o1ot lenght from OUT1.



MODE 8

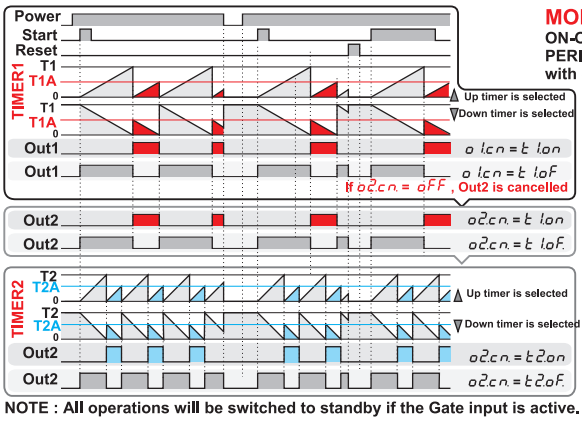
SINGLE PERIOD TIMING with START ON



If o1ot or o2ot is selected Hold, OUT1 is set ON or OFF about T1 lenght , OUT2 is set ON or OFF about T2 lenght when START Input is set to ON .

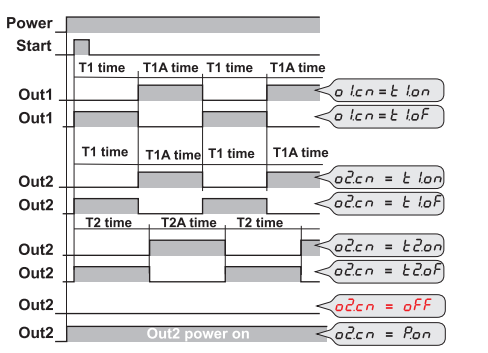
Pulse output is taken about o2ot lenght from OUT2.

Pulse output is taken about o1ot lenght from OUT1.



MODE 9

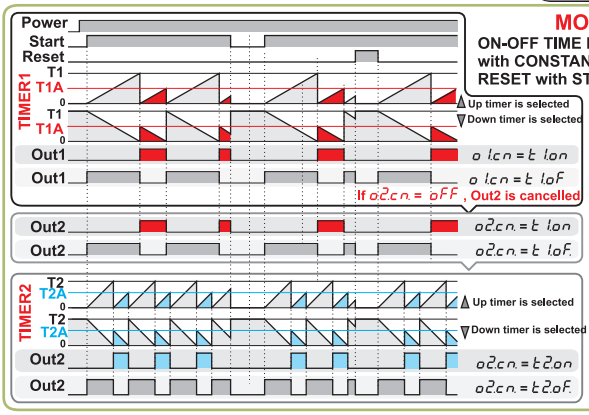
ON-OFF TIME PERIODIC PROCESS with START PULSE

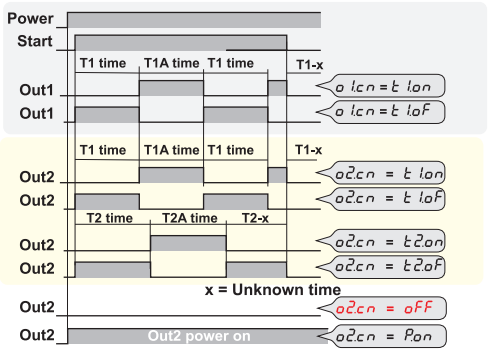


NOTE : All operations will be switched to standby if the Gate input is active.

