InTouch® Compact Edition ABCIP Configuration Guide

Invensys Systems, Inc.

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Welcome

This guide explains how to configure the ABCIP I/O driver for InTouch Compact Edition.

This guide assumes you know how to use Microsoft Windows, including navigating menus, moving between applications and moving objects on the screen. If you need help with these tasks, see the Microsoft online help.

You can view this document online or you can print it, in part or entirely, by using the print feature in Adobe Acrobat Reader.

Documentation Conventions

This documentation uses the following conventions:

Convention	Used for
Initial Capitals	Paths and file names.
Bold	Menus, commands, dialog box names, and dialog box options.
`Monospace`	Code samples and display text.

Technical Support

Wonderware Technical Support offers a variety of support options to answer any questions on Wonderware products and their implementation.

Before you contact Technical Support, refer to the relevant section(s) in this documentation for a possible solution to the problem. If you need to contact Technical Support for help, have the following information ready:

- The type and version of the operating system you are using.
- Details of how to recreate the problem.
- The exact wording of the error messages you saw.
- Any relevant output listing from the Log Viewer or any other diagnostic applications.
- Details of what you did to try to solve the problem(s) and your results.
- If known, the Wonderware Technical Support case number assigned to your problem, if this is an ongoing problem.

Chapter 1

About the ABCIP Driver

This section explains the concepts of the ABCIP driver and identifies all hardware and software components required to implement communication between InTouch Compact Edition and compatible PLCs.

About ABCIP driver

The ABCIP driver enables communication between InTouch Compact Edition and compatible target devices that include Allen-Bradley ControlLogix, FlexLogix, CompactLogix, and MicroLogix PLCs. The ABCIP driver communicates with PLCs using the Allen-Bradley Common Industrial Protocol (CIP).

Device Specifications

To establish communication with the ABCIP driver, your target PLC must meet the following specifications:

Manufacturer: Allen Bradley/Rockwell

Compatible equipment: ControlLogix 5000 Family with 1756-ENET or 1756-ENBT module installed

Network Specifications

To establish communication with the ABCIP driver, your device network must meet the following specifications:

- Device communication port:
  - For ControlLogix 5000 Family, Ethernet port on the 1756-ENET module
  - For MicroLogix 1100, Ethernet Channel (Channel 1)
- Physical protocol: Ethernet
- Logic protocol: CIP over Ethernet TCP/IP
- Device run-time software: None
- Specific PC board: Ethernet port
- Cable wiring scheme: Regular Ethernet cable

Chapter 2

Configuring the ABCIP I/O Driver

This section explains how to configure the ABCIP driver by completing the following tasks:

- Select the PLC driver
- Configure other PLC-specific settings
- Configure advanced settings
- Associate an InTouch Access Name with the configured driver

You configure the ABCIP driver from the **Driver Configuration** dialog box. In a managed InTouch Compact Edition application, you access this dialog box from the WindowMaker **Special**, **InTouch Compact Edition application**, **IO Driver Configuration** menu.

For more information about configuring connection settings, see the documentation of your PLC hardware manufacturer.

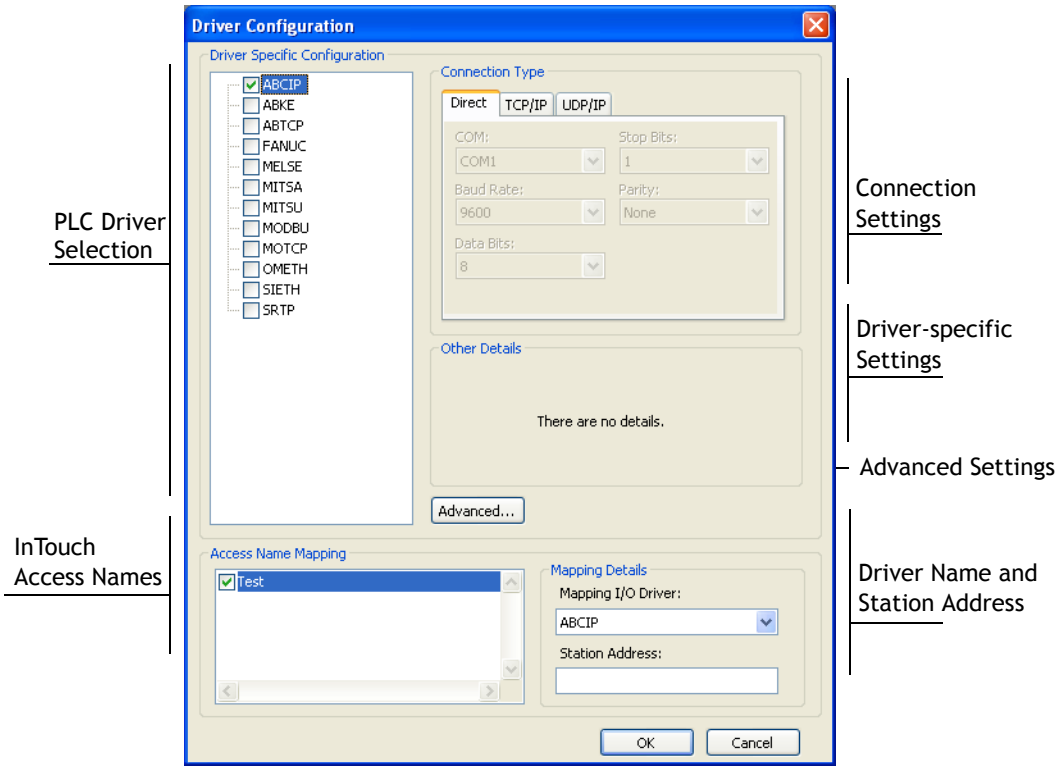
Note For each driver, you can configure only one set of driver parameters.

