Option Modules
ProfiNet IO Communications Option

HA501838U001 Issue 1
Technical Manual

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AC30 PROFINET IO Option

Technical Manual
HA501838U001 Issue 1

WARRANTY

Safety Information

Requirements

IMPORTANT: *Please read this information BEFORE installing the equipment.*

Intended Users

This manual is to be made available to all persons who are required to install, configure or service equipment described herein, or any other associated operation.

The information given is intended to highlight safety issues, EMC considerations, and to enable the user to obtain maximum benefit from the equipment.

Complete the following table for future reference detailing how the unit is to be installed and used.

INSTALLATION DETAILS	
Model Number *(see product label)*	
Where installed *(for your own information)*	

Application Area

The equipment described is intended for industrial motor speed control utilising AC induction or AC synchronous machines.

Personnel

Installation, operation and maintenance of the equipment should be carried out by qualified personnel. A qualified person is someone who is technically competent and familiar with all safety information and established safety practices; with the installation process, operation and maintenance of this equipment; and with all the hazards involved.

Product Warnings

	DANGER Risk of electric shock		**WARNING** Hot surfaces		**Caution** Refer to documentation		**Earth/Ground** Protective Conductor Terminal

CAUTION!

APPLICATION RISK

- The specifications, processes and circuitry described herein are for guidance only and may need to be adapted to the user's specific application. We cannot guarantee the suitability of the equipment described in this Manual for individual applications.

RISK ASSESSMENT

Under fault conditions, power loss or unintended operating conditions, the drive may not operate as intended. In particular:

• Stored energy might not discharge to safe levels as quickly as suggested, and can still be present even though the drive appears to be switched off	• The motor's direction of rotation might not be controlled • The motor speed might not be controlled • The motor might be energised

A drive is a component within a drive system that may influence its operation or effects under a fault condition. Consideration must be given to:

- Stored energy
- Supply disconnects
- Sequencing logic
- Unintended operation

Safety Information

DANGER! - Ignoring the following may result in injury

1. This equipment can endanger life by exposure to rotating machinery and high voltages.

2. The equipment must be permanently earthed due to the high earth leakage current, and the drive motor must be connected to an appropriate safety earth.

3. Ensure all incoming supplies are isolated before working on the equipment. Be aware that there may be more than one supply connection to the drive.

4. There may still be dangerous voltages present at power terminals (motor output, supply input phases, DC bus and the brake, where fitted) when the motor is at standstill or is stopped.

5. For measurements use only a meter to IEC 61010 (CAT III or higher). Always begin using the highest range.
CAT I and CAT II meters must not be used on this product.

6. Allow at least 5 minutes for the drive's capacitors to discharge to safe voltage levels (<50V). Use the specified meter capable of measuring up to 1000V dc & ac rms to confirm that less than 50V is present between all power terminals and between power terminals and earth.

7. Unless otherwise stated, this product must NOT be dismantled. In the event of a fault the drive must be returned. Refer to "Routine Maintenance and Repair".

WARNING! - Ignoring the following may result in injury or damage to equipment

SAFETY
Where there is conflict between EMC and Safety requirements, personnel safety shall always take precedence.

- Never perform high voltage resistance checks on the wiring without first disconnecting the drive from the circuit being tested.

- Whilst ensuring ventilation is sufficient, provide guarding and /or additional safety systems to prevent injury or damage to equipment.

- When replacing a drive in an application and before returning to use, it is essential that all user defined parameters for the product's operation are correctly installed.

- All control and signal terminals are SELV, i.e. protected by double insulation. Ensure all external wiring is rated for the highest system voltage.

- Thermal sensors contained within the motor must have at least basic insulation.

- All exposed metalwork in the Inverter is protected by basic insulation and bonded to a safety earth.

- RCDs are not recommended for use with this product but, where their use is mandatory, only Type B RCDs should be used.

EMC

- In a domestic environment this product may cause radio interference in which case supplementary mitigation measures may be required.

- This equipment contains electrostatic discharge (ESD) sensitive parts. Observe static control precautions when handling, installing and servicing this product.

- This is a product of the restricted sales distribution class according to IEC 61800-3. It is designated as "professional equipment" as defined in EN61000-3-2. Permission of the supply authority shall be obtained before connection to the low voltage supply.

Disposal

Waste Electrical and Electronic Equipment (WEEE)

Waste Electrical and Electronic Equipment - must not be disposed of with domestic waste.

It must be separately collected according to local legislation and applicable laws.

Parker Hannifin Company, together with local distributors and in accordance with EU directive 2002/96/EC, undertakes to withdraw and dispose of its products, fully respecting environmental considerations.

For more information about how to recycle your Parker supplied waste equipment, please contact your local Parker Service Centre.

Packaging

During transport our products are protected by suitable packaging. This is entirely environmentally compatible and should be taken for central disposal as secondary raw material.

Contents..Page No.

AC30 PROFINET IO OPTION

Introduction

Features

- PROFINET IO
- 100Mbit, full duplex
- Galvanically isolated 2-port Ethernet interface
- Network Status and Module Status LEDs
- Up to a total of 256 bytes of cyclic I/O data in each direction
- Up to 64 modules
- Web server
- FTP server
- GSD XML file provided

The Product Code

The product code for the PROFINET IO Option is:

