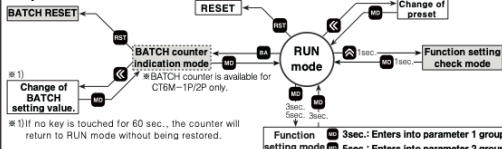


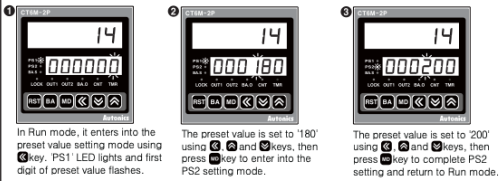
Basic operations and constitution(Counter/Timer/Communication)

1. Operations and functions



1-1. Change of preset(Counter/Timer)

Even if changing the preset value, input operation and output control will continue. In addition, the preset value could be set to 0 and 0 preset value turns ON. According to output mode, preset value could not be set to 0. (When setting to 0, preset value "0" will flash 3 times.)



1-2. Function setting check mode

Setting value of function setting mode can be confirmed using the [F] and [C] keys.

1-3. Switching display function in preset indicator

Setting value 1(PS1) and setting value 2(PS2) are displayed each time pressing [M] key in dual preset mode. (In timer, it is available for OND, OND1 or OND2 output mode.)

1-4. Reset

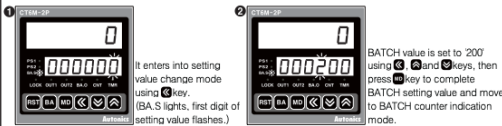
In Run mode or function setting mode, if pressing [R] key or applying the signal to the RESET terminal on the back side, present value will be initialized and output will maintain off status.

2. BATCH Counter(For CT6M-1P□□/CT6M-2P□□ model only)

In BATCH counter indication mode, "BATCH counter value" is displayed in count indicator and "BATCH counter setting value" is displayed in preset indicator.

2-1. Change of BATCH setting value

If pressing [M] key in Run mode, it will enter into BATCH counter indication mode.



2-2. BATCH Counting operation

BATCH counting value is increased until BATCH RESET signal applied. BATCH counting value will be circulated when it is over 999999.

1) BATCH counting operation in Counter: Counts the number of reaching setting value of CT6M-1P□□ or reaching dual setting value of CT6M-2P□□.

2) BATCH counting operation in Timer: Counts the number of reaching setting time. (In case of "FLK" output mode, count the number of reaching T.off setting time and T.on setting time.)

2-3. BATCH output

If input signal is applied while changing BATCH setting value, counting operation and output control will be performed.

- If BATCH count value equals to BATCH setting value, BATCH output will be ON and maintain ON status until BATCH reset signal is applied.

- When the power is set off then resupplied in status of BATCH output is ON, BATCH output maintains ON status until BATCH RESET signal is applied.

2-4. BATCH reset

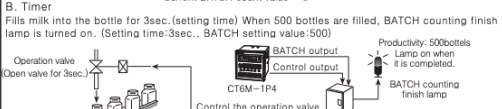
If pressing reset button or applying the signal to BATCH RESET terminal on the back side panel, BATCH counting value should be reset.

- When BATCH reset is applied, BATCH counting value maintains at 0 and BATCH output maintains in the OFF status.

2-5. Application of BATCH Counter function

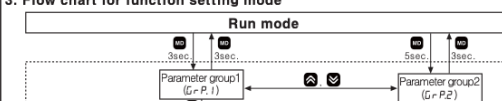
A. Counter
In case, put 5 products in a box then pack the boxes when they reaches to 200.

- Counter preset setting value="5", BATCH setting value="200"
- When the count value of counter reaches to the present value "5", the control output(OUT) will be on, and at this time the count value of the BATCH counter will be increased by "1". The control box which is received the control output (OUT) repeatedly controls conveyor to move the full box and to place the next empty box for standby. When the BATCH count value reaches to "200", BATCH output will be ON. Then the control box stops conveyor and provides a control signal for packing.