MODE A

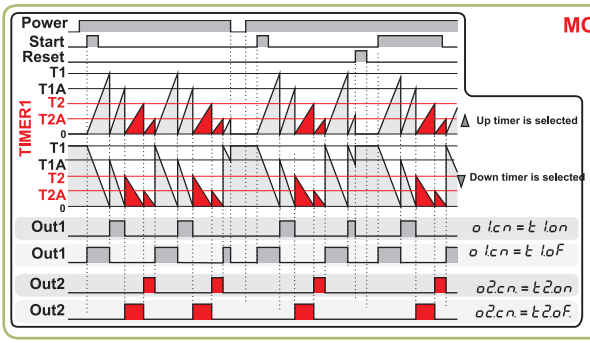
ON-OFF TIME PERIODIC PROCESS with CONSTANT START and RESET with START OFF

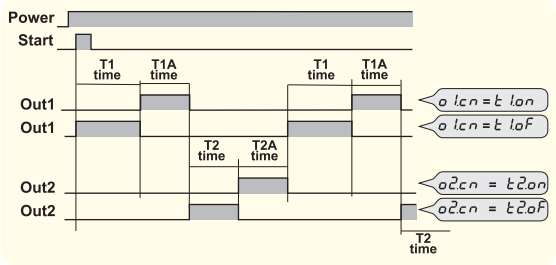




MODE B

ON-OFF TIME DOUBLE CONTACT DOUBLE PERIODIC PROCESS with START PULSE

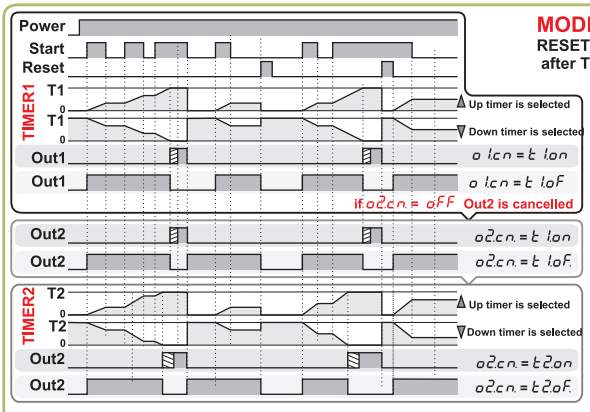


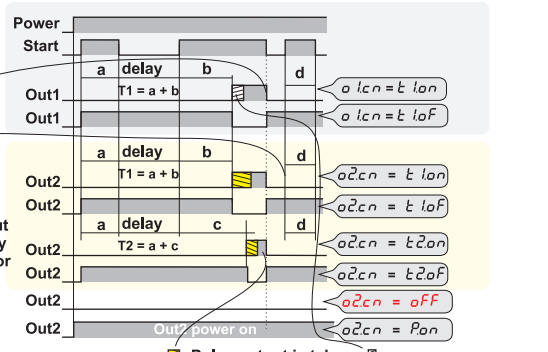


ATTENTION! In order to choose this mode , o2cn parameter must be setted to t2on or t2oF .

MODE C

RESET with START OFF after TIMING with start





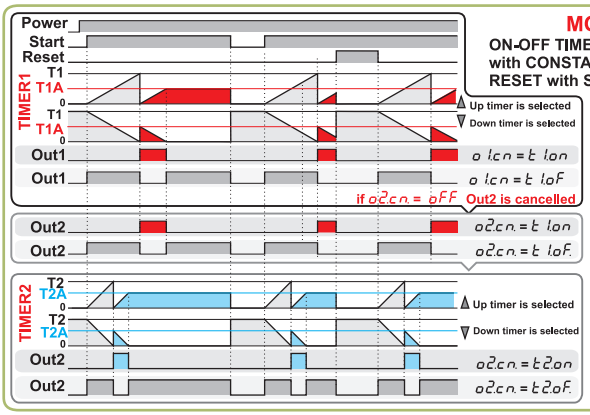
If o1ot or o2ot is selected Hold ,output is generated constantly until ON START Input or RESET Input is taken from OUT1 or OUT2.

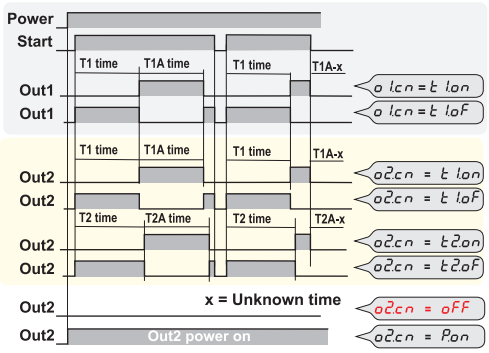
Pulse output is taken about o2ot lenght from OUT2.

