Modicon TM5

PCI Modules
Hardware Guide

04/2012

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www.schneider-electric.com

Schneider Electric

The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof. Neither Schneider Electric nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information contained herein. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

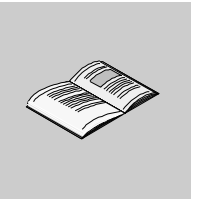
All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

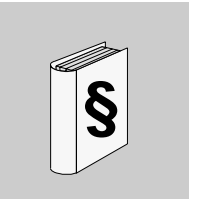
Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

Table of Contents



Safety Information



Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a Danger safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, **can result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, **can result in** minor or moderate injury.

NOTICE

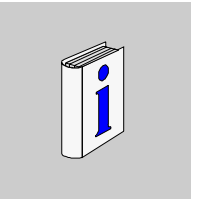
NOTICE is used to address practices not related to physical injury.

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

About the Book



At a Glance

Document Scope

This manual describes the hardware implementation of the Modicon TM5 PCI modules. It provides parts descriptions, specifications, wiring diagrams, installation and setup for Modicon TM5 PCI modules.

Validity Note

This document has been updated with the release of SoMachine V3.1.

The technical characteristics of the device(s) described in this manual also appear online. To access this information online:

Step	Action
1	Go to the Schneider Electric home page *www.schneider-electric.com*.
2	In the **Search** box type the model number of a product or the name of a product range. ● Do not include blank spaces in the model number/product range. ● To get information on a grouping similar modules, use asterisks (*).
3	If you entered a model number, go to the **Product datasheets** search results and click on the model number that interests you. If you entered the name of a product range, go to the **Product Ranges** search results and click on the product range that interests you.
4	If more than one model number appears in the **Products** search results, click on the model number that interests you.
5	Depending on the size of your screen, you may need to scroll down to see the data sheet.
6	To save or print a data sheet as a .pdf file, click **Download *XXX* product datasheet**.

The characteristics presented in this manual should be the same as those that appear online. In line with our policy of constant improvement we may revise content over time to improve clarity and accuracy. In the event that you see a difference between the manual and online information, use the online information as your reference.

Related Documents

Title of Documentation	Reference Number
Modicon TM5 Expansion Modules Configuration Programming Guide	EIO0000000420 (Eng), EIO0000000421 (Fre), EIO0000000422 (Ger), EIO0000000423 (Spa), EIO0000000424 (Ita), EIO0000000425 (Chs)
Modicon Flexible TM5 / TM7 System - System Planning and Installation Guide	EIO0000000426 (Eng), EIO0000000427 (Fre), EIO0000000428 (Ger), EIO0000000429 (Spa), EIO0000000430 (Ita), EIO0000000431 (Chs)
Modicon TM5 PCI Modules Instruction Sheet	BBV56042

You can download these technical publications and other technical information from our website at www.schneider-electric.com.

Product Related Information

⚠ ⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires except under the specific conditions specified in the appropriate hardware guide for this equipment.
- Always use a properly rated voltage sensing device to confirm the power is off where and when indicated.
- Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to the unit.
- Use only the specified voltage when operating this equipment and any associated products.

Failure to follow these instructions will result in death or serious injury.

⚠ DANGER

EXPLOSIVE POTENTIAL

- Only use this equipment in non-hazardous locations, or in locations that comply with Class I, Division 2, Groups A, B, C and D.
- Do not substitute components which would impair compliance to Class I Division 2.
- Do not connect or disconnect equipment unless power has been removed or the location is known to be non-hazardous.

Failure to follow these instructions will result in death or serious injury.

⚠ WARNING

LOSS OF CONTROL

- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop and overtravel stop, power outage and restart.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.
- Observe all accident prevention regulations and local safety guidelines.[1]
- Each implementation of this equipment must be individually and thoroughly tested for proper operation before being placed into service.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

[1] For additional information, refer to NEMA ICS 1.1 (latest edition), "Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control" and to NEMA ICS 7.1 (latest edition), "Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems" or their equivalent governing your particular location.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Only use software approved by Schneider Electric for use with this equipment.
- Update your application program every time you change the physical hardware configuration.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

User Comments

We welcome your comments about this document. You can reach us by e-mail at techcomm@schneider-electric.com.

TM5 System General Rules for Implementing

1

What's in this Chapter?

This chapter contains the following topics:

Installation Requirements

Before Starting

Read and understand this chapter before beginning the installation of your TM5 System.

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires except under the specific conditions specified in the appropriate hardware guide for this equipment.
- Always use a properly rated voltage sensing device to confirm the power is off where and when indicated.
- Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to the unit.
- Use only the specified voltage when operating this equipment and any associated products.

Failure to follow these instructions will result in death or serious injury.