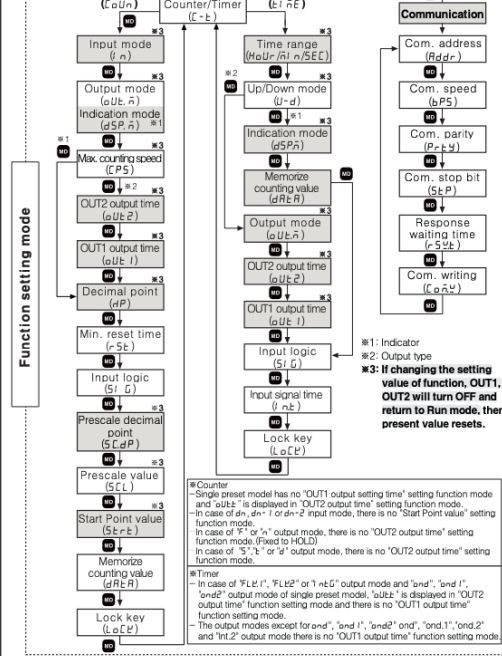


B. Timer

Fills milk into the bottle for 3sec. (Setting time) When 500 bottles are filled, BATCH counting finish lamp is turned on. (Setting time:3sec., BATCH setting value:500)



3. Flow chart for function setting mode



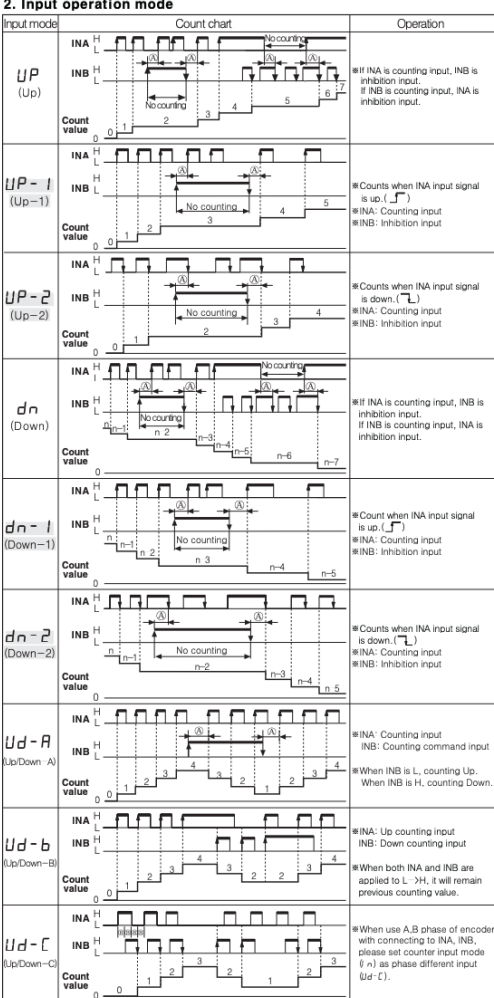
Counter mode

1. Parameter setting

Setting mode	How to set
Counter/Timer (C-T)	CoUn: COUNTER Lt nE: TIMER
Input mode (I n)	UD-C: UP-1, UP-2, dn-1, dn-2, Ud-R, Ud-b, Ud-C F: n → C → r → P → 9 → R → 5 → L → d
Output mode (oUe n)	F: n → C → r → P → 9 → R → 5 → L → d
Indication mode (dSP n)	HoLd: HoLd, CoLr
Max. counting speed (CPS)	30 → 1E → 5E → 10E
OUT2 output time (oUe 2)	3 → 2 → 1 → 0
OUT1 output time (oUe 1)	3 → 2 → 1 → 0
Decimal point (dP)	6Digit type 4Digit type
Min. reset time (r5E)	1 → 20 Unit: ms
Input logic (Si L)	nP: No-Voltage input nP: Voltage input
Prescale decimal point (5LdP)	6Digit type 4Digit type
Prescale value (5L C)	3 → 2 → 1 → 0
Start Point Value (5Lr E)	3 → 2 → 1 → 0
Memory protection (dRr)	CLr → EC
Lock key (LoC L)	LoF: Cancellation of the lock mode. LoC1: Locks [F] key. LoC2: Locks [C] keys. LoC3: Locks [M] keys.

