



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 <input type="text" value="0"/> <input type="text" value="1"/> - <input type="text" value="-"/> <input type="text" value="-"/> <input type="text" value="3"/> | | |
| 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. |
|---------------------------------|---|

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

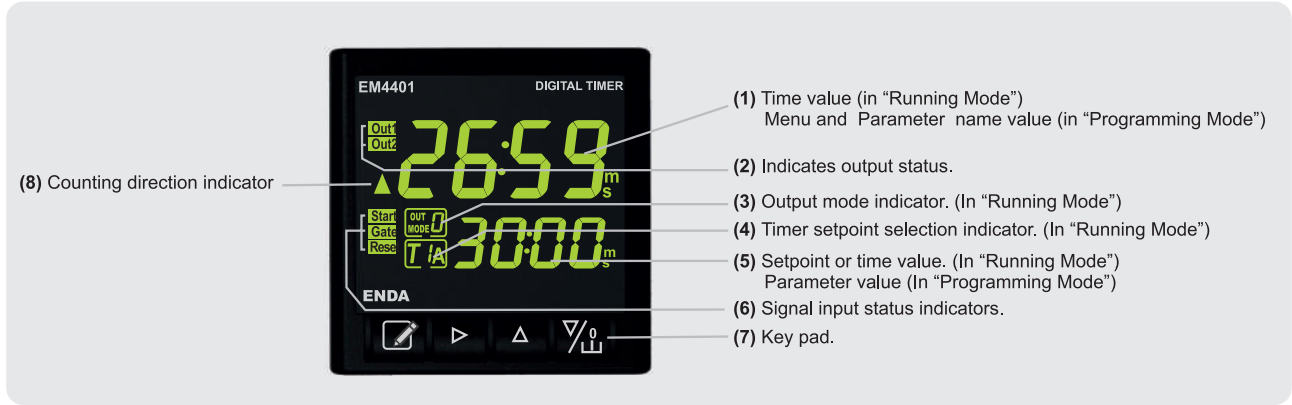
| | |
|----------------------------|---|
| Housing Type | Suitable for flush-panel mounting according to DIN 43 700. |
| Dimensions | EM4401 : W48xH48xD87mm, EM7701 : W72xH72xD97mm. |
| Weight | EM4401 : Approx. 230g, EM7701 : Approx. 380g (After packing). |
| Enclosure Materials | Self extinguishing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