NOTICE

ELECTROSTATIC DISCHARGE

- Store all components in their protective packaging until immediately before assembly.
- Never touch exposed conductive parts such as contacts or terminals.

Failure to follow these instructions can result in equipment damage.

Programming Considerations

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Only use software approved by Schneider Electric for use with this equipment.
- Update your application program every time you change the physical hardware configuration.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Operating Environment

⚠ DANGER

EXPLOSIVE POTENTIAL

- Only use this equipment in non-hazardous locations, or in locations that comply with Class I, Division 2, Groups A, B, C and D.
- Do not substitute components which would impair compliance to Class I Division 2.
- Do not connect or disconnect equipment unless power has been removed or the location is known to be non-hazardous.

Failure to follow these instructions will result in death or serious injury.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Install and operate this equipment according to the environmental conditions described in the operating limits.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Installation Considerations

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Use appropriate safety interlocks where personnel and/or equipment hazards exist.
- Install and operate this equipment in an enclosure appropriately rated for its intended environment.
- Use the sensor and actuator power supplies only for supplying power to the sensors or actuators connected to the module.
- Power line and output circuits must be wired and fused in compliance with local and national regulatory requirements for the rated current and voltage of the particular equipment.
- Do not use this equipment in safety-critical machine functions.
- Do not disassemble, repair, or modify this equipment.
- Do not connect any wiring to reserved, unused connections, or to connections designated as Not Connected (N.C.).

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTE: Schneider Electric recommends the use of UL-recognized and CSA approved JDYX2 or JDYX8 fuse types.

Wiring Rules and Recommendations

Introduction

There are several rules that must be followed when wiring PCI module.

Wiring Rules

⚠ ⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires except under the specific conditions specified in the appropriate hardware guide for this equipment.
- Always use a properly rated voltage sensing device to confirm the power is off where and when indicated.
- Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to the unit.
- Use only the specified voltage when operating this equipment and any associated products.

Failure to follow these instructions will result in death or serious injury.

The following rules must be applied when wiring the PCI module:

Use twisted-pair, shielded cables for networks and field bus.

Refer to the section Grounding the TM5 System *(see Modicon TM5 / TM7 Flexible System, System Planning and Installation Guide)* to ground the shielded cables.

Environmental Characteristics

Introduction

The following information describes the system-wide environmental requirements and characteristics for the TM5 System.

The general environmental specifications are common to all components of the TM5 System.

Enclosure Requirements

TM5 components are designed as Zone B, Class A industrial equipment according to IEC/CISPR Publication 11. If they are used in environments other than those described in the standard, or in environments that do not meet the specifications in this manual, your ability to meet electromagnetic compatibility requirements in the presence of conducted and/or radiated interference may be reduced.

All TM5 components meet European Community (CE) requirements for open equipment as defined by EN61131-2. You must install them in an enclosure designed for the specific environmental conditions and to minimize the possibility of unintended contact with hazardous voltages. Your enclosure should be constructed of metal to improve the electromagnetic immunity of your TM5 System. Your enclosure should have a keyed locking mechanism to minimize unauthorized access.

Environmental Characteristics

This equipment meets UL, CSA, GOST-R and c-Tick certifications and CE requirements as indicated in the table below. This equipment is intended for use in a Pollution Degree 2 industrial environment.

The table below provides the general environmental characteristics:

Characteristic	Specification	
This product is compliant with Europe RoHS recommendations and China RoHS regulations. 		
Standard	IEC61131-2 ed. 3 2007	
Agencies	UL 508 • CSA 22.2 No. 142-M1987 • CSA 22.2 No. 213-M1987	
Ambient operating temperature	Horizontal installation	- 10...55 °C (14...131 °F)[1]
	Vertical installation	- 10...50 °C (14...122 °F)
Storage temperature		-25...70° C (-13...158 °F)

Characteristic	Specification	
Relative humidity		5...95% (non-condensing)
Degree of pollution	IEC60664	2
Degree of protection	IEC61131-2	IP20
Corrosion immunity		No
Operating altitude		0...2000 m (0...6.560 ft.)
Storage altitude		0...3000 m (0...9.842 ft.)
Vibration resistance	Mounted on a DIN rail	3.5 mm (0.138 in.) fixed amplitude from 5...8.4 Hz 9.8 m/s^2 (1 g_n) fixed acceleration from 8.4...150 Hz
Mechanical shock resistance		147 m/s^2 (15 g_n) for a duration of 11 ms
Connection type		Removable spring terminal block
Connector insertion/removal cycles		50
Note: **1** Some devices have extended temperature operating ranges subject to derating and possibly other restrictions. See the specific characteristics for your electronic module.		

