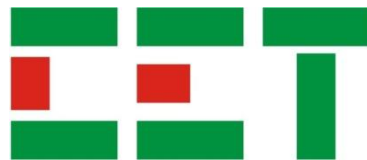


PMC-518D RTU

User Manual

Version: V1.3A

02/07/2012



Ceiec Electric Technology

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Standards Compliance



DANGER

This symbol indicates the presence of danger that may result in severe injury or death and permanent equipment damage if proper precautions are not taken during the installation, operation or maintenance of the device.



CAUTION

This symbol indicates the potential of personal injury or equipment damage if proper precautions are not taken during the installation, operation or maintenance of the device.



Failure to observe the following instructions may result in severe injury or death and/or equipment damage.

- Installation, operation and maintenance of the device should only be performed by qualified, competent personnel that have the appropriate training and experience with high voltage and current devices.
- Ensure that power source is turned OFF before performing any work on the device.
- Before connecting the device to the power source, check the label on top of the device to ensure that it is equipped with the appropriate power supply.
- Do not use the device for primary protection functions where failure of the device can cause fire, injury or death. The device should only be used for shadow protection if needed.
- Under no circumstances should the device be connected to a power source if it is damaged.
- To prevent potential fire or shock hazard, do not expose the device to rain or moisture.
- DO NOT open the device under any circumstances.

Limited warranty

- Ceiec Electric Technology (CET) offers the customer a minimum of 12-month functional warranty on the device for faulty parts or workmanship from the date of dispatch from the distributor. This warranty is on a return to factory for repair basis.
- CET does not accept liability for any damage caused by device malfunctions. CET accepts no responsibility for the suitability of the device to the application for which it was purchased.
- Failure to install, set up or operate the device according to the instructions herein will void the warranty.
- Only CET's duly authorized representative may open your device. The unit should only be opened in a fully anti-static environment. Failure to do so may damage the electronic components and will void the warranty.

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Chapter 1 Introduction

This chapter provides an overview of the PMC-518D and summarizes many of its key features.

1.1 Overview

The PMC-518D RTU is an intelligent remote terminal unit, featuring quality construction, DIN rail mount and a large, easy to read LCD display. It comes standard with 18 self-excited Digital Inputs for status monitoring or utility pulse counting and optionally provides 6 or 8 Digital Outputs for remote control applications and two Analog Inputs for interfacing with external transducers. Further, the SOE Log records all setup changes, DI status changes and DO operations in 1ms resolution. With the standard RS-485 port and Modbus RTU protocol support, the PMC-518D becomes a vital component in any building, factory, substation or utility automation systems.

You can setup the PMC-518D through its front panel or via our free PMC Setup software. The device is also supported by our PecStar® Integrated Energy Management System.

1.2 Features

Ease of use

- Large, backlit, easy to read LCD display
- Simple, password-protected setup via front panel or free PMC Setup software
- Easy installation with DIN rail mounting, no tools required

SOE Log

- 128 events time-stamped to ± 1 ms resolution
- Setup changes and I/O operations

Digital Inputs

- 18 channels for external status monitoring or utility pulse counting with programmable scales for collecting WAGES information
- Volts free dry contact, 24VDC internally wetted
- 1000Hz sampling

Digital Outputs (Optional)

- 6 or 8 channels for remote control applications
- Form A mechanical relays

Analog Inputs (Optional)

- 0-20 / 4-20mA DC input
- Interface with external transducer signals
- Programmable zero and full scales

Communications

- Optically isolated RS485 port
- Baud rate from 1200 to 19,200bps
- Modbus RTU protocol

Real-time clock

- Battery-backed real-time clock @ 6ppm or 0.5s/day
- Can be set through front panel or via communications

System Integration

- Supported by our PecStar® iEMS and PMC Setup
- Easy integration into other Automation or SCADA systems via Modbus RTU protocol

1.3 Typical Application

- Status monitoring
- Remote control
- Substation, building, factory and utility automation

1.4 Getting more information

Additional information is available from CET via the following sources:

- Visit www.ceiec-electric.com
- Contact your local representative
- Contact CET directly via email or telephone

Chapter 2 Installation



Caution

Installation of the PMC-518D should only be performed by qualified, competent personnel that have the appropriate training and experience with high voltage and current devices.

2.1 Appearance

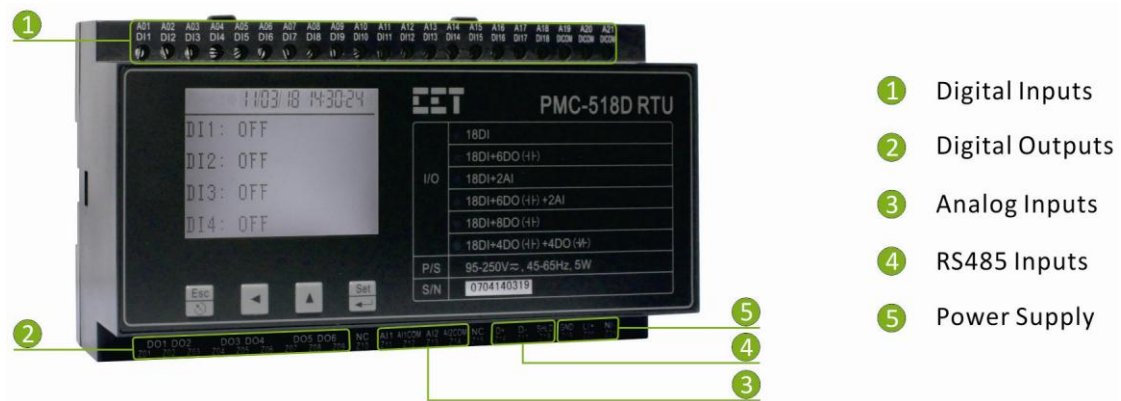
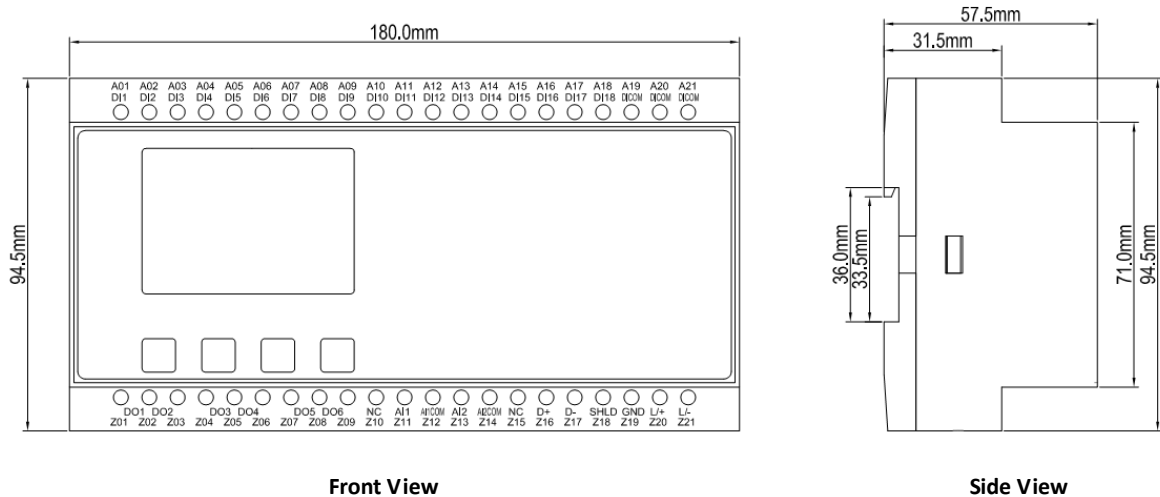


Figure 2-1 Appearance

2.2 Unit Dimensions



Front View

Side View

Figure 2-2 Dimensions

2.3 Mounting

The PMC-518D should be installed in a dry environment with no dust and kept away from heat, radiation and electrical noise sources.