Pulse output is taken about o1ot lenght from OUT1.

MODE D

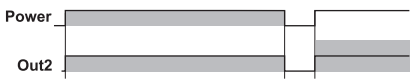
ON-OFF TIME SINGLE PERIODIC with CONSTANT START and RESET with START OFF



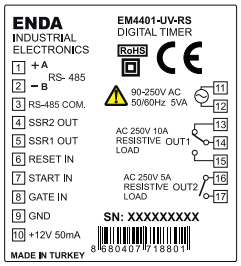


NOTE 1 : All operations will be switched to standby if the Gate input is active.

NOTE 2 : If o2cn parameter is set to Pon , 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.

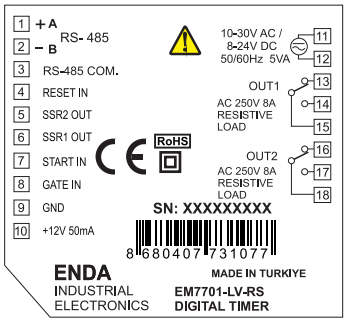


CONNECTION DIAGRAM

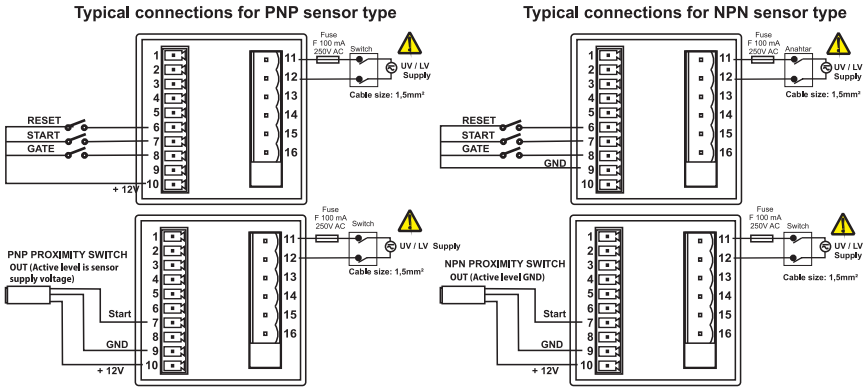


Equipment is protected throughout by DOUBLE INSULATION.

Holding screw 0.4-0.5Nm

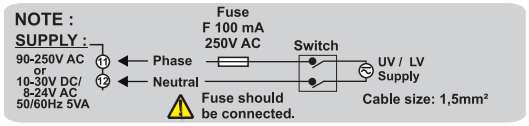


SENSOR CONNECTION SAMPLES

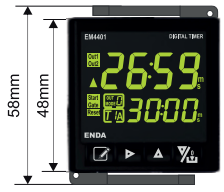


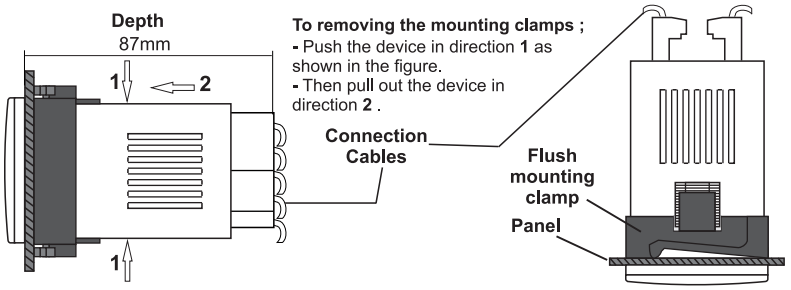
Logic output of the device is not electrically isolated. Therefore, the logic output terminals should not be grounded when using grounded thermocouples.