Electromagnetic Susceptibility

The table below provides the TM5 System electromagnetic susceptibility specifications:

Characteristic	Specification	Range
Electrostatic discharge	IEC/EN 61000-4-2	8 kV (air discharge) 4 kV (contact discharge)
Electromagnetic fields	IEC/EN 61000-4-3	10 V/m (80 MHz...2 GHz) 1 V/m (2...2.7 GHz)
Fast transients burst	IEC/EN 61000-4-4	Power lines: 2 kV I/O: 1 kV Shielded cable: 1 kV Repetition rate: 5 and 100 KHz
Surge immunity 24 Vdc circuit	IEC/EN 61000-4-5	1 kV in common mode 0.5 kV in differential mode
Surge immunity 230 Vac circuit		2 kV in common mode 1 kV in differential mode
Induced electromagnetic field	IEC/EN 61000-4-6	10 V_{eff} (0.15...80 MHz)

Characteristic	Specification	Range
Conducted emission	EN 55011 (IEC/CISPR11)	150...500 kHz, quasi peak 79 dBµV
		500 kHz...30 MHz, quasi peak 73 dBµV
Radiated emission	EN 55011 (IEC/CISPR11)	30...230 MHz, 10 m@40 dBµV/m
		230 MHz...1 GHz, 10 m@47 dBµV/m

PCI Modules Installation

Installation Considerations

For mounting positions and minimum clearances, the PCI modules are mounted according to the rules defined for the controllers. Refer to the site requirements for the installation of the system *(see Modicon TM5 / TM7 Flexible System, System Planning and Installation Guide)*.

NOTE: The PCI module is designed to operate within the same temperature range as the controllers, including the controller de-rating for extended temperature operation, and temperature restrictions associated with the mounting positions.

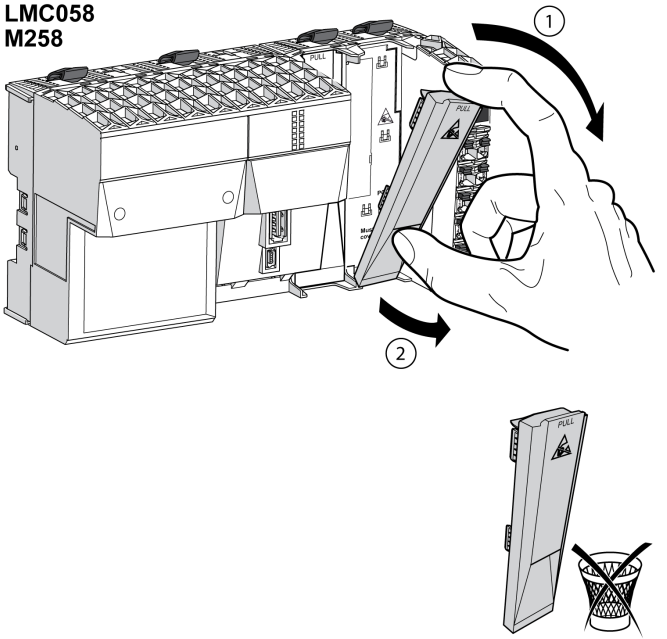
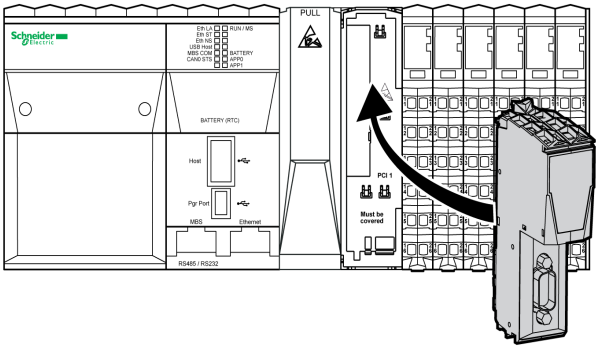
NOTICE
ELECTROSTATIC DISCHARGE ● Ensure that empty PCI slots have their covers in place before applying power to the controller. ● Never touch an exposed PCI connector. **Failure to follow these instructions can result in equipment damage.**

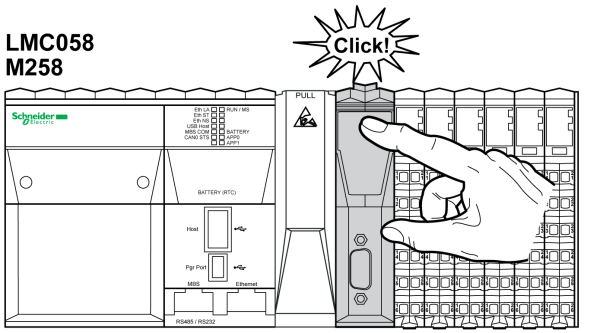
NOTICE
ELECTROSTATIC DISCHARGE ● Store electronic components in their protective packaging until immediately before assembly. ● Only touch modules on the housing. ● Take the necessary protective measures against electrostatic discharges. **Failure to follow these instructions can result in equipment damage.**

Installation

The following table describes the different steps to install PCI modules on the controller.