Installation steps:

- Before installation, make sure that the 35mm DIN-Rail is already in place
- Align the top of the mounting channel at the back of the PMC-518D at an angle against the top of the DIN rail as show in Figure 2-3 below
- Rotate the bottom of the PMC-518D towards the back while applying a slight pressure to make sure that the device is completely and securely fixed on to the DIN rail

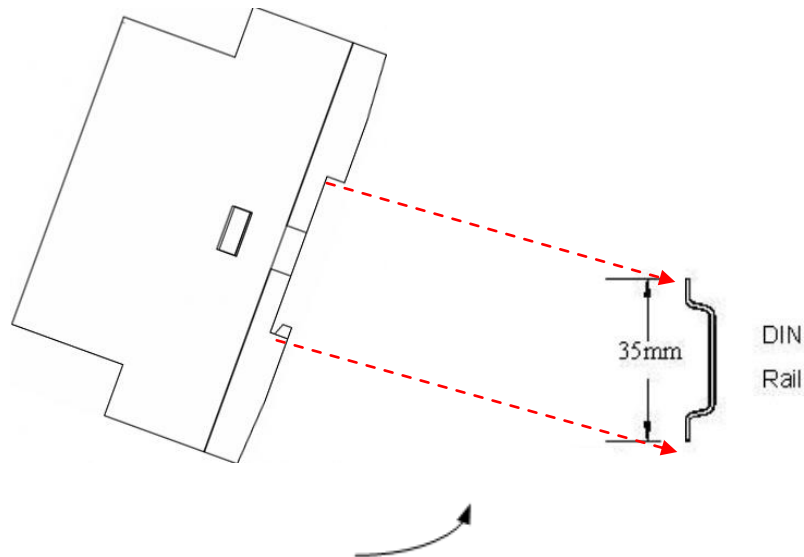


Figure 2-3 Mounting the PMC-518D

2.4 Communications Wiring

The PMC-518D provides one RS485 port and supports the Modbus RTU protocol. Up to 32 devices can be connected on a RS485 bus. The overall length of the RS485 cable connecting all devices should not exceed 1200m.

If the master station does not have a RS485 communications port, a RS232/RS485 or USB/RS485 converter with optically isolated outputs and surge protection should be used.

The following figure illustrates the RS485 communications connections on the PMC-518D:

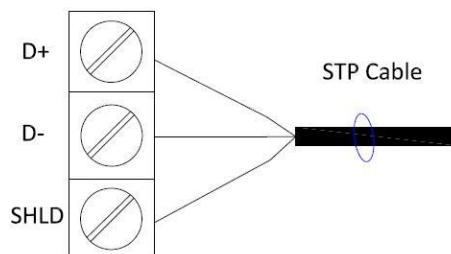


Figure 2-4 RS485 Communications Connections

2.5 Digital Input Wiring

The following figure illustrates the Digital Input connections on the PMC-518D:

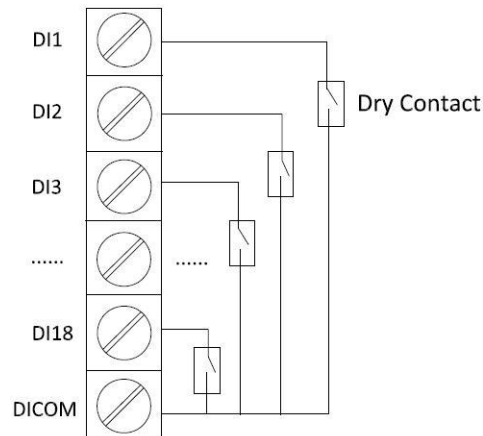


Figure 2-5 DI Connections

2.6 Digital Output Wiring

The following figure illustrates the Digital Output connections on the PMC-518D:

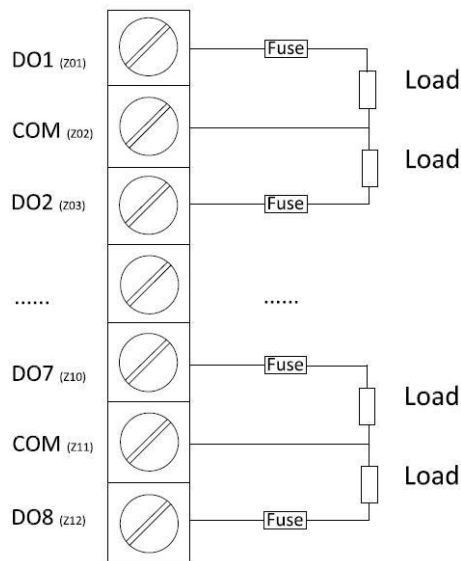


Figure 2-6 DO Connections

2.7 Analog Input Wiring

The following figure illustrates the Analog Input connections on the PMC-518D:

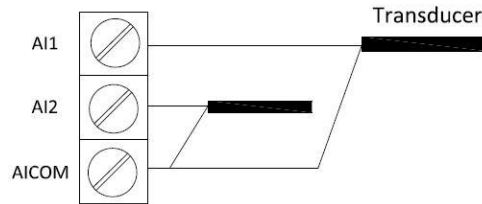


Figure 2-7 AI Connections

2.8 Power Supply Wiring

For AC supply, connect the live wire to the L/+ terminal and the neutral wire to the N/- terminal. For DC supply, connect the positive wire to the L/+ terminal and the negative wire to the N/- terminal. Connect the GND terminal to ground.

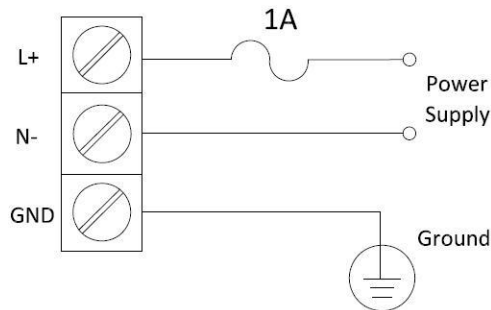


Figure 2-8 Power Supply Connections

Chapter 3 Front Panel

The PMC-518D has a large, easy to read LCD display with backlight and four buttons which allow quick access to view measurements and device information, configure the parameters and perform maintenance. This chapter introduces the front panel operations.

