

XABSLC5 Driver Manual

Allen Bradley SLC-500 Full Duplex DF1 Protocol Driver

**Rockwell
Automation**
 Allen-Bradley
PROGRAMMABLE
LOGIC CONTROLLERS
SLC 500



CPKSoft Engineering Process Monitoring and Industrial Automation Software

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Index

1.	Introduction	3
2.	Driver details	4
2.1.	Driver overview	4
2.2.	Supported devices.....	9
3.	Command list	10
3.1.	Generic Read as Analog Values	10
3.2.	Generic Read as Binary Values	10
3.3.	Generic Write as Analog Values	11
3.4.	Generic Write as Binary Values	12
4.	Appendices	13
4.1.	Error messages	13
4.2.	Keywords list.....	14

1. Introduction

CPKSoft Engineering assumes no responsibility for any errors that may appear in this document. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

This driver is included with all unlimited licenses of TAS-HMITalk. It is not sold separately. It requires the TAS-HMITalk ActiveX to work, therefore it cannot be used as a stand-alone driver.

If you use this driver in your applications, you need to include the xabslc5.tlk in the set of files that you distribute. This file must be located in the same folder where the hmitalk.ocx file is registered in order to be found by the activex when the applications are executed.

The source-code for the xabslc5.tlk driver is available in plain-C language for additional USD 399 if you own a license of TAS-HMITalk 8.04 or higher.

Refer to the following link to visit the xabslc5 driver page at CPKSoft Engineering website: <http://www.cpksoft.com/tabid/55/ProductID/7/PageIndex/1/Default.aspx>.

Visit this link if you want to see a complete list of drivers that are currently available for TAS-HMITak: <http://www.cpksoft.com/Drivers/tabid/55/Default.aspx>.

Also, refer to this link if you are interested in purchasing a license of the most recent version of TAS-HMITalk: <http://www.cpksoft.com/Products/tabid/54/Default.aspx>.

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2. Driver details

2.1. Driver overview

XABSLC5 allows you to use full-duplex DF1 protocol (System point-to-point) to communicate with ALLEN-BRADLEY SLC-500 PLCs using any of the following

adapters connected to the PC's RS-232 port:

- Channel 0 located in the processor
- 1747-KE (DH-485)
- 1785-KE (Data Highway Plus)
- 1770-KF2 (Data Highway Plus)
- 1770-KF3 (DH-485)
- 1771-KE/KF (Data Highway)
- 1770-KF2 (Data Highway)

No additional boards are required in the PC bus.

To minimize the number of messages needed to poll all the required information, it is a good idea to concentrate all data to be transmitted in groups of consecutive integers within the PLC memory. Up to 16 ON/OFF status, 1 16-bit value, 2 8-bit values or even floating-point values (scaled to a range of 0 to 65535) can be encoded in each integer value sent or received.

<SLC-500 Addressing Format> This convention for accessing to the SLC-500 controllers' data

is used by the following SLC-500 commands:

- Generic Read
- Generic Write

The general format of item names for data from SLC-500 controllers matches the naming convention used by the programming software. The format is shown below. (The parts of the name shown in square brackets ([]) are optional.)

X [FILE] : ELEMENT [.FIELD] [/BIT]

X:

Identifies the file type. The list below summarizes the valid file types and the default file number for each type:

X	File Type	Default File O	*Output	0 I	*Input	1 S	Status
2 B	Binary	3 T	Timer	4 C	Counter	5 R	Control
Integer	7 F	**Floating P.	8				6 N

* Output and Input file types may be Read Only depending on the SLC-500 model. ** Available only on certain SLC500 models. Check the Processor Manual for the model being used. If the Floating Point file type is not supported, file 8 is reserved and unusable.

FILE:

File number must be 0-255 decimal. File 0 must be Output, file 1 must be Input, file 2 must be Status and so on for all the default file types. If this number is not specified, the default file number will be used.

ELEMENT:

Element number within the file. For Input and Output files it must be between 0 and 30 decimal. All other file types, it must be between 0 and 255 decimal.