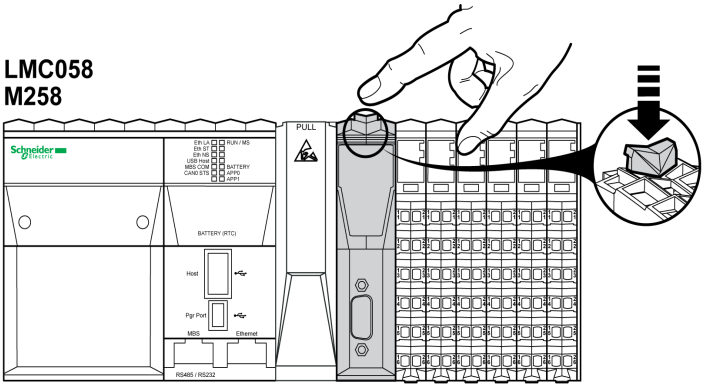
Step	Action
1	Disconnect all power from all equipment prior to removing any covers or installing a PCI module.
2	Remove the PCI module from the packaging.

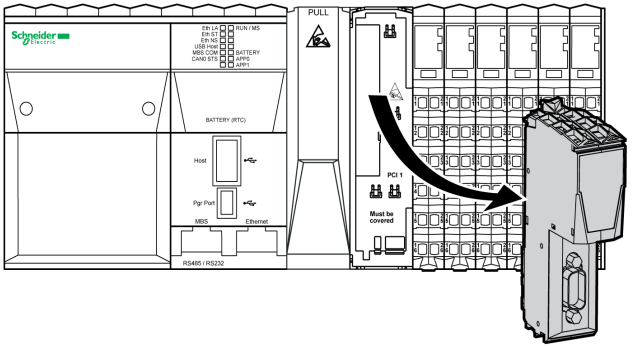
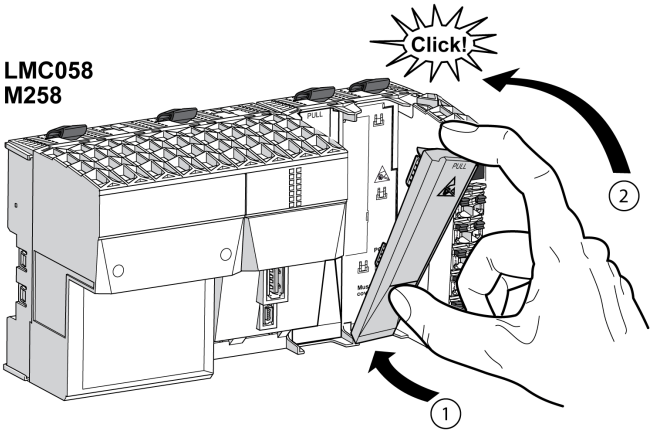
Step	Action
3	Remove the cover of the slot on the controller. **NOTE:** Keep the cover to reuse it for the deinstallation. **LMC058** **M258** 
4	Place the PCI module on the slot of the controller. **LMC058** **M258** 

Step	Action
5	Push the PCI module into the controller until it clicks. 

De-installation

The following table describes the different steps to de-install PCI modules from the controller.

Step	Action
1	Disconnect all power from all equipment, including connected devices, prior to removing a PCI module.
2	Press the locking clip on the PCI module. 

Step	Action
3	Pull the PCI module out from its mounting slot. **LMC058** **M258** 
4	Put the cover on the slot of the controller. **LMC058** **M258** 

TM5 System PCI General Overview

2

General Description

Introduction

The communication electronic modules are designed to be connected to the Modicon M258 Logic Controller and Modicon LMC058 Motion Controller ranges.