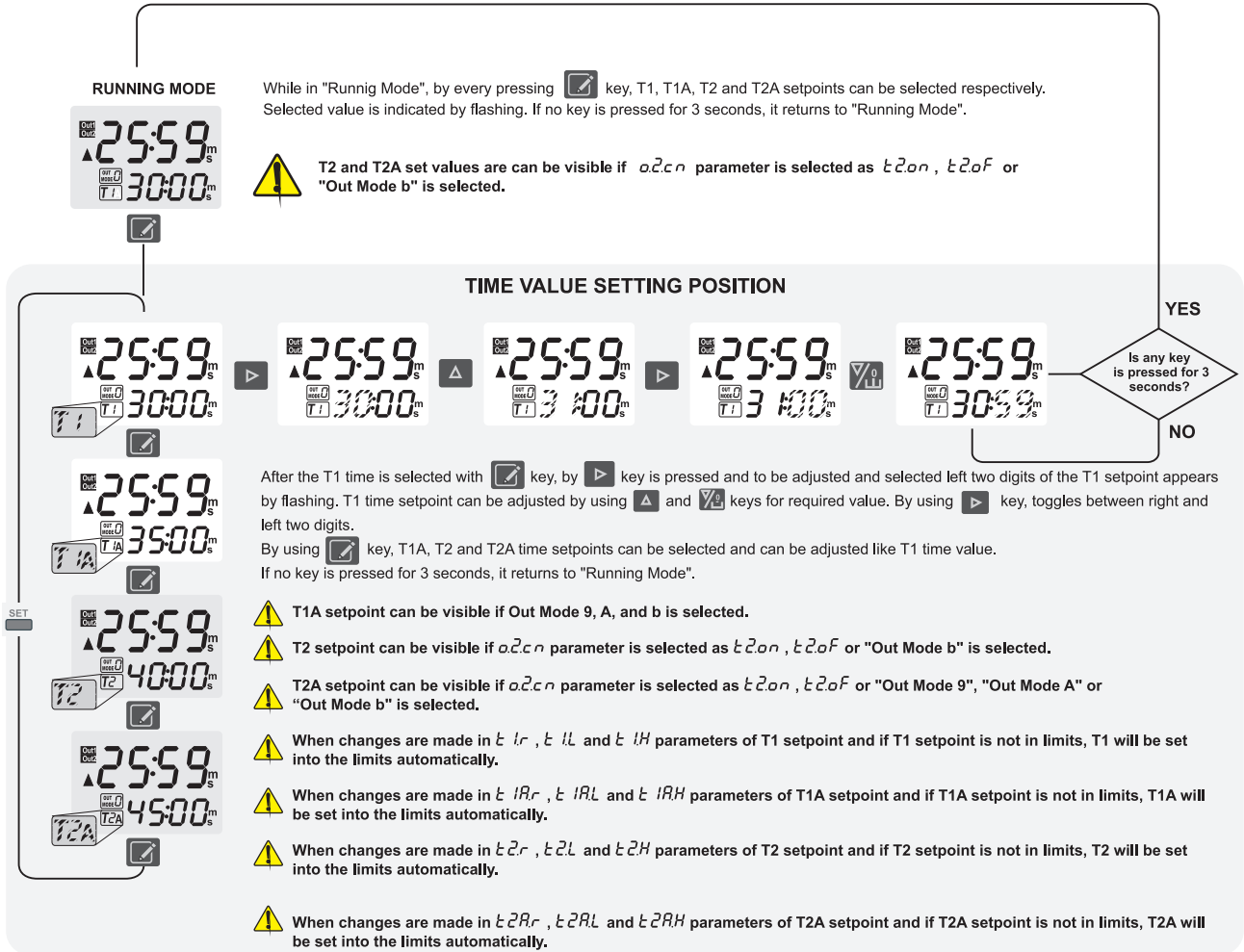
SİSEL MÜHENDİSLİK ELEKTRONİK SAN. VE TİC. A.Ş.
Sertifika Mah. Barbaros Cad. No:18 Y.Duduca 34775
ÜMRANİYE/İSTANBUL-TURKEY
Tel : +90 216 499 46 64 Pbx. Fax : +90 216 365 74 01
url : www.enda.com.tr

