



03 Feb. 06

PROFIBUS on Woodhead products provide connectivity to a vast choice of industrial devices offering powerful real-time data acquisition and easy integration into your industrial architecture.

Profibus



Features

- **Profibus protocols supported:**
 - **PROFIBUS DP Class1 & 2**
 - **S7/MPI - SIEMENS Simatic® S7**
 - **FDL for S5 - SIEMENS Simatic® S5**
 - **FDL Send/Receive**
 - **PROFIBUS FMS**
- **Supports connectivity with Simatic® S5, S7 (200 / 300 / 400) PLCs without Siemens SOFTNET software**
- **Gateway feature – Profibus protocols on Woodhead products can run simultaneously with others available protocols (Ethernet TCP/IP, Serial, Modbus Plus)**
- **Best choice for SCADA applications – PROFIBUS data are available through WW DAServer/SuiteLink, OPC server, ActiveX Control, Development libraries**
- **Woodhead products can run PROFIBUS on large choice of operating systems:**
 - **Windows 32-bit (XP / 2003 Server / 2000 / NT), Windows XP Embedded**
 - **Ardence RTX, VxWorks, QNX, Linux, Dos**

Woodhead is a member of PTO (PROFIBUS Trade Organization), PNO (PROFIBUS Nutzerorganisation e. V.) and FRANCE Profibus.

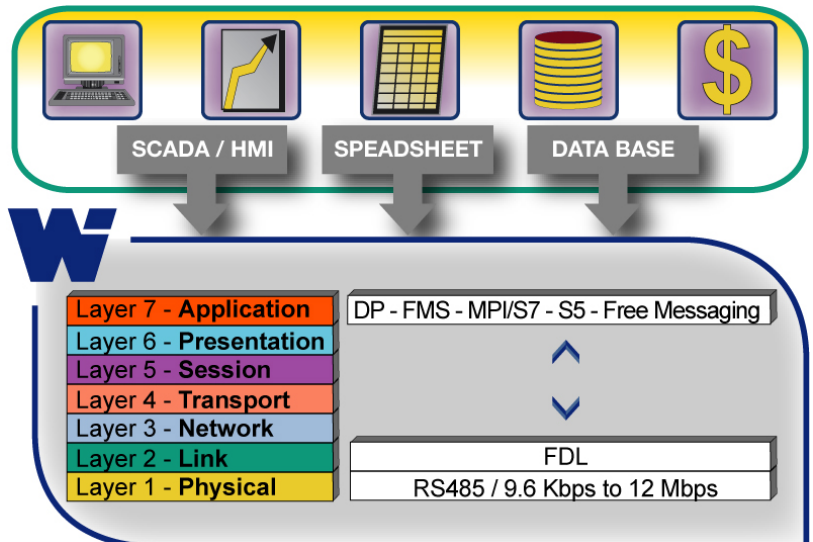
Description

PROFIBUS (**PRO**cess **FI**eld **BUS**) is a vendor-independent and an open fieldbus standard for a wide range of applications in manufacturing, process and building automation. Vendor independence and openness are guaranteed by the PROFIBUS standard EN 50 170.

With PROFIBUS, devices of different manufacturers can communicate without special interface adjustments. PROFIBUS can be used for both high-speed time critical transmission and extensive complex communication tasks.

PROFIBUS standard EN 50170 specifies the functional, electrical and mechanical characteristics for a Serial transmission fieldbus.

The protocol architecture is oriented to the OSI reference model. PROFIBUS is located both at the cell supervisor level named Layer 7 (application layer) and at the field network level named Layer 1 (physical layer) and Layer 2 (Data Link layer).



