

## PM Temperature Controller(Simple Version)– Serial Communication Manual (Doc.:T10-00099/V.1.2) P.1

### NOTE:

- The serial communication of this controller can support RS485 interface. When wiring, please pay attention to RJ-12 connector polarity.
- The protocols of ModBus are adopted, which supports formats of RTU and ASCII.
- Supports the 00 function of ModBus diagnostic Mode (0x08).
- Maximum 8 sets for multiple write-in / read.
- In order to lengthen the lifespan of internal memory (EEPROM) of the controller, if the data changes frequently, it is suggested set the contact point (Coil) address “0000” to 0 (power off no memory). When the data is no longer being written, set this address as 1 (data write EEPROM).
- For settings and English names of communication parameters, please see Operating Manual.

| Description                                                                  | Address | Read/Write | Function Code |
|------------------------------------------------------------------------------|---------|------------|---------------|
| Set Value (SV) setting. Range: SV L ~ SV H                                   | 0000    | r/w        | 03/06         |
| Min. output setting of control output 1 (o1 L). Range: 0~300 (unit: 0.1%)    | 0001    | r/w        | 03/06         |
| Max. output setting of control output 1 (o1 H). Range: 500~1000 (unit: 0.1%) | 0002    | r/w        | 03/06         |
| Alarm output 1 (AL 1) setting. Range: -1999 ~ 9999                           | 0005    | r/w        | 03/06         |
| Alarm output 2 (AL 2) setting. Range: -1999 ~ 9999 (note 1)                  | 0006    | r/w        | 03/06         |
| Alarm output 3 (AL 3) setting. Range: -1999 ~ 9999 (note 1)                  | 0007    | r/w        | 03/06         |
| Setting of alarm 1 (A1Fu). Range: 00~26                                      | 0008    | r/w        | 03/06         |
| Setting of alarm 2 (A2Fu). Range: 00~26 (note 1)                             | 0009    | r/w        | 03/06         |
| Setting of alarm 3 (A3Fu). Range: 00~26 (remark 1)                           | 0010    | r/w        | 03/06         |
| Time setting of alarm 1 (A3Tr). Range: -1999~9999 sec.                       | 0011    | r/w        | 03/06         |
| Time setting of alarm 2 (A3Tr). Range: -1999~9999 sec. (note 1)              | 0012    | r/w        | 03/06         |
| Time setting of alarm 3 (A3Tr). Range: -1999~9999 sec. (note 1)              | 0013    | r/w        | 03/06         |
| Setting proportional band 1 (P). Range: 0~2000                               | 0014    | r/w        | 03/06         |
| Integration time setting (I). Range: 0~3600 sec.                             | 0015    | r/w        | 03/06         |
| Differentiation time setting (d). Range: 0~240 sec.                          | 0016    | r/w        | 03/06         |
| AT offset value (AtSv). Range: 0~999                                         | 0018    | r/w        | 03/06         |
| Output cycle time (Cyc). Range: 0~120 sec.                                   | 0019    | r/w        | 03/06         |
| Hysteresis width (Hys). Range: 0~900                                         | 0020    | r/w        | 03/06         |
| SV Low limit setting (SV L). Range: subject to specs.                        | 0023    | r/w        | 03/06         |
| SV High limit setting (SV H). Range: subject to specs.                       | 0024    | r/w        | 03/06         |
| PV Compensation (PvCm). Range: -999~999                                      | 0026    | r/w        | 03/06         |
| Soft start (Soft). Range: 0~20 times                                         | 0027    | r/w        | 03/06         |
| Prevention of integration stop (ARW). Range: 0~100%                          | 0028    | r/w        | 03/06         |
| Filter parameter setting (FiLr). Range: 001~999 (unit: 0.01sec)              | 0029    | r/w        | 03/06         |
| Analog input displays decimal point (Pnt). Range: 0~3                        | 0030    | r/w        | 03/06         |
| Setting of low limit display of analog input (In1L). Range: -1999~9999       | 0031    | r/w        | 03/06         |
| Setting of high of limit display of analog input (In1H). Range: -1999~9999   | 0032    | r/w        | 03/06         |
| Low calibration of analog output 1 (Co1L). Range: 2~9000                     | 0035    | r/w        | 03/06         |
| High calibration of analog output 1 (Co1H). Range: 0~4000                    | 0036    | r/w        | 03/06         |
| Selection of re-transmission target (o3TY). Range: PV, Out1, Out2            | 0039    | r/w        | 03/06         |
| Low calibration of analog re-transmission (Co3L). Range: 0~9000              | 0040    | r/w        | 03/06         |
| High calibration of analog output (Co3H). Range: 0~4000                      | 0041    | r/w        | 03/06         |
| Low display setting of re-transmission output (o3L). Range: -1999~9999       | 0042    | r/w        | 03/06         |

