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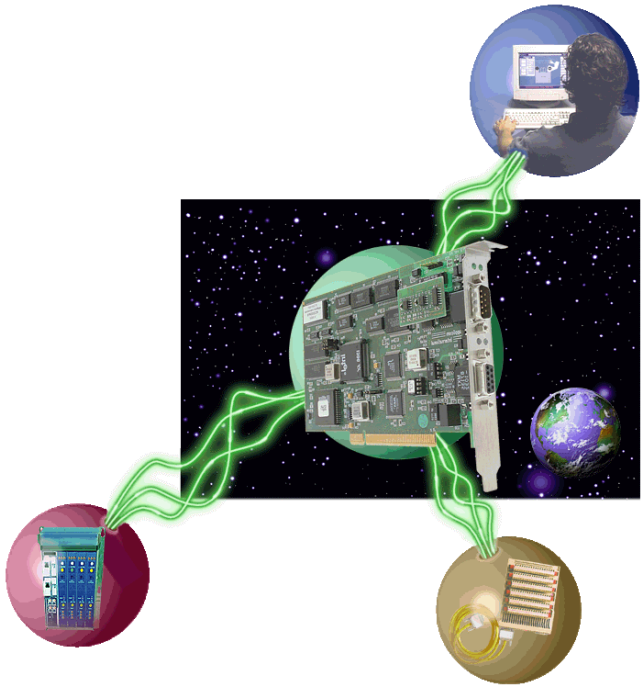
Woodhead

Protocol manual

Allen-Bradley on DF1

applicom® 3.7

a product of Woodhead Software & Electronics



http://www.applicom-int.com

Table of contents

1. - Functionality

- Introduction

The ***applicom***® product uses the **Full-Duplex DF1** protocol to connect transparently:

- To the **DH** and **DH+** network via the **Allen-Bradley** interface module reference **1770-KF2**

See chapter.*Configuration example of the Allen-Bradley module reference 1770-KF2*

- To the **DH-485** network via the **Allen-Bradley** interface module reference **1770-KF3**.
  See chapter.*Configuration example of the Allen-Bradley module reference 1770-KF3*
- To the console socket of **Allen-Bradley** PLCs in direct link.

The ***applicom***® product therefore supports the most widespread **Allen-Bradley** PLCs, namely:

- The PLC-5, Logix5550 familys and the SLC5/04 on **DH+.**
- The PLCs SLC500, 5/01, 5/02 and 5/03 on **DH-485**.
- The PLC-5, Logix5550, MicroLogix familys and the SLC5/03, 5/04 and 5/05 PLCs on the RS232 socket of the processor.

The channel, configured in Allen-Bradley protocol, offers the following functionalities:

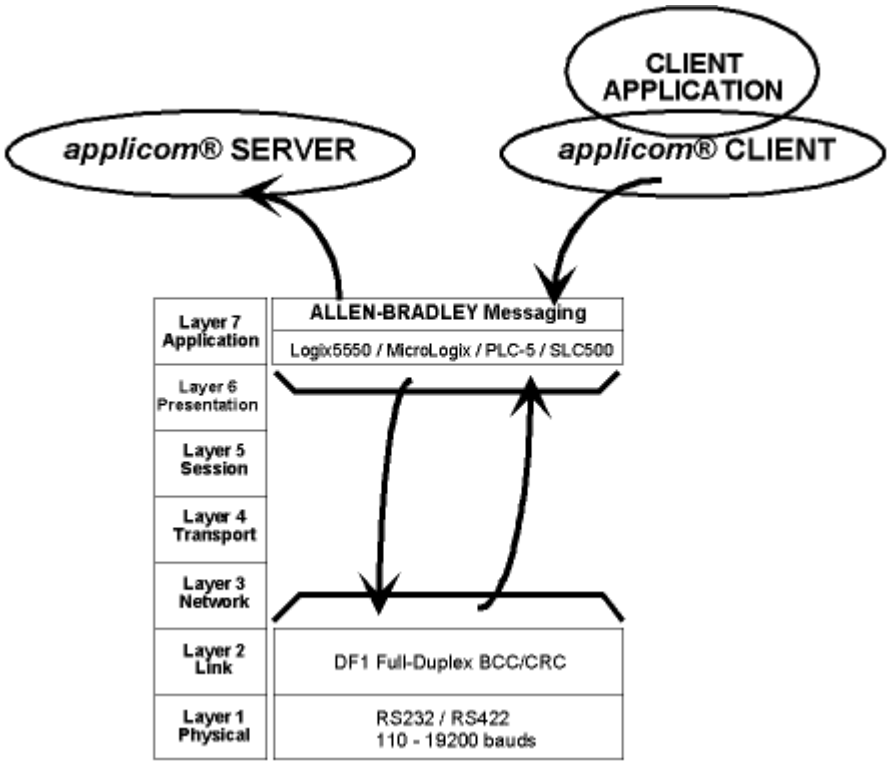
- Client to access PLCs.
- Server, compatible PLC-5, SLC500 and 5/0x, **with no previous configuration**.