The Woodhead interfaces connected on PROFIBUS fieldbus can simultaneously manage 5 different types of communication messagings, depending on the connected devices:

- **PROFIBUS DP Class1 & 2** - Master and Slave modes
Develop according European standard EN 50170 (Part 2)
- **S7/MPI** - Master mode
For connectivity with SIEMENS Simatic® S7 series
- **FDL S5 (SINEC L2)** - Master mode
For connectivity with SIEMENS Simatic® S5 series
- **FDL Send/Receive**
Free messaging on ISO Layer 2
- **PROFIBUS-FMS** - Client & Server modes

BradCommunications™

Profibus-DP



Features

- **Woodhead compatible products:**

- ▶ **applicom® Interface Cards**
- ▶ **applicom® Gateways**

Part numbers available at the end of this document.

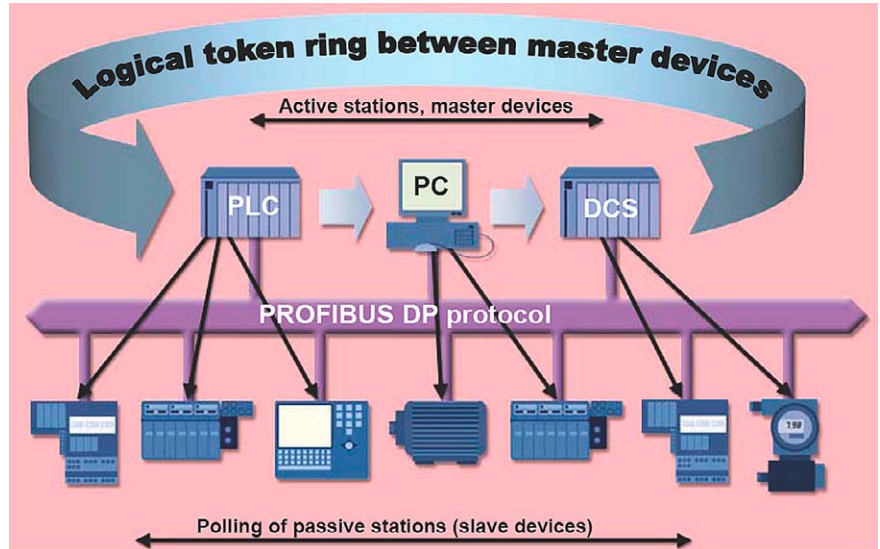
- **Master and Slave modes can be used simultaneously**

- **The compatible products listed above supports the simultaneous execution of DP protocol as well as S7/MPI, FDL for S5 and FDL Send/Receive protocols**

Important: For protocol characteristics about Profibus-DP Direct-Link™ (DRL-DPM-xxx) and SST™ (SST-PB3-xxx) solutions. Please, consult their respective product data sheets.

Master and Slave modes

PROFIBUS-DP (Decentralized Peripheral) fieldbus is based on the European standard EN 50170 (Part 2). PROFIBUS-DP is designed especially for communication between automation control systems and distributed I/O at the device level.



Master mode

Profibus-DP running in Master mode includes Class-1 & 2 and multi-master management.

PROFIBUS-DP telegrams can be used to transfer up to 244 bytes of data per telegram and to connect address devices from 0 to 126.

Each DP device has specific parameters such as device version, baud rate, data format, I/O length, user parameters, etc. These parameters are stored in a file with .GSD extension. The GSD file is provided by your manufacturer and is required for device configuration. Woodhead configuration tool is able to import GSD files and allows you to edit and to modify the user parameters to initialize PROFIBUS devices.

Woodhead interfaces can read and/or write Input and Output from Profibus devices thanks to the software applications:

| Data format | Device data type | |
|-------------------------------------|------------------|--------|
| | Input | Output |
| Bit | BI | BO |
| Byte | OI | OO |
| Word (16-bit) | WI | WO |
| Double word (32-bit) | DI | DO |
| Floating point (32-bit) IEEE format | FI | FO |

Maximum number of variables per request^[1]

| Data format | Device data type | |
|-------------------------|-----------------------|------------------------|
| | Max. quantity in read | Max. quantity in write |
| Bit | 1952 | 1952 |
| Byte | 244 | 244 |
| Word (16-bit) | 122 | 122 |
| Double word (32-bit) | 61 | 61 |
| Floating point (32-bit) | 61 | 61 |

[1]: Maximum of variables could vary depending of the software interfaces used (DLL, OPC, DDE).