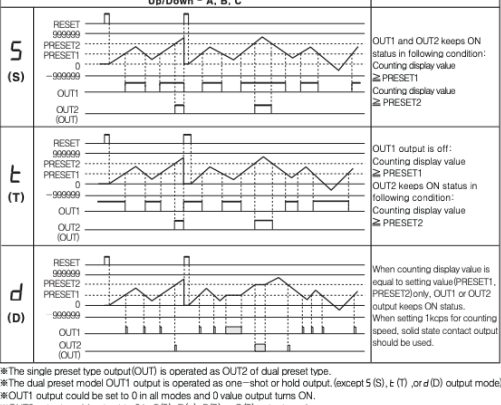
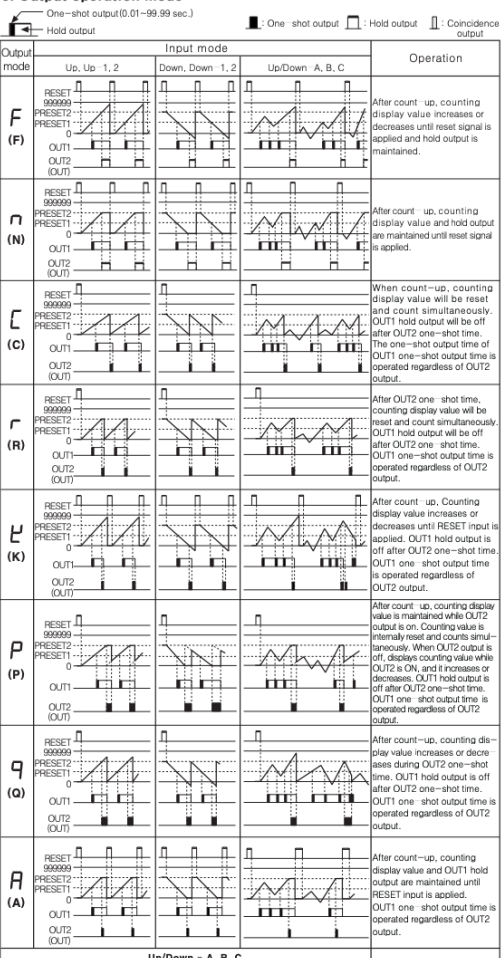
*1: Explanation of decimal point and prescale decimal point setting
- Decimal point setting: Set decimal point of the display value on front indicator.
- Prescale decimal point setting: Set prescale decimal point of counting regardless of decimal point of display value on front indicator.

2. Input operation mode



Input type	Voltage input	No-Voltage input	Counting speed	Min. signal width	Counting speed	Min. signal width
H	5-30VDC	Short circuit	1cps	500ms	5kps	0.1ms
L	0-2VDC	Open	30cps	16.7ms	10kps	0.5ms
			1kps	0.5ms		1cps=1Hz

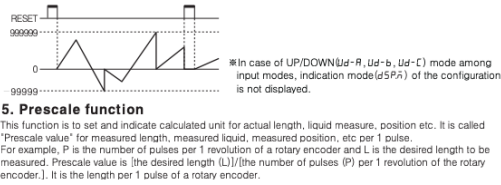
3. Output operation mode



4. Counter operation of the indicator

Indicate mode (dSP n)	Count chart	Operation
Up/Down (Up, Up-1, Up-2)	Count value increases or decreases until RESET input is applied.	Count value increases or decreases until RESET input is applied.
HoLd (HoLd)	Count value increases or decreases until RESET input is applied.	Count value increases or decreases until RESET input is applied.

5. Prescale function



6. Start Point function

This function of setting Start Point value in counter operation mode.
- In case of "dn-1", "dn-2" or "dn-2" in timer input mode, it is not available.
- When reset is applied, the present value is initialized to Start Point.
- After count up in "r", "p", "q" output mode, preset value starts at Start Point.