The frames supported are in the two modes CLIENT and SERVER:

- PLC-5 / Logix5550 range: « **Typed Read** », « **Typed Write** », « **Word Range Read** », « **Word Range Write** » and « **Read Modify Write** ».
- 5/0x / MicroLogix range: « **Protected Typed Logical Read with Three Address Fields** » and « **Protected Typed Logical Write with Three Address Fields** »

Remarks in the case of Logix5550 :

- The variables in the PLC should be arranged in files of type PLC-5
- The server functionality is not available.



Several protocol configurations are allowed with the **Allen-Bradley** interface module and the ***applicom*®** card:

- The formats: 110 to 19200 baud, with or without parity, 1 stop bit, 8 data bits.
- The protocols: **Full-Duplex BCC**, **Full-Duplex CRC**, with or without included responses.

- Client functionality with Allen-Bradley Messaging

The functions managed by the choice of an **Allen-Bradley** channel allow access to variables defined in the table below.

The address of the variable accessed must be calculated by referring to the column « ***applicom*®** Addressing » in the table.

Allen-Bradley PLC Variable	***applicom*® Addressing (Addr)**	**Exchange type (cyclic mode)**	**Corresponding *applicom*® Function (library/DLL access)**
Bx/w or Bx:y/z	x * 16384 + w x * 16384 + y*16 + z	Read bits Write bits	READPACKBIT, READDIFBIT WRITEPACKBIT, WRITEDIFPACKBIT
Nx:y	x * 16384 + y	Read words Write words	READWORD, READDIFWORD WRITEWORD, WRITEDIFWORD
Nx:y	x * 16384 + y	Read double words * Write double words *	READDWORD, READDIFDWORD WRITEDWORD, WRITEDIFDWORD
Fx:y	x * 16384 + y	Read floating words Write floating words	READFWORD, READDIFFWORD WRITEFWORD, WRITEDIFFWORD
Tx:y/PRE	16384*x + y		READTIMER, WRITETIMER
Cx:y/PRE	16384*x + y		READCOUNTER, WRITECOUNTER

w : N° of bits (0 to 15999)
x : N° of file (0 to 999)
y : N° of element in the file (0 to 999)
z : N° of sub-element (0 to 15)

Input/Output variables for PLC-5 :

PLC variable Item (DDE/OPC)	Use by the ***applicom*®** library/DLL		
	Addresses	Exchange type	Function name
I:y/z	(y * 16) + z	Read input bit	READPACKIBIT
O:y/z	(y * 16) + z	Read output bit	READPACKQBIT
		Write output bit	WRITEPACKQBIT
I:y	y	Read input word	READIWORD
O:y	y	Read output word	READQWORD
		Write output word	WRITEQWORD

y : word number in the file (0 to 999).
z : no. of the bit in the word (0 to 15)

Inout/Output variables for SLC-500 :

PLC variable Item (DDE/OPC)	Use by the ***applicom***® library/DLL		
	Addresses	Exchange type	Function name
I:m.y/z	(m * 512) + (y * 16) + z	Read input bit	READPACKIBIT
O:m.y/z	(m * 512) + (y * 16) + z	Read output bit	READPACKQBIT
		Write output bit	WRITEPACKQBIT
I:m.y	(m * 512) + y	Read input word	READIWORD
O:m.y	(m * 512) + y	Read output word	READQWORD
		Write output word	WRITEQWORD

m : module no. (0 to 31)
y : word number in the module (0 to 31).
z : no. of the bit in the word (0 to 15)

REMARK:

■ Caution, the bit write functions are not part of Allen-Bradley specifications. To force one or more bits, the ***applicom***® software reads a word in the binary file, masks and forces the user bits, then writes the complete word in the equipment. This mechanism can lead to random effects if the equipment has forced other bits of the word between the read and the write.

■ The counters and timers are only available with the ***applicom***® library.

■ The counters and timers are not available with the Logix5550 PLC.

■ Other ***applicom***® functions to ensure control of some modems (example: Hayes command modem, etc.).

Exchange type	**Corresponding *applicom*® function (library/DLL access)**
Message transmission	WRITEMES,WRITEDIFMES

Maximum number of variables per frame with the library

Object	Max. quantity in read	Max. quantity in write
Bit	2048	1792
Word	128	128
Double word	64 *	64 *
Floating word	64	64
Counter / Timer	1	1

* the double words are managed as single words.

