Programmable Device Server

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3.1. Overview
Serial Devices to Ethernet Gateway

Take your serial devices to the modern world.
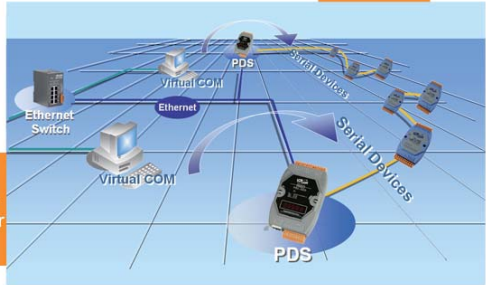Programmable Device Server

The ICP DAS Programmable Device Server is designed to bring network connectivity to your serial devices. The programmable features allow developers to quickly build custom applications that turn "dull" serial devices into "intelligent" devices right away without modifying their hardware or software configuration.

With extensive experience accumulated over many years, a great number of serial devices such as PLCs, bar code readers, RFID readers, meters and motion controllers, etc., have been widely used in various applications. As the advances in communication technologies in recent years, continue to drive optimization of data accessibility and remote operation ability, a wide variety of industries have begun to feel the urge to upgrade their latency serial communications to Ethernet network connections. The ICP DAS PDS series of products are your best choice for implementing this scenario in a robust, reliable and cost-effective way.
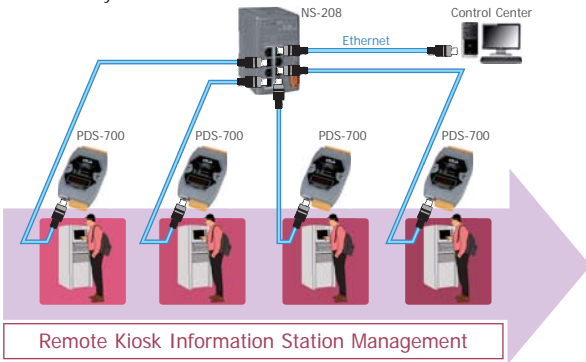
Remote Kiosk Information Station Management

The VxComm Driver creates virtual COM port(s) on Windows NT 4.0/2000/XP/2003/Vista32 systems and maps them to the remote serial port(s) of the PDS/DS series. The user's serial client programs need to only be changed to the virtual COM port access the serial devices that are allocated on the Internet or Ethernet network via the PDS/DS series.

## Easy Serial Device Networking with "transparency"

The most intuitive and easiest way to remotely control serial devices is to access those devices transparently via a network with no software modification required. The ICP DAS PDS product line offers two transparent applications:

◆ Socket Connections:
Using a TCP/IP socket connection, client programs can exchange information with specific PDS/DS serial ports and talk to serial devices directly. For example, simply create a socket connection to the TCP/IP port 10001 (default) of the PDS/DS device and you can then access Port1 of the PDS/DS remotely. This is an OS-independent method and works well on most OS (operating systems) that provide socket functions.

◆ Virtual COM Ports:
ICP DAS developed a specific function called "Virtual COM" that simulates PDS serial ports as fixed PC COM ports. Virtual COM ports appear to the system and applications as real ports. Once established, users can immediately enjoy the convenience that networking provides.
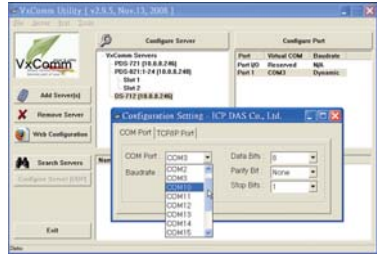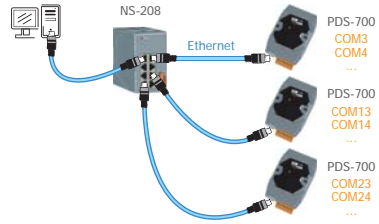
DynaCOM Technology