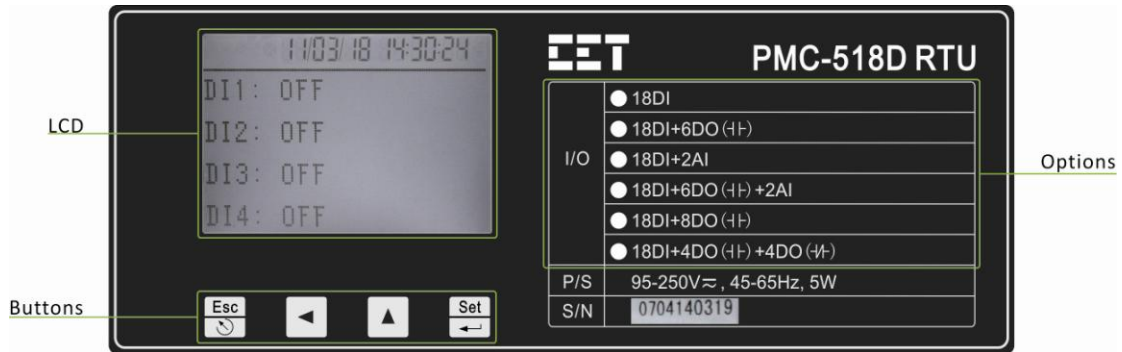


Figure 3-1 Front Panel

3.1 Buttons

Buttons	View Mode / Menu Level	Parameter configuration via Setup or Maintenance Menu (Default password is a numeric zero "0")
<<>	Scroll to the next measurement page or the next menu item.	Before a parameter is selected for modification, pressing this button scrolls to the next parameter in the menu. If a parameter is already selected, pressing this button moves the cursor one position to the left if the parameter being changed is a numeric value. This button is ignored if the parameter being changed is not a numeric value.
<>	Scroll to the previous measurement page or the previous menu item.	Before a parameter is selected for modification, pressing this button scrolls to the previous parameter in the menu. If a parameter is already selected, pressing this button increments a numeric value or scrolls to the next item in the selection list.
< Set >	Pressing this button enters the sub-menu.	At the parameter configuration level, pressing this button selects the parameter for modification. After changing the parameter, pressing this button again saves the new setting into memory.
< Esc >	Pressing this button returns to the previous menu level if it's already in a sub-menu. This button is ignored at the top display level.	At the parameter configuration level, pressing this button cancels the changes and exits the configuration mode.

Table 3-1 Buttons

3.2 Default Screen

The default display screen for the PMC-518D is illustrated in Figure 3-2. If there is no front panel activity for 3 minutes, the display will automatically return to the default display screen.

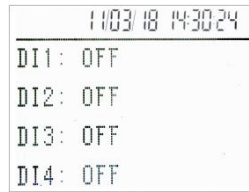


Figure 3-2 PMC-518D Default Display Screen

3.3 Data Display

From the default display screen, pressing button <◀▶> views the measurements data. The following table illustrates the data display screens for the PMC-518D.

Press Button	Display Screens	Parameters
<◀▶>	Display 1(default)	DI1-DI4
	Display 2	DI5-DI8
	Display 3	DI9-DI12
	Display 4	DI13-DI16
	Display 5	DI17-DI18
	Display 6 ¹	DO1-DO6 or DO1-DO8
	Display 7 ²	AI1-AI2

Table 3-2 PMC-518D Data Display Screens

Note:

- (1) When the I/O option is 18DI or 18DI+2AI, the screens that display the DO statuses do not appear.
- (2) When the I/O option is 18DI or 18DI+6DO, the screen that displays the AI values does not appear.

3.4 Main Menu

3.4.1 Main Screen

Pressing the <Set> button enters PMC-518D's Main Menu, which is illustrated in Figure 3-3.

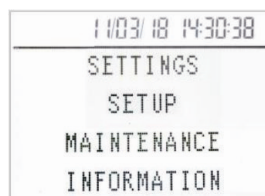


Figure 3-3 PMC-518D's Main Menu

There are four options in the main menu - **SETTINGS**, **SETUP**, **MAINTENANCE**, and **INFORMATION**. Choose **SETTINGS** to view the setup parameters; choose **SETUP** to configure the setup parameters; choose **MAINTENANCE** to perform maintenance; and choose **INFORMATION** to view device information.

3.4.2 PMC-518D's Menu

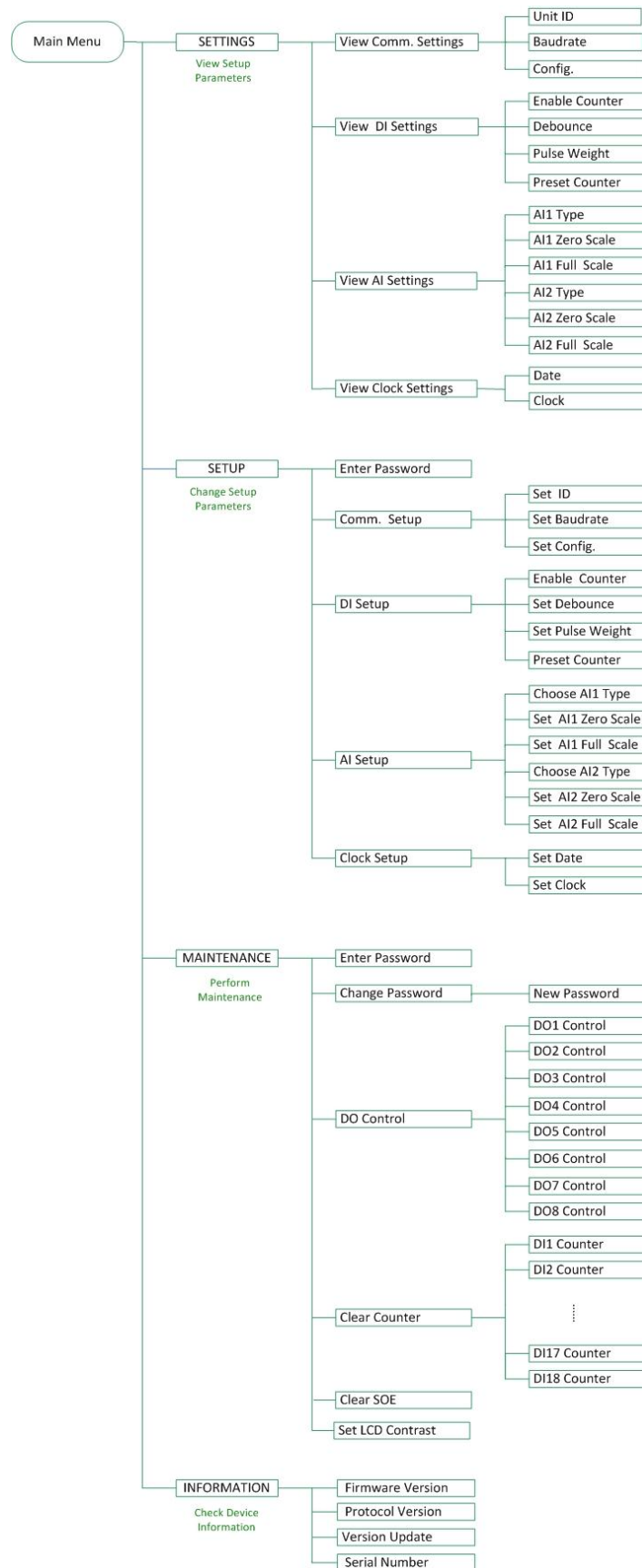


Figure 3-4 Main Menu

3.5 Using the Main Menu

There are four options in the main menu:

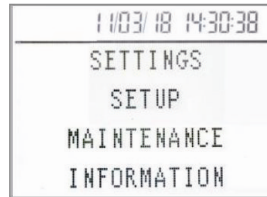


Figure 3-5 Main screen

SETTINGS – View setup parameters

SETUP – Configure setup parameters

MAINTENANCE – Perform maintenance

INFORMATION – View device information

This section describes front panel navigation within each option.

3.5.1 SETTINGS

From the main menu, scroll to the **SETTINGS** option by using the <◀> button and then press the <Set> button to enter its sub-menu. The following groups appear:

- Comm. Setup – View the communication setup parameters
- DI Setup – View the DI setup parameters
- AI Setup – View the AI setup parameters
- Clock Setup – View the date and clock

Settings in each group:

Group	Settings	
	Setup Parameters	Rang/Options
Comm. Setup	Unit ID	1 to 247
	Baudrate	1200/2400/4800/9600/19200bps
	Configuration	8N2/8O1/8E1/8N1/8O2/8E2
DI Setup	Counter Enable	E(Enable)/D(Disable)
	Debounce	1 to 1000ms
	Pulse Weight	0.001 to 1000.000
	Counter Preset	0.000 to 999,999.999
AI Setup	AI1 Type	0-20mA/4-20mA
	AI1 Zero	-999,999 to 999,999
	AI1 Full	-999,999 to 999,999
	AI2 Type	0-20mA/4-20mA
	AI2 Zero	-999,999 to 999,999
	AI2 Full	-999,999 to 999,999
Clock Setup	Date	20YY/MM/DD
	Clock	HH:MM:SS

Table 3-3 Settings

3.5.2 SETUP

Setup configuration via the front panel is password protected. The user is required to enter a password before making configuration changes to the device through the front panel. The default password is "0" (numeric zero).

From the main menu, scroll to the SETUP option by using the <◀> button and then press the <Set> button to enter its sub-menu. The following groups appear:

- Comm. Setup – Configure communication setup parameters
- DI Setup – Configure DI setup parameters
- AI Setup – Configure AI setup parameters
- Clock Setup – Configure the date and clock settings

Configuration in each group:

Group	Configuration		
	Parameters	Description	Range/Options
Comm. Setup	ID	Modbus Address	1 to 247
	Baudrate	Data rate in bits per second	1200/2400/4800/ 9600/19200bps
	Config.	Data Format	8N2/8O1/8E1/8N1/8O2/8E2
DI Setup	Counter Enable	Enable Pulse Counter	E(Enable)/D(Disable)
	Debounce	Debounce time	1 to 1000ms
	Pulse Weight	Pulse Weight	0.001 to 1000.000
	Counter Preset	Preset Pulse Counter value	0.000 to 999,999.999
AI Setup	AI1 Type	Select between 0-20mA or 4-20mA	0-20mA/4-20mA
	AI1 Zero	The value that corresponds to the minimum Analog Input of 0 mA or 4 mA	-999,999 to 999,999
	AI1 Full	The value that corresponds to the maximum Analog Input of 20 mA	-999,999 to 999,999
	AI2 Type	Select between 0-20mA or 4-20mA input	0-20mA/4-20mA
	AI2 Zero	The value that corresponds to the minimum Analog Input of 0 mA or 4 mA	-999,999 to 999,999
	AI2 Full	The value that corresponds to the maximum Analog Input of 20 mA	-999,999 to 999,999
Clock Setup	Date	Date of the device	20YY/MM/DD
	Clock	Clock of the device	HH:MM:SS

Table 3-4 Setups

3.5.3 MAINTENANCE

A password is required before performing maintenance to the device through the front panel. The default password is "0" (numeric zero).

From the main menu, scroll to the MAINTENANCE option by using the <◀> button and then press the <Set> button to enter its sub-menu. The following groups appear:

- Change Password – Change Password
- DO Control – Perform DO Control
- Clear Counter – Clear DI Counter
- Clear SOE – Clear the SOE Log
- Contrast Setup – Configure the LCD contrast

Maintenance in each group:

Group	Function
Change Password	Change Password – The Range of password is between 0000 to 9999 The default password is “0” (numeric zero)
DO Control	DO Control – Normal Force On Force Off
Clear Counter	Clear DI Pulse Counter (DI1 to DI18)
Clear SOE	Clear the SOE Log
Contrast Setup	Set LCD Contrast – The LCD contrast can be set between zero and nine where the higher value represents a darker contrast

Table 3-5 Maintenance

3.5.4 INFORMATION

From the main menu, scroll to the INFORMATION option by using the <◀> button and then press the <Set> button to enter its sub-menu. The following groups appear:

- Firmware – View the firmware version
- Protocol – View the Protocol version
- Update – View the date of the latest firmware update
- SN – View the Serial Number

Information in each group:

Group	Description	Note
Firmware	Firmware Version	For example, V1.02.11
Protocol	Protocol Version	For example, V2.3
Update	Date of the latest firmware update	For example, 11.07.09
SN	Serial Number	For example,1108471895

Table 3-6 Information

3.6 Front Panel Setup Parameters

The SETUP menu provides the following setup parameters:

Sub-Menu	Parameters	Description	Options/Range	Default
Enter Password	Enter Password	/	0000 to 9999	0
Comm. Setup	ID	Modbus Address	1 to 247	100
	Baudrate	Data rate in bits per second	1200/2400/4800/ 9600/19200bps	9600
	Config.	Data Format	8N2/8O1/8E1/8N1/8O2/8E2	8E1
DI Setup	Counter Enable	Enable Pulse Counter	E(Enable)/D(Disable)	D
	Debounce	Debounce time	1 to 1000ms	20
	Pulse Weight	Pulse Weight	0.001 to 1000.000	1
	Counter Preset	Preset Pulse Counter value	0.000 to 999,999.999	0.000
AI Setup¹	AI1 Type	Select between 0-20mA or 4-20mA input	0-20mA/4-20mA	4-20
	AI1 Zero	The value that corresponds to the minimum Analog Input of 0 mA or 4 mA	-999,999 to 999,999	0
	AI1 Full	The value that corresponds to the maximum Analog Input of 20 mA	-999,999 to 999,999	0
	AI2 Type	Select between 0-20mA or 4-20mA input	0-20mA/4-20mA	0
	AI2 Zero	The value that corresponds to the minimum Analog Input of 0 mA or 4 mA	-999,999 to 999,999	0
	AI2 Full	The value that corresponds to the maximum Analog Input of 20 mA	-999,999 to 999,999	0
Clock Setup	Date	Date of the device	20YY/MM/DD	/
	Clock	Clock of the device	HH:MM:SS	/

Table 3-7 Setup Parameters

Note:

- 1) When the PMC-518D is not equipped with the AI option, **AI Setup** does not appear.