Timer mode

1. Parameter setting		How to set	
Counter/Timer (C-T)	$C \rightarrow U \rightarrow n \rightarrow E$	$C \rightarrow U \rightarrow n$: COUNTER	$E \rightarrow n \rightarrow E$: TIMER
Setting mode	<ul style="list-style-type: none"> 6Digit type 5Digit type 4Digit type 	<ul style="list-style-type: none"> 6Digit type 5Digit type 4Digit type 	
Timer range (HoUr/nSEc)	<ul style="list-style-type: none"> 6Digit type 5Digit type 4Digit type 	<ul style="list-style-type: none"> 6Digit type 5Digit type 4Digit type 	
UP/DOWN mode (U-d)	$UP \leftrightarrow dn$	<ul style="list-style-type: none"> UP: Time proceeds from 0 to the setting value. dn: Time proceeds from the setting value to 0. 	
Indication mode (dSPn)	$E \rightarrow RL \rightarrow HoLd \rightarrow n \rightarrow E$	<ul style="list-style-type: none"> Used for the indicator only. It is added that the feature which set the setting time when selecting HoLd or nE (Refer to 3. Timer operation for the indicator). 	
Memory protection (dRLr)	$CLr \leftrightarrow rEC$	<ul style="list-style-type: none"> Used for the indicator only. CLr: Initializes time value when power is off. rEC: Memorizes time value at the moment of power off. 	
Output mode (oUt.n)	$o \rightarrow n \rightarrow 1 \rightarrow o \rightarrow n \rightarrow 2 \rightarrow FLK \rightarrow FL1 \rightarrow FL2 \rightarrow i \rightarrow n \rightarrow t$	<ul style="list-style-type: none"> key: To shift flashing digit position of OUT2 output time value. key: To change OUT2 output time value. Set OUT2 one-shot output time. Setting range: 0.01~99.99sec. HoLd is displayed by pressing key 4 times. 	
OUT2 output time (oUt2)		<ul style="list-style-type: none"> key: To shift flashing digit position of OUT1 output time value. key: To change OUT1 output time value. Set OUT1 one-shot output time. Setting range: 0.01~99.99sec. HoLd is displayed by pressing key 4 times. 	
OUT1 output time (oUt1)		<ul style="list-style-type: none"> key: To shift flashing digit position of OUT1 output time value. key: To change OUT1 output time value. Set OUT1 one-shot output time. Setting range: 0.01~99.99sec. HoLd is displayed by pressing key 4 times. 	
Input logic (SiG)	$nPN: No-Voltage input$ $PnP: Voltage input$	<ul style="list-style-type: none"> Check input logic value (PNP, NPN). 	
Input signal time (InT)	$I \rightarrow 20$ (Unit: ms)	<ul style="list-style-type: none"> CTS/CITY: Set min. external INA, INH, RESET signal width. CTM: Set min. external INA, RESET, INHIBIT, BATCH RESET signal width. 	
Lock key (LoCk)	$LoFF \leftrightarrow LoC1$ $LoC3 \leftrightarrow LoC2$	<ul style="list-style-type: none"> nFF: Cancellation of the lock mode nF1: Locks key. LoC2: Locks keys. LoC3: Locks keys. 	

2. Output operation mode

Output mode	Time chart	Operation
and (OND)		<ol style="list-style-type: none"> Time starts when INA signal turns on. When INA signal turns off, time resets. When INA signal is on, Power ON Time Start is operated. Control output operates as hold or one-shot output.
and.1 (OND.1)		<ol style="list-style-type: none"> Time starts when INA signal turns on. If INA signal is applied repeatedly, only initial signal is recognized. When INA signal is on, Power ON Time Start is operated. Control output operates as hold or one-shot output.
and.2 (OND.2)		<ol style="list-style-type: none"> Time starts when power turns on. Time resets when reset turns off. Time starts when reset turns off. Control output operates as hold or one-shot output. It memorizes display value at the moment of power off.
FLK (FLK)		<ol style="list-style-type: none"> Time starts when INA signal turns on. When INA signal is on, Power ON Time Start is operated. Control output operates as hold output, output turns off for the T.off time and turns on for the T.on time repeatedly. The T.on time and T.off time must be set individually. In case of using the contact output, min. setting time must be set over 100ms.