Profibus-DP

Master and Slave modes



Access to the specific services of Profibus DP messaging (DP-V0, DP-V1)

Woodhead interface cards allow accessing to specific Profibus DP-V0 and DV-V1 services. This functionality is available through the Woodhead development library (DLL) delivered with the product.

List of PROFIBUS Services

| Service | Description |
|---------|--------------------------|
| 56 | Read Input |
| 57 | Read Output |
| 58 | Global Control |
| 59 | Get Configuration |
| 60 | Slave Diagnostic |
| 61 | Set Global Control Group |
| 62 | Get Slave Parameter |
| 63 | Set Slave Parameter |
| 67 | Read Data Bloc C1 |
| 68 | Write Data Block C1 |
| 69 | Read Data Block C2 |
| 70 | Write Data Block C2 |
| 72 | Abort Data Block Comm C2 |
| 0x10037 | Set Slave Adr |

By using DP-V1 services, you are able to setup the configuration and calibration of field devices during operation, as well as alarm acknowledgement. This acyclic transmission is parallel to the cyclic communication, but has lower priority.

Slave mode

This functionality provides data exchange between Woodhead interface card and DP Master(s) on the Profibus network.

The interface configured in DP Slave mode behaves as a standard Slave device. This device could be accessed from the DP Master on the network as well as the client applications on the local machine through the DP Master functionality. The GSD description files are provided and installed with the product.

The size of Input/Output data area could be configuring from 0 to 244 bytes. The interface can ensure data consistency up to size of 122 bytes (the data consistency insures the data coherence of word, double-word and floating-point types).

Function statuses guarantee refreshing of data with the remote Master as long as it sets the "Bus Time-out" (watchdog control) parameter.

FDL for S5



Features

- **Woodhead compatible products:**

- ▶ **applicom® Interface Cards**
- ▶ **applicom® Gateways**

Part numbers available at the end of this document.

- **The compatible products listed above supports the simultaneous execution of FDL for S5 protocol as well as DP, S7/MPI and FDL Send/Receive protocols**

Master mode

S5 messaging on Profibus, developed by Siemens France, was designed especially to open Siemens SINEC L2 PLC's (based on FDL) to PC-Based applications. S5 messaging uses PROFIBUS layer 2 called **Fieldbus Data Link (FDL)** to send and receive S5 requests.

FDL S5 messaging on Woodhead interfaces is **Master** type (**Active Station**) and enables to manage, as a client, exchanges with S5 PLCs such as:

- **95U**,
- **115U** (942, 943, 943B, 944, 944B, 945),
- **135U** (928, 928B),
- **155U** (946, 947, 948, 948B)

Please contact us for other supported couplers

A Function Block (FB100) is provided for each type of Siemens S5 CPUs. You have to download it into the PLC program in order to ensure S5 messaging communication.

Woodhead interfaces can read and/or write to many different PLC data types according to the table below:

| Data format | Device data type | | | | | |
|--|------------------|----------------|---------------------------|---------------------|-------|--------|
| | Memento Flag | Smerker S Flag | Data Block ^[1] | Extended Data Block | Input | Output |
| Bit | M | S | DB | DX | E | A |
| Byte | MB | SY | | | EB | AB |
| Word (16-bit) | MW | SW | DBDW | DXDW | EW | AW |
| Double word (32-bit) | MD | SD | DBDD | DXDD | | |
| Floating point (32-bit) Siemens KG format | MDKG | SDKG | DBDDKG | DXDDKG | | |

^[1]: DB, DX maximum size is 256 words. DB0 and DB1 (for 95U), DB150 - not accessible (reserved by Siemens communication program).