3.7 Front Panel Maintenance Parameters

The MAINTENANCE menu provides the following parameters:

Sub-Menu	Parameters	Options/Range
Enter Password	New Password	Default=0
Change Password	Change Password	0000 to 9999
DO Control ¹	DO1 Control	Normal [*] /Force On/Force Off
	DO2 Control	
	DO3 Control	
	DO4 Control	
	DO5 Control	
	DO6 Control	
	DO7 Control ²	
	DO8 Control ²	
Clear Counter	DI1(Counter 1) ³	YES/NO [*]
	DI2(Counter 2) ³	
	DI3(Counter 3) ³	
	DI4(Counter 4) ³	
	DI5(Counter 5) ³	
	DI6(Counter 6) ³	
	DI7(Counter 7) ³	
	DI8(Counter 8) ³	
	DI9(Counter 9) ³	
	DI10(Counter 10) ³	
	DI11(Counter 11) ³	
	DI12(Counter 12) ³	
	DI13(Counter 13) ³	
	DI14(Counter 14) ³	
	DI15(Counter 15) ³	
	DI16(Counter 16) ³	
	DI17(Counter 17) ³	
	DI18(Counter 18) ³	
Clear SOE	Clear the SOE Log	YES/NO [*]
Contrast Setup	Set LCD Contrast	0 to 9 (Default=4)

* Default

Table 3-8 Maintenance Parameters

Note:

- 1) When the I/O option is 18DI or 18DI+2AI, the **DO Control** sub-menu does not appear.
- 2) When the I/O option is 18DI+6DO, **DO7 Control and DO8 Control** do not appear.
- 3) Only when DIx Pulse Counter is enabled, Clear DIx is available.

Chapter 4 Applications

4.1 Digital Inputs

The PMC-518D comes standard with eighteen self-excited Digital Inputs that are internally wetted at 24 VDC.

Digital Inputs are typically used for monitoring external status which can help prevent equipment damage, improve maintenance, and track security breaches. The real-time statuses of the Digital Inputs are available on the front panel LCD Display as well as through communications. Changes in Digital Input status are stored as events in the SOE Log in 1 ms resolution.

Besides, Digital Inputs can also be used for pulse counting to collect WAGES (Water, Air, Gas, Electricity and Steam) information. The WAGES information is available on the front panel LCD display as well as through communication.

4.2 Digital Outputs

The PMC-518D comes optionally with six or eight Form A Electromechanical Digital Outputs, which can be used for remote control applications.

4.3 Analog Input

Analog Inputs are normally used for monitoring a wide range of conditions such as flow rates, RPM, fluid levels, oil pressures and transformer temperatures. The PMC-518D comes optionally with two Analog Inputs which can be programmed as 0mA to 20mA or 4mA to 20mA input.

There are 3 setup parameters:

- Type:** Select between 0-20mA or 4-20mA input.
- AI Zero:** This value corresponds to the minimum Analog Input of 0 mA (for 0-20mA input) or 4 mA (for 4-20mA input) and has a range of -999,999 to +999,999.
- AI Full:** This value corresponds to the maximum Analog Input of 20 mA and has a range of -999,999 to +999,999.

For example, to measure the oil temperature of a transformer, connect the outputs of the temperature sensor to the AI terminals of the PMC-518D. The temperature sensor outputs 4mA when the temperature is -25°C and 20mA when the temperature is 100°C. As such, the **Type** parameter should be programmed as **4-20mA**. The **AI FULL** parameter should be programmed with the value 100, and the **AI ZERO** parameter should be programmed with the value -25. Therefore, when the output of the sensor is 20mA, the reading will be 100.00°C. When the output is 4mA, the reading will be -25.00°C. When the output is 12mA, the reading will be $(100^{\circ}\text{C} - (-25^{\circ}\text{C})) \times (12\text{mA} - 4\text{mA}) / (20\text{mA} - 4\text{mA}) + (-25^{\circ}\text{C}) = 37.50^{\circ}\text{C}$.

4.4 SOE Log

The PMC-518D's SOE Log can store up to 128 events such as power-on, power-off, Digital Input/Output status changes and setup changes in its non-volatile memory. Each event record includes the event classification, its relevant parameter values and a timestamp in 1ms resolution.

All events can be retrieved via communications for display. If there are more than 128 events, the

newest event will replace the oldest event on a first-in-first-out basis. The SOE Log can be reset from the front panel or via communications.

4.5 Typical Application

The following figure shows the typical application of the PMC-518D.

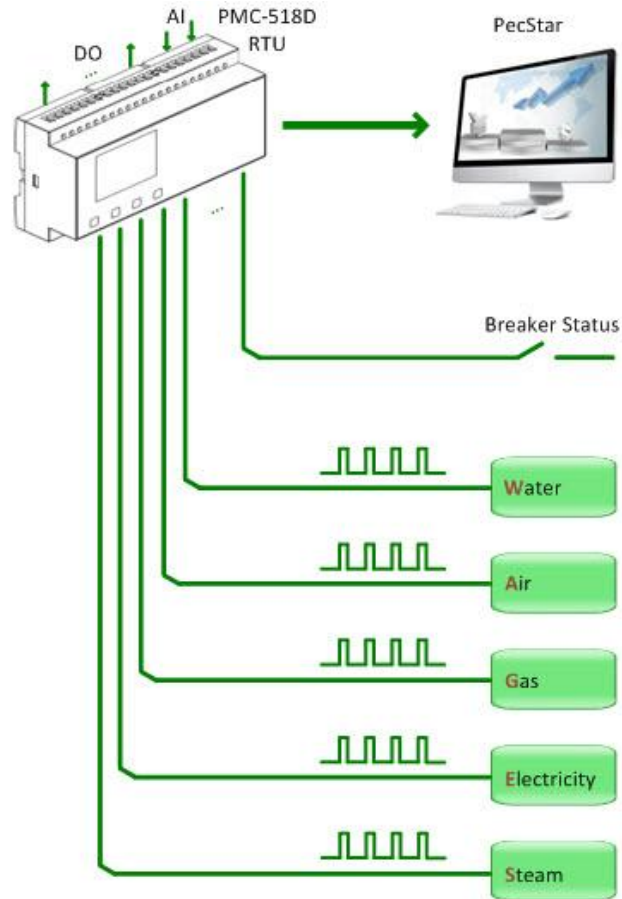


Figure 4-1 Typical Application

Chapter 5 Modbus Register Map

This chapter provides a complete description of the Modbus register mapping (**Protocol Version 2.3**) for the PMC-518D RTU to facilitate the development of 3rd party communications driver for accessing information on the PMC-518D. In general, the registers on the PMC-518D are implemented as Modbus Holding Registers with the exception of the DO Control registers, which are implemented as “Write Only” Modbus Coil Registers. The PMC-518D supports the following Modbus functions:

- 1) Read Holding Registers (Function Code 0x03)
- 2) Force Single Coil (Function Code 0x05)
- 3) Preset Multiple Registers (Function Code 0x10)

For a complete Modbus Protocol Specification, please visit <http://www.modbus.org>.