ICP DAS Virtual COM also supports an exclusive function - Dynamic Virtual COM Mapping (DynaCOM); if the system can only access limited or fixed numbers of COM Ports, specific PDS serial ports can be dynamically assigned to the corresponding COM port numbers.
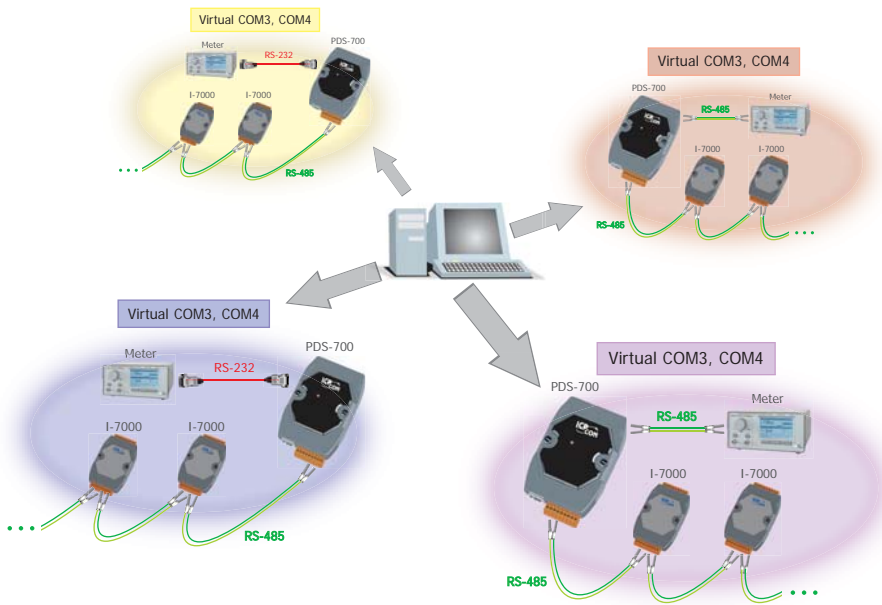
DynaCOM use same virtual COM ports mapping to several PDS dynamically

Programmable Enhanced "Device Servers"

The programmable features of the PDS series of products makes it possible to effectively implement exclusive protocols and exclusive communication mechanisms for complex PDS-based applications. This provides the following advantages:

◆ Effective network transmission:
Place your customized software on the PDS to directly perform processes locally. The effective data and information can be periodically sent back to the PC based on a schedule that can be planned in advance and the devices will work independently on-site, even when not connected to a network. Therefore, the design of system can be much more flexible. This also reduces the need to rely on the network, which is an inevitable factor for conventional DS (Device Server) as it has to keep on "talking" to the PC via the network to ensure the status maintains transparency.

Domain Knowledge Idea

Question PDS-700

System Integrator

Value-Added Solutions

◆ Previous development efforts can be duplicated:
Along with serial devices, you can place your customized or value-added software on the PDS to implement an intelligent Ethernet controller. This controller can then be used in applications for future projects, dramatically reducing programming requirements. In addition, your value-added software is embedded in the PDS, so if a computer system undergoes hardware replacement or upgrade, incompatibility issues don't need to be considered, which therefore reduces system maintenance work.

Programmable Protocol Converter

RFTD Reader

PLC

Ethernet

PDS-700

Unified Protocol

NS-208

Unified Protocol

Meter

Machine

PDS-700
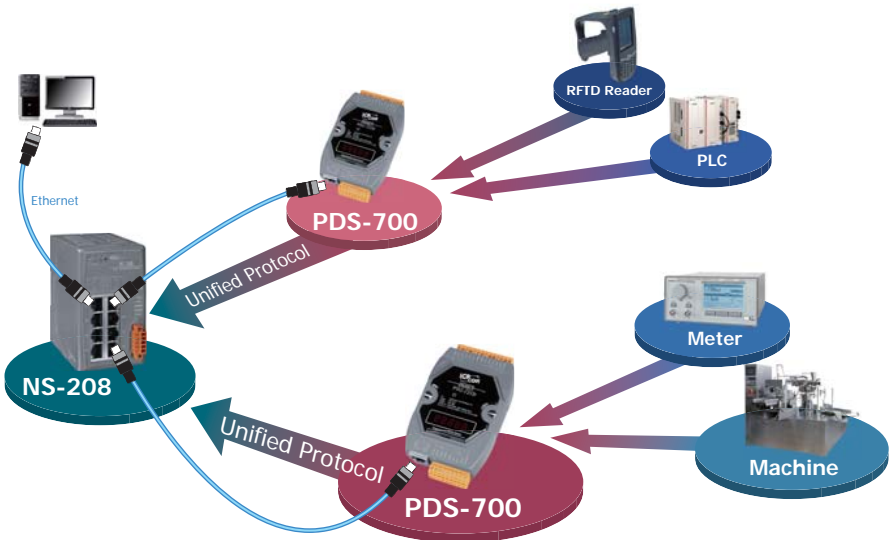
Virtual I/O Highly Integrates On-Site Messages