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

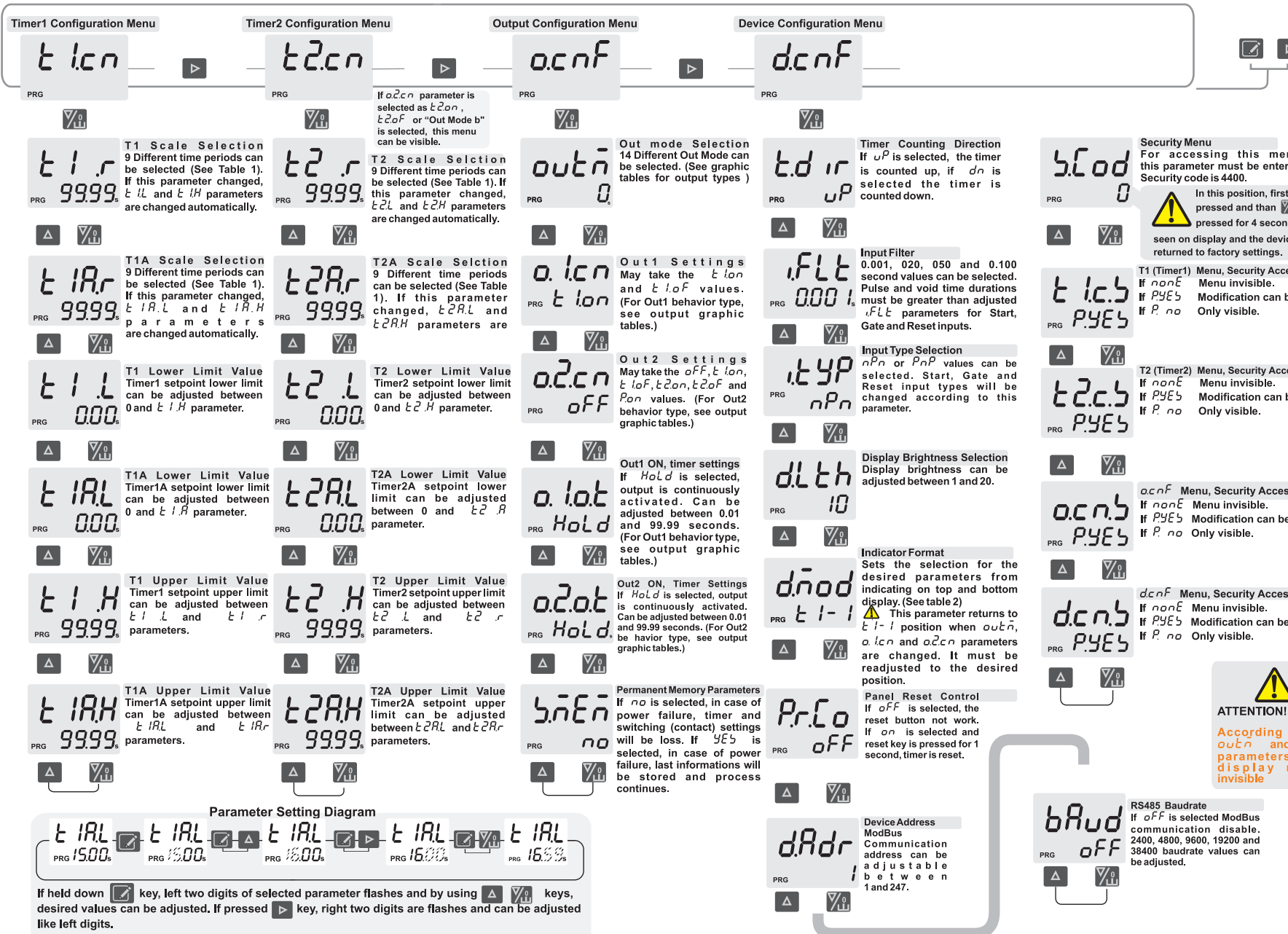


PROGRAMMING DIAGRAM

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

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



In this position, first key is pressed and then key is pressed for 4 seconds, *dPAr* is seen on display and the device is returned to factory settings.

TABEL 1 Scale selection table.

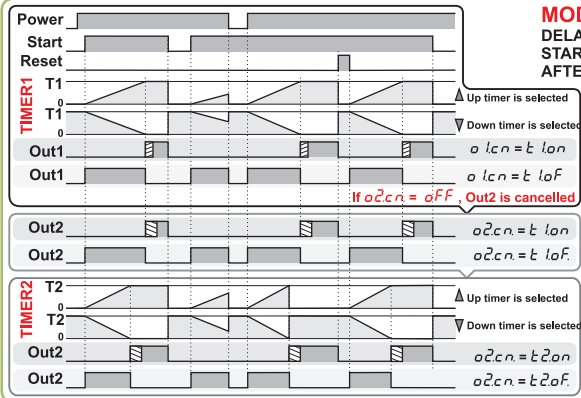
| Parameter | Adjustable Value |
|-----------|--|
| 9999s | Between 0.01 sec. and 99.99 sec. |
| 9999s | Between 0.1 sec. and 999.9 sec. |
| 9999s | Between 1 sec. and 9999 sec. |
| 9999m | Between 0 min., 0.01sec and 99 min., 59 sec. |
| 9999m | Between 0.1 min. and 999.9 min. |
| 9999m | Between 1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

TABEL 2 Parameter selection table to display

| Parameter | TOP Display | BOTTOM Display |
|--------------|-------------|----------------|
| <i>t1-1</i> | Timer1 | T1 set |
| <i>t1A</i> | Timer1 | T1A set |
| <i>t1-2</i> | Timer1 | T2 set |
| <i>t1A</i> | Timer1 | T2A set |
| <i>t2-2</i> | Timer2 | T2 set |
| <i>t2A</i> | Timer2 | T2A set |
| <i>t1.t2</i> | Timer1 | Timer2 |
| <i>t1.AS</i> | Timer1 | T1A set |
| <i>t2.AS</i> | Timer2 | T2A set |