Selecting the PLC Driver

Before you configure the ABCIP driver, you need to select it in the **Driver Configuration** dialog box. You can select more than one PLC driver to configure. All selected PLC drivers can be associated with InTouch Access Names.

To select the PLC driver

1. In WindowMaker on the **Special** menu, point to **InTouch Compact Edition application,** and then click **IO Driver Configuration**. The **Driver Configuration** dialog box appears.



2. From the list in the left pane, select the check box next to the ABCIP driver.

   The selected PLC driver appears in the **Mapping I/O Driver** list in the **Mapping Details** area of the **Driver Configuration** dialog box. You can associate it with an InTouch Access Name. For more information refer to Associating a PLC Driver with an Access Name on page 14

You can now configure connection settings, advanced settings, and other PLC-specific settings on the right pane of the dialog box.

Configuring Advanced Settings

This section explains how to configure the following advanced settings for an ABCIP driver:

- Time-out settings
- Protocol settings
- Buffer Length settings

Depending on the PLC driver you select, one or more of these settings might be disabled.

Note For more information about configuring advanced settings, see the documentation of your PLC hardware manufacturer.

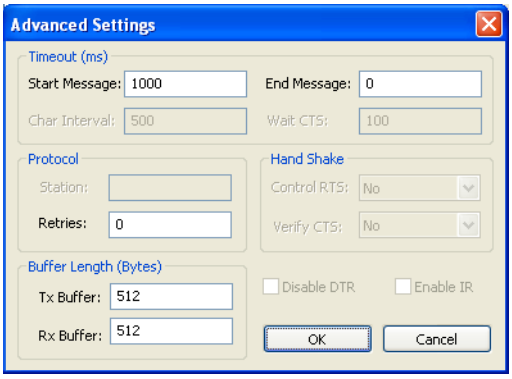
Configuring Time-out Settings

You can configure the following time-out settings:

- Start Message
- End Message

To configure time-out settings

1. In the **Driver Specific Configuration** dialog box, select the driver you want to configure.
2. Click **Advanced**. The **Advanced Settings** dialog box appears.



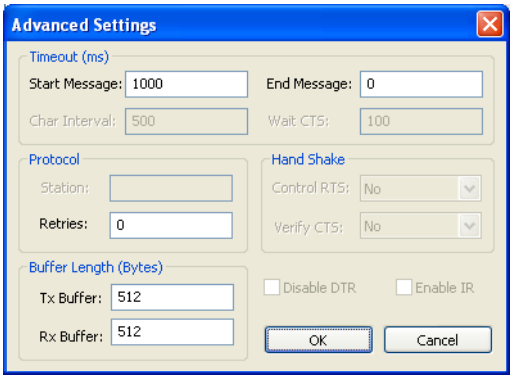
3. In the **Timeout** area, assign values to the following settings:
   - **Start Message** - Time-out period in milliseconds for the message to start.
   - **End Message** - Time-out period in milliseconds for the message to end.
4. Click **OK**.

Configuring Protocol Settings

You can configure the number of attempts to retry a communication command after a previous failure. This setting specifies how many times the driver attempts to execute the same communication command before reporting a communication error.

To configure Protocol retry setting

1. In the **Driver Specific Configuration** dialog box, select the driver you want to configure.
2. Click **Advanced**. The **Advanced Settings** dialog box appears.



3. In the **Protocol** area, enter the number of retry attempts in the **Retries** box.
4. Click **OK**.

Configuring Buffer Length Settings

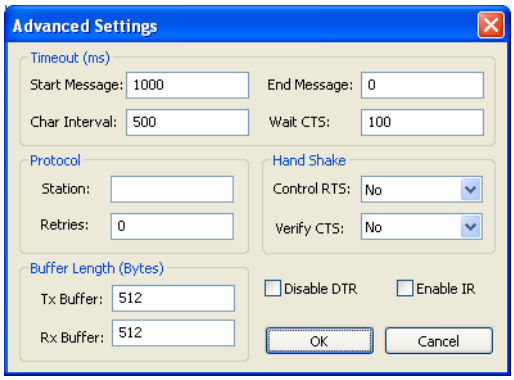
You can configure the following Buffer Length settings:

- Transmission Buffer (Tx) Length
- Reception Buffer (Rx) Length

The Buffer Length settings determine the number of bytes allocated from memory as a temporary buffer. The driver stores data in the temporary buffer while communicating with the PLC.