Maximum number of variables per frame with PCDDE

Object	Max. Quantity in read	Max. Quantity in write
Bit	2048	1
Word	128	1
Double word	64 *	1 *
Floating word	64	1

* the double words are managed as single words.

The number given for read frames corresponds to the maximum number of points (as imposed by the server and/or the protocol) which can be grouped together during dynamic optimization of the frames carried out by the server. However, this number can be reduced to suit a specific item of equipment by configuring the length of frames in the topic (see chapter "Implementation/Topics configuration/Advanced options").

Where write operations are concerned, a variable automatically entails the formation of a frame.

Maximum number of variables per frame with OPC server

Object	Max. quantity in read	Max. quantity in write
Bit	2048	1792
Word	128	128
Double word	64 *	64 *
Floating word	64	64

* the double words are managed as single words.

The number given for read frames corresponds to the maximum number of points (as imposed by the server and/or the protocol) which can be grouped together during dynamic optimization of the frames carried out by the server. However, this number can be reduced to suit a specific item of equipment by configuring the length of frames in the topic (see chapter "Implementation/Topics configuration/Advanced options").

For the write frames, see chapter "OPC Server/Optimization of synchronous and asynchronous requests".

- Server Functionality with Allen-Bradley Messaging

The **Allen-Bradley Server** on ***applicom*®** interface provides for client PLCs PLC-5 and SLC500, without previous configuration, a database of 32 kbits and 32 kwords.

Requests supported	ALLEN-BRADLEY addresses	Corresponding APPLICOM addresses	APPLICOM area
Read/Write bits	B9:0 .... B9:255	0 to 15 .... 4080 to 4095	bit area
	B10:0 .... B10:255	4096 to 4111 .... 8176 to 8191	
	....	....	
	B16:0 .... B16:255	28672 to 28687 .... 32752 to 32767	
Read/Write words	N17:0 .... N17:255	0 255	word area
	N18:0 .... N18:255	256 511	
	....	....	
	N144:0 .... N144:255	32512 32767	
Read/Write floating words*	F145:0 .... F145:255	0 255	word area (F256 to F272 uniquely with PLC-5)
	F146:0 .... F146:255	256 511	
	....	....	
	F272:0 .... F272:255	32512 32767	

*table 1: **applicom**® Server Addressing*

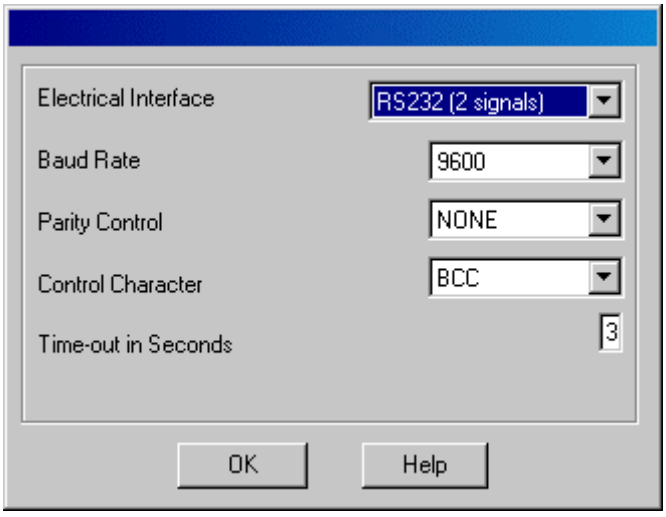
* addresses of floating words in the ***applicom*®** database are word addresses.

2. - Configuration

- Allen-Bradley DF1 => DH / DH+ / DH-485

Configuration of the ***applicom*®** channel is identical for DH/DH+/DH-485 networks. The distinction is made uniquely on the type of **Allen Bradley** interface module connected on the ***applicom*®** channel.

- The **Allen Bradley** module reference 1770-KF2 allows you to connect to a DH or DH+ network. The distinction DH / DH+ is made by configuration of module 1770-KF2.
- The **Allen-Bradley** module reference 1770-KF3 allows you to connect to a DH-485 network.



Electrical interface :

The interface module type is determined by the reference of the module installed on the ***applicom*®** interface or on the galvanic isolation option (BX4010, BX4010R).

You have then the following options:

RS232 (2 signals) (3RS232*, 5RS232*, 6RS232)
RS232 (6 signals) (3RS232*, 5RS232*, 6RS232)
BC20 mA*
3RS485*
3RS485-4*
5RS485* or 6RS485

*** : <u>Not galvanically isolated. Isolation only ensured with option BX4010 and BX4010R</u>.**

For the module compatibility, you can refer to the Wiring/Output module compatibility section of « hardware installation » manual.

RS232 (2 signals)(3RS232*, 5RS232*, 6RS232)
Means that only the TxD and RxD signals are exploited by the protocol task installed on the channel. RTS, DTR, CTS and DCD signals can be accessed from the application by using the ***applicom*®** library GETMODEM and SETMODEM functions.