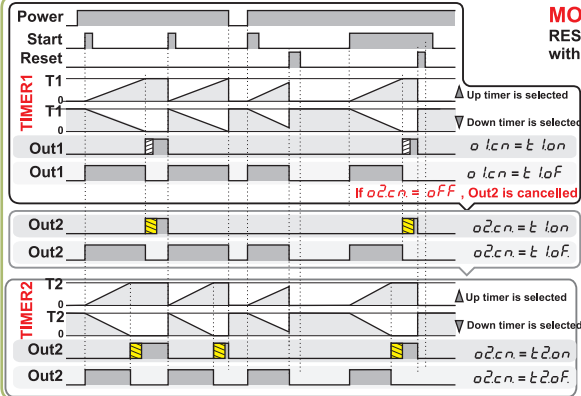
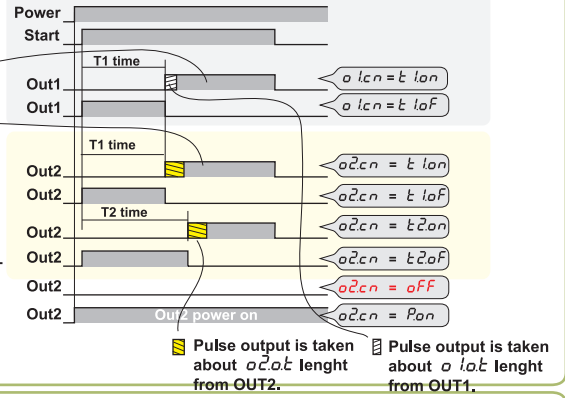
ATTENTION!
According to the *outn* and *o2cn* parameters some display modes invisible

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



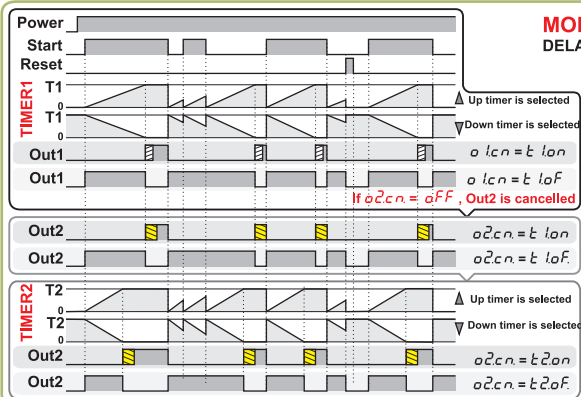
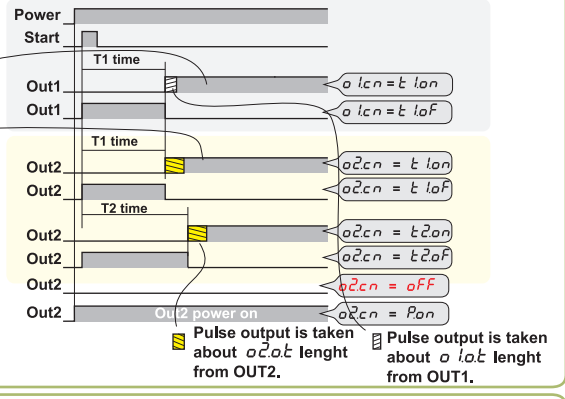
MODE 0
DELAY with CONSTANT START ON and RESET AFTER START

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



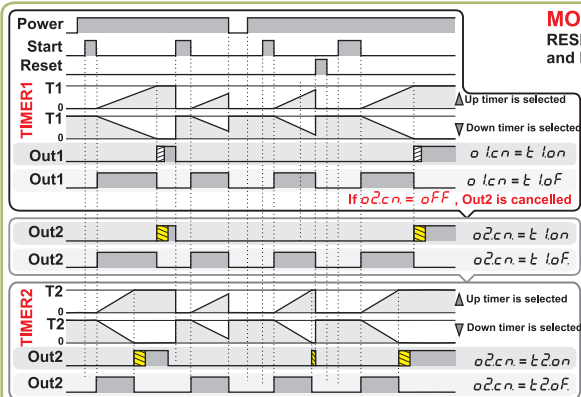
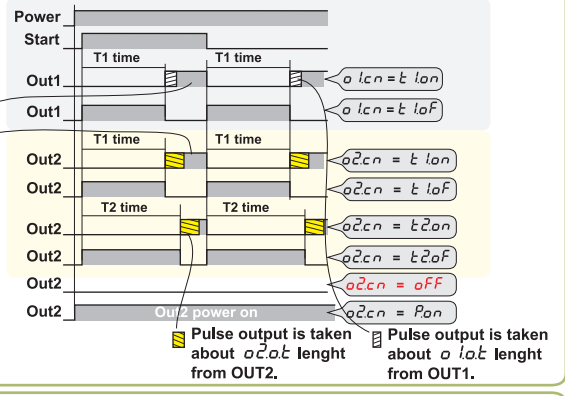
MODE 1
RESET and DELAY with PULSE START ON