I/O acquisition is very important when performing on-site integration, so, along with DCON utility provided by ICP DAS, the RS-485 of PDS is able to be connected to I-7000 series products to offer abundant I/O modules for various purposes. For easier on-site integration ope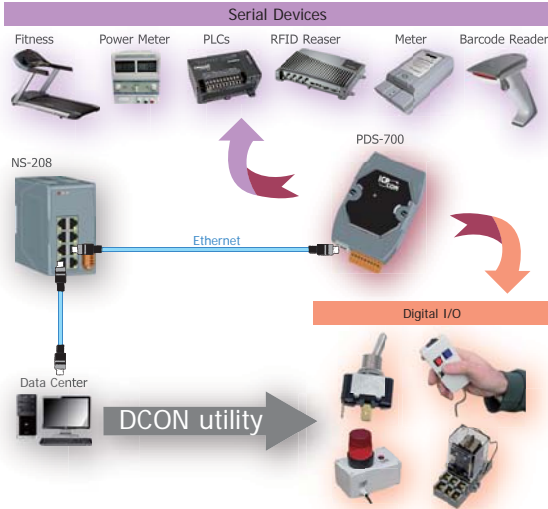rations, some PDS models also provide Digital I/O, which is also supported by the DCON utility, the EZ Data Logger or other DCON client programs.

"Virtual I/O" is an extension of "Virtual COM" technology that simulates the PDS's digital I/Os control as a virtual COM port (Port I/O) application on the PC. You are now able to access the PDS's digital I/Os using the DCON protocol through the virtual COM port. In addition, the DCON utility and EZ Data Logger also support control of the PDS's digital I/Os through the use of "Virtual I/O" technology, so you can monitor PDS's digital I/Os and complete the I/Os application in a convenient way.

Programmable Data Monitor, Filter and I/O Controls

Information:
◆ System Status
◆ Warning Messages
◆ Remove Duplicated Messages

Raw Data:
◆ Debug Messages
◆ System Status
◆ External Device Status
◆ Waring & Event Messages
◆ ...
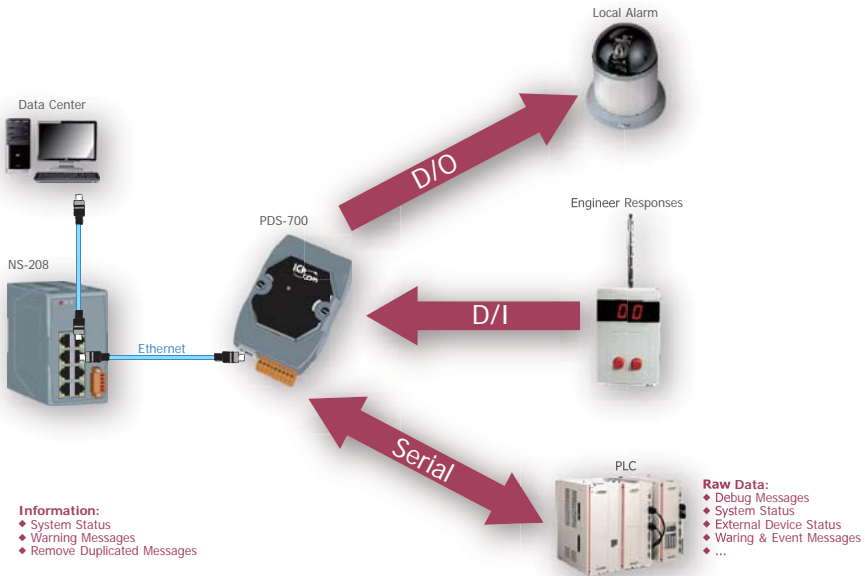
ESD Protection and Frame Ground

The PDS series offers TVS diode ESD protection technology with a frame ground design that protects your system from being damaged by high potential voltages.