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|                                                                          |      |     |       |
|--------------------------------------------------------------------------|------|-----|-------|
| High display setting of re-transmission output (o3 H). Range: -1999~9999 | 0043 | r/w | 03/06 |
| (Process control)                                                        |      |     |       |
| Process initial step (strt): Range 0~15                                  | 0045 | r/w | 03/06 |
| Process ending step (endt): Range strt~15                                | 0046 | r/w | 03/06 |
| Repeat times (rept): Range 0~9999                                        | 0047 | r/w | 03/06 |
| Wait temperature (wait): Range 0~1000                                    | 0048 | r/w | 03/06 |
| Target value of step 0 (SV 0): Range SV L ~ SV H                         | 0049 | r/w | 03/06 |
| Target value of step 1 (SV 1): Range SV L ~ SV H                         | 0050 | r/w | 03/06 |
| Target value of step 2 (SV 2): Range SV L ~ SV H                         | 0051 | r/w | 03/06 |
| Target value of step 3 (SV 3): Range SV L ~ SV H                         | 0052 | r/w | 03/06 |
| Target value of step 4 (SV 4): Range SV L ~ SV H                         | 0053 | r/w | 03/06 |
| Target value of step 5 (SV 5): Range SV L ~ SV H                         | 0054 | r/w | 03/06 |
| Target value of step 6 (SV 6): Range SV L ~ SV H                         | 0055 | r/w | 03/06 |
| Target value of step 7 (SV 7): Range SV L ~ SV H                         | 0056 | r/w | 03/06 |
| Target value of step 8 (SV 9): Range SV L ~ SV H                         | 0057 | r/w | 03/06 |
| Target value of step 9 (SV 10): Range SV L ~ SV H                        | 0058 | r/w | 03/06 |
| Target value of step 10 (SV 11): Range SV L ~ SV H                       | 0059 | r/w | 03/06 |
| Target value of step 11 (SV 12): Range SV L ~ SV H                       | 0060 | r/w | 03/06 |
| Target value of step 12 (SV 13): Range SV L ~ SV H                       | 0061 | r/w | 03/06 |
| Target value of step 13 (SV 14): Range SV L ~ SV H                       | 0062 | r/w | 03/06 |
| Target value of step 14 (SV 14): Range SV L ~ SV H                       | 0063 | r/w | 03/06 |
| Target value of step 15 (SV 15): Range SV L ~ SV H                       | 0064 | r/w | 03/06 |
|                                                                          |      |     |       |
| Heating time of step 0 (Tr 0): Range 0~6000 minute                       | 0065 | r/w | 03/06 |
| Heating time of step 1 (Tr 1): Range 0~6000 minute                       | 0066 | r/w | 03/06 |
| Heating time of step 2 (Tr 2): Range 0~6000 minute                       | 0067 | r/w | 03/06 |
| Heating time of step 3 (Tr 3): Range 0~6000 minute                       | 0068 | r/w | 03/06 |
| Heating time of step 4 (Tr 4): Range 0~6000 minute                       | 0069 | r/w | 03/06 |
| Heating time of step 5 (Tr 5): Range 0~6000 minute                       | 0070 | r/w | 03/06 |
| Heating time of step 6 (Tr 6): Range 0~6000 minute                       | 0071 | r/w | 03/06 |
| Heating time of step 7 (Tr 7): Range 0~6000 minute                       | 0072 | r/w | 03/06 |
| Heating time of step 8 (Tr 8): Range 0~6000 minute                       | 0073 | r/w | 03/06 |
| Heating time of step 9 (Tr 9): Range 0~6000 minute                       | 0074 | r/w | 03/06 |
| Heating time of step 10 (Tr 10): Range 0~6000 minute                     | 0075 | r/w | 03/06 |
| Heating time of step 11 (Tr 11): Range 0~6000 minute                     | 0076 | r/w | 03/06 |
| Heating time of step 12 (Tr 12): Range 0~6000 minute                     | 0077 | r/w | 03/06 |
| Heating time of step 13 (Tr 13): Range 0~6000 minute                     | 0078 | r/w | 03/06 |
| Heating time of step 14 (Tr 14): Range 0~6000 minute                     | 0079 | r/w | 03/06 |
| Heating time of step 15 (Tr 15): Range 0~6000 minute                     | 0080 | r/w | 03/06 |
|                                                                          |      |     |       |
| Max. output of step 0 (Ho 0): Range 0.0~100.0%                           | 0081 | r/w | 03/06 |
| Max. output of step 1 (Ho 1): Range 0.0~100.0%                           | 0082 | r/w | 03/06 |
| Max. output of step 2 (Ho 2): Range 0.0~100.0%                           | 0083 | r/w | 03/06 |
| Max. output of step 3 (Ho 3): Range 0.0~100.0%                           | 0084 | r/w | 03/06 |
| Max. output of step 4 (Ho 4): Range 0.0~100.0%                           | 0085 | r/w | 03/06 |
| Max. output of step 5 (Ho 5): Range 0.0~100.0%                           | 0086 | r/w | 03/06 |