RS232 (6 signals)(3RS232, 5RS232, 6RS232)
Means that the protocol task installed at the channel level manages the signals.
- TxD and RxD for data transmission and reception.
- RTS, an output signal positioned by the ***applicom*®** interface before each transmission.
- CTS, an input signal, must be active to allow transmission.
- DCD, an input signal, must be active to validate reception.

You can position the DTR output signal from the applicative program by using the ***applicom*®** library SETMODEM function.
You can query the CTS and DCD input signal status from the application program by using the ***applicom*®** library GETMODEM function.
The 6RS232 module ensures the galvanic isolation.

BC20 mA
Conductive 20 mA current loop. The active or passive operation is determined by wiring. If active, see "5BC20 module characteristics" in wiring section of the Hardware installation manual. The active operation should only be used if BX4010 and BX4010R boxes are used.

3RS485
2-wire RS485 link. The line prepolarization as well as the load resistance are wiring-selectable.
Caution: Wiring is different from modules 3RS485-4 and 5RS485.

3RS485-4
4-prepolarized wire RS422 / RS485 link. The load resistance is wiring-selectable.

5RS485 or 6RS485
2 or 4-prepolarized wire RS422 / RS485 link. Load resistances are wiring-selectable. In addition, the 6RS485 module ensures the galvanic isolation. Your interface must be equipped for this type of PROM module V3.0 or higher.

Baud rate :
You must select a transmission speed comprised between **50 and 38400 bauds**, independently on each channel. This speed must be consistent with that of the equipments connected on the channel.

Parity control :
Addition or not of a parity bit. You must select the type of parity check.
- **None**
- **Odd**
- **Even**

Control character :
Used to define the type of « Error check » control character. This choice must be identical to that configured on the Allen-Bradley communication module reference 1770-KF2 or 1770-KF3.

Time out
Maximum time separating the start of request transmission by the ***applicom*®** DF1 client from the server's response. The Time out trips uniquely if the **Allen-Bradley** module (1770-KF2 or 1770-KF3) has acknowledged the request. From this moment if the equipment takes a greater time to reply to you, the current function will return status 55 « Message lost».
By default this time is set to 3 seconds.

Equipment configuration :

Equipment type Available:

This choice is used to select the type of remote equipment in order to use the corresponding request format.

Absent:

Equipment not configured.

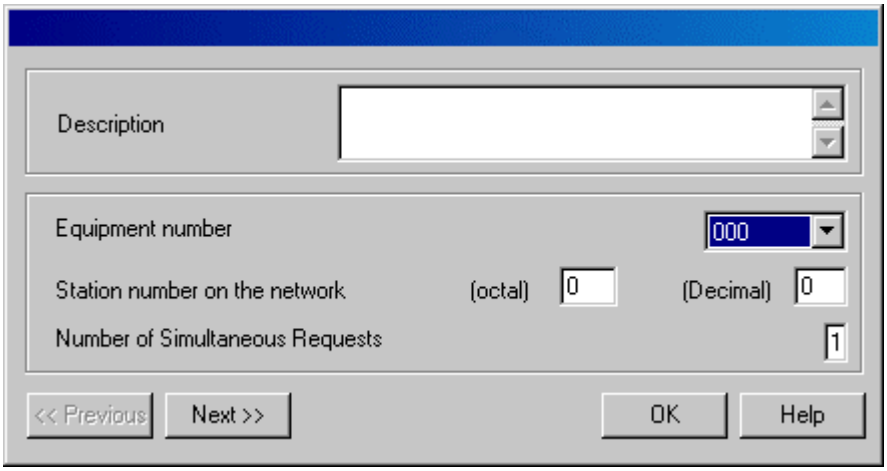
PLC-5 or Logix5550 :

Equipment interrogated with requests in PLC-5 format.

SLC or MicroLogix :

Equipment interrogated with requests in SLC format.

This dialog box is used to define up to 256 server equipments of ***applicom***® DF1 client.



Station number on the network :

The station number on the network can range from:

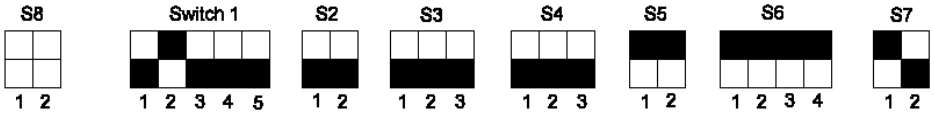
0 to 255 on DH
0 to 63 on DH+
0 to 31 on DH-485

Number of simultaneous questions :

This parameter allows you to adjust the maximum number of simultaneous requests generated by the ***applicom***® DF1 client to server equipment.
This value is set to 1 by default and can range from 1 to 3.