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



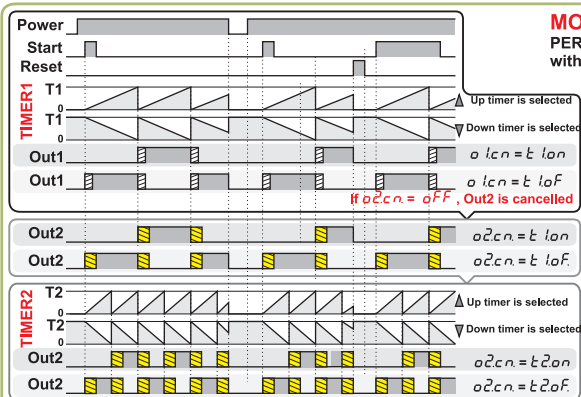
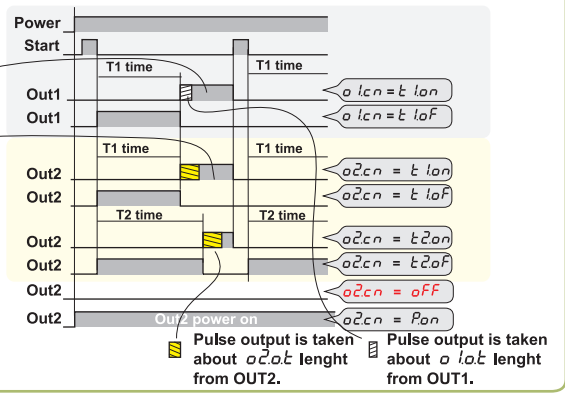
MODE 2
DELAY with START ON/OFF

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



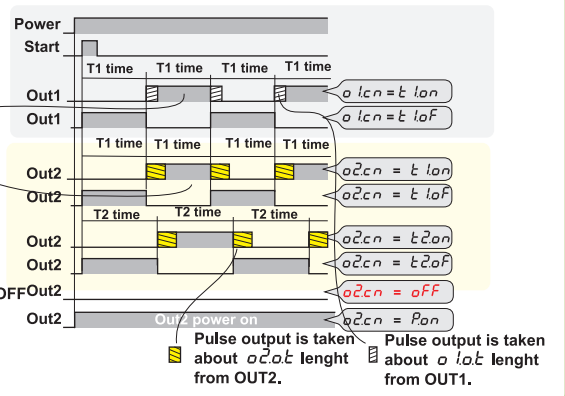
MODE 3
RESET with START and DELAY with START OFF

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

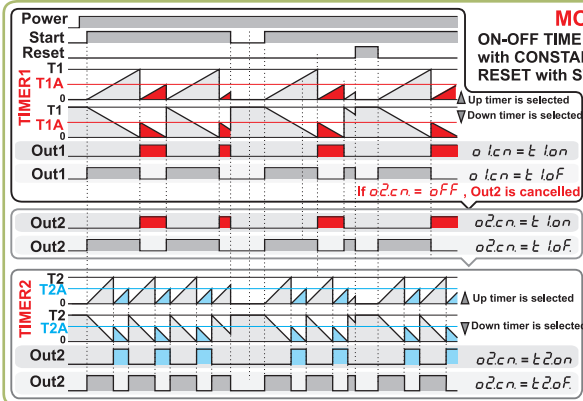


MODE 4
PERIODIC PROCESS with START PULSE

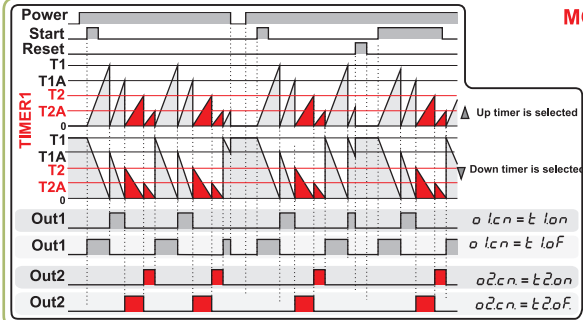
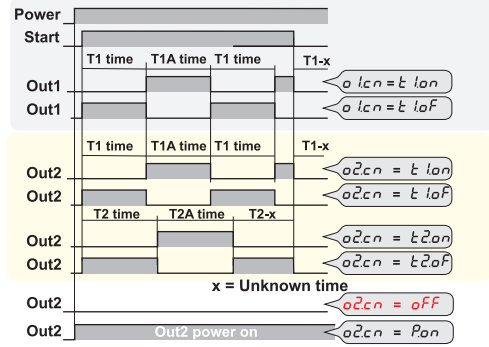
If $o1ot$ or $o2ot$ is selected Hold, Periodically OUT1 is set to ON or OFF with every T1 time, OUT2 is set to ON or OFF with every T2 time.