Maximum number of variables per request^[2]

| Data format | Device data type | |
|--------------------------------|-----------------------|------------------------|
| | Max. quantity in read | Max. quantity in write |
| Bit | 1600 | 8 ou 16 ^[3] |
| Byte | 200 | 200 |
| Word (16-bit) | 100 | 100 |
| Double word (32-bit) | 50 | 50 |
| Floating point (32-bit) | 50 | 50 |

^[2]: Maximum of variables could vary depending of the software interfaces used (DLL, OPC, DDE).

^[3]: A write bit request is limited to a maximum of:

- ▶ 8 bits for the outputs, memento and Smerker with a 1st address modulo 8.
- ▶ 16 bits for a DB or a DX with a 1st address modulo 16

Profibus FMS



Features

- **Warning, PROFIBUS-FMS is no more supported on Woodhead products but still available on request**
- **Woodhead compatible products:**
 - ▶ **applicom® Interface Cards**

Part numbers available at the end of this document.
- **The compatible products listed above supports the simultaneous execution of FDL for S5 protocol as well as DP, S7/MPI and FDL Send/Receive protocols**

Master - Client & Server modes

PROFIBUS-FMS is the general-purpose solution for communication tasks at the cell level. FMS services open up a wide range of applications.

PROFIBUS-FMS on Woodhead interface is **Master** type (**Active Station**) and manage exchanges with the other FMS devices as **FMS Client** and **FMS Server**.

FMS requests supported:

- **FMS Initiate**
- **FMS Abort**
- **FMS Reject**
- **FMS Status**
- **FMS GetOD** (Short Form)
- **FMS GetOD** (Long Form)
- **FMS Ident**
- **FMS Read** and **FMS Write**

PROFIBUS-FMS protocol is valid with FMS devices such as:

- Siemens S5 series: CP5431-FMS for 115U, 135U, 155U
- Siemens S7 series: S7-300 (CP343), CPU S7-400 (CP443-5 Basic)
- Klöckner-Moeller series: NET230
- Crouzet series: RPX, MIDU
- etc.

Client mode

The Woodhead interfaces can dialogue with **Master (MMAC)** or **Slave (MSAC)** type devices. Connections are type "D" Defined connection (DIN 19245 part 2 clause 4.2.5.2). It has direct access to variables of type **Boolean**, **Integer8**, **Unsigned8**, **Integer16**, **Unsigned16**, **Integer32**, **Unsigned32**, and **Floating Point**.

These variables can be read or written to as **Object Type Simple Variables** or **Object Type Array** of the same variables. They are available whatever the software applications you use.

Logical connections and disconnections to devices (FMS Initiate and FMS Abort) are automatically managed by the Woodhead interfaces firmware and are also available for applications using the applicom® DLL Library via the functions **AppConnect** and **AppUnconnect**.

Other FMS requests are only accessible with the DLL Library, such as **FMS Ident**, **FMS Status** and **FMS GetOD**. Software utilities are also included to check and get the object dictionary with corresponding **FMS** index directly from the **FMS** devices.

FMS supported functions

| FMS Object Type | Description |
|-------------------------|---|
| Boolean | Read bits, write bits |
| Unsigned8 | Read packed bytes, Write packed bytes |
| Unsigned16 | Read words, Write words |
| Unsigned32 | Read double words, write double words |
| Floating Point (32-bit) | Read floating points, write floating points |

Maximum number of variables per request^[1]

| Data format | Device data type | |
|-------------------------|-----------------------|------------------------|
| | Max. quantity in read | Max. quantity in write |
| Bit | 240 | 240 |
| Byte | 240 | 240 |
| Word (16-bit) | 120 | 120 |
| Double word (32-bit) | 60 | 60 |
| Floating point (32-bit) | 60 | 50 |

[1]: Maximum of variables could vary depending of the software interfaces used (DLL, OPC, DDE).