Z in

Transient Current — TVS Diode — PROTECTED CIRCUIT

C

Frame Ground

ESD
(Eelectro-Static Discharge)

Frame Ground
Provides a path for the ESD to the Earth Ground

Earth Ground
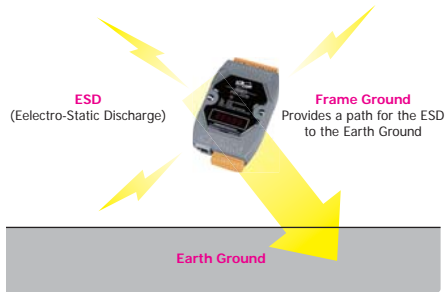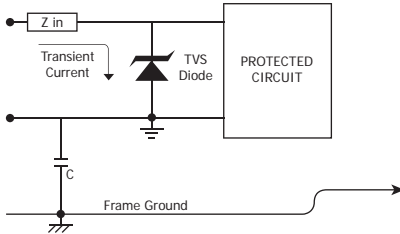
Under normal operating conditions, the TVS diode presents high impedance (appears as an open circuit) to the protected component. If the voltage exceeds the limitation, the TVS diode avalanches, providing a low impedance path for the transient current. As a result, the transient current is diverted away from the protected components and shunted through the TVS diode. The device returns to a high impedance state after the transient threat has passed.

Self-Tuner Inside

The PDS series is equipped with a "Self-Tuner" chip that automatically controls the sending/receiving direction of the RS-485 ports.

Without the presence of Self-Tuner, users need to enable the RS-485 transmitter before transmitting, and disable the transmitter after the transmission is complete. The time required to enable and disable the transmitter (direction control) is the major source of many communication issues, and it is very difficult to debug. The built-in Self-Tuner in the PDS effectively removes this direction control issue and also simplifies the software/firmware programming required for communication applications.

Easy Web Configuration

The PDS also contains a built-in web server that enables users to conveniently configure the PDS. A web browser, like IE or Firefox, can be used to connect to the PDS to modify the configuration, such as: IP address, subnet mask, gateway, DHCP client, UDP search, Web Server, Telnet Server, TCP ACK delay, Watchdog timeout, Master IP, Filter IP, COM port baud rate, data format and transfer mode, etc.
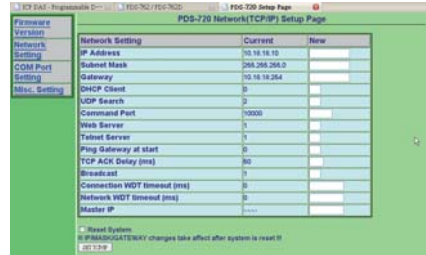
Master IP and Filter IP

The PDS can use a master IP setting that allows a client to configure the PDS and COM ports. This prevents the configuration of the PDS and COM ports from being changed by other clients.

The IP filter setting limits which client PCs are able to access the PDS module via specific IP addresses. Connections from other clients will be rejected by the PDS.

◆ Change Setting
◆ Access Ports

Master IP

NS-208   PDS-700

◆ Access Ports

IP Filter

Connections are rejected by PDS-700
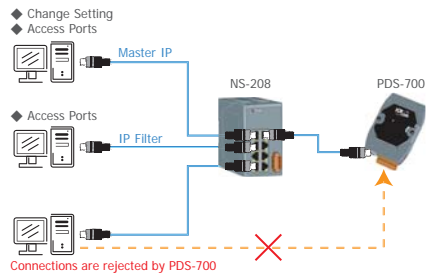
Data Sharing with Multiple Clients

M0: Transparent Mode (Multi-echo)
In transparent mode, the PDS sends data from a serial device to each client that is connected to the same serial port of the PDS. Thus, each connected client has a copy of the same data from the serial device.

**M1: Slave Mode (Single-echo)**
In slave mode, the PDS only sends data from a serial device to the client that requires the service. If there are no requirements from the client, then data will not be sent to the client. The PDS services each client individually when sharing data from the serial device, but the clients do not have a copy of the same data.
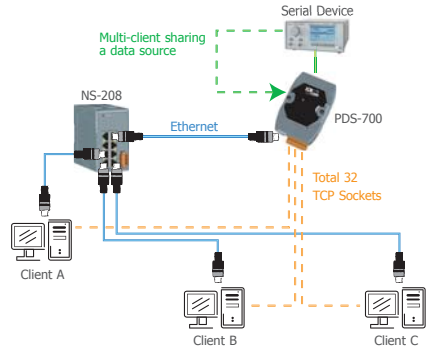
UDP Flood Attack Protection

A UDP flood attack is a denial-of-service (DoS) attack that sends a large number of UDP packets to a remote host. As a result, the affected system will be forced into replying to many packets, eventually causing the host to be unreachable by other clients.