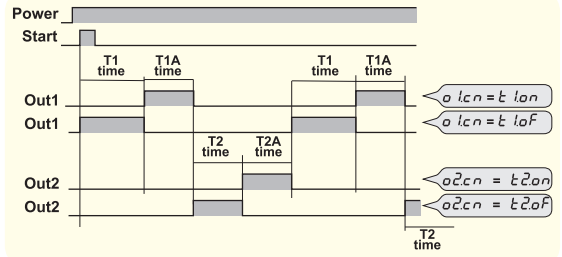
NOTE : All operations will be switched to standby if the Gate input is active.



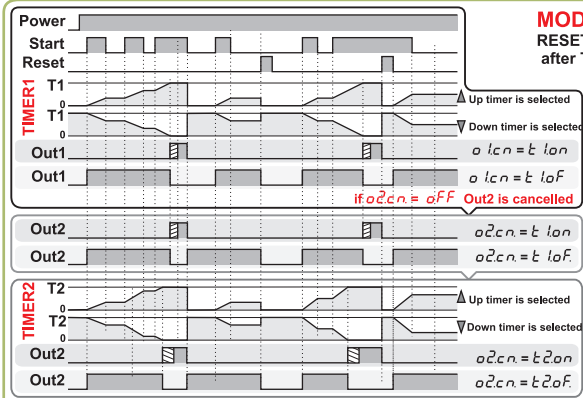
MODE A
ON-OFF TIME PERIODIC PROCESS with CONSTANT START and RESET with START OFF



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

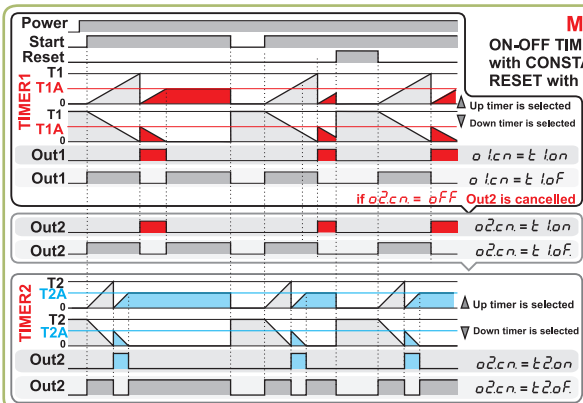
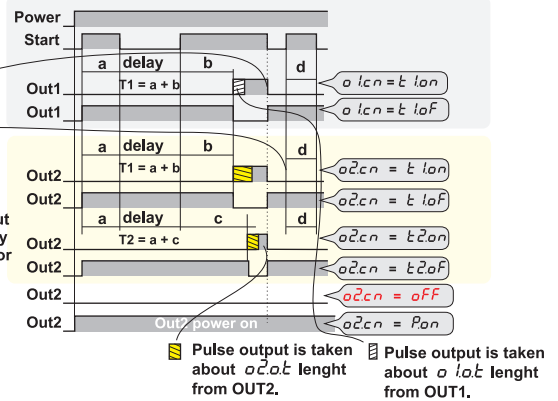


ATTENTION! In order to choose this mode, $o2cn$ parameter must be set to $t2on$ or $t2of$.