Profibus FMS



Client & Server modes

Server mode

PROFIBUS FMS protocol running in Server mode provides a shared memory of **32Kwords** and **32 Kbits** called Database for FMS Client connected to the network. **Bit, byte, word, double** and **floating point** areas of this Data-Base are seen as an **array objects** of the corresponding type.

Link are **MMAC** type, "O" type connection oriented Open connection at the responder (DIN 19245 part 2 clause 4.2.5.2). Each interface supports **8 FMS communication references**.

The access rights are "**Read all and Write all**". The communication **object dictionary (OD)** is fixed.

Other objects which could be used to make redundancy (between PCs):

- A simple Unsigned16 variable (read and write access) to control the "**Watchdog**" digital output of the interface card. The unit is the second.
- A simple Boolean variable (read only access) to get the value from the digital input of the interface card.

| FMS Object Type | Description |
|-----------------|-------------------------|
| 1 | Boolean |
| 5 | Unsigned8 |
| 6 | Unsigned16 |
| 7 | Unsigned32 |
| 8 | Floating Point (32-bit) |

Object Dictionary

| Index | Access rights | Object Type | Number of element per object | Variable | Object base address |
|--------------|---------------|-------------|------------------------------|----------------------------|------------------------------------|
| 21 | R/W | 6 | 1 | Discrete Output "WatchDog" | WATCHDOG |
| 22 | R | 1 | 1 | Discrete input | DIGITAL INPUT |
| 100 to 611 | R/W | 6 | 64 | Word (16-bit) | WORD 0000-003F to WORD 7FC0-7FFF |
| 1000 to 1255 | R/W | 1 | 128 | Bit | BIT 0000-007F to BIT 7FC0-7FFF |
| 2000 to 2511 | R/W | 7 | 32 | Double word (32-bit) | DWORD 0000-003E to DWORD 7FC0-7FFE |
| 3000 to 3511 | R/W | 8 | 32 | Floating Point (32-bit) | FWORD 0000-007F to FWORD 7FC0-7FFE |
| 4000 to 4108 | R/W | 5 | 128 | Byte | BYTE 0000-007F to BYTE 3600-367F |

S7 / MPI



Features

- **Woodhead compatible products:**

- ▶ **applicom® Interface Cards**
- ▶ **applicom® Gateways**
- ▶ **Direct-Link™ Interface Cards**

Part numbers available at the end of this document.

- **The compatible products listed above supports the simultaneous execution of S7/MPI protocol as well as DP, FDL for S5 and FDL Send/Receive protocols**

Master mode

S7 protocol is an application layer protocol which implements functions for exchanging data between SIEMENS Simatic® S7 series PLCs and other devices that supports the S7 protocol - e.g. PCs.

The S7 protocol can be running on either a standard *PROFIBUS network* or on a *MPI network*. MPI network is new programming interface for Simatic® S7 series. It replaces the old PG interface of the S5 series. Using MPI network, you can connect the CPU port directly on S7 PLC systems. This means that no extra CP board has to be installed in the PLC.

S7 protocol on Woodhead interfaces is a Master client (Active Station) and enables to manage data exchanges with SIEMENS Simatic® S7 PLC's such as:

- S7/300 and S7/400 directly on CPU port
- M7-300, S7/300 (CPU315-2 DP, CP342-5 DP, CP343-5) or compatible
- M7-400, S7/400 (CPU413-2 DP & CPU414-2 DP & CPU416-2DP) or compatible
- OP

Woodhead interfaces can read and/or write major types of data in these PLC's thanks to the software applications:

| Data format | Device Data-Type | | | | | |
|-------------------------------------|------------------|---------------------------|-------|--------|-------|---------|
| | Memento flag | Data Block ^[1] | Input | Output | Timer | Counter |
| Bit | M | DB DBX | E | A | | |
| Byte | MB | DB DBB | EB | AB | | |
| Word (16 bit) | MW | DB DBW | EW | AW | T | Z |
| Double word (32-bit) | MD | DB DBD | | | | |
| Floating point (32-bit) IEEE Format | MDF | DB DBDF | | | | |

[1]: DB maximum size is 65536 words.