7003-PN-00

Installation

1. Remove the Graphical Keypad (GKP) by pulling from the top down, and remove.
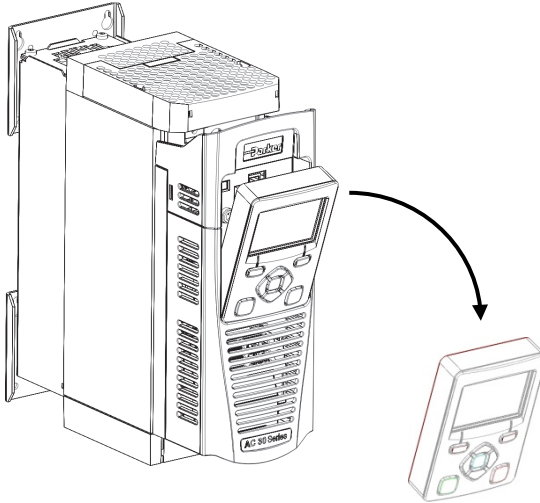
2. After removing the screw slide the control module lower cover down slightly and then remove.
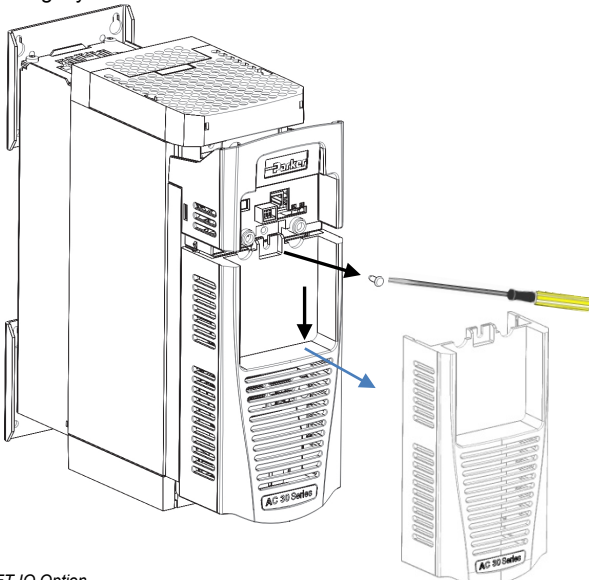
3. Click the Option into place and tighten the retaining screw, as shown.
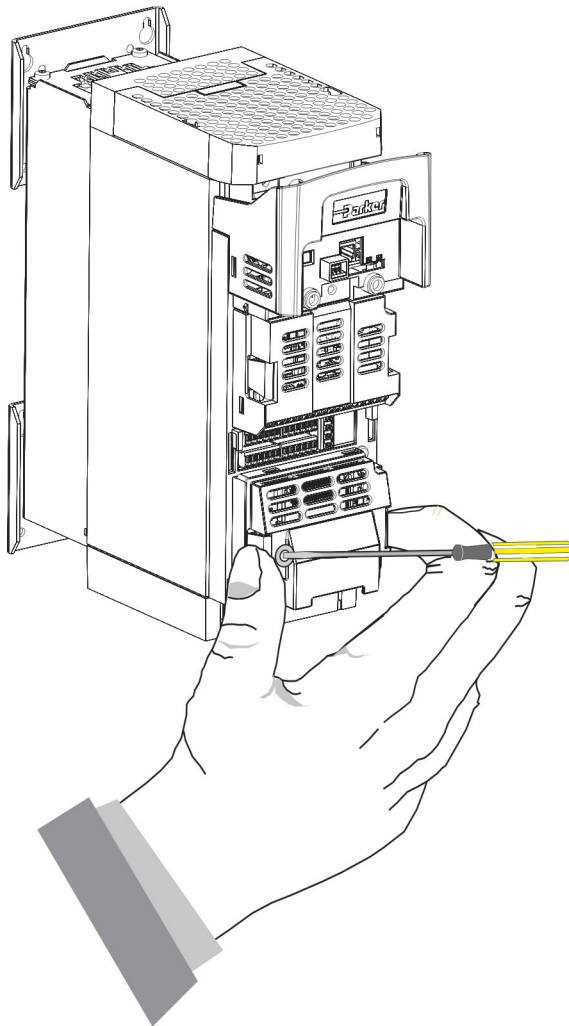
4. Slide and click back the control module lower cover, tighten the retaining screw and slot back the GKP.

Connecting to the PROFINET Network

LEDs

Network Status   Module Status

NS   MS
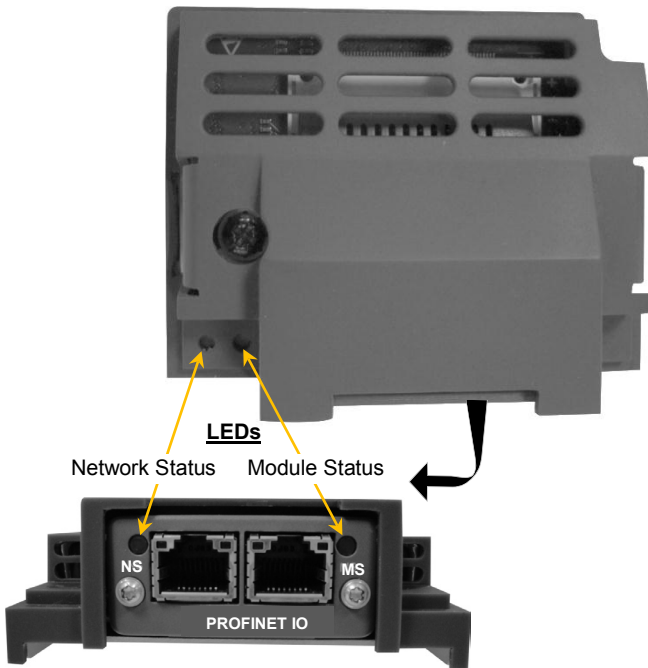
PROFINET IO

Two RJ45 Ethernet sockets are provided. Either or both sockets may be used. Having 2 ports reduces the need for additional Ethernet switches.

The socket shields are connected to protective earth via a filter.

Only use certified PROFINET cabling, terminated with RJ45 plugs.
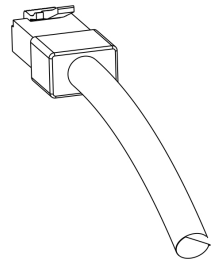
LEDs

Networks Status (NS) LED

State	Indication
Off	Not online / No connection with IO controller.
Green	Connection with IO controller established - RUN state.
Green Flashing	Connection with IO controller established - STOP state.

Module Status (MS) LED

State	Indication
Off	No power or not initialised
Green	Normal operation
Green, 1 flash	Diagnostic event present
Green, 2 flashes	Used for node identify
Red	Exception
Red, 1 flash	Configuration error
Red, 2 flashes	IP address not set
Red, 3 flashes	Station Name not set
Red, 4 flashes	Major internal error

Configuration

The option requires configuration of the slave address, station name and mapping of the process data to the master. Note that some communication parameters only become active after the AC30 leaves the configuration state.

The **0044 Comms Required** parameter must be set to **PROFINET IO**.

Address

There are three methods to set the IP address, subnet mask and gateway address of the slave: the slave sets its own address, the address is set externally, say be a PLC, or the address is set by a DHCP server.   The parameter **0199 Address Assignment** is used to choose the method.