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|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|---------|
| Max. output of step 6 (Ho 6): Range 0.0~100.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0087 | r/w   | 03/06   |
| Max. output of step 7 (Ho 7): Range 0.0~100.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0088 | r/w   | 03/06   |
| Max. output of step 8 (Ho 8): Range 0.0~100.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0089 | r/w   | 03/06   |
| Max. output of step 9 (Ho 9): Range 0.0~100.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0090 | r/w   | 03/06   |
| Max. output of step 10 (Ho 10): Range 0.0~100.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0091 | r/w   | 03/06   |
| Max. output of step 11 (Ho 11): Range 0.0~100.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0092 | r/w   | 03/06   |
| Max. output of step 12 (Ho 12): Range 0.0~100.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0093 | r/w   | 03/06   |
| Max. output of step 13 (Ho 13): Range 0.0~100.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0094 | r/w   | 03/06   |
| Max. output of step 14 (Ho 14): Range 0.0~100.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0095 | r/w   | 03/06   |
| Max. output of step 15 (Ho 15): Range 0.0~100.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0096 | r/w   | 03/06   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |      |       |         |
| Alarm hysteresis setting (Ahys) Range 00~1000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0097 | r/w   | 03/06   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |      |       |         |
| 0098~0127 Reserved                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |       |         |
| Control output (out). Range: 0~1000 (unit: 0.1%)<br>(Can be changed only when under manual mode)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0128 | r/(w) | 03/(06) |
| Present value (PV) (Accuracy is subject to the digits set with via Pnt)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 0130 | r     | 03      |
| Temperature at cool junction (CjT) (room temperature) (Unit: 0.1°C)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0131 | r     | 03      |
| Load current (LoadCur)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0133 | r     | 03      |
| Error code:<br>0x01: Input open circuit                      0x02: Cooling compensation error<br>0x08: Input exceeds positive range        0x10: Input exceeds negative range<br>0x20: AD circuit fault                                                                                                                                                                                                                                                                                                                                                                                   | 0134 | r     | 03      |
| Contact status, word format, convenient for one-time reading: (1/0)<br>0x001: Writes in data                      0x002: Disable panel buttons<br>0x004: Execute AT                          0x008: Auto/Manual mode<br>0x010: none                                  0x020: Cool/Heat mode<br>0x040 : none                                  0x080: °F/°C<br>0x100: Alarm 1                              0x200: Alarm 2<br>0x400: Alarm 3                              0x0800: OUT1<br>0x1000: OUT2                                0x2000: Process run/stop<br>0x8000: Process Hold status | 0135 | r     | 03      |
| Process control: Process running segment (ProSeg)<br>Display range: 0~15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 136  | r     | 03      |
| Process control: Present running linearity target value (ProRunSv)<br>Range: SV L ~ SV H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 137  | r/w   | 03/06   |
| Process control: Present running segment final target (ProSv)<br>Range: SV L ~ SV H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 138  | r     | 03      |
| Process control: Remained time (ProLeft)<br>Display range: 5999 ~ 0 minute                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 139  | r     | 03      |
| Process control: Remained cycle times (ProRepeat)<br>Display range: 9999 ~ 0 times                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 140  | r     | 03      |
| Coil                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |       |         |
| Data writing (DataWrite)<br>Set 1, the data will be written into the internal EEPROM. It will reset to 0 after 2 sec.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0000 | r/w   | 01/05   |
| Panel Lock (PnLock):<br>Disable controller buttons                      (Note 3)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0001 | r/w   | 01/05   |
| Execute Auto-Tuning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0002 | r/w   | 01/05   |