Retained output (FLK.1)		<ol style="list-style-type: none"> Time starts when INA signal turns on. When INA signal is on, Power ON Time Start is operated. Power OFF Time Start is operated. Control output operates as hold output. In case of using the contact output, min. setting time must be set over 100ms.
One-Shot output (FLK.2)		<ol style="list-style-type: none"> Time starts when INA signal turns on. When INA signal is on, Power ON Time Start is operated. Control output operates as one-shot output. In case of using the contact output, min. setting time must be set over 100ms.
Hold output (FLK.2)		<ol style="list-style-type: none"> Time starts when INA signal turns ON and the display value at the moment when power is off is memorized. When INA signal is on, Power ON Time Start is operated. Power OFF Time Start is operated. Control output operates as one-shot output. In case of using the contact output, min. setting time must be set over 100ms.
Interval (Power Reset)		<ol style="list-style-type: none"> Control output turns ON and time starts when INA signal turns ON. When INA signal is on, Power ON Time Start is operated. Power OFF Time Start is operated. When it reaches setting time, indication value and control output are reset automatically. Control output is ON when time is progressing.
Interval 1 (Power Reset)		<ol style="list-style-type: none"> Control output turns ON and time starts when INA signal turns ON. When INA signal is on, Power ON Time Start is operated. Power OFF Time Start is operated. When it reaches setting time, indication value and control output are reset automatically. Control output is ON when time is progressing.
Interval 2 (Power Reset)		<ol style="list-style-type: none"> Time starts when INA input is ON and Resets when INA input is OFF. INA input is ON, OUT1 output is ON during T1 (HOLD) or T1. When it reaches setting time, display value resets and OUT2 output is ON during T2 (HOLD) or T2 output time. Output turns OFF when reaching the setting time even if one-shot time is longer than setting time.
Signal ON Delay 1 (Power Reset)		<ol style="list-style-type: none"> INA is ON, control output remains ON (except when power is off and reset is on). When INA signal is OFF, time processes. When it reaches setting time, indication value and control output are reset automatically. INA input is ignored while time is progressing.
On-Off Delay 1 (Power Reset)		<ol style="list-style-type: none"> When INA input is ON, output is ON and time is progressing, then output is OFF after On_Delay time. When INA input is OFF, output is ON and time is progressing, then output is OFF after Off_Delay time. If INA input is OFF within On_Delay time, step 2 starts again. If INA input is ON within Off_Delay time, step 1 starts again.
On-Off Delay 2 (Power Reset)		<ol style="list-style-type: none"> When INA input turns ON, time progresses and output turns ON after On_Delay time. When INA input turns OFF, time progresses and output turns OFF after Off_Delay time. INA input turns OFF when On_Delay time, output will turn ON and step2 operate. If INA input turns ON within Off_Delay time, output will turn OFF and step1 operate.
Integration Time (Power Reset)		<ol style="list-style-type: none"> Time is progressing while INA input is ON. Time progresses stops while INA input is OFF. When it reaches the setting time, output is ON.

3. Timer operation for the indicator

When memory protection setting is OFF (TOTAL)		<ol style="list-style-type: none"> Time starts when INA input is ON. Setting value is initialized when Reset input is ON. Time progress stops when INHIBIT input is ON. Resets when power is OFF.
When memory protection setting is ON (HoLd)		<ol style="list-style-type: none"> Time starts when INA input is ON. Setting value is initialized when Reset input is ON. Time progress stops while INHIBIT input is ON. When reset input is applied, display value is memorized. Display value at the moment of power OFF is memorized.
When memory protection setting is OFF (On Time Display)		<ul style="list-style-type: none"> ON Time indicate mode of INA input Time reset start operates when INA input turns ON. Time progress stops while INA input is OFF. When time progress stops and power is off, the display value is initialized. If progress time is greater than setting time when INA input turns off, display value flashes and operation stops until reset signal is applied.
When memory protection setting is ON (On Time Display)		<ul style="list-style-type: none"> ON Time indicate mode of INA input Time reset start operates when INA input turns ON. Time progress stops while INA input is OFF. When time progress stops and power is off, the display value is memorized. If progress time is greater than setting time when INA input turns off, display value flashes and operation stops until reset signal is applied.