If the IP address is set by the slave (**Address Assignment = FIXED**) then three further parameters must be set. These are:

0200 Fixed IP Address

0201 Fixed Subnet Mask

0202 Fixed Gateway Address

Device Name

The slave requires a device (station) name to be assigned. This must be done by the PROFINET master.

Process Data

The cyclic I/O data is configured by using the read and write process data mapping tables in the AC30. These tables are two parameter arrays in which AC30 parameter numbers may be added.

String-type parameters may not be mapped.

Read Mapping

The read process data represents cyclic data sent from the PLC to the AC30. Only writable AC30 parameters, that are not configuration parameters, may be added to the read process data.

Write Mapping

The write process data represents cyclic data sent from the AC30 to the PLC.

Mapping Arrays

Parameter arrays may be added into the process data, however this could lead to large amounts of data being passed across the communications. An alternative is to only reference the element(s) of the array required. This is possible as each element of a parameter array has its own parameter number. See the Appendix A– Array Parameter Numbers.

Default Mapping

The process data mapping will contain a factory default mapping. The default mapping may be overwritten if required.

Modules

The GSD file defines a number of modules. When configuring the PLC, the modules may be added to the slave device slots as required. These modules map to the process data in the order in which they are added.

The modules relevant to the AC30 are:

Module	Maps to parameter
Input 1 byte	Write process data – 1-byte parameters
Input 1 word	Write process data – 2-byte parameters
Input 2 words	Write process data – 4-byte parameters
Output 1 byte	Read process data – 1-byte parameters
Output 1 word	Read process data – 2-byte parameters
Output 2 words	Read process data – 4-byte parameters

The size of a parameter may be determined from its data type. The relationship between the AC30 parameter and PROFINET data types is given in Appendix B – Data Types.

If parameter arrays are to be included in the process data mapping, then add as many modules as there are indexes in the array. Each module must be the same size as the element of the array.

Cyclic Data Exchange

Cyclic data exchange will occur when a connection is established either in RUN mode (PROCESS ACTIVE) or STOP mode (IDLE). However, the read process data will only update the mapped parameters when in the PROCESS ACTIVE mode.

On a transition into the PROCESS ACTIVE state all read process mapped parameters will be updated.

When in the PROCESS ACTIVE state the read process mapped parameters will all update only when a change in the read process data occurs.

Example Configuration

Configuration Summary

Communications Settings	
Device Name	drive
IP Address, Subnet Mask, Gateway Address	

Read Process Mapping Table		Data Type	Bytes	PLC Module
000	**0627 Comms Control Word**	WORD	2	Output 1 word
001	**0681 Comms Reference**	REAL	4	Output 2 words
002	000			
003	000			

Write Process Mapping Table		Data Type	Bytes	PLC Module
000	**0661 Status Word**	WORD	2	Input 1 word
001	**0395 Actual Speed Percent**	REAL	4	Input 2 words
002	000			
003	000			

Example Using a SIMATIC PLC

Prior knowledge of the SIMATIC S7-300 PLC and SIMATIC Manager software is assumed. The following is an example of configuring the PLC.

1.   Create a project.

Start **SIMATIC Manager** and create a new project. Right-click on the project name at the top level and from **Insert New Object** select **SIMATIC 300 Station**.
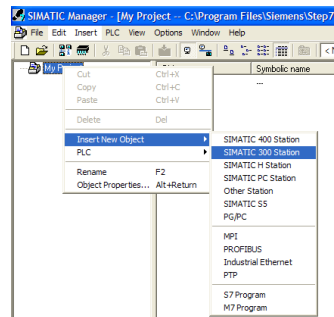
2. PLC Interface.

The interface between the PLC and PC is selected by clicking on the **Options** menu and choosing **Set PG/PC Interface**.

In this example the PC Ethernet card is chosen.
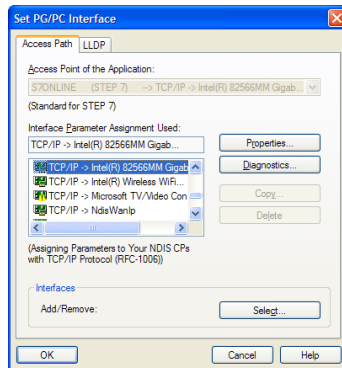
3. Start HW Config.

To configure the PLC, click on **SIMATIC 300** and double-click on **Hardware**. This will start **HW Config**.
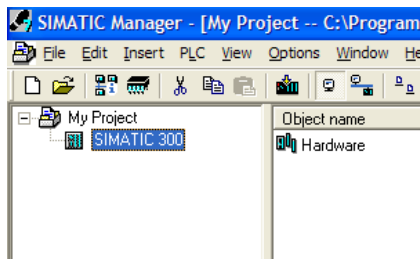
4. Configure the PLC hardware.

In **HW Config**, select **Insert** from the menu followed by Insert Object. From the pop-up menu choose **SIMATIC 300 →RACK 300 → Rail**. The rail should then appear as shown.

Right-click on slot 1 to add the appropriate power supply.
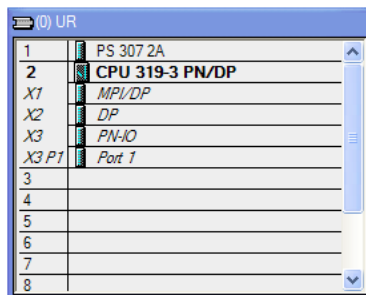
Right-click on slot 2 to add the appropriate CPU.

5. Install the GSD file.

Install the PROFINET IO GSD XML file. This can be downloaded from
www.parker.com/ssd
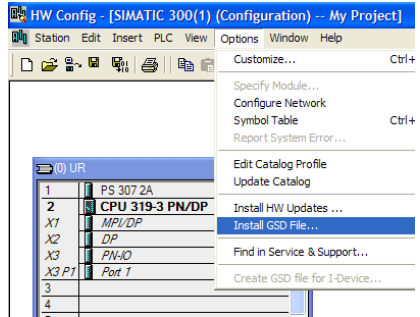
This will then become available in the catalogue shown on the right-hand side of the window under **PROFIBUS IO →Additional Field Devices →General →Anybus CompactCom PRT 2-Port**
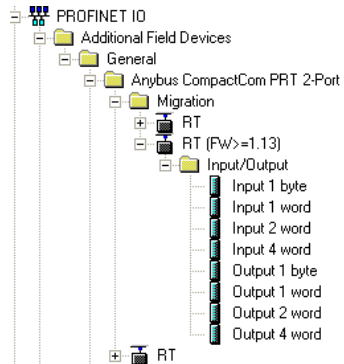
For PLCs that do not support extended diagnostics use the Device Access Point under the heading Migration (FW>=1.13).