Communication Electronic Module Features

The following table shows the communication electronic module features:

Reference	Description
TM5PCRS2 *(see page 26)*	TM5 interface electronic module, 1 RS232, electrically isolated
TM5PCRS4 *(see page 32)*	TM5 interface electronic module, 1 RS485, electrically isolated
TM5PCDPS *(see page 37)*	TM5 interface electronic module, Profibus DP slave

NOTE:

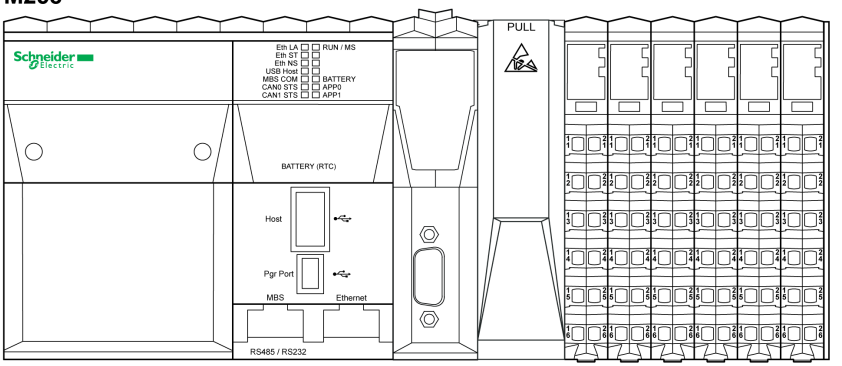
For information on compatibility rules between PCI communication electronic modules and controllers, refer to:

- Modicon M258 Logic Controller Hardware Guide *(see Modicon M258, Logic Controller, Hardware Guide)*,
- Modicon LMC058 Motion Controller Hardware Guide *(see Modicon LMC058, Motion Controller, Hardware Guide)*.

PCI slots

The figure below shows a controller with the PCI slots:

LMC058
M258



NOTE: For more information on the compatibility of the PCI electronic modules with the specific Controller references and other considerations, please see the specific Hardware Guide for your Controller.

NOTICE
ELECTROSTATIC DISCHARGE • Ensure that empty PCI slots have their covers in place before applying power to the controller. • Never touch an exposed PCI connector. **Failure to follow these instructions can result in equipment damage.**

For more details about addition of one more module, refer to Inserting the electronic Modules *(see Modicon TM5 / TM7 Flexible System, System Planning and Installation Guide)*.

TM5PCRS2 PCI Communication Electronic Module

3

What's in this Chapter?

This chapter contains the following topics:

TM5PCRS2 Presentation

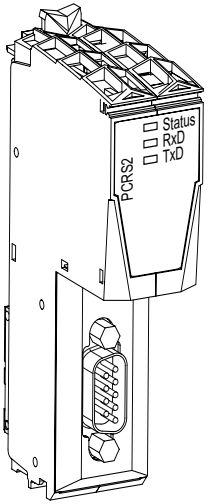
Main Characteristics

The table below describes the main characteristics of the serial line TM5PCRS2 communication electronic module:

Main Characteristics	
Interface type	RS232
Connector type	D-Sub 9, male
Transfer rate	115.2 kbit/s max.

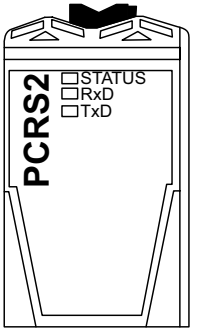
Ordering Information

The figure below presents the TM5PCRS2:



Status LEDs

The figure below shows the TM5PCRS2 status LEDs:



The table below shows the description of the TM5PCRS2 status LEDs:

LED	Color	Status	Description
Status	Green	On	Module configured and operational.
	Red	On	The module is waiting for configuration.
RxD	Yellow	On	The module is receiving data via the RS232 interface.
TxD	Yellow	On	The module is transmitting data via the RS232 interface.

TM5PCRS2 Characteristics

Introduction

These are the general characteristics for the TM5PCRS2 communication electronic module. See also the Environmental Characteristics *(see page 16)*.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not exceed any of the rated values specified in the following tables.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

General Characteristics

The table below describes the general characteristics of the TM5PCRS2 communication electronic module:

General characteristics	
Power dissipation	0.33 W max.
Weight	50 g (1.8 oz)

Characteristics

The table below describes the characteristics of the TM5PCRS2 communication electronic module:

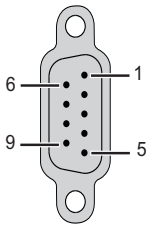
Characteristics		
Isolation	Between serial line and internal electronics	See note [1]
Data formats		Please refer to *Modicon TM5, PCI Modules Configuration, Programming Guide*.
Handshake lines		RTS, CTS

[1] The two power circuits reference the same futional ground (FE) through specific components designed to reduce effects of electromagnetic interference. These components are rated at 30 or 60 Vdc.

TM5PCRS2 Wiring Diagram

RS232 Interface

The following diagram shows the male RS232 interface for TM5PCRS2:



The following table describes the different pins of the male RS232:

Pin	RS232	Description
1	Reserved	-
2	RxD	Receives data
3	TxD	Transmits data
4	Reserved	-
5	0 V	-
6	Reserved	-
7	RTS	Ready To Send
8	CTS	Clear To Send
9	Reserved	-

TM5PCRS4 PCI Communication Electronic Module

4

What's in this Chapter?