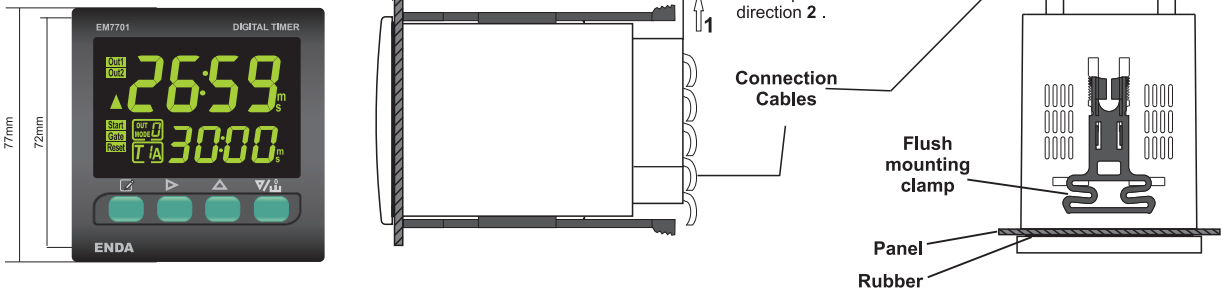
Note : **1)** Mains supply cords shall meet the requirements of **IEC60227** or **IEC60245.**
2) In accordance with the safety regulations, the power supply switch shall bring the identification of the relevant instrument and it should be easily accessible by the operator.



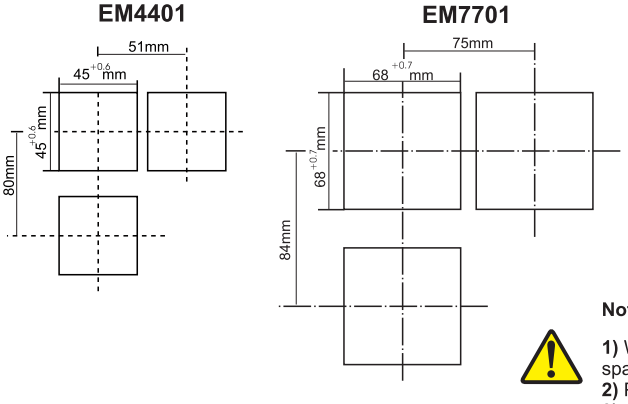
DIMENSIONS







PANEL CUT OUT



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.

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 DIGITAL TIMER MODBUS ADRESS 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
	H7	0007d (0007h)	Word	Maximum setpoint value limit for T1A time. **(Format must be as in the H0 parameter)**	R W	9999
Timer2 Configuration Parameters	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
	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
Output Parameters	H16	0016d (0010h)	Word	Outpu 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 ADRESS 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 : Word 1 Word 2 Word 3 Word 4 Word 5 Word 6 Word 7 Word 8 Word 9 Word 10 Word 11 Word 12 Word 13 Word 14 ME 44 01 0- 1 52 M ar 2 10 . 6 **NOTE :** **To view each word correctly by changing the byte sequences should be displayed as ASCII TEXT**	R

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)

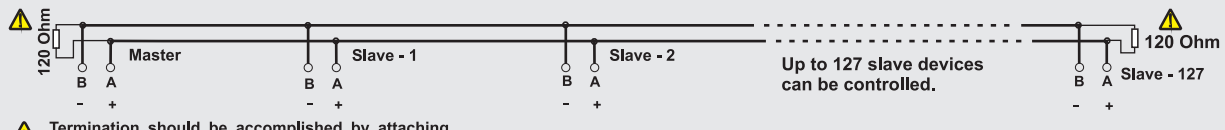
Device Address		**(0A)h**
Function Code		**(01)h**
Beginning address of coils.	**MSB**	**(04)h**
	LSB	**(A1)h**
Number of coils (N)	**MSB**	**(00)h**
	LSB	**(01)h**
CRC DATA	**LSB**	**(AC)h**
	MSB	**(63)h**

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



Termination should be accomplished by attaching 120 Ohm resistors to the start and at the end of the communication line.

** Applies to devices with Modbus function.*