FIELD:

Refers to the subelement number. If the file type is Timer, Counter or Control, then the subelement field must be replaced by its corresponding number. In some cases there is no reference needed for a subelement number, and if a subelement is included in the command, it will be ignored.

BIT:

Valid for all file types except Floating Point. Must be 0-15 decimal.

DESCRIPTION OF THE AVAILABLE FILE ITEMS:

OUTPUT FILE ITEMS:

O[n]:e.s[/b]

- "n" represents the file number and is optional. If not specified, it is assumed to be zero.
- "e" indicates the element number in the file.
- "s" indicates the sub-element number (0 - 255).
- "b" specifies the bit (0 - 15 decimal.) "/b" may be omitted if necessary to treat the I/O group as a numeric value.

Examples:

- O0:0/0
- O:2/15
- O:3

INPUT FILE ITEMS:

I[n]:e.s[/b]

- "n" represents the file number and is optional. If not specified, it is assumed to be one.
- "e" indicates the element number in the file.
- "s" indicates the sub-element number (0 - 255).
- "b" specifies the bit (0 - 15 decimal.) "/b" may be omitted if necessary to treat the I/O group as a numeric value.

Examples:

- I1:0/0
- I:2/15
- I:3

ADDRESSING I/O MODULES:

The elements (words) in I/O modules are mapped into a memory table. If the Analog I/O modules are being used, then the point naming will differ from the point naming in the programming software. The Item Name must be computed from the sum total of words used by the previous input or output blocks regardless their relative position in the module rack. The operator can use the programming software Data Monitor to look at the memory map of the I file or O file to verify your address. If the address is unsure, or if the PLC

configuration is likely to change, copy the points in question to the N table or B table and access the data from there.

LABEL I/O MODULES WITH "WORD COUNTS":

The address of any point within the I/O datatable space, in an SLC processor, is the sum of the words occupied by previous modules (to the left in the rack) of the same type.

Therefore, to determine the correct address for any particular point in the I/O datatable, one must know the number of words each module will consume. Refer to the list below:

N. of Words	Module	
0	1747-L524	SLC 5/02 Module Processor
1	1746-IA8	8 point 120VAC input module
1	1746-OA16	16 Point 120VAC output module
1	1746-IA16	16 point 120VAC input module
4	1746-NI4	4 point 20mA analog input module
4	1746-NO4I	4 point 20mA analog output module
1	1746-OA8	8 point 120VAC input module
2	1746-IB32	32 point DC input module

Important note:

In the table above, the minimum amount of words which can be consumed by a module is 1 (16 bits). This is due to the memory scheme of all Allen-Bradley processors.

STATUS FILE ITEMS:

S[n]:e[/b]

- "n" represents the file number and is optional. If not specified, it is assumed to be two.
- "e" indicates the element number in the file (0 - 255 decimal).
- "b" is optional. If specified, it indicates the bit (0 - 15 decimal).

Important note:

Refer to the SLC-500 Family Processor Manual (Allen-Bradley Publication) for a complete description of Status file information.

Examples:

- S2:6 (major error fault)
- S2:13 (math register)
- S:1/5 (forces enabled)

BINARY FILE ITEMS:

B[n]:e/b or B[n]/m

- "n" represents the file number and is optional. If not specified, it is assumed to be three. If specified, the file number must be between 9 and 255 decimal.
- "e" specifies the element (word) number within the Binary file. It must be between 0 and 255 decimal.
- "b" specifies the bit number within the word. In the first form (where ":e" is present,) the bit number must be between 0 and 15 decimal.
- "m" also represents the bit number. However, in the second form, no word number is specified and the bit number may be between 0 and 4095.

Examples:

- B3/4095 (same bit as B:255/15)

- B:6/4 (same bit as B/100)
- B3

TIMER FILE ITEMS:

T[n]:e.f[/b]

- "n" represents the file number and is optional. If not specified, it is assumed to be four. If specified, the file number must be between 9 and 255 decimal.
- "e" specifies the element number (three words per element) within the Timer file. It must be between 0 and 255 decimal.
- "f" identifies one of the valid Timer fields. The valid fields for Timer Files are listed in the table below (use the numeric order as reference). If "f" is omitted, it is assumed to be the word 0.
- "b" is optional and is normally not used. All of the fields of a timer can be accessed by specifying the ".f" fields. However, it is possible to use "/b" to single out a bit in the .PRE or .ACC fields (which are words).