About MPI interface

The MPI physical interface is identical to PROFIBUS RS485 (pinout conformed to the EN 50 170) standard. The default baud rate is 187.5 Kbps. The maximal distance is 50 meters between two stations (of the same segment). Using repeaters, the maximum distance is 1100 meters between two repeaters.

Maximum number of variables per request^[2]

| Data format | Max. quantity in read | | | Max. quantity in write |
|------------------------------------|-----------------------|------|-------------|------------------------|
| | Byte | Word | Double word | |
| Bit | 1600 | | | 12 |
| Byte | 200 | | | 200 |
| Word (16-bit) | 128 | 100 | | 100 |
| Double word (32-bit) | 64 | 64 | 50 | 50 |
| Floating point (32-bit) IEE format | 64 | 64 | 50 | 50 |
| Timer/Counter | | 100 | | 100 |

[2]: Maximum of variables could vary depending of the software interfaces used (DLL, OPC, DDE).

FDL Send/Receive

Free messaging on ISO Layer 2



Features

- **Woodhead compatible products:**

- ▶ **applicom® Interface Cards**

Part numbers available at the end of this document.

- **The compatible products listed above supports the simultaneous execution of FDL Send/Receive protocol as well as DP, S7/MPI and FDL for S5 protocols**

Overview

The PROFIBUS network can be used for purposes other than messaging (e.g. DP, FMS, S7/MPI), by implementing FDL services. These services allow you to send free messages in SDA and SDN type Profibus requests.

The data is unsolicited, i.e. each telegram sent to the remote device will not necessarily get a response. Equally, you may receive a telegram without having previously sent one.

The use of FDL protocol on Woodhead products is available by using the development libraries (LIB, DLL, NI LabVIEW VI, etc).

By selecting the Profibus FDL protocol you can send messages in wait, deferred and cyclic modes. Reception is carried out automatically in a word area configured in the Woodhead interface database.

Functionalities supported by the Profibus FDL protocol

By selecting Profibus FDL messaging, you can send messages in point to point or broadcast modes. This choice and the definition of the SAPs (local and remote) are indicated for each device during configuration.

The content and size of the message, up to 244 bytes, are fully defined by the user via the following functions.

| Exchange type | PLC function (library/DLL access) |
|---|--------------------------------------|
| Write packed bytes | WRITEPACKBYTE, WRITEDIFPACKBYTE |
| Write words in Intel format | WRITEWORD, WRITEDIFWORD |
| Write words in Motorola format | WRITEWORD, WRITEDIFWORD |
| Write double words in Intel format | WRITEDWORD, WRITEDIFDWORD |
| Write double words in Motorola format | WRITEDWORD, WRITEDIFDWORD |
| Write floating words in Intel format | WRITEFFWORD, WRITEDIFFWORD |
| Write floating words in Motorola format | WRITEFFWORD, WRITEDIFFWORD |