6. Add the PROFINET Controller.

Double-click on the PROFINET IO (**PN-IO**) Controller module to reveal the dialog box. Click on **Properties…** to set up the IP address and Subnet mask.
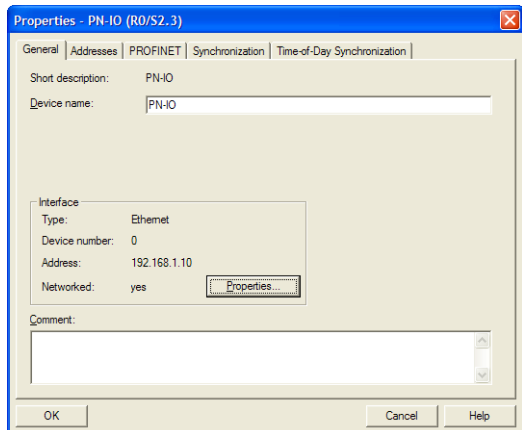
Click on **New…** to
create a new
network and
select this. In this
example **Ethernet**
has been
selected.

The IP address,
subnet mask and
gateway of the
PLC may be set
here.
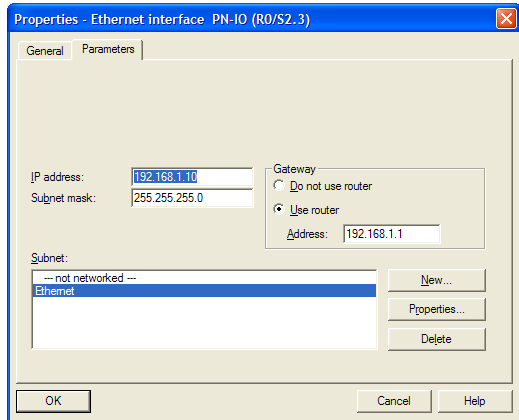
Right-click on the
PROFINET IO (PN-IO)
Controller module and
select **Insert PROFINET
IO System**.
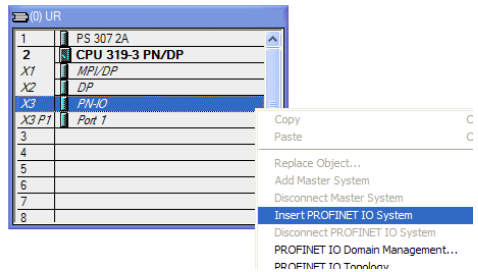
7. Add the slave.

Click and drag the Device from the catalogue and drop onto the
PROFINET IO System. This represents the AC30 option slave.
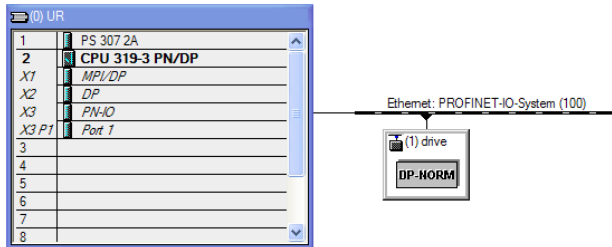
Double click
on the
PROFINET
slave device
to configure it.

Set the
Device Name
(Station
Name) of the
slave.

If the IP
address of
the slave is to
be set by the
PLC, check
the **Assign IP
address via
IO controller**
and click on
Ethernet…
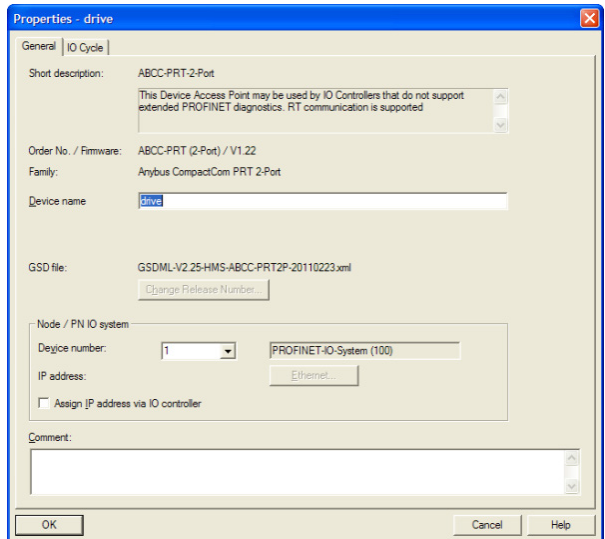
8. Assign the Device Name of the PROFINET Slave

Double-click on the PROFINET IO-System to reveal the dialog box. Make sure the checkbox **Use Name in IO-Device / Controller** is cleared, otherwise the device name will require a dot extension.
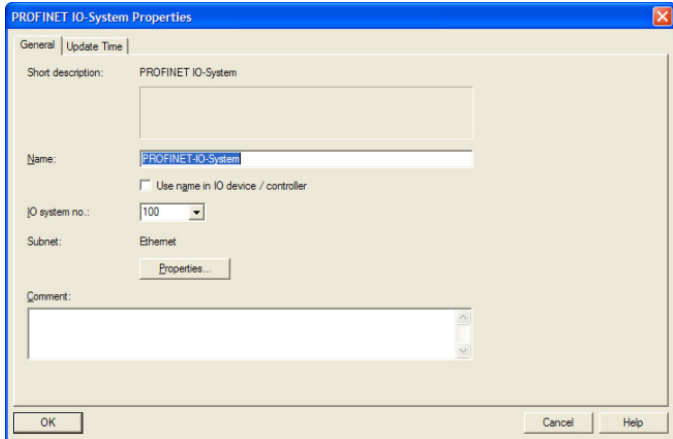
If the Device Name (Station Name) of the slave is not set or is to be changed then select **PLC** from the menu and choose **Assign Device Name…** to reveal the dialog box.

To carry out this task, an Ethernet interface must be used between the PC and PLC (see part 2 above).