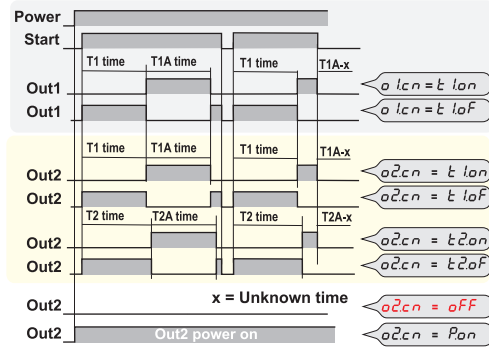


MODE C
RESET with START OFF after TIMING with start

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



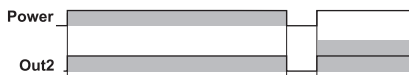
MODE D
ON-OFF TIME SINGLE PERIODIC with CONSTANT START and RESET with START OFF



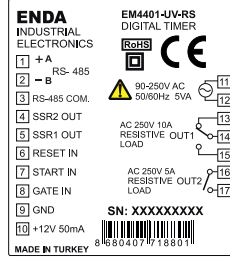
NOTE 1 : All operations will be switched to standby if the Gate input is active.

NOTE 2 : If $o2cn$ parameter is set to $P on$, 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.

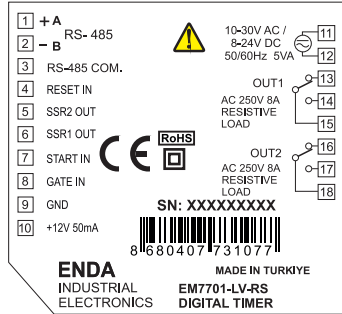


CONNECTION DIAGRAM



Equipment is protected throughout by DOUBLE INSULATION.

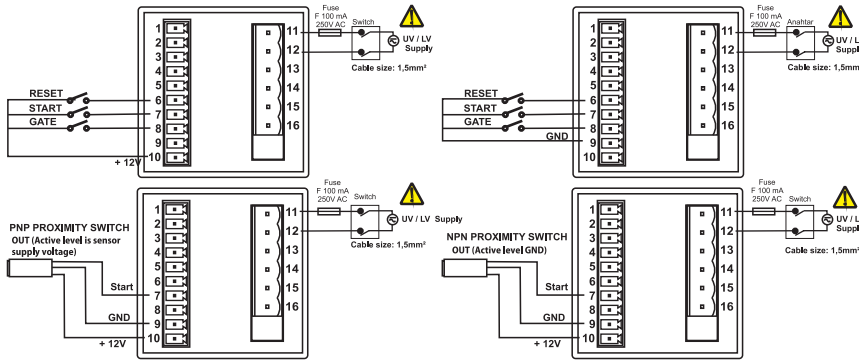
Holding screw 0.4-0.5Nm



SENSOR CONNECTION SAMPLES

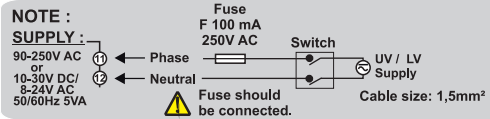
Typical connections for PNP sensor type

Typical connections for NPN sensor type

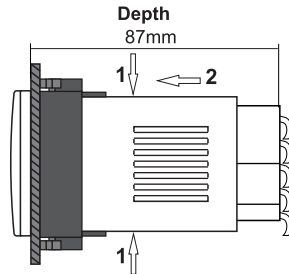
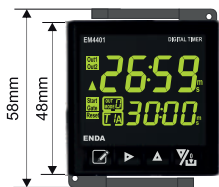


! Logic output of the device is not electrically isolated. Therefore, the logic output terminals should not be grounded when using grounded thermocouples.

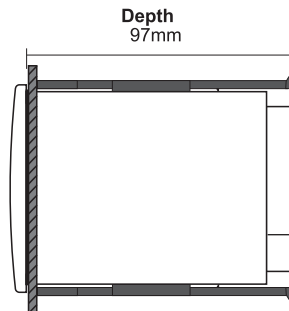
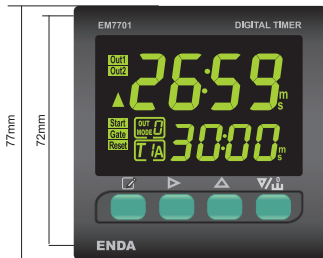
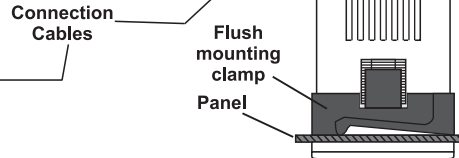
Note : 1) Mains supply cords shall meet the requirements of IEC60227 or IEC60245.
2) In accordance with the safety regulations, the power supply switch shall bring the identification of the relevant instrument and it should be easily accessible by the operator.