This chapter contains the following topics:

TM5PCRS4 Presentation

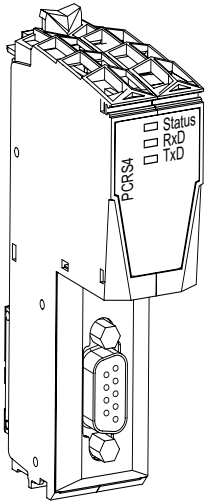
Main Characteristics

The table below describes the main characteristics of the serial line TM5PCRS4 communication electronic module:

Main Characteristics	
Interface type	RS485
Connector type	D-Sub 9, female
Transfer rate	115.2 kbit/s max.

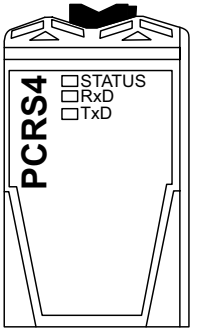
Ordering Information

The figure below presents the TM5PCRS4:



Status LEDs

This figure shows the TM5PCRS4 status LEDs :



The table below shows the description of the TM5PCRS4 status LEDs:

LEDs	Color	Status	Description
Status	Green	On	Module configured and operational.
	Red	On	The module is waiting for configuration.
RxD	Yellow	On	The module is receiving data via the RS485 interface.
TxD	Yellow	On	The module is transmitting data via the RS485 interface.

TM5PCRS4 Characteristics

Introduction

These are the general characteristics for the TM5PCRS4 communication electronic module. See also Environmental Characteristics. *(see page 16)*

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not exceed any of the rated values specified in the following tables.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

General Characteristics

The table below describes the general characteristics of the TM5PCRS4 communication electronic module:

General characteristics	
Power dissipation	0.40 W max.
Weight	50 g (1.8 oz)

Characteristics

The table below describes the characteristics of the TM5PCRS4 communication electronic module:

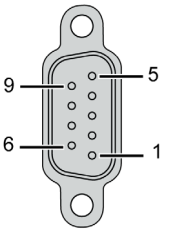
Characteristics		
Isolation	Between serial line and internal electronics	See note [1]
	Between channels	Not isolated

[1] The two power circuits reference the same functional ground (FE) through specific components designed to reduce effects of electromagnetic interference. These components are rated at 30 or 60 Vdc.

TM5PCRS4 Wiring Diagram

RS485 Interface

The following diagram shows the female RS485 interface for TM5PCRS4:



The following table describes the different pins of the female RS485:

Pin	RS485	Description
1	Reserved	-
2	Reserved	-
3	D1 (A+)	Transmit/receive data Low
4	Reserved	-
5	0 V	TTL supply
6	+5 V / 50 mA	TTL supply
7	Reserved	-
8	D0 (B-)	Transmit/receive data High
9	Reserved	-

TM5PCDPS PCI Communication Electronic Module

5

What's in this Chapter?

This chapter contains the following topics:

TM5PCDPS Presentation

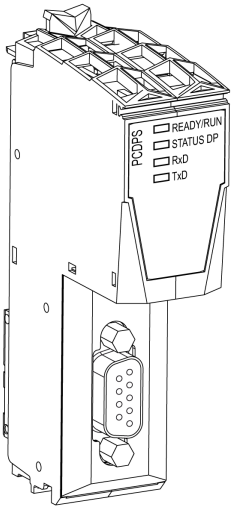
Main Characteristics

The table describes the main characteristics of the Profibus DP TM5PCDPS communication electronic module:

Main Characteristics	
Fieldbus	Profibus DP slave
Interface type	RS485
Connector type	D-Sub 9, female
Transfer rate	12 Mbit/s max.

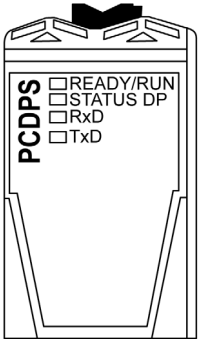
Ordering Information

The figure presents the TM5PCDPS:



Status LEDs

This figure shows the TM5PCDPS status LEDs:



The table shows the description of the TM5PCDPS status LEDs:

LEDs	Color	Status	Description
READY/RUN	Green / red	Off	The module supply is not connected.
	Green	On	Communication is performed on the PCI bus.
	Red	Flashing	A boot error has been detected.
		On	Communication on the PCI bus has not yet been started.
STATUS DP	Green	On	The module is in RUN mode, performing cyclic communication.
	Red	On	The configuration between the slave and master is different.
		Cyclic Flashing	The module is in STOP mode, no communication is performed, a connection error has been detected.
		Acyclic Flashing	The module is not configured.
RxD	Yellow	On	The module is receiving data via the RS485 interface.
TxD	Yellow	On	The module is transmitting data via the RS485 interface.