Order number Timer Fields

0	.PRE
1	.ACC
2	.EN
3	.TT
4	.DN

Examples:

- T4:0.1 (means: .ACC)
- T4:3.4 (means: .DN)
- T4:1.0 (means: .PRE)

COUNTER FILE ITEMS:

C[n]:e.f[/b]

- "n" represents the file number and is optional. If not specified, it is assumed to be five. If specified, the file number must be between 9 and 255 decimal.
- "e" specifies the element number (three words per element) within the Counter file. It must be between 0 and 255 decimal.
- "f" identifies one of the valid Counter fields. The valid fields for the Counter Files are listed in the table below (use the numeric order as reference). If "f" is omitted, it is assumed to be the word 0.
- "b" is optional and is normally not used. All of the fields of a counter can be accessed by specifying the ".f" fields. However, it is possible to use "/b" to single out a bit in the .PRE or .ACC fields (which are words).

Order number Counter Fields

0	.PRE
1	.ACC
2	.CU
3	.CD
4	.DN
5	.OV
6	.UN

7 .UA

Examples:

- C5:0.1 (means: .ACC)
- C5:3.5 (means: .OV)
- C5:1.0 (means: .PRE)

CONTROL FILE ITEMS:

R[n]:e[f][/b]

- "n" represents the file number and is optional. If not specified, it is assumed to be six. If specified, the file number must be between 9 and 255 decimal.
- "e" specifies the element number (three words per element) within the Control file. It must be between 0 and 255 decimal.
- "f" identifies one of the valid Control fields. The valid fields for the Control files are listed in the table below (use the numeric order as reference). If "f" is omitted, it is assumed to be the word 0.
- "b" is optional and is normally not used. All of the fields of a Control file can be accessed by specifying the ".f" fields. However, it is possible to use "/b" to single out a bit in the .LEN or .POS fields (which are words).

Order number Control Fields

0	.LEN
1	.POS
2	.EN
3	.DN
4	.ER
5	.UL
6	.IN
7	.FD

Examples:

- R6:0.0 (means: .LEN)
- R6:3.2 (means: .EN)
- R6:1.1 (means: .POS)

INTEGER FILE ITEMS:

N[n]:e[b]

- "n" represents the file number and is optional. If not specified, it is assumed to be seven. If specified, the file number must be between 9 and 255 decimal.
- "e" specifies the element number within the Integer file. It must be between 0 and 255 decimal.
- "b" is optional. If specified, it indicates the bit (0 - 15 decimal).

Examples:

- N7:0
- N7:0/15
- N7:3

FLOATING POINT FILE ITEMS:

F[n]:e

- "n" represents the file number (optional). If not specified, it is assumed to be eight. If specified, the file number must be between 9 and 255 decimal.
- "e" specifies the element number within the Floating Point file. It must be between 0 and 255 decimal.

Examples:

- F8:0
- F8:2

<If you are using 1747-KE>

IMPORTANT NOTES:

----- Remember to configure the 1747-KE using the following settings:

- Use the DF1 FULL DUPLEX Protocol
- Use the checksum mode (BCC or CRC) as stated in HMITalk1.DriverP5 parameter.
- Use the baud-rate, parity, stop bits and data bits that are currently used in the driver settings.

You should verify these settings by connecting your PC to the 1747-KE CONFIG port using an ASCII terminal (i.e. PROCOMM or XTALK) and then follow the steps described in the 1747-KE User Manual.

Be careful to include the 1747-KE node address as the source node in your HMITalk1.DriverP0 parameter if it is other than 0.