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Profibus

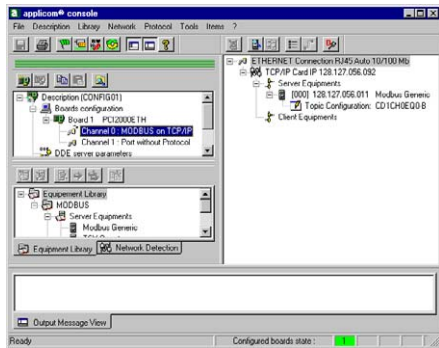


Diagnostics and Test tools

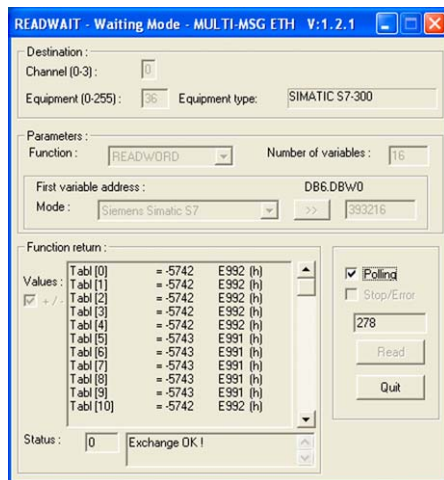
All Woodhead products, compatible with the PROFIBUS messaging, include free of charge a set of powerful and easy-to-use tools for developing, testing and monitoring any kind of application.

These tools co-exist with your industrial application providing invaluable help implementing Woodhead products and troubleshooting the entire control and communication system before and during operation.

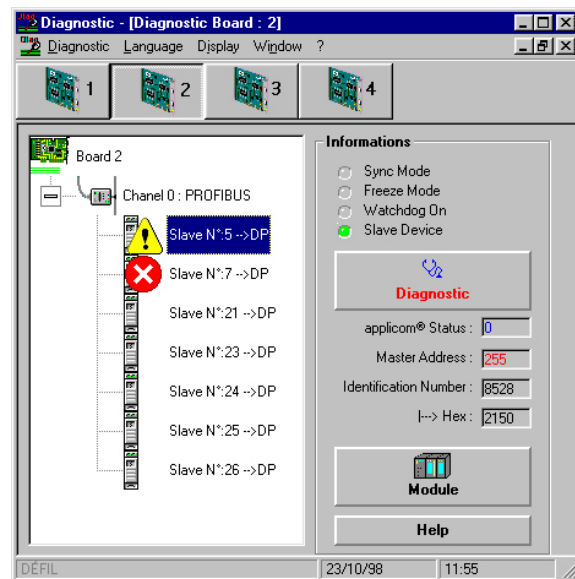
They provide real-time information about the network traffic (network load, number of request, data rate, etc). A tree structure displays the network topology that provides specific information corresponding to the communication project selected: card, channel, protocol, and equipment. Animated icons provide rapid information about status of equipment (connected, active, error, not configured...).



- Configuration console -



- Read/Write test tool -



Ordering Information

| Part Number | Description | DP Master | DP Slave | FMS ^[1] | S7 | MPI | FDL for S5 | FDL Send/Rec |
|-------------|--|-----------|----------|--------------------|----|-----|------------|--------------|
| APP-PF2-PCI | applicom PCI2000PFB combo Full Profibus 12Mb + Profibus MPI 187.5 kb, PCI 5V | X | X | | X | | | X |
| APP-PFB-CPI | applicom CPC11000PFB Full Profibus 12Mb card, Compact PCI 3U | X | X | | X | | | X |
| APP-PFB-PCI | applicom PCI1500PFB, Full Profibus 1.5Mb PCI 5V | X | | X | X | X | X | X |
| APP-PFB-PCU | applicom PCU1500PFB, Full Profibus 1.5Mb, Universal PCI 3.3/5 V | X | | X | X | X | X | X |
| APP-PS7-PCI | applicom PCI1500S7, Profibus S7/MPI 1.5Mb, PCI 5V | | | | X | X | | |
| APP-PS7-PCU | applicom PCU1500S7, Profibus S7/MPI 1.5Mb, Universal PCI 3.3/5 V | | | | X | X | | |
| APP-ESP-GTW | applicom GATEway, Eth. ↔ Eth., Eth. ↔ Profibus, Profibus ↔ Serial | X | X | | X | X | X | |
| DRL-MPI-PCU | Direct-Link PCU100PFB Profibus MPI/S7 card Universal PCI 3.3/5 V | | X | | X | X | | |

[1]: Warning, PROFIBUS-FMS is no more supported on Woodhead products but still available on request.



For product and technical information, Visit: www.woodhead.com

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