5.1 Basic Measurements

Register	Property	Description	Format	Scale/Unit
0000	RO	AI1 Actual Value ¹	UINT16	×100, mA ²
0001	RO	AI2 Actual Value ¹	UINT16	×100, mA
0002	RO	AI1 Scaled Value	INT32	
0004	RO	AI2 Scaled Value	INT32	
0006	RO	DI Status ³	Bitmap	
0008	RO	DO Status ⁴	Bitmap	
0009	RO	SOE Pointer ⁵	UINT32	
0011	RO	DI1 (Counter1) Value	UINT32	×1000 0 to 999,999,999
0013	RO	DI2 (Counter2) Value	UINT32	×1000 0 to 999,999,999
0015	RO	DI3 (Counter3) Value	UINT32	×1000 0 to 999,999,999
0017	RO	DI4 (Counter4) Value	UINT32	×1000 0 to 999,999,999
.....			
0043	RO	DI17 (Counter17) Value	UINT32	×1000 0 to 999,999,999
0045	RO	DI18 (Counter18) Value	UINT32	×1000 0 to 999,999,999

Table 5-1 Basic Measurements

Notes:

- 1) AI shows the real value of external transducer signal.
- 2) “×100, mA” indicates the value returned in the register is 100 times the actual engineering value with the unit mA. For example, when the register contains a value 1001, the actual current is 1001 / 100 = 10.01mA.
- 3) For the **DI Status** register, the bit values of B0 to B17 represent the states of DI1 to DI18,

respectively, with “1” meaning active (closed) and “0” meaning inactive (open).

- 4) For the **DO Status** register, the bit values of B0 to B7 represent the states of DO1 to DO8, respectively, with “1” meaning active (Operated) and “0” meaning inactive (Released).
- 5) The range of the **SOE Pointer** is between 0 and 0xFFFFFFFF. The **SOE Pointer** is incremented by one for every event generated and will roll over to 0 if its current value is 0xFFFFFFFF. Since the **SOE Pointer** is a 32-bit value and the SOE Log capacity is relatively small with only 128 events in the PMC-518D, an assumption has been made that the **SOE pointer** will never roll over. If a **Clear SOE** is performed from the front panel or via communications, the **SOE Pointer** will be reset to zero and then immediately incremented by one with a new “Clear SOE via Front Panel” or “Clear SOE via Communications” event. Therefore, any 3rd party software should assume that a **Clear SOE** action has been performed if it sees the **SOE Pointer** rolling over to one or to a value that is smaller than its own pointer. In this case, the new **SOE Pointer** also indicates the number of events in the SOE Log if it is less than 128. Otherwise, there will always be 128 events in the SOE Log.

5.2 Setup Parameters

Register	Property	Description	Format	Range/Options
6000	RW	Unit ID	UINT16	1 to 247 (Default = 100)
6001	RW	Baud rate	UINT16	0=1200 1=2400 2=4800 3=9600* 4=19200
6002	RW	Configuration	UINT16	0=8N2 1=8O1 2=8E1* 3=8N1 4=8O2 5=8E2
6003	RW	DO1 Pulse Width	UINT16	0* to 600 (x0.1s) 0 = Latch Mode
6004	RW	DO2 Pulse Width	UINT16	
6005	RW	DO3 Pulse Width	UINT16	
6006	RW	DO4 Pulse Width	UINT16	
6007	RW	DO5 Pulse Width	UINT16	
6008	RW	DO6 Pulse Width	UINT16	
6009	RW	DO7 Pulse Width	UINT16	
6010	RW	DO8 Pulse Width	UINT16	
6011	RW	AI1 Type	UINT16	0= 4-20mA* 1= 0-20mA
6012	RW	AI2 Type	UINT16	0= 4-20mA* 1= 0-20mA

6013	RW	AI1 Full Scale	INT32	-999,999 to +999,999
6015	RW	AI1 Zero Scale	INT32	-999,999 to +999,999
6017	RW	AI2 Full Scale	INT32	-999,999 to +999,999
6019	RW	AI2 Zero Scale	INT32	-999,999 to +999,999
6021	WO	Clear SOE	UINT16	Writing "0xFF00" to the register clears the SOE and resets its pointer to "0"
6022	RW	DI Function ¹	UINT32	The values of B0 to B17 represent the functions of DI1 to DI18, respectively, with "1" meaning "Pulse Counter" and "0" meaning "Digital Input".
6024	RW	DI1 (Counter1) Pulse weight	UINT32	1 to 1000,000 (x0.001) (Default = 1000)
6026	RW	DI2 (Counter2) Pulse weight	UINT32	1 to 1000,000 (x0.001) (Default = 1000)
6028	RW	DI3 (Counter3) Pulse weight	UINT32	1 to 1000,000 (x0.001) (Default = 1000)
6030	RW	DI4 (Counter4) Pulse weight	UINT32	1 to 1000,000 (x0.001) (Default = 1000)
.....			
6058	RW	DI18 (Counter18) Pulse weight	UINT32	1 to 1000,000 (x0.001) (Default = 1000)
6060	RW	DI1 (Counter1) Preset Value	UINT32	0* to 999,999,999 (x0.001)
6062	RW	DI2 (Counter2) Preset Value	UINT32	0* to 999,999,999 (x0.001)
6064	RW	DI3 (Counter3) Preset Value	UINT32	0* to 999,999,999 (x0.001)
6066	RW	DI4 (Counter4) Preset Value	UINT32	0* to 999,999,999 (x0.001)
.....			
6094	RW	DI18 (Counter18) Preset Value	UINT32	0* to 999,999,999 (x0.001)
6096	RW	DI1 (Counter1) Debounce	UINT16	1 to 1000 (ms) (Default=20)
6097	RW	DI2 (Counter2) Debounce	UINT16	1 to 1000 (ms) (Default=20)
6098	RW	DI3 (Counter3) Debounce	UINT16	1 to 1000 (ms) (Default=20)
6099	RW	DI4 (Counter4) Debounce	UINT16	1 to 1000 (ms) (Default=20)
.....			
6113	RW	DI18 (Counter18) Debounce	UINT16	1 to 1000 (ms) (Default=20)
6114	WO	Clear DI1 (Counter1)	UINT16	Writing "0xFF00" to the register clears the DI1 Counter
6115	WO	Clear DI2 (Counter2)	UINT16	Writing "0xFF00" to the register

				clears the DI2 Counter
6116	WO	Clear DI3 (Counter3)	UINT16	Writing "0xFF00" to the register clears the DI3 Counter
6117	WO	Clear DI4 (Counter4)	UINT16	Writing "0xFF00" to the register clears the DI4 Counter
.....			
6131	WO	Clear DI18 (Counter18)	UINT16	Writing "0xFF00" to the register clears the DI18 Counter

* Default

Table 5-2 Setup Parameters

Notes:

- 1) The range of register 6022 is 0 to 0x3FFFF. If the value written in register 6022 exceeds this range, the PMC-518D ignores the "Write" command and returns the 0x03 exception code.