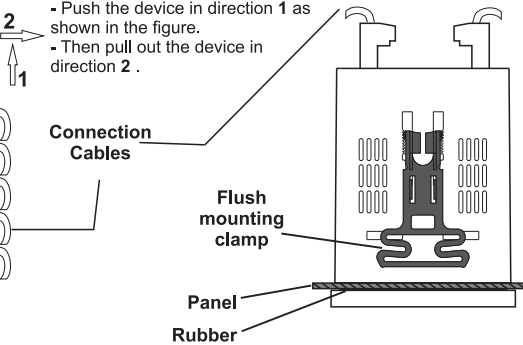
DIMENSIONS



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



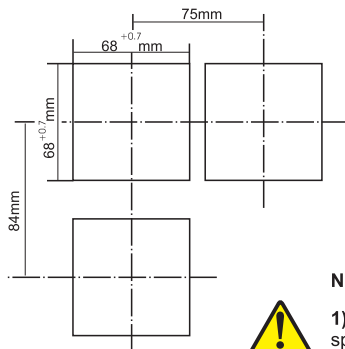
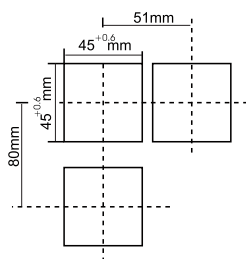
To removing the mounting clamps ;
- Push the device in direction 1 as shown in the figure.
- Then pull out the device in direction 2 .



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 ADRES 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 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 : <div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 5px auto;"> <table style="font-family: monospace; font-size: 0.8em; border-collapse: collapse;"> <tr> <td style="padding: 0 2px;">Word</td><td style="padding: 0 2px;">Word</td><td style="padding: 0 2px;">Word</td><td style="padding: 0 2px;">Word</td><td style="padding: 0 2px;">Word</td><td style="padding: 0 2px;">Word</td><td style="padding: 0 2px;">Word</td><td style="padding: 0 2px;">Word</td><td style="padding: 0 2px;">Word</td><td style="padding: 0 2px;">Word</td><td style="padding: 0 2px;">Word</td><td style="padding: 0 2px;">Word</td><td style="padding: 0 2px;">Word</td><td style="padding: 0 2px;">Word</td><td style="padding: 0 2px;">Word</td> </tr> <tr> <td style="text-align: center;">1</td><td style="text-align: center;">2</td><td style="text-align: center;">3</td><td style="text-align: center;">4</td><td style="text-align: center;">5</td><td style="text-align: center;">6</td><td style="text-align: center;">7</td><td style="text-align: center;">8</td><td style="text-align: center;">9</td><td style="text-align: center;">10</td><td style="text-align: center;">11</td><td style="text-align: center;">12</td><td style="text-align: center;">13</td><td style="text-align: center;">14</td> </tr> <tr> <td style="border: 1px solid black;">M</td><td style="border: 1px solid black;">E</td><td style="border: 1px solid black;">4</td><td style="border: 1px solid black;">4</td><td style="border: 1px solid black;">0</td><td style="border: 1px solid black;">1</td><td style="border: 1px solid black;">0</td><td style="border: 1px solid black;">-</td><td style="border: 1px solid black;">1</td><td style="border: 1px solid black;"> </td><td style="border: 1px solid black;"> </td><td style="border: 1px solid black;"> </td><td style="border: 1px solid black;"> </td><td style="border: 1px solid black;">5</td><td style="border: 1px solid black;">2</td><td style="border: 1px solid black;">M</td><td style="border: 1px solid black;">a</td><td style="border: 1px solid black;">r</td><td style="border: 1px solid black;"> </td><td style="border: 1px solid black;">2</td><td style="border: 1px solid black;">1</td><td style="border: 1px solid black;">0</td><td style="border: 1px solid black;">.</td><td style="border: 1px solid black;">6</td> </tr> </table> </div> | 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 | M | E | 4 | 4 | 0 | 1 | 0 | - | 1 | | | | | 5 | 2 | M | a | r | | 2 | 1 | 0 | . | 6 | R |
| 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| M | E | 4 | 4 | 0 | 1 | 0 | - | 1 | | | | | 5 | 2 | M | a | r | | 2 | 1 | 0 | . | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NOTE : To view each word correctly by changing the byte sequences should be displayed as ASCII TEXT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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