TM5PCDPS Characteristics

Introduction

These are the general characteristics for the TM5PCDPS communication electronic module. See also Environmental Characteristics *(see page 16)*.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not exceed any of the rated values specified in the following tables.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

General Characteristics

The table describes the general characteristics of the TM5PCDPS communication electronic module:

General Characteristics	
Power dissipation	1.8 W
Weight	50 g (1.8 oz)

Characteristics

The table describes the characteristics of the TM5PCDPS communication electronic module:

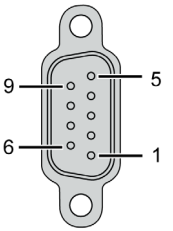
Characteristics		
Isolation	Between Profibus DP and internal electronics	See note[1]
	Between channels	Not isolated

[1] The two power circuits reference the same functional ground (FE) through specific components designed to reduce effects of electromagnetic interference. These components are rated at 30 or 60 Vdc.

TM5PCDPS Wiring Diagram

RS485 Interface

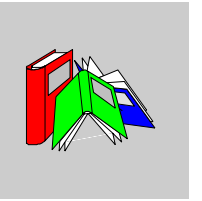
The diagram shows the female RS485 Profibus DP interface for TM5PCDPS:



The table describes the different pins of the female D-Sub 9 RS485 interface:

Pin	Profibus DP	Description
1	Reserved	–
2	Reserved	–
3	RxD/TxD-P	Transmit/receive data High
4	CNTR-P	Transmit enable High
5	Reserved	–
6	Reserved	–
7	Reserved	–
8	RxD/TxD-N	Transmit/receive data Low
9	CNTR-N	Transmit enable Low

Glossary



A

analog input

An *analog input* module contains circuits that convert an analog DC input signal to a digital value that can be manipulated by the processor. By implication, the analog input is usually direct. That means a data table value directly reflects the analog signal value.

analog output

An *analog output* module contains circuits that transmit an analog DC signal proportional to a digital value input to the module from the processor. By implication, these analog outputs are usually direct. That means a data table value directly controls the analog signal value.

AWG

The *american wire gauge* standard specifies wire gauges in North America.

B

bus base

A *bus base* is a mounting device that is designed to seat an electronic module on a DIN rail and connect it to the TM5 bus for M258 and LMC058 controllers. Each base bus extends the TM5 data and to the power buses and the 24 Vdc I/O power segment. The electronic modules are added to the TM5 system through their insertion on the base bus. The base bus also supplies the articulation point for the terminal blocks.

C

CAN

The *controller area network* protocol (ISO 11898) for serial bus networks is designed for the interconnection of smart devices (from multiple manufacturers) in smart systems for real-time industrial applications. CAN multimaster systems help ensure high data integrity through the implementation of broadcast messaging and advanced diagnostic mechanisms. Originally developed for use in automobiles, CAN is now used in a variety of industrial automation control environments.

CANopen

CANopen is an open industry-standard communication protocol and device profile specification.

compact I/O module

A *compact I/O module* is an indissociable group of five analog and/or digital I/O electronic modules in a single reference.

configuration

The *configuration* includes the arrangement and interconnection of hardware components within a system and the hardware and software selections that determine the operating characteristics of the system.

controller

A *controller* (or “programmable logic controller,” or “programmable controller”) is used to automate industrial processes.

CPDM

controller power distribution module

CSA

The *canadian standards association* defines and maintains standards for industrial electronic equipment in hazardous environments.

CTS

Clear to send is a data transmission signal and acknowledges the RDS signal from the transmitting station.

D

De-rating

De-rating describes a reduction in an operating specification. For devices in general it is usually a specified reduction in nominal power to facilitate operation at increased ambient conditions like higher temperatures or higher altitudes.

DHCP

The *dynamic host configuration protocol* is an advanced extension of BOOTP. DHCP is a more advanced, but both DHCP and BOOTP are common. (DHCP can handle BOOTP client requests.)

digital I/O

A *digital input* or *output* has an individual circuit connection at the electronic module that corresponds directly to a data table bit that holds the value of the signal at that I/O circuit. It gives the control logic digital access to I/O values.

DIN

Deutsches Institut für Normung is a German institution that sets engineering and dimensional standards.

E

electronic module

In a programmable controller system, most electronic modules directly interface to the sensors, actuators, and external devices of the machine/process. This electronic module is the component that mounts in a bus base and provides electrical connections between the controller and the field devices. Electronic modules are offered in a variety of signal levels and capacities. (Some electronic modules are not I/O interfaces, including power distribution modules and transmitter/receiver modules.)