5.3 DO Control

The DO Control registers are implemented as "Write-Only" Modbus Coil Registers and can be controlled with the Force Single Coil command (Function Code 0x05). The PMC-518D does not support the Read Coils command (Function Code 0x01) because DO Control registers are "Write-Only".

The PMC-518D adopts the ARM before EXECUTE operation for the remote control of its Digital Outputs. Before executing an OPEN or CLOSE command on a Digital Output, it must be "Armed" first. This is achieved by writing the value 0xFF00 to the appropriate register to "Arm" a particular DO operation. The DO will be "Disarmed" automatically if an "Execute" command is not received within 15 seconds after it has been "Armed". If an "Execute" command is received without first having received an "Arm" command, the PMC-518D ignores the "Execute" command and returns the 0x04 exception code.

Register	Property	Description	Format	Note
9100	WO	Arm DO1 Close	UINT16	Writing "0xFF00"
9101	WO	Execute DO1 Close	UINT16	Writing "0xFF00"
9102	WO	Arm DO1 Open	UINT16	Writing "0xFF00"
9103	WO	Execute DO1 Open	UINT16	Writing "0xFF00"
9104	WO	Arm DO2 Close	UINT16	Writing "0xFF00"
9105	WO	Execute DO2 Close	UINT16	Writing "0xFF00"
9106	WO	Arm DO2 Open	UINT16	Writing "0xFF00"
9107	WO	Execute DO2 Open	UINT16	Writing "0xFF00"
9108	WO	Arm DO3 Close	UINT16	Writing "0xFF00"
9109	WO	Execute DO3 Close	UINT16	Writing "0xFF00"
9110	WO	Arm DO3 Open	UINT16	Writing "0xFF00"
9111	WO	Execute DO3 Open	UINT16	Writing "0xFF00"
9112	WO	Arm DO4 Close	UINT16	Writing "0xFF00"
9113	WO	Execute DO4 Close	UINT16	Writing "0xFF00"

9114	WO	Arm DO4 Open	UINT16	Writing "0xFF00"
9115	WO	Execute DO4 Open	UINT16	Writing "0xFF00"
9116	WO	Arm DO5 Close	UINT16	Writing "0xFF00"
9117	WO	Execute DO5 Close	UINT16	Writing "0xFF00"
9118	WO	Arm DO5 Open	UINT16	Writing "0xFF00"
9119	WO	Execute DO5 Open	UINT16	Writing "0xFF00"
9120	WO	Arm DO6 Close	UINT16	Writing "0xFF00"
9121	WO	Execute DO6 Close	UINT16	Writing "0xFF00"
9122	WO	Arm DO6 Open	UINT16	Writing "0xFF00"
9123	WO	Execute DO6 Open	UINT16	Writing "0xFF00"
9124	WO	Arm DO7 Close	UINT16	Writing "0xFF00"
9125	WO	Execute DO7 Close	UINT16	Writing "0xFF00"
9126	WO	Arm DO7 Open	UINT16	Writing "0xFF00"
9127	WO	Execute DO7 Open	UINT16	Writing "0xFF00"
9128	WO	Arm DO8 Close	UINT16	Writing "0xFF00"
9129	WO	Execute DO8 Close	UINT16	Writing "0xFF00"
9130	WO	Arm DO8 Open	UINT16	Writing "0xFF00"
9131	WO	Execute DO8 Open	UINT16	Writing "0xFF00"

Table 5-3 DO Control

5.4 SOE Log

Each event occupies 8 registers as shown in the following table.

Register	Property	Description	Format
10000-10007	RO	Event 1	SOE LOG (Table 5-5)
10008-10015	RO	Event 2	SOE LOG
10016-10023	RO	Event 3	SOE LOG
10024-10031	RO	Event 4	SOE LOG
10032-10039	RO	Event 5	SOE LOG
10040-10047	RO	Event 6	SOE LOG
10048-10055	RO	Event 7	SOE LOG
10056-10063	RO	Event 8	SOE LOG
10064-10071	RO	Event 9	SOE LOG
10072-10079	RO	Event 10	SOE LOG
10080-10087	RO	Event 11	SOE LOG
10088-10095	RO	Event 12	SOE LOG
.....			SOE LOG
11016-11023	RO	Event 128	SOE LOG

Table 5-4 SOE Log

Offset	Properties	Description
+0	RO	Reserved
+1	RO	High-order Byte: Event Classification (Table 5-6)
		Low-order Byte: Sub-Classification (Table 5-6)

+2	RO	High-order Byte: Year (Year-2000)
		Low-order Byte: Month (0 to 12)
+3	RO	High-order Byte: Day (0 to 31)
		Low-order Byte: Hour (0 to 23)
+4	RO	High-order Byte: Minute (0 to 59)
		Low-order Byte: Second (0 to 59)
+5	RO	Millisecond (0 to 999)
+6	RO	Event Value High-order Word
+7	RO	Event Value Low-order Word

Table 5-5 SOE LOG Data Structure

Event Classification	Sub-Classification	Event Value Scale/Option	Description
1	1	1/0	DI1 Close/DI1 Open
	2	1/0	DI2 Close/DI2 Open
	3	1/0	DI3 Close/DI3 Open
	4	1/0	DI4 Close/DI4 Open
	5	1/0	DI5 Close/DI5 Open
	6	1/0	DI6 Close/DI6 Open
	7	1/0	DI7 Close/DI7 Open
	8	1/0	DI8 Close/DI8 Open
	9	1/0	DI9 Close/DI9 Open
	10	1/0	DI10 Close/DI10 Open
	11	1/0	DI11 Close/DI11 Open
	12	1/0	DI12 Close/DI12 Open
	13	1/0	DI13 Close/DI13 Open
	14	1/0	DI14 Close/DI14 Open
	15	1/0	DI15 Close/DI15 Open
	16	1/0	DI16 Close/DI16 Open
	17	1/0	DI17 Close/DI17 Open
	18	1/0	DI18 Close/DI18 Open
2	1	1/0	DO1 Operated/ DO1 Released
	2	1/0	DO2 Operated/ DO1 Released
	3	1/0	DO3 Operated/ DO1 Released
	4	1/0	DO4 Operated/ DO1 Released
	5	1/0	DO5 Operated/ DO1 Released
	6	1/0	DO6 Operated/ DO1 Released
	7	1/0	DO7 Operated/ DO1 Released
	8	1/0	DO8 Operated/ DO1 Released
3	1	0	Power On
	2	0	Power Down
4	1	0	Setup Changes via Front Panel ¹
	2	0	Setup Changes via Communications ¹

5	1	1-18	Clear DI Counter (1-18) via Front Panel
	2	1-18	Clear DI Counter (1-18) via Communications
6	1	1	Clear SOE via Front Panel
	2	1	Clear SOE via Communications

Table 5-6 Event Classification

Notes:

- 1) "Setup Changes" events include the configuration changes of DI parameters, DO parameters, AI parameters and communication parameters.