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|                                                     |      |     |       |
|-----------------------------------------------------|------|-----|-------|
| Auto / Manual Switch Auto(1)/Manu (0)               | 0003 | r/w | 01/05 |
| Reserved                                            | 0004 |     |       |
| Control direction (Dir) Cool(1)/Heat(0)             | 0005 | r/w | 01/05 |
| Reboot (Note 4)                                     | 0006 | r/w | 01/05 |
| Temperature unit indication (Unit). °F(1)/°C(0)     | 0007 | r   | 01    |
| Alarm 1 status (ALM 1) On(1)/Off(0)                 | 0008 | r   | 01    |
| Alarm 2 status (ALM 2) On(1)/Off(0) (Note 2)        | 0009 | r   | 01    |
| Alarm 3 status (ALM 3) On(1)/Off(0) (Note 2)        | 0010 | r   | 01    |
| Output status (Out) 1(when out>0%) / 0(when out=0%) | 0011 | r   | 01    |
| Process status run(1)/stop(0)                       | 0013 | r/w | 01/05 |
| Process status Skip(1) and reset to 0 automatically | 0014 | r/w | 01/05 |
| Process status Hold (1)/continue(0)                 | 0015 | r/w | 01/05 |

- Calculation of ModBus register addresses: command address +40001  
Calculation of coil address: command address + 00001
- All addresses and function codes are decimal.

Note 1. This controller provides 1 alarm output (NPN circuit) , it can also set various parameters and action mode of ALM2 & ALM3 to be like the ALM1 via communication.

Note 2. When ALM2 & ALM3 have set alarm actions (A2Fu, A3Fu>0) and output conditions established, COIL (address 0009, 0010) status will set as 1.

Note 3. There is a “Tour”(Time-Out”) parameter among the communication parameters. The set range is 5~99 sec.  
If communication is disconnected and over this set time, PnLock is deactivated automatically.  
If the controller is at manual mode, it will reset output (out1, out2) to zero

Note 4. To set COIL address 0006 as 1, this controller will executes soft start, do no need to shut down the power.  
If communication parameter is changed, it can execute remote reboot.

### Responded Error Code

|    |                                                                                                           |
|----|-----------------------------------------------------------------------------------------------------------|
| 01 | Address error. Possible cause: read data address in not defined, or multiple read/write exceeds the range |
| 02 | Multiple read/write exceeds 8 operations                                                                  |
| 03 | Unsupported ModBus command or command error                                                               |
| 04 | Data temporarily cannot be set. The panel is inputting data                                               |

Conch Electronic Co., Ltd.

No. 3, Keji 1ST Road, Annan District,

Tainan City, Taiwan, Zip code: 70955

Tel: 886-6-384-2111

Fax: 886-6-384-0855