- Configuration example of the Allen-Bradley module reference 1770-KF2

In this configuration example the ***applicom***® channel will be present on the DH+ network with station number 0.



Switch 8:
Comm Standard

RS232 if module 5RS232 on the ***applicom***® interface channel

or

RS422 if module 5RS485/6RS485 on the ***applicom***® interface channel
Refer to chapter *4-wire RS485 wiring (RS422) : Allen-Bradley Module reference 1770-KF2* in the *Hardware installation* manual.

Switch 1:
Asynchronous Link

	Duplex	: Full
	Error check	: BCC
	Parity	: None
	Embed Respns	: Yes
(3)	Duplicate Messages	: Accept
(4)	Hand shake	: Off

Switch 2:
Station number in octal Digt 1
0

Switch 3:
Station number in octal Digt 2
0

Switch 4:
Station number in octal Digt 3
0

Switch 5:
Baud rate
57600

Switch 6:
Async Baud Rate + Diagnostics

Baud	: 19200
Diagnostics	: Execute

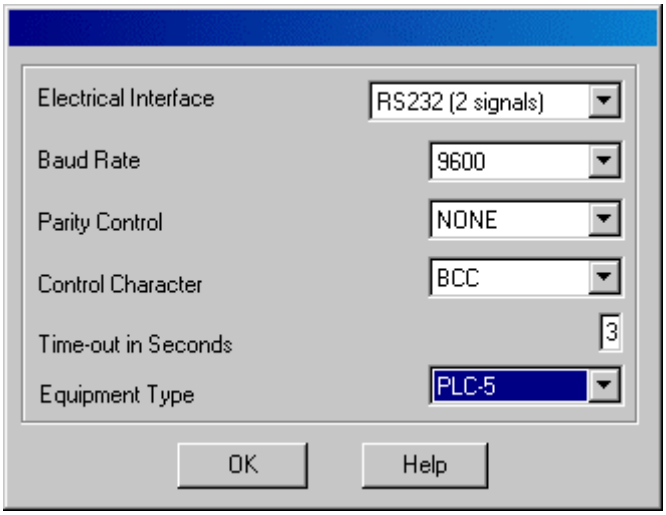
Switch 7:
Network Select
DH+

- Configuration example of the Allen-Bradley module reference 1770-KF3

In this configuration example the ***applicom***® channel will be present on the DH-485 network with station number 0.

Parameter number	Parameter		Value
0	Node address (00 - 31)		00
1	DH-485 baud rate	: 19 200	19
2	Diagnostic command	: No	00
3	RS232 baud rate	: 19 200	19
4	Parity	: None	00
5	DF1 protocol	: Full-Duplex	00
6	Error detection	: BCC	00
7	Modem handshake	: Disable	00
8	Duplicate message	: Enable	01
0.	Max. token holder address		31
1.	Token hold factor		03
2.	DF1 retries		02
3.	DF1 ack timeout		10
4.	CTS to transmit delay		00
5.	End of msg. to RTS off		00
6.	Half-duplex master address		10
7.	Group number		00

- Allen-Bradley DF1 => Console socket



Electrical interface :

The interface module type is determined by the reference of the module installed on the ***applicom*®** interface or on the galvanic isolation option (BX4010, BX4010R).

You have then the following options:

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RS232 (6 signals) (3RS232*, 5RS232*, 6RS232)
BC20 mA*
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3RS485-4*
5RS485* or 6RS485

*** : <u>Not galvanically isolated. Isolation only ensured with option BX4010 and BX4010R</u>.**

For the module compatibility, you can refer to the wiring section of « hardware installation » manual.

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4-prepolarized wire RS422 / RS485 link. The load resistance is wiring-selectable.

5RS485 or 6RS485
2 or 4-prepolarized wire RS422 / RS485 link. Load resistances are wiring-selectable. In addition, the 6RS485 module ensures the galvanic isolation. Your interface must be equipped for this type of PROM module V3.0 or higher.

Baud rate :
You must select a transmission speed comprised between **50 and 38400 bauds** (9600bds to 1.5 Megabits for PC1000PFB, 9600bds to 500Kbs for PC1500PFB), independently on each channel. This speed must be consistent with that of the equipments connected on the channel.

Parity control :
Addition or not of a parity bit. You must select the type of parity check.
- **None**
- **Odd**
- **Even**

Control character :
Used to define the type of « Error check » control character. This choice must be identical to that configured on the remote PLC.

Time out :
Maximum time separating the start of request transmission by the ***applicom*®** DF1 client from the server's response. The Time out trips uniquely if the remote PLC has acknowledged the request. From this moment if the equipment takes a greater time to reply to you, the current function will return status 55 « Message lost».
By default this time is set to 3 seconds.