2.2. Supported devices

This driver can communicate with these devices, but is not necessarily limited to this list:

ALLEN BRADLEY SLC-500 Family using Full Duplex DF1 Protocol
ALLEN BRADLEY SLC-500 5/03
ALLEN BRADLEY SLC-500 5/04
ALLEN BRADLEY Micrologix 1000

3. Command list

3.1. Generic Read as Analog Values

Description of this command:

Reads information from any area of the PLC data table memory interpreting the values as analog inputs.

Type of data handled by this command:

Analog Input

Number of points accepted by this command:

1-30

Meaning of the DriverP0 parameter:

Identifies the destination address of the PLC with which you want to communicate (0-255).

Meaning of the DriverP1 parameter:

Indicates a source address of Ch0, KE or KF adapters other than 0. Use this parameter only if necessary (0-255).

Meaning of the DriverP2 parameter:

Reserved.

Meaning of the DriverP3 parameter:

Reserved.

Meaning of the DriverP4 parameter:

Reserved.

Meaning of the DriverP5 parameter:

Defines if BCC (0) or CRC (1) must be used.

Meaning of the DriverP6 parameter:

Indicates the address information (ASCII Symbol) of the first element to be read. Example: N7:0

3.2. Generic Read as Binary Values

Description of this command:

Reads information from any area of the PLC data table memory interpreting the values as digital inputs.

Type of data handled by this command:

Digital Input

Number of points accepted by this command:

1-240

Meaning of the DriverP0 parameter:

Identifies the destination address of the PLC with which you want to communicate (0-255).

Meaning of the DriverP1 parameter:

Indicates a source address of Ch0, KE or KF adapters other than 0. Use this parameter only if necessary (0-255).

Meaning of the DriverP2 parameter:

Reserved.

Meaning of the DriverP3 parameter:

Reserved.

Meaning of the DriverP4 parameter:

Reserved.

Meaning of the DriverP5 parameter:

Defines if BCC (0) or CRC (1) must be used.

Meaning of the DriverP6 parameter:

Indicates the address information (ASCII Symbol) of the first element to be read. Example:
I1:0/0

3.3. Generic Write as Analog Values

Description of this command:

Writes analog information to any area of the PLC data table memory.

Type of data handled by this command:

Analog Output

Number of points accepted by this command:

1-30

Meaning of the DriverP0 parameter:

Identifies the destination address of the PLC with which you want to communicate (0-255).

Meaning of the DriverP1 parameter:

Indicates a source address of Ch0, KE or KF adapters other than 0. Use this parameter only if necessary (0-255).

Meaning of the DriverP2 parameter:

Reserved.

Meaning of the DriverP3 parameter:

Reserved.

Meaning of the DriverP4 parameter:

Reserved.

Meaning of the DriverP5 parameter:

Defines if BCC (0) or CRC (1) must be used.

Meaning of the DriverP6 parameter:

Indicates the address information (ASCII Symbol) of the first element to be written.
Example: N7:0

3.4. Generic Write as Binary Values

Description of this command:

Writes digital information to any area of the PLC data table memory, in groups of 16 bits.

Type of data handled by this command:

Digital Output

Number of points accepted by this command:

16,32,48,...,240 (must be a multiple of 16)

Meaning of the DriverP0 parameter:

Identifies the destination address of the PLC with which you want to communicate (0-255).

Meaning of the DriverP1 parameter:

Indicates a source address of Ch0, KE or KF adapters other than 0. Use this parameter only if necessary (0-255).

Meaning of the DriverP2 parameter:

Reserved.

Meaning of the DriverP3 parameter:

Reserved.

Meaning of the DriverP4 parameter:

Reserved.

Meaning of the DriverP5 parameter:

Defines if BCC (0) or CRC (1) must be used.

Meaning of the DriverP6 parameter:

Indicates the address information (ASCII Symbol) of the first element to be written.
Example: O0:0/0 (note: any bit number you specify will be ignored and assumed as 0).

4. Appendices

4.1. Error messages

The following list shows all the possible error messages that can be returned by the protocol driver during a failed communication in the 'DriverStatus' property.