Make sure the slave device is connected to the network.
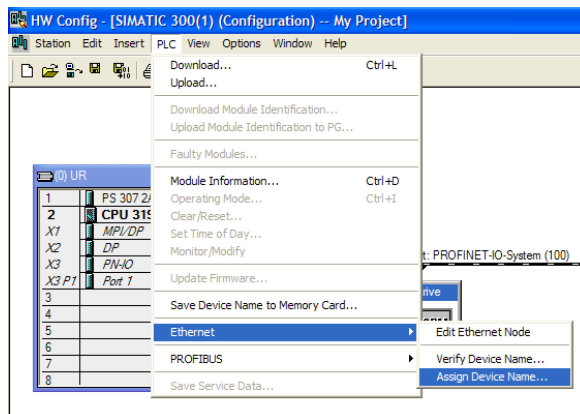
The **Device name** drop down contains a list of all the device names of the slaves in the configuration.

The **Available devices** list show all connected slaves.

Match the device name with the available device and click on **Assign name**. The slave will then take on its device name.
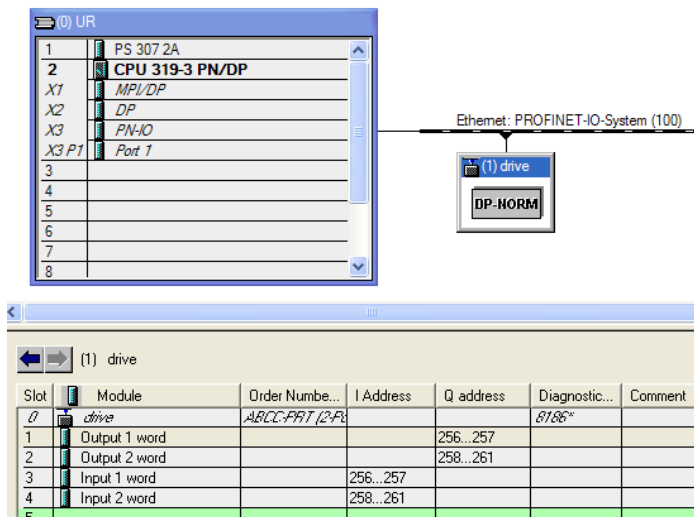
To help identify the slave click on **Flashing on**. The slave Module Status LED will flash green (2 flashes).
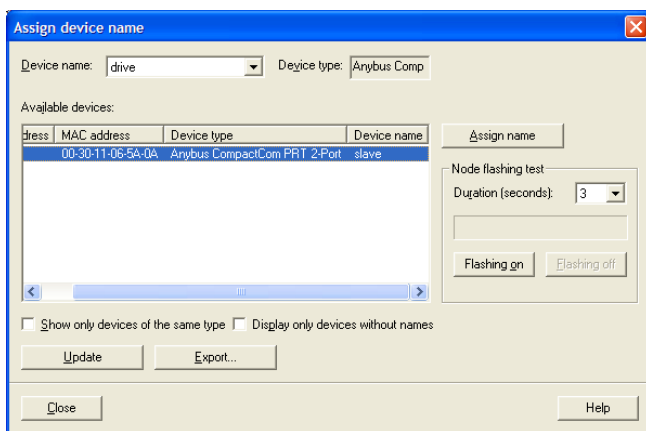
9. Configure the process data for the slave.

By selecting the slave, the input and output process data may be configured. This must match the configuration set up in the AC30.

The appropriate input and output modules may be dragged from the catalogue and dropped into the appropriate slot. All output modules must come before the input modules.

10. Save, compile and download.

Make sure the PC/PLC interface is connected. Select **Station** from the menu and **Save and Compile** then select **PLC** and **Download…**

Configuring the AC30

AC30 Parker Drive Quicktool (PDQ)

When performing an online configuration, the fitted option card will automatically be selected. In offline mode, parameter **0044 Comms required** must be set to PROFINET IO:

In the Application tab, the following settings are available in the Communications block.

Select the method to set the IP address, subnet mask and gateway address using the **0199 Address Assignment** parameter:

If this parameter is set to FIXED then the parameters **0200 Fixed IP Address, 0201 Fixed Subnet Mask, 0202 Fixed Gateway Address** must be set:

Add the required parameters to the Read Process Mapping table (parameter **0055 Read Mapping)** by selecting them from the popup window:
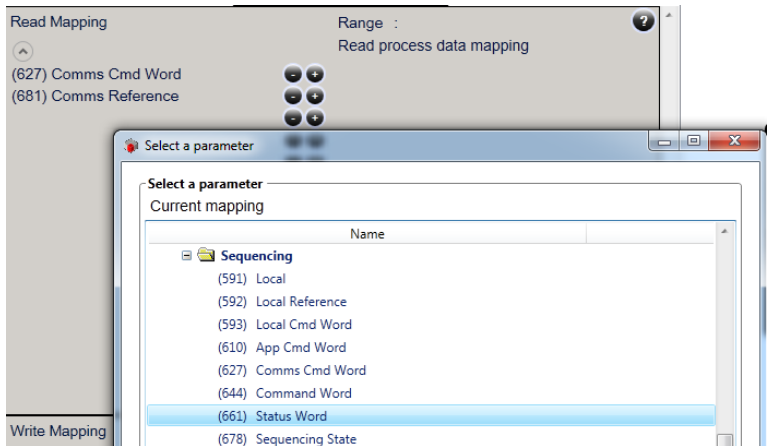
Add the required parameters to the Write Process Mapping table (parameter **0120 Write Mapping)** by selecting them from the popup window:
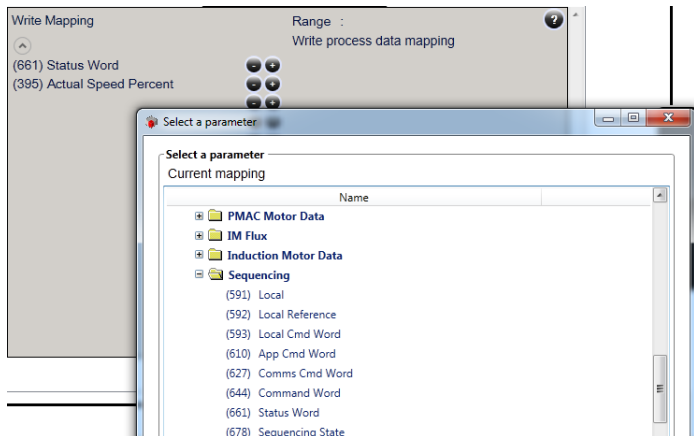
Note the Process Data mapping ends on the first empty entry.