4. Timer '0' time setting

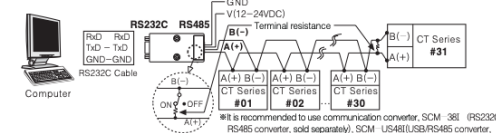
4-1. Available output operation mode to set '0' time setting	$and, and.1, and.2, nFd, nFd.1$
4-2. Operation according to output mode (at 0 time setting)	
A. OND(Signal ON Delay) mode(ana)	<ul style="list-style-type: none"> Setting time1 is set to 0 Setting time2 is set to 0
B. OND.1(Signal ON Delay 1) mode(ana.1)	<ul style="list-style-type: none"> Setting time1 is set to 0 Setting time2 is set to 0
C. OND.2(Signal ON Delay2) mode(ana.2)	<ul style="list-style-type: none"> Setting time1 is set to 0 Setting time2 is set to 0
D. NFD(ON-OFF Delay) mode(nFd)	<ul style="list-style-type: none"> Off Delay setting time is set to 0 ON Delay setting time is set to 0
E. NFD.1(ON-OFF Delay1) mode(nFd.1)	<ul style="list-style-type: none"> Off Delay setting time is set to 0 ON Delay setting time is set to 0
5. Setting value(PS1) is greater than Setting value2(PS2)	<p>In OND(ana), OND.1(ana.1) or OND.2(ana.2) output mode</p> <p>-UP mode: If setting value1 of timer is greater than setting value2, OUT1 will not turn ON.</p> <p>-DOWN mode: If setting value1 of timer is greater than setting value2, OUT1 will turn ON immediately when start signal is applied.</p>

2. Application of system organization

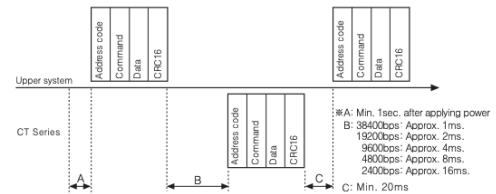
1. Parameter setting

Table with columns: Setting mode, Explanation, Com. address (Hex), Com. speed (bps), Com. parity (P), Com. stop bit (S), Response waiting time (R), Com. write (W). Includes hex values for settings like Com. address (01H), Com. speed (2400), etc.

3. Communication control ordering



- 1. The communication method is MODBUS RTU (PI-MBUS-300-REV.JJ).
2. After 1sec. of power supply into the high order system, it starts to communicate.
3. Initial communication will be started by the high order system. When a command comes out from the high order system, CT series will respond.



4. Communication command and block

Table for Read Coil Status (Func 01 H) and Read Input Status (Func 02 H). Includes Slave Address, Function, Starting Address, No. of Points, and Error Check (CRC16).

Table for Read Holding Registers (Func 03 H) and Read Input Registers (Func 04 H). Includes Slave Address, Function, Starting Address, No. of Points, and Error Check (CRC16).

Table for Force Single Coil (Func 05 H). Includes Slave Address, Function, Coil Address, Force Data, and Error Check (CRC16).

Table for Preset Single Register (Func 06 H). Includes Slave Address, Function, Register Address, Preset Data, and Error Check (CRC16).

Table for Preset Multiple Registers (Func 10 H). Includes Slave Address, Function, Starting Address, No. of Register, Byte Count, and Error Check (CRC16).

Table for Read Coil Status (Func 01 H) and Read Input Status (Func 02 H) with detailed data fields like High/Low bits and Error Check (CRC16).

Table for Read Holding Registers (Func 03 H) and Read Input Registers (Func 04 H) with detailed data fields and Error Check (CRC16).

5. Modbus Mapping Table

Table 5-1. Reset/Output: No(Address), Func, Explanation, Setting range, Notice. Includes entries for 0001(0000) Reset, 0002(0001) OUT2 output, etc.

Table 5-2. Terminal input status: No(Address), Func, Explanation, Setting range, Notice. Includes entries for 10001(0000) INA input status, 10002(0001) INB input status, etc.

Table 5-3. Product Information: No(Address), Func, Explanation, Factory specification, Notice. Includes entries for 30001-30100 Reserved, 30101(0064) Product number H, etc.

Table 5-4. Monitoring data: No(Address), Func, Explanation, Setting range, Notice. Includes entries for 31001(03E8) BA0 LED display status, 31002(03E9) BA1 LED display status, etc.