EN

EN identifies one of many European standards maintained by CEN (*European Committee for Standardization*), CENELEC (*European Committee for Electrotechnical Standardization*), or ETSI (*European Telecommunications Standards Institute*).

encoder

An *encoder* is a device for length or angular measurement (linear or rotary encoders).

Ethernet

Ethernet is a physical and data link layer technology for LANs, also known as IEE 802.3.

expansion bus

The *expansion bus* is an electronic communication bus between expansion modules and a CPU.

expert I/O

*Expert I/O*s are dedicated modules or channels for advanced features. These features are generally embedded in the module in order to not use the resources of the PLC Controller and to allow a fast response time, depending of the feature. Regarding the function, it could be considered as a “stand alone” module, because the function is independent of the Controller processing cycle, it just exchanges some information with the Controller CPU.

F

FAST I/O

*FAST I/O*s are specific I/Os with some electrical features (response time, for example) but the treatment of these channels is done by the Controller CPU.

FE

Functional ground is the point of a system or device that must be grounded to help prevent equipment damage.

FG

frequency generator

firmware

The *firmware* represents the operating system on a controller.

H

hot swapping

Hot swapping is the replacement of a component with a like component while the system remains operational. The replacement component begins to function automatically after it is installed.

HSC

high-speed counter.

I

I/O

input/output

IEC

The *international electrotechnical commission* is a non-profit and non-governmental international standards organization that prepares and publishes international standards for all electrical, electronic, and related technologies.

input filter

An *input filter* is a special function that rejects input noises. It is useful for helping to minimize input noises and chatter in limit switches. All inputs provide a level of input filtering using the hardware. Additional filtering with software is also configurable through the programing or the configuration software.

IP 20

Ingress protection rating according to IEC 60529. IP20 modules are protected against ingress and contact of objects larger than 12.5 mm. The module is not protected against harmful ingress of water.

L

LED

A *light emitting diode* is an indicator that lights up when electricity passes through it.

M

Modbus

The Modbus communication protocol allows communications between many devices connected to the same network.

N

NC

A *normally closed* contact is a contact pair that is closed when the actuator is de-energized (no power is applied) and open when the actuator is energized (power is applied).

network

A network includes interconnected devices that share a common data path and protocol for communications.

P

PCI

A *peripheral component interconnect* is an industry-standard bus for attaching peripherals.

PDM

A *power distribution module* distributes either AC or DC field power to a cluster of I/O modules.

PE

Protective ground is a return line across the bus for fault currents generated at a sensor or actuator device in the control system.

Profibus DP

Profibus Decentralised Peripheral is a linear bus with a centralized access procedure of the Master/Slave type. Only Master stations, also known as active stations, have access rights to the bus. The Slave or passive stations can only respond to prompts.The physical connection is a single shielded twisted pair, but fiber optic interfaces are available to create tree, star, or ring structures. Compared to the ISO model, only layers 1, 2 are implemented, since access from the user interface is made directly to the link layer via simple mapping of variables.

Pt100/Pt1000

Platinum resistance thermometer are characterized by their nominal resistance R0 at a temperature of 0° C.

- Pt100 (R0 = 100 Ohm)
- Pt1000 (R0 = 1 kOhm)

PWM

Pulse width modulation is used for regulation processes (e.g. actuators for temperature control) where a pulse signal is modulated in its length. For these kind of signals, transistor outputs are used.

R

RS-232

RS-232 (also known as EIA RS-232C or V.24) is a standard type of serial communication bus, based on three wires.

RS-485

RS-485 (also known as EIA RS-485) is a standard type of serial communication bus, based on two wires.

RTS

Request to send is a data transmission signal and will be acknowledged by the CTS signal from the destination node.

RxD

receiving data (data transmission signal)

S

SEL-V

A system that follows IEC 61140 guidelines for *safety extra low voltage* is protected in such a way that voltage between any 2 accessible parts (or between 1 accessible part and the PE terminal for Class 1 equipment) does not exceed a specified value under normal conditions or under single-fault conditions.

sink input

A *sink input* is a wiring arrangement in which the device provides current to the input electronic module. A sink input is referenced to 0 Vdc.

SL

serial line

source output

A *source output* is a wiring arrangement in which the output electronic module provides current to the device. A source output is referenced to +24 Vdc.

T

terminal block

The *terminal block* is the component that mounts in an electronic module and provides electrical connections between the controller and the field devices.

TxD

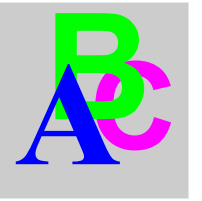
TxD represents a transmit signal.

U

UL

Underwriters laboratories, US organization for product testing and safety certification.

Index



W