Acyclic Data Exchange

AC30 parameters may be accessed acyclically from the network using Record Data read / write services.

The AC30 parameters may be accessed via Application Process Instance zero (API 0). Slot 0, Subslot 1 may be used.

There is a 1:1 correlation between the index and the parameter number.

- When reading more data than the actual size of the parameter, the response will only contain the actual parameter data without any additional padding.

- Parameter arrays may be accessed; either as a whole or as individual elements.   See the Appendix A– Array Parameter Numbers.

- Parameter string arrays must be accessed by each element. Attempting to access the whole array will only return the first element.

Example Acyclic Data Exchange

Example using a SIMATIC PLC

The acyclic read and write services may be achieved using the functions SFB52 RDREC and SFB53 WRREC.

In this example a parameter of length 4 bytes, parameter number 15 will be read using RDREC.

```
                              DB11
                            "RDREC"
                        ─EN          ENO─
    M0.0     M0.1                    VALID─ ...
    ─┤ ├──────( P )──────REQ
                                     BUSY─ ...
             DW#16#1FFA─ID
                                     ERROR─ ...
                     15─INDEX
                                     STATUS─ ...
                      4─MLEN
                                     LEN─ ...
             P#M 20.0
              BYTE 4─RECORD
```
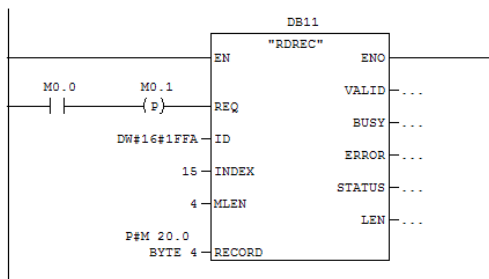
- The ID is set to 1FFAh (8186) which is the diagnostic address found in Slot 0, Subslot 1.

- INDEX is set to the parameter number 15.

- MLEN is set to 4 bytes; the length of the parameter.

- The RECORD parameter will hold the response parameter data.

Lost Communications Trip

Supervised Parameter

The **0047 Comms Supervised** parameter indicates that the PROFINET network participation is supervised by another PROFINET device.

The Supervised parameter value is set to TRUE when one or more IO connections are established.

The Supervised parameter will subsequently change to FALSE if the connection is closed or the PROFINET watchdog has timed out.

Comms Break Trip

The Comms Break trip will generate a trip if a break in communications is detected. A trip event will be generated when a transition from TRUE to FALSE of the parameter **0047 Comms Supervised** occurs.

To enable the Comms Break trip, the parameter **0048 Comms Trip Enable** must be set to TRUE *and* the **COMMS BREAK** bit set in the parameter **0697 Enable 1-32**.

For more information on enabling trips see Chapter 10 Trips & Fault Finding in the AC30 Product Manual HA501718U001.

Diagnostic Event

A single diagnostic event may be created. The severity is fixed as Minor Recoverable.

Four AC30 parameters are associated with the diagnostic event:

0185 Comms Event Code

This code represents the Channel Error Type as follows:

10h	Generic Error Error
20h	Current Short circuit
21h	Current, device input side Short circuit
22h	Current, inside the device Short circuit
23h	Current, device output side Short circuit
30h	Voltage Over voltage
31h	Mains Voltage Over voltage
32h	Voltage inside the device Over voltage
33h	Output Voltage Over voltage
40h	Temperature Over temperature
41h	Ambient Temperature Over temperature
42h	Device Temperature Over temperature
50h	Device Hardware Error
60h	Device Software Error
61h	Internal Software Error
62h	User Software Error
63h	Data Set Error
70h	Additional Modules Error
80h	Monitoring Error
81h	Communication Error
82h	Protocol Error Error
90h	External Error Error
F0h	Additional Functions Error

0187 Comms Event Set

A rising edge signal from FALSE to TRUE will create a diagnostic event. The **Comms Event Clear** parameter must be set FALSE.

0188 Comms Event Clear

A rising edge signal from FALSE to TRUE will remove a diagnostic event. The **Comms Event Set** parameter must be set to FALSE.

0186 Comms Event Active

This parameter indicates if a diagnostic event is active or not.

Note: The rising edge signals for Comms Event Set and Comms Event Clear must be held for at least 10ms in FALSE and at least 10ms in TRUE to take effect.

When a diagnostic event is active the Status LED will flash green.

Ethernet

Web Server

The option has a built-in web server enabling some configuration and diagnostics for the option.

To enable the web server the parameter **0203 Option Web Enable** must be set to TRUE. The web pages may be accessed by a web browser by entering the IP address of the option.

A number of built-in pages are available. The main index page provides a link to the Network Interface pages and the Parameter Data pages.

Network Interface Pages

The Network Interface page provides basic information about the option.

ABCC-PRT (2-Port)
Network interface

Serial#:	0xA015C973
MAC ID:	00:30:11:06:5A:0A
Firmware version:	1.23 Build 1
Uptime:	0 days, 0h 1m 28s
CPU load:	50%

► **Main**   ► **Network configuration**
► **Network statistics**

The Network Statics page provides information about the Ethernet ports and communications statistics.

Parameter Data Pages

The Parameter Data pages allow access to some AC30 parameters. To enable access to this page the parameter **0204 Web Parameters Enable** must be set to TRUE.

The parameter page lists the mapped process data parameters and any soft parameters that have been defined. The Parameter column contains the parameter number followed by its name.

Authorization

Directories can be protected from web access by placing a file called 'web_accs.cfg' in the directory to protect (see the FTP Server section). All the built-in web files are virtual files and are located in the root directory.

The file shall contain a list of users that are allowed to access the directory and it subdirectories.

File format:

```
Username1:Password1
Username2:Password2
…
UsernameN:PasswordN

[AutName]
(message goes here)
```

List of approved users

Optional login message

FTP Server

The option has a built-in FTP server enabling access to the FLASH-based file system which hosts 2MByte of non-volatile storage.

To enable the FTP server the parameter **0205 Option FTP Enable** must be set to TRUE. To access the file system an FTP client is required such as Windows Explorer. Enter the IP address in to the address bar, for example ftp://192.168.1.57

By default no files are stored on the file system (the built-in web files are virtual files).

User Accounts

User accounts are stored in the configuration file '\ftp.cfg'. This file holds the usernames, passwords and home directory for all users. Usernames and password must not exceed 15 characters in length. Users are not able to access files outside of their home directory.