Table 5-5. Present value setting group: No(Address), Func, Explanation, Setting range, Notice. Includes entries for 40001(0000) PS2 setting value, 40002(0001) PS1 setting value, etc.

Table 5-6. Function setting mode-Counter group: No(Address), Func, Explanation, Setting range, Notice. Includes entries for 40051(0032) Counter/Timer (t), 40052(0033) Input mode (n), etc.

Table 5-7. Function setting mode-Counter group (continued): No(Address), Func, Explanation, Setting range, Notice. Includes entries for 40053(0034) indication mode (t/4A), 40054(0035) Output mode (t/n), etc.

Table 5-7 (continued). Function setting mode-Counter group: No(Address), Func, Explanation, Setting range, Notice. Includes entries for 40055(0036) Maximum counting speed (t/PS), 40056(0037) OUT2(OUT) output time, etc.

Table 5-7 (continued). Function setting mode-Counter group: No(Address), Func, Explanation, Setting range, Notice. Includes entries for 40059(003A) Min. reset time (t/SE), 40060(003B) Prescale decimal point position (t/L), etc.

Table 5-7 (continued). Function setting mode-Counter group: No(Address), Func, Explanation, Setting range, Notice. Includes entries for 40101(0064) Count/Timer (t), 40102(0065) Time range (t/RI+nSEC), etc.

Table 5-8. Function setting mode-Communication group: No(Address), Func, Explanation, Setting range, Notice. Includes entries for 40151(0096) Com. address (t/addr), 40152(0097) Com. speed (t/bps), etc.

6. Exception processing

Table 6-1. Exception code details: Slave Address, Function+80H, Exception Code, Error Check (CRC16). Includes Low/High byte breakdown for Exception Code.

- Illegal Function (Exception Code: 01H): Not supporting command
-Illegal Data Address (Exception Code: 02H): Mismatch between start address of asked data and transmittable address in device
-Illegal Data Value (Exception Code: 03H): Mismatch between asked the number of data and transmittable the number of data in device
-Slave Device Failure (Exception Code: 04H): Command is processed incorrectly.

Table 6-2. Example: Master sends output status (ON:1, OFF:0) of non existing coil 01001 (03E8H) from Slave (Address:17). Includes Query (Master) and Response (Slave) sections.

Read and write of parameter value using communication

- 1. Read of the parameter area: 0002(0122), 0003(CA1), 0004(BA,0), 10001-10005(Terminal input), 30101-30125(Product information), 31001-31013(Monitoring data)
2. Read and write of the parameter area: 0001(Reset starts), 0005(BATCH Reset starts), 40001-40006(Setting value saving group), 40051-40066(Counter setting group), 40101-40110(Timer setting group), 40151-40156(Microcommunication setting group)
3. Read of communication: Read parameter value using communication. (Function: 01H, 02H, 03H, 04H)
4. Communication write: Change parameter value using communication. (Function: 05H, 06H, 10H)

Table for Software Integrated device management program (DAQMaster): Operating system, Processor, RAM, Hard disk, VGA, other.

Table for Factory default setting: Parameter, Factory default setting. Includes Input mode (n), Output mode (t/n), CPS (t/PS), etc.

Caution for using

- 1. The power ON/OFF: Power voltage rises for 100ms after power on and falls for 500ms after power off.
2. Use insulated and resistive voltage/current or Class2 supply power device to input 24VAC/24VDC power supply model.
3. Input signal line: Use as short a cable from the sensor to this unit as possible.
4. When selecting input logic: Be sure that supply power is off when selecting input logic, then select logic input according to input logic changing method.
5. Contact coil input (When it is used as Counter): If any contact input at high speed mode (1k, 5k, 10k), it may fluctuate by chattering.
6. When test dielectric voltage and insulation resistance of the control panel with this unit installed: Please isolate this unit from the circuit of control panel.
7. Do not use below places: Place where there are severe vibration or impact, Place where there are strong alkalis or acids are used, Place where there are direct ray of the sun, Place where there are strong magnetic field or electric noise are generated.

Autonics Corporation logo and contact information: Satisfiable Partner For Factory Automation, HEAD QUARTERS, OVERSEAS SALES, and a proposal for product improvement and development.