Equipment type :
None : Equipment not configured.
PLC-5
SLC
Logix5550
MicroLogix

3. - *applicom*® functions usable on the master DF1 Allen-Bradley channel

- Wait mode

readpackibit		
readpackqbit	**writepackqbit**	
readpackbit	**writepackbit**	
readiword		
readqword	**writeqword**	
readword	**writeword**	
readdword	**writedword**	
readfword	**writefword**	
readtimer	**writetimer**	
readcounter	**writecounter**	
	writemes	
getmodem	**setmodem**	

- Deferred mode

readdifibit		
readdifqbit	**writedifpackqbit**	
readdifbit	**writedifpackbit**	
readdifiword		
readdifqword	**writedifqword**	
readdifword	**writedifword**	
readdifdword	**writedifdword**	
readdiffword	**writediffword**	
	writedifmes	
testtransdif	**transdif**	**transdifpack**

- Cyclic mode

createcyc
startcyc **stopcyc** **actcyc**
transcyc **transcycpack**

Cyclic function Type:

TYPE OF VARIABLE IN EQUIPMENT	Function type	
	Reading	Writing
Input packed bits	X	
Output packed bits	X	X
Packed bits	X	X
Input words	X	
Output words	X	X
Words	X	X
32 bit double words	X	X
32 bit IEEE floating words	X	X

4. - Item of image variables

- Presentation

The "item of image variables" are the syntaxes which allow to access to the variables through the DDE server "pcdde" or the OPC server.

Report you to sections "DDE server/Principles regarding access to Data" or "OPC server/Data Access Principle".

According to the configuration of the equipment, the descriptor is determined by default by the server. In case of Allen-Bradley DF1 protocol, the default descriptor is Allen-Bradley descriptor.

You however have the possibility of using another descriptor (in particular the ***applicom*®** standard descriptor) by the means of the advanced options.

- Standard descriptor

The standard descriptor can be used for access to the equipments which have not specific descriptors. The address field of the item name may be 10 digits long. It allows to compose a linear address from 0 to 4 giga.

	Single Mode	Table Mode, Matrix Mode
Bits	**Bx**	**Bx_n, Bx_n_l**
Words	**Wx**	**Wx_n, Wx_n_l**
Bits in word	**Wx.b**	
ASCII string in words		**M_Wx_n**
Double words	**Dx**	**Dx_n, Dx_n_l**
Floating words	**Fx**	**Fx_n, Fx_n_l**

Note : Limit values for n and l parameters are depending on the protocol. However, in case of PCDDE, limits cannot never be superior than 128 for bits and bytes, 64 for words, 32 for double words and floating words.

For more information on the limits in read and write, see :
Maximum number of variables per frame with PCDDE on page 5
Maximum number of variables per frame with OPC server on page 5

For variable addressing, refer to the chapter - Client functionality with Allen-Bradley Messaging on page 3.

- Bits => Bx (BIT type)

x : First bit number.
Example : B4

- Bits => Bx_n, Bx_n_l

n : Number of bits.
l : Number of bits per line (Matrix mode only).
Examples : B4_10, B4_10_5

- Words => Wx (16 bit WORD type)

x : First word number.
Example : W4

- Words => Wx_n, Wx_n_l

n : Number of words.
l : Number of words per line (Matrix mode only).
Examples : W4_10, W4_10_5

- Bits in word => Wx.b (BIT type)

For this syntax, maximum numbers of variables per frame are :
- in read : 128*16
- in write : 1

x : First word number.
b : Bit range in the word (0 to 15).
Example : W4.5

- ASCII string in words => M_Wx_n (16 bit WORD type)

For more information on the use of the ASCII string, you can consult the chapter "Use of message mode".

x : Number of first word which contains the string.
n : Number of potential words which can contain the ASCII string (1 to 65).
Example : M_W100_30

In the example, the word array from W100 to W129 can contain the string.

- Double words => Dx (32 bit WORD type)

x : First double word number.
Example : D4

- Double words => Dx_n, Dx_n_l

n : Number of double words.
l : Number of double words per line (Matrix mode only).
Examples : D4_10, D4_10_5

- Floating words => Fx (32 bits IEEE REAL type)

x : First floating word number.
Example : F4

- Floating words => Fx_n, Fx_n_l

n : Number of floating words.
l : Number of floating words per line (Matrix mode only).
Examples : F4_10, F4_10_5

- Allen-Bradley descriptor

This descriptor is usable only for access to the ALLEN-BRADLEY PLCs through the ***applicom***® interfaces with **DF1** protocol.

This descriptor is the default descriptor determined by the OPC and DDE server.