The UDP function can be disabled on the PDS if the network suffers a flood attack or receives a large numbers of UDP packets from the network devices. This protects the PDS from UDP flood attacks.
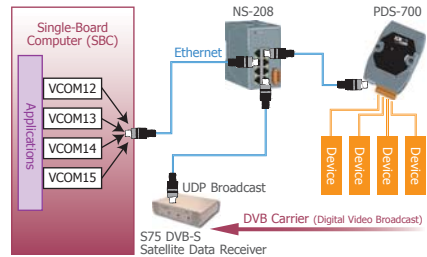
Industrial PoE Solution

Power over Ethernet (PoE) allows power and data to be carried over a single Ethernet cable, so a device can operate solely from the power it receives through the data cable. This innovation allows greater flexibility in office design, higher efficiency in systems design, and faster turnaround time in set-up and implementation.

When using PoE devices such as the PPDS-700-MTCP, PPDS-700-IP67 and PET-7000 (Ethernet I/O module with PoE), you can select the ICP DAS "PoE" switch — "NS-205PSE"- as the power source. The NS-205PSE automatically detects whether the connected devices are PoE devices or not. This mechanism ensures that the NS-205PSE will work with both PoE and non-PoE devices simultaneously.

As a power source for PoE devices, the NS-205PSE requires a power input ranging from +46 V_{DC} ~ +55 V_{DC}.

Modbus/TCP to Modbus/RTU Gateway

Modbus has become a de facto standard communications protocol in the industry, and is now the most commonly available means of connecting industrial electronic devices.

Modbus allows for communication between many devices connected to the same network, for example a system that measures temperature and humidity and communicates the results to a computer. Modbus is often used to connect a supervisory computer with a remote terminal unit (RTU) in supervisory control and data acquisition (SCADA) systems.

The default firmware of the µPAC-7186EX(D)-MTCP and PPDS-700-MTCP devices allows them to become a single Modbus/TCP to multiple Modbus/RTU converter. You can simply use the Modbus Utility to configure the device and then set a connection between the SCADA/HMI software and the µPAC-7186EX(D)-MTCP and PPDS-700-MTCP.

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● Selection Guide

PDS-700 Series Comparison Table

Series	Ethernet	Virtual COM	Virtual I/O	Programmable	Modbus	Casing
PDS-700	10/100 M	Yes	Yes	Yes	-	Fire Retardant Plastic
PPDS-700-MTCP	10/100 M, PoE	Yes	Yes	Yes	Yes	Fire Retardant Plastic
PDSM-700	10/100 M	Yes	Yes	Yes	-	Metal
PPDSM-700-MTCP	10/100 M, PoE	Yes	Yes	Yes	Yes	Metal
DS-700	10/100 M	Yes	-	-	-	Fire Retardant Plastic
PPDS-700-IP67	10/100 M, PoE	Yes	-	Yes	-	IP67 Waterproof Plastic

①

PDS-700 Selection Guide

Model Name	Ethernet	DI/DO	COM1	COM2	COM3	COM4	COM5	COM6	COM7	COM8	Page
PDS-720 PDS-720D	10/100 M	-	5-wire RS-232	2-wire RS-485	-	-	-	-	-	-	3-2-1
PDS-721 PDS-721D	10/100 M	6/7	5-wire RS-232	2-wire RS-485	-	-	-	-	-	-	3-2-3
PDS-732 PDS-732D	10/100 M	4/4	5-wire RS-232	2-wire RS-485	5-wire RS-232	-	-	-	-	-	3-2-5
PDS-734 PDS-734D	10/100 M	4/4	5-wire RS-232	2-wire RS-485	RS-422/ RS-485	-	-	-	-	-	3-2-7
PDS-742 PDS-742D	10/100 M	-	5-wire RS-232	2-wire RS-485	5-wire RS-232	9-wire RS-232	-	-	-	-	3-2-9
PDS-743 PDS-743D	10/100 M	4/4	5-wire RS-232	2-wire RS-485	3-wire RS-232	3-wire RS-232	-	-	-	-	3-2-11
PDS-752 PDS-752D	10/100 M	-	5-wire RS-232	2-wire RS-485	5-wire RS-232	5-wire RS-232	5-wire RS-232	-	-	-	3-2-13
PDS-755 PDS-755D	10/100 M	-	5-wire RS-232	2-wire RS-485	2-wire RS-485	2-wire RS-485	2-wire RS-485	-	-	-	3-2-15
PDS-762 PDS-762D	10/100 M	1/2	5-wire RS-232	2-wire RS-485	3-wire RS-232	3-wire RS-232	3-wire RS-232	3-wire RS-232	-	-	3-2-17
PDS-782 PDS-782D	10/100 M	-	5-wire RS-232	2-wire RS-485	3-wire RS-232	3-wire RS-232	3-wire RS-232	3-wire RS-232	3-wire RS-232	3-wire RS-232	3-2-19
PDS-782-25 PDS-782D-25	10/100 M	-	5-wire RS-232	2-wire RS-485	3-wire RS-232	3-wire RS-232	3-wire RS-232	3-wire RS-232	3-wire RS-232	3-wire RS-232	3-2-21