5.5 Time

There are two sets of Time registers supported by the PMC-518D - Year/Month/Day/Hour/Minute/Second (Register # 9000 to 9002) and UNIX Time (Register # 9004). When sending time to the PMC-518D over Modbus communications, care should be taken to only write one of the two Time register sets. All registers within a Time register set must be written in a single transaction. If registers 9000 to 9004 are being written to at the same time, both Time register sets will be updated to reflect the new time specified in the UNIX Time register set (9004) and the time specified in registers 9000-9002 will be ignored. Writing to the Millisecond register (9003) is optional during a Time Set operation. When broadcasting time, the function code must be set to 0x10 (Pre-set Multiple Registers). Incorrect date or time values will be rejected by the PMC-518D.

Register	Property	Description	Format	Note
9000	RW	High-order Byte: Year	UINT16	0 to 99 (Year-2000)
		Low-order Byte: Month		1 to 12
9001	RW	High-order Byte: Day	UINT16	1 to 31
		Low-order Byte: Hour		0 to 23
9002	RW	High-order Byte: Minute	UINT16	0 to 59
		Low-order Byte: Second		0 to 59
9003	RW	Millisecond	UINT16	0 to 999
9004	RW	UNIX Time in Second	UINT32	(0 to 3155759999) This time shows the number of seconds that have elapsed since January 1, 1970, at 00:00:00

Table 5-7 Time Registers

5.6 Device Information

Register	Property	Description	Format	Note
9800 - 9819	RO	Device Model ¹	UNIT16	PMC-518D
9820	RO	Feature Code	UNIT16	00: 18DI 01: 18DI + 6DO 02: 18DI + 2AI 03: 18DI + 6DO + 2AI 04: 18DI + 4DO + 4DO (NC)

				05: 18DI + 8DO
9821	RO	Firmware Version	UNIT32	e.g. 10111 shows the version is V1.01.11
9823	RO	Protocol Version	UNIT16	e.g. 23 shows the version is V2.3
9824	RO	Firmware Update Date: XX(Year-2000) - XX(Month)- XX(Day)	UNIT32	e.g.110506 means May 6,2011
9826	RO	Serial Number: XX(Year-2000) - XX(Month)- XX(Lot Number) - XXXX(Device Number)	UNIT32	e.g. 1105471895 means that this device was the 1895 th device manufactured in Lot 47 of May 2011
9828 - 9829		Reserved		

Table 5-8 Device Information

Note:

- 1) The Device Model appears in registers 9800 to 9819 and contains the ASCII encoding of the string "PMC-518D" as shown in the following table.

Register	Value(Hex)	ANSII
9800	0x50	P
9801	0x4D	M
9802	0x43	C
9803	0x2D	-
9804	0x35	5
9805	0x31	1
9806	0x38	8
9807	0x44	D
9808-9819	0x20	<Null>

Table 5-9 ASCII Encoding of "PMC-518D"

Appendix A - Technical Specification


Power Supply (L+, N-, GND)	
Standard	95-250VAC/DC, ±10%, 45-65Hz
Burden	5W
Digital Inputs (DI1 to DI18, DICOM)	
Type	Dry contact, 24VDC internally wetted
Sampling	1000Hz
Debounce	1ms minimum
Digital Outputs (DO1 to DO8)	
Type	Form A mechanical relay
Loading	5A @ 250VAC or 30VDC
Analog Inputs (AI1, AI2)	
Type	0-20mA / 4-20mA DC
Accuracy	0.5%
Overload	24mA
Environmental conditions	
Operating temp	-25°C to +70°C
Storage temp	-40°C to +85°C
Humidity	5% to 95% non-condensing
Atmospheric pressure	70 kPa to 106 kPa
Mechanical Characteristics	
Installation	Standard DIN-Rail Mount
Unit Dimensions	180x94.5x57.5mm
IP Rating	52
Shipping Weight	0.7kg
Shipping Dimensions	222x136x100mm

Appendix B - Standards Compliance

Safety Requirements		
CE LVD 2006/95/EC		EN61010-1-1-2001
Insulation Dielectric test: 2kV @ 1 minute Insulation resistance: >100MΩ Impulse voltage: 5kV, 1.2/50μs		IEC 60255-5-2000
Electromagnetic Compatibility CE EMC Directive 2004/108/EC (EN 61326: 2006)		
Immunity Tests		
Electrostatic discharge		IEC 61000-4-2:2001 Level III
Radiated fields		IEC 61000-4-3:2008 (10 V/m)
Fast transients		IEC 61000-4-4:2004 Level III
Surges		IEC 61000-4-5:2005 Level III
Conducted disturbances		IEC 61000-4-6:2006 Level III
Magnetic Fields		IEC 61000-4-8:2009 Level IV
Oscillatory waves		IEC 61000-4-12:1995 Level III
Radio Disturbances		CISPR 22:2006, Level B
Emission Tests		
Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment		EN 55011: 2009 (CISPR 11)
Limits and methods of measurement of radio disturbance characteristics of information technology equipment		EN 55022: 2006+A1: 2007 (CISPR 22)
Limits for harmonic current emissions for equipment with rated current ≤16 A		EN 61000-3-2: 2006+A1: 2009
Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current ≤16 A		EN 61000-3-3: 2006
Emission standard for residential, commercial and light-industrial environments		EN 61000-6-3: 2007
Electromagnetic Emission Tests for Measuring Relays and Protection Equipment		IEC 60255-25: 2000
Mechanical Tests		
Vibration Test	Response	IEC 60255-21-1 Level I
	Endurance	IEC 60255-21-1 Level I
Shock Test	Response	IEC 60255-21-2 Level I
	Endurance	IEC 60255-21-2 Level I
Bump Test		IEC 60255-21-2 Level I



Appendix C - Ordering Guide

		Ceiec Electric Technology	<i>Version 20111231</i>
Product Code		Description	
PMC-518D RTU			
Power Supply			
2		95-250VAC/DC, 45-65Hz	
I/O			
A		18DI	
B*		18DI + 6DO	
C*		18DI + 2AI	
D*		18DI + 6DO + 2AI	
F*		18DI + 4DO + 4DO (NC)	
G*		18DI + 8DO	
Display Language			
E		English	
PMC-518D	-	2	A E
			PMC-518D-2AE (Standard Model)

* Additional charges apply

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