	Single Mode	Table Mode, Matrix Mode
Input bits	**I :y/z**	**I :y/z_n, I :y/z_n_l**
Output bits	**O :y/z**	**O :y/z_n, O :y/z_n_l**
Bits	**Bx/w or Bx:y/z**	**Bx/w_n or Bx:y/z_n, Bx/w_n_l or Bx:y/z_n_l**
Input words	**I :y**	**I :y_n, I :y_n_l**
Output words	**O :y**	**O :y_n, O :y_n_l**
Words	**Nx:y**	**Nx:y_n, Nx:y_n_l**
Bits in word	**Nx:y.b or Nx:y/b**	
ASCII string in the words		**M_Nx:y_n**
Double words	**Dx:y**	**Dx:y_n, Dx:y_n_l**
Floating words	**Fx:y**	**Fx:y_n, Fx:y_n_l**

Note: Limit values for n and l parameters are depending on the protocol. However, in case of PCDDE, limits cannot never be superior than 128 for bits and bytes, 64 for words, 32 for double words and floating words.

For more information on the limits in read and write, see :
Maximum number of variables per frame with PCDDE on page 5
Maximum number of variables per frame with OPC server on page 5

For variable addressing, refer to the chapter - Client functionality with Allen-Bradley Messaging on page 3.

- Input bits => I :y/z (BIT type)

y : Element number in file (0 to 999).
z : First bits number (0 to 15).
Example : I :2/4

- Input bits => I :y/z_n, I :y/z_n_l

n : Number of bits.
l : Number of bits per line (Matrix mode only).
Examples : O :2/4_4, O :2/4_4_2

- Output bits => O :y/z (BIT type)

y : Element number in file (0 to 999).
z : First bits number (0 to 15).
Example : O :2/4

- Output bits => O :y/z_n, O :y/z_n_l

n : Number of bits.
l : Number of bits per line (Matrix mode only).
Examples : O :2/4_4, O :2/4_4_2

- Bits => Bx/w or Bx:y/z (BIT type)

x : File number (0 to 999).
y : Element number in file (0 to 999).
z : First sub-element number (0 to 15).
w : First bit number (0 to 15999).
Example : B10/1600 or B10:100/0

- Bits => Bx/w_n or Bx:y/z_n, Bx/w_n_l or Bx:y/z_n_l

n : Number of bits.
l : Number of bits per line (Matrix mode only).
Examples : B10/1600_4 or B10:100/0_4, B10/1600_4_2 or B10:100/0_4_2

- Input words => I :y (16 bits WORD)

y : Word number in file (0 to 999).
Example : I :10

- Input words => I :y_n, I :y_n_l

n : Number of words.
l : Number of words per line (Matrix mode only).
Examples : I :10_10, I :10_10_5

- Output words => O :y (16 bits WORD)

y : Word number in file (0 to 999).
Example : O :10

- Output words => O :y_n, O :y_n_l

n : Number of words.
l : Number of words per line (Matrix mode only).
Examples : O :10_10, O :10_10_5

- Words => Nx:y (16 bits WORD)

x : File number (0 to 999).
y : Word number in file (0 to 999).
Example : N10:100

- Words => Nx:y_n, Nx:y_n_l

n : Number of words.
l : Number of words per line (Matrix mode only).
Examples : N10:100_10, N10:100_10_5

- Bits in word => Nx:y.b or Nx:y/b (BIT type)

For this syntax, maximum numbers of variables per frame are :
- in read : 128*16
- in write : 1

x : File number (0 to 999).
y : Word number in file (0 to 999).
b: Bit range in the word.(0 to 15)
Example : N10:100.5

- ASCII string in the words => M_Nx:y_n (16 bits WORD type)

For more information on the use of the ASCII string, you can consult the chapter "Use of message mode".

x : File number (0 to 999).
y : Number of first word which contains the string (0 to 999).
n : Number of potential words which can contain the ASCII string (1 to 65).
Example : M_N100:10_30

In example, the words array N100:10 to N100:39 can contain the string.

- Double words => Dx:y (32 bits WORD)

x : File number (0 to 999).
y : Double word number in file (0 to 999).
Example : D100 :10

- Double words => Dx:y_n, Dx:y_n_l

n : Number of double words.
l : Number of double words per line (Matrix mode only).
Examples : D100 :10_10, D100 :10_10_5

- Floating words => Fx:y (32 bits IEEE REAL)

x : File number (0 to 999).
y : Floating word number in file (0 to 999).
Example : F20:6

- Floating words => Fx:y_n, Fx:y_n_l

n : Number of floating words.
l : Number of floating words per line (Matrix mode only).
Examples : F20:6_10, F20:6_10_5

5. - Appendices

- List of extra files for this protocol

MASTDH.	DF1 master task
SERVDH.	DF1 server task
NETDH.	DF1 network management task
BTDH.	Time base

- Evolution / compatibility

This protocol necessitates on ***applicom*®** interfaces a version EPROM minimum V3.6.