This list does not include some error messages that can be returned by the activex component while attempting to establish a connection.

- [1005] DRIVER (Internal): Invalid driver stage
- [1300] PROTOCOL (Timeout): No answer
- [2200] CONFIG (NumValues): Too many values (max=240)
- [2207] CONFIG (NumValues): Too many values (max=30)
- [3014] CONFIG (P0): Invalid device address (0-255)
- [3571] CONFIG (P1): Invalid source address (0-255)
- [5513] CONFIG (P5): Invalid validation mode (0=BCC/1=CRC)
- [6010] CONFIG (P6): Invalid address (valid format: N[7]:0[.0][/0])
- [6017] CONFIG (P6): Invalid element number (0-999)
- [6018] CONFIG (P6): Invalid file number (0-999)
- [6019] CONFIG (P6): Invalid file type (must be I/O/S/B/T/C/R/N or F)
- [6026] CONFIG (P6): Invalid start bit (0-15)
- [6028] CONFIG (P6): Invalid sub-element number (0-999)
- [8000] CONFIG (Remote): 1771 module response was not valid
- [8001] CONFIG (Remote): A file has an illegal value
- [8010] CONFIG (Remote): Access denied (improper privilege)
- [8017] CONFIG (Remote): Adapter cannot communicate with module
- [8018] CONFIG (Remote): Address does not point to something usable
- [8022] CONFIG (Remote): Address reference exist to deleted area
- [8023] CONFIG (Remote): Addressing problem
- [8025] CONFIG (Remote): Another node is program owner
- [8027] CONFIG (Remote): Application layer timeout error
- [8038] CONFIG (Remote): Cannot complete request
- [8039] CONFIG (Remote): Cannot execute command
- [8052] CONFIG (Remote): Command cannot be executed
- [8055] CONFIG (Remote): Command execution failure for unknown reason
- [8067] CONFIG (Remote): Communication zone problem
- [8070] CONFIG (Remote): Condition already exist
- [8071] CONFIG (Remote): Condition cannot be generated
- [8080] CONFIG (Remote): Data conversion error
- [8090] CONFIG (Remote): Data or file is too large
- [8111] CONFIG (Remote): Duplicated label
- [8112] CONFIG (Remote): Duplicated node detected error
- [8113] CONFIG (Remote): Duplicated token holder detected error
- [8140] CONFIG (Remote): File is open (another node owns it)
- [8141] CONFIG (Remote): File is wrong size

- [8152] CONFIG (Remote): Function disallowed
- [8156] CONFIG (Remote): Hardware fault
- [8157] CONFIG (Remote): Histogram overflow
- [8158] CONFIG (Remote): Host could not complete function
- [8159] CONFIG (Remote): Host has a problem and will not communicate
- [8165] CONFIG (Remote): Illegal command or format (try using less values)
- [8169] CONFIG (Remote): Illegal data type
- [8197] CONFIG (Remote): Invalid parameter or data
- [8204] CONFIG (Remote): Less levels specified in address
- [8206] CONFIG (Remote): Link layer error
- [8208] CONFIG (Remote): Local port is disconnected
- [8216] CONFIG (Remote): More levels specified in address
- [8218] CONFIG (Remote): No access
- [8240] CONFIG (Remote): Not used
- [8274] CONFIG (Remote): Processor is in program mode
- [8297] CONFIG (Remote): Remote node cannot buffer command
- [8298] CONFIG (Remote): Remote node host is missing or shut down
- [8299] CONFIG (Remote): Remote node problem
- [8315] CONFIG (Remote): Scanner not able to communicate with 1771 module
- [8326] CONFIG (Remote): Station is offline
- [8328] CONFIG (Remote): Symbol is of improper format
- [8329] CONFIG (Remote): Symbol not found
- [8338] CONFIG (Remote): Transaction size plus word address is too large
- [8347] CONFIG (Remote): Unknown error

4.2. Keywords list

The following list shows a set of words directly related to this driver.

"1000, 5/03, 5/04, ALLEN, BRADLEY, DF1, Duplex, Full, Micrologix, SLC500".