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PPDS-700-MTCP Selection Guide

Model Name	Ethernet	DI/DO	COM1	COM2	COM3	COM4	COM5	COM6	COM7	COM8	Modbus	Page
PPDS-712-MTCP	10/100 M, PoE	-	5-wire RS-232	-	-	-	-	-	-	-	Yes	3-3-1
PPDS-715-MTCP	10/100 M, PoE	-	RS-422 RS-485	-	-	-	-	-	-	-	Yes	3-3-3
PPDS-720-MTCP PPDS-720D-MTCP	10/100 M, PoE	-	5-wire RS-232	2-wire RS-485	-	-	-	-	-	-	Yes	3-2-1
PPDS-721-MTCP PPDS-721D-MTCP	10/100 M, PoE	6/7	5-wire RS-232	2-wire RS-485	-	-	-	-	-	-	Yes	3-2-3
PPDS-732-MTCP PPDS-732D-MTCP	10/100 M, PoE	4/4	5-wire RS-232	2-wire RS-485	5-wire RS-232	-	-	-	-	-	Yes	3-2-5
PPDS-734-MTCP PPDS-734D-MTCP	10/100 M, PoE	4/4	5-wire RS-232	2-wire RS-485	RS-422/ RS-485	-	-	-	-	-	Yes	3-2-7
PPDS-742-MTCP PPDS-742D-MTCP	10/100 M, PoE	-	5-wire RS-232	2-wire RS-485	5-wire RS-232	9-wire RS-232	-	-	-	-	Yes	3-2-9
PPDS-743-MTCP PPDS-743D-MTCP	10/100 M, PoE	4/4	5-wire RS-232	2-wire RS-485	3-wire RS-232	3-wire RS-232	-	-	-	-	Yes	3-2-11
PPDS-752-MTCP PPDS-752D-MTCP	10/100 M, PoE	-	5-wire RS-232	2-wire RS-485	5-wire RS-232	5-wire RS-232	5-wire RS-232	-	-	-	Yes	3-2-13
PPDS-755-MTCP PPDS-755D-MTCP	10/100 M, PoE	-	5-wire RS-232	2-wire RS-485	2-wire RS-485	2-wire RS-485	2-wire RS-485	-	-	-	Yes	3-2-15
PPDS-762-MTCP PPDS-762D-MTCP	10/100 M, PoE	1/2	5-wire RS-232	2-wire RS-485	3-wire RS-232	3-wire RS-232	3-wire RS-232	3-wire RS-232	-	-	Yes	3-2-17
PPDS-782-MTCP PPDS-782D-MTCP	10/100 M, PoE	-	5-wire RS-232	2-wire RS-485	3-wire RS-232	3-wire RS-232	3-wire RS-232	3-wire RS-232	3-wire RS-232	3-wire RS-232	Yes	3-2-19

Note: COM1 of PPDS-715-MTCP is 4-wire RS-422 or 2-wire RS-485 with 2000 Vrms Isolation.

DS-700 Selection Guide

Series	Ethernet	Isolation	COM1	COM2 – COM8	DI/DO	Programmable	Page
DS-712	10/100 M	-	5-wire RS-232	-	-	-	3-3-1
DS-715	10/100 M	2000 Vrms	4-wire RS-422 or 2-wire RS-485	-	-	-	3-3-3

PPDS-700-IP67 Selection Guide

Series	Ethernet	COM1	COM2	COM3	COM4	IP67	Page
PPDS-741-IP67	10/100 M, PoE	5-wire RS-232	2-wire RS-485	2-wire RS-485	2-wire RS-485	Yes	3-4-1
PPDS-742-IP67	10/100 M, PoE	5-wire RS-232	2-wire RS-485	5-wire RS-232	2-wire RS-485	Yes	3-4-1
PPDS-743-IP67	10/100 M, PoE	5-wire RS-232	2-wire RS-485	5-wire RS-232	5-wire RS-232	Yes	3-4-1