From version V3.3 :
Management of variables :
Input bits (I :y/z), output bits (O :y/z)
Input words (I :y), output words (O :y)

From version V3.4 :
Logix5550 and MicroLogix are supported.

6. - Return status of applicom® functions

- Introduction

The various ***applicom***® functions return a status word that:
- Guarantees the request quality.
- Can be used to diagnose the cause of a failure.

The meaning of the status word value is detailed in the following tables. In addition to the general meaning, "Further information" allows you to direct your diagnosis according to the protocol used.

- *applicom*® general statuses

-6	The **TRANSCYC** (or **TRANSCYCPACK**) function is used with a cyclic function number that is no longer activated.
-5	The user program tries to perform a **TRANSDIF** (or **TRANSDIFPACK**) deferred transfer although the deferred request in progress is not completed.
-1	**TRANSDIF** (or **TRANSDIFPACK**) deferred transfer request related to a write that took place correctly.
0	No anomaly detected. The function took place correctly.
1	**Unknown function.** The requested function is not supported.
2	**Incorrect address.** The address of the variable you are soliciting is incorrect.
3	**Incorrect data.** Further details : Function: BINBCD, BCDBIN. - At least one of the accessed values is not in BCD format ($0 \leq$ value ≤ 9999).
4	**Irretrievable data.**
32	**Bad parameter passed into the function.** Incorrect number of variables.
35	**Data not available in cyclic read.** Attempt to transfer data with **TRANSCYC** (or **TRANSCYCPACK**) before it has been read in the equipment.
40	Deferred read or write attempt when the deferred request register is full. Another task must free the resources by making an exitbus
41	Deferred read or write attempt when the deferred request register is full Perform deferred request transfers with **TRANSDIF** (or **TRANSDIFPACK**) in order to release the register (64 positions).
42	Deferred request transfer attempt with **TRANSDIF** (or **TRANSDIFPACK**) when the latter is empty (no deferred requests in progress).
45	**Non-resident communication software.** Initialize the ***applicom*®** interface before using it by typing command **applicom** (or **PCINIT** under Windows).
46	Board number not configured, or Master/client ***applicom*®** function aiming at a channel configured as slave/server, or vice versa.
47	No ***applicom*®** interface.
51	Driver system problem.
59	Protection key missing on the ***applicom*®** interface.. Using ***applicom*®** function without INITBUS function.
66	Insufficient ***applicom*®** interface memory.
255	Used by the « PCDDE » MS-Windows server. Initial value of « STATUS_READ » and « STATUS_WRITE ». This value indicates that no transaction has been made between « PCDDE » and ***applicom*®** interface.

Comments :
Negative status are information codes.

- Statuses according to the protocol

0	No anomaly detected. The function took place correctly.
1	**Unknown function.** The requested function is not supported.
2	**Incorrect address.** The address of the variable you are soliciting is incorrect.
3	**Incorrect data.** Inconsistent frame content.
32	**Bad parameter passed into the function.** Incorrect number of variables.
33	**Response time fault (Time-Out).** No response to the request within time limit. Check wiring. Check the channel and slave configuration.
34	**Parity fault in reception or of control word (CRC16, BCC).**
36	**Equipment not configured.** Define the equipment configuration with **PCCONF** and start again the ***applicom*®** product.
43	The station has not been requested.
48	The ***applicom*®** interface **RS232** channel configured as "**6 signals**" cannot transmit since it waited for the Modem CTS for more than 3 seconds during a transmission.
53	**Line synchronization problem.** Detection of duplicated token. Node address duplicated.
54	Physical problem.
55	**Time-Out elapsed, Message Lost** Client message elapsed (Master level).
56	**Negative acknowledgment from the equipment (NACK).** Bad configuration of the control BCC/CRC type. Line error RS232

7. - Glossary of terms

baud
Bit per second

BCC
Block Check character

BX4010
4 channels distribution box, with galvanic insulation.

BX4010R
4 channels rack distribution box, with galvanic insulation.

channel
Physical output of an ***applicom***® card.

CRC
Cyclic Redundancy Check

CTS
Clear To Send

DCD
Data Carrier Detect

DF1
A peer-to-peer link-layer protocol that combines features of ANSI X3.28-1976 specification subcategorize **D1** (data transparency) and **F1** (two-way simultaneous transmission with embedded responses).

DH
Data Highway

DTR
Data Terminal Ready

Full-Duplex
emission and reception in the same time.

applicom® interface
Communication card, ISA or PCI type, with the ***applicom***® real time multi-task kernel.

item
Defines an element

OPC
Ole for Process Control

PCDDE
applicom® DDE server.

EPROM

Read only memory on ***applicom*®** interfaces which contains programs

RTS

Request To Send

RxD

Recept signal.

TxD

Transmit signal.

8. - Index