File format:

```
Username1:Password1:Homedir1
Username2:Password2:Homedir2
…
UsernameN:PasswordN:HomedirN
```

If there is no \ftp.cfg' file or if the parameter **0206 Option FTP Admin Mode** parameter is set to TRUE then there will be unrestricted access to the file system.

Parameters

Configuration Parameters

0044 Comms Required		Range		RW	Saved	Config
Type	USINT (enumerated)	(1)	NONE	✓	✓	✓
Default	NOT FITTED	(2)	BACNET IP			
		(3)	BACNET MSTP			
Communications option parameter.		(4)	CANOPEN			
		(5)	CC LINK			
Sets the required communications option.		(6)	CONTROLNET			
		(7)	DEVICENET			
		(8)	ETHERCAT			
		(9)	ETHERNET IP			
		(10)	MODBUS RTU			
		(11)	MODBUS TCP			
		(12)	PROFIBUS DPV1			
		(13)	PROFINET IO			

0199 Address Assignment		Range		RW	Saved	Config
Type	USINT (enumerated)	(0)	SLAVE SETS ADDRESS	✓	✓	✓
Default	SLAVE SETS ADDRESS	(1)	EXTERNAL			
		(2)	DHCP			
Communications option parameter.						
Sets the method for setting the IP address, subnet mask and gateway address.						

0200 Fixed IP Address		Range	RW	Saved	Config
Type	DWORD (IP address)	0.0.0.0 … 255.255.255.255	✓	✓	✓
Default	0.0.0.0				
Communications option parameter. IP address to be set by the slave. The **Address Assignment** parameter must be set to SLAVE SETS ADDRESS for this parameter to take effect.					

0201 Fixed Subnet Mask		Range	RW	Saved	Config
Type	DWORD (IP address)	0.0.0.0 … 255.255.255.255	✓	✓	✓
Default	0.0.0.0				
Communications option parameter. Subnet mask to be set by the slave. The **Address Assignment** parameter must be set to SLAVE SETS ADDRESS for this parameter to take effect.					

0202 Fixed Gateway Address		Range	RW	Saved	Config
Type	DWORD (IP address)	0.0.0.0 … 255.255.255.255	✓	✓	✓
Default	0.0.0.0				
Communications option parameter. Gateway address to be set by the slave. The **Address Assignment** parameter must be set to SLAVE SETS ADDRESS for this parameter to take effect.					

0203 Option Web Enable		Range	RW	Saved	Config
Type	BOOL	FALSE	✓	✓	✓
Default	TRUE	TRUE			
Communications option parameter.					
Enable access to the option's web server.					

0204 Web Parameters Enable		Range	RW	Saved	Config
Type	BOOL	FALSE	✓	✓	✓
Default	TRUE	TRUE			
Communications option parameter.					
Allows access to the parameter page via the option's web server.					

0205 Option FTP Enable		Range	RW	Saved	Config
Type	BOOL	FALSE	✓	✓	✓
Default	TRUE	TRUE			
Communications option parameter.					
Allows access to the option's FTP server.					

0206 Option FTP Admin Mode		Range	RW	Saved	Config
Type	BOOL	FALSE	✓	✓	✓
Default	TRUE	TRUE			
Communications option parameter.					
Allows unrestricted access to the option's FTP server. The parameter **Option FTP Enable** must be set to TRUE to access the server.					

0207 IPConfig Enable		Range	RW	Saved	Config
Type	BOOL	FALSE	✓	✓	✓
Default	TRUE	TRUE			
Communications option parameter. Enables the option to be accessed via the IPConfig PC utility.					

0055 Read Mapping		Range	RW	Saved	Config
Type	Array of UINT	0	✓	✓	✓
Default	0	…			
Communications option parameter. Sets the required read process data mapping. Each entry in the table represents the required parameter number.		Last parameter number			

0120 Write Mapping		Range	RW	Saved	Config
Type	Array of UINT	0	✓	✓	✓
Default	0	…			
Communications option parameter. Sets the required write process data mapping. Each entry in the table represents the required parameter number.		Last parameter number			

0048 Comms Trip Enable	Range	RW	Saved	Config
Type	BOOL	FALSE	✓	✓	✗
Default	TRUE	TRUE			
Communications option parameter. Enables the communications trip.				

Runtime Parameters

0185 Comms Event Code	Range	RW	Saved	Config
Type	BYTE	0x00	✓	✗	✗
Default	0	…			
Communications option parameter. Sets the event code to be used when a diagnostic event is created.	0xFF			

0187 Comms Event Set	Range	RW	Saved	Config
Type	BOOL	FALSE	✓	✗	✗
Default	FALSE	TRUE			
Communications option parameter. A rising edge (FALSE to TRUE) will create a diagnostic event.				

0188 Comms Event Clear	Range	RW	Saved	Config
Type	BOOL	FALSE	✓	✗	✗
Default	FALSE	TRUE			
Communications option parameter. A rising edge (FALSE to TRUE) will remove a diagnostic event.				

Diagnostic Parameters

0045 Comms Fitted		Range
Type	USINT (enumerated)	(0) UNKNOWN
		(1) NONE
		(2) BACNET IP
Communications option parameter.		(3) BACNET MSTP
		(4) CANOPEN
Indicates the communications option fitted.		(5) CC LINK
		(6) CONTROLNET
		(7) DEVICENET
		(8) ETHERCAT
		(9) ETHERNET IP
		(10) MODBUS RTU
		(11) MODBUS TCP
		(12) PROFIBUS DPV1
		(13) PROFINET IO

0046 Comms State		Range
Type	USINT (enumerated)	(0) SETUP – setup in progress
		(1) NW INIT – network-related initialisation tasks are being performed
Communications option parameter.		(2) WAIT PROCESS – no IO connection
Indicates the state of the communications option fitted.		(3) IDLE – IO connection established – STOP mode
		(4) PROCESS ACTIVE– IO connection established – RUN mode
		(5) ERROR – configuration data mismatch
		(6) RESERVED
		(7) EXCEPTION – unrecoverable error
		(8) NONE – option not fitted

0239 PROFINET State		Range
Type	USINT (enumerated)	(0) SETUP – setup in progress
		(1) NW INIT – network-related initialisation tasks are being performed
PROFINET communications option parameter. Indicates the state of the communications option fitted as the parameter **0046 Comms State**, but using specific enumerated strings for PROFINET.		(2) WAITING TO CONNECT – no IO connection
		(3) STOP MODE – IO connection established – STOP mode
		(4) CONNECTED – IO connection established – RUN mode
		(5) ERROR – configuration data mismatch
		(6) RESERVED
		(7) EXCEPTION – unrecoverable error
		(8) NONE – option not fitted

0240 PROFNET Device Name		Range
Type	STRING	Null terminated string.
PROFINET communications option parameter. Indicates the current Device Name (Station Name) of the PROFINET option.		

0189 Option MAC Address		Range
Type	STRING	Null terminated string.
Communications option parameter. Indicates the Ethernet MAC address of the option.		

0195 Option IP Address	Range
Type	DWORD (IP address)	0.0.0.0
		…
Communications option parameter. Indicates the current IP address of the slave.	255.255.255.255

0196 Option Subnet Mask	Range
Type	DWORD (IP address)	0.0.0.0
		…
Communications option parameter. Indicates the current subnet mask of the slave.	255.255.255.255

0197 Option Gateway	Range
Type	DWORD (IP address)	0.0.0.0
		…
Communications option parameter. Indicates the gateway address of the slave	255.255.255.255

0198 Option DHCP Enabled	Range
Type	BOOL	FALSE
		TRUE
Communications option parameter. Indicates if the DHCP client of the option is enabled.	

0047 Comms Supervised	Range
Type	BOOL	FALSE
		TRUE
Communications option parameter. Indicates that the PROFINET network participation is supervised by another PROFINET device.	

0049 Comms Module Version	Range
Type	DWORD	0x00000000
		…
Communications option parameter. Firmware version of the option communications module.	0xFFFFFFFF The most significant byte is the major version number, followed by the minor version number. The least significant byte is the build number.

0050 Comms Module Serial	Range
Type	DWORD	0x00000000
		…
Communications option parameter. Serial number of the option communications module.	0xFFFFFFFF

0051 Comms Diagnostic		Range
Type	USINT (enumerated)	(0) NONE
		(1) HARDWARE MISMATCH – required communications option does not match that fitted, or no option fitted but one is required.
Communications option parameter.		(2) INVALID CONFIGURATION – the configuration of the option is not valid.
Indicates the state of the communications option fitted.		(3) MAPPING FAILED – the process data mapping is not permitted, e.g. adding read-only parameters to the read process data mapping.
		(4) EXCEPTION – configuration error
		(5) UNSUPPORTED OPTION – the fitted option is not currently supported

0052 Comms Diagnostic Code		Range
Type	DWORD	0x00000000
		…
Communications option parameter.		0xFFFFFFFF
Diagnostic code associated with the Diagnostic parameter.		

0053 Comms Exception		Range
Type	BYTE	0x00
		…
Communications option parameter.		0xFF
Exception code associated with the Diagnostic parameter being in EXCEPTION		

0054 Comms Net Exception		Range
Type	BYTE	0x00
		…
		0xFF
Communications option parameter. Network specific exception code associated with the Diagnostic parameter being in EXCEPTION		

0186 Comms Event Active		Range
Type	BOOL	FALSE
		TRUE
Communications option parameter. Indicates a diagnostic event is active.		

Troubleshooting

Configuration problems can often be identified by looking at the Network Status and Module Status LEDs and from the **Comms Diagnostic** and **PROFINET State** parameters. The values of the Diagnostic parameter are summarized in the Diagnostic Parameters section.

Network

The PROFINET IO only operates on a 100Mbit/s network.

Hardware Mismatch

Diagnostic = HARDWARE MISMATCH

- The required option does not match the actual fitted option.
- No option is fitted but one is required.

Invalid Configuration

Diagnostic = INVALID CONFIGURATION

- Invalid read or write process data mapping
- Invalid communication settings

Diagnostic = MAPPING FAILED

- Attempting to map a parameter that does not exist.
- Attempting to map a configuration parameter.
- Attempting to map a string parameter.
- Attempting to map a read-only parameter to the read process data.

Module Status LED Off

- The Module Status LED will remain off until there is a physical connection to a network.

PROFINET State = ERROR or

Module Status LED Flashing Red (1 flash)

- Configuration mismatch between AC30 and PLC. Note the Output Modules must come before the Input Modules.

Module Status LED Flash Red (2 flashes)

- The PROFINET option does not have a device name. This must be set from the PLC. The device name can be changed only if there is no open connection to the PLC.

Module Status LED Flash Red (2 flashes)

- IP address not set. If using DHCP, make sure the DHCP server is online.

PLC Indication

Flashing Bus Fault (BF) LED on the PLC.

- A module in the hardware configuration (HW Config) does not match the physical module or that the module is not connected to the network.

Appendix A – Array Parameter Numbers

Some parameters have multiple elements and are classified as parameter arrays. A parameter array has a parameter number that accesses the *whole* of the array. It also has parameter numbers that represent each *element* of the array.

Array Example

A parameter array called **My Array** has 4 elements.

Parameter Number	Parameter - My Array
0152	Whole array
0153	index 0
0154	index 1
0155	index 2
0156	index 3

If the parameter number of the whole array is 0152, then the parameter number of the element index 0 of the array will be 0153, the parameter number of the element index 1 will be 0154, etc.

Note that *string* array parameters access their elements via parameter numbers that are calculated in a different way. See the AC30 Product Manual HA501718U001 for more details.

Appendix B – Data Types

The relationship between AC30 parameter and PROFINET data type is given in the table below.

AC30 Parameter		PROFINET	
Data Type	**Description**	**Data Type**	**Bytes**
BOOL	Boolean	Boolean	1
SINT	Short integer	Integer8	1
INT	Integer	Integer16	2
DINT	Double integer	Integer32	4
USINT	Unsigned short integer	Unsigned8	1
UINT	Unsigned integer	Unsigned16	2
UDINT	Unsigned double integer	Unsigned32	4
REAL	Floating point	Floating Point (32-bit IEEE-754)	4
TIME	Duration	Unsigned32	4
DATE	Date	Unsigned32	4
TIME_OF_DAY	Time of day	Unsigned32	4
DATE_AND_TIME	Date and time of day	Unsigned32	4
STRING	String	Visible string	*n*
BYTE	Bit string length 8	Unsigned8	1
WORD	Bit string length 16	Unsigned16	2
DWORD	Bit string length 32	Unsigned32	4

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