To configure Buffer Length settings

1. In the **Driver Specific Configuration** dialog box, select the driver you want to configure.
2. Click **Advanced**. The **Advanced Settings** dialog box appears.



3. In the **Buffer Length (Bytes)** area, assign values to the following settings:
   - **Tx Buffer** - Transmission buffer size in bytes.
   - **Rx Buffer** - Reception buffer size in bytes.
4. Click **OK**.

Associating a PLC Driver with an Access Name

After configuring the ABCIP driver, you need to associate it with an existing InTouch Access Name. For more information about creating an InTouch Access Name, see the *InTouch HMI Data Management Guide*.

When you associate a PLC driver with an Access Name, you need to specify a Station Address. The Station Address is used by the ABCIP driver to specify slave network addresses of PLCs.

The Station Address must comply with the following syntax based on the type of network:

Ethernet Network

Specify the Station Address using the following syntax:

- For ControlLogix

  <IP Address>:<Slot Number>

  Where:

  - *<Family>*:

    If you do not specify this parameter, the default family is a ControlLogix 5000 device. Otherwise, you can specify 1100 for a MicroLogix 1100 device.
  - *<IP Address>*:

    The IP address assigned to the ABCIP PLC on the network.
  - *<Slot Number>*

    A sequential number beginning with 0 assigned to each slot in a ControlLogix chassis.

    For example - 10.168.23.77:1 or 1100:192.168.1.53:1
- For others

  <Family>:<IP Address>:<Slot Number>

Data Highway Plus Network

Specify the station address using the following syntax:

<Family>:<IP_Address>:<Backplane>:<Slot>:<Channel>:<Remote Node>

Where:

- *<Family>*:

  The model family of the ABCIP PLC. Use one of the following:

  1 or 5000 - ControlLogix 5000

  2 or 500 - SLC500

  4 or 1100 – Micrologix 1100

  3 or 5 - PLC5
- *<IP Address>*:

  The IP address of the of the ControlLogix PLC (or more specifically, its 1756-ENET module) that acts as a device.
- *<Backplane>*:

  Always 1.
- *<Slot>*:

  The slot number of the ControlLogix PLC where the 1756-DHRIO module is installed.
- *<Channel>*:

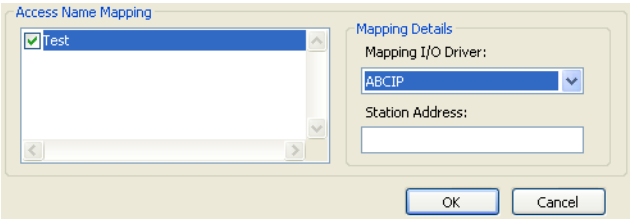
  The DH+ channel (A or B) to which the remote node is connected.
- *<Remote Node>*:

  DH+ address of the remote node (in decimal).

Note For more information about configuring the station address, see the documentation of your PLC hardware manufacturer.

To associate a PLC driver with an Access Name

1. Open the **Driver Configuration** dialog box.
2. In the **Access Name Mapping** area, locate the InTouch Access Name you want to associate with the PLC driver.



Note If no Access Names appear in the list, you need to define an Access Name from the InTouch HMI.

3. Select the Access Name.
4. In the **Mapping I/O Driver** list, select the configured driver.
5. In the **Station Address** box, type the station address.

   When you move the mouse pointer over the **Station Address** box, a tooltip shows the required syntax for a station address.
6. Click **OK**.

Chapter 3

Troubleshooting the ABCIP Driver

You can detect communication errors between an InTouch Compact Edition application and the PLC by using the following item names:

Item name	Purpose
SysReadStatus	Receives error code for a failed read operation from the PLC
SysWriteStatus	Receives error code for a failed write operation to the PLC
SysReadCompleted	Indicates if the read operation from the PLC completes (TRUE) or not (FALSE)
SysWriteCompleted	Indicates if the write operation to the PLC completes (TRUE) or not (FALSE)

Note You can associate only one InTouch tag with each item name.

To troubleshoot communication problems

1. In WindowMaker, configure a set of I/O tags to associate with the error item names:
   - An I/O discrete tag to point at the item name SysReadCompleted.
   - An I/O discrete tag to point at the item name SysWriteCompleted.
   - An I/O integer tag to point at the item name SysReadStatus.
   - An I/O integer tag to point at the item name SysWriteStatus.

2. Configure animation display links for the I/O tags, such as:
   - Fill color animations for the I/O tags associated with the SysReadCompleted and SysWriteCompleted items.
   - Analog value display links for the I/O tags associated with the SysReadStatus and SysWriteStatus items.
3. At run time, if a read or write error occurs between the InTouch Compact Edition and the PLC, the fill color animation indicates a problem. The value next to the fill color animation shows the error code.

Find the ABCIP error codes in the following table. The table also includes typical problems associated with an error code and possible solutions.

Error Code	Description	Possible Causes	Procedure to Solve
0	Ok	Communication without problems	None required
1	Invalid serial port	The serial port specified is invalid	Specify a valid serial port
2	Invalid baud rate	The baud rate specified is invalid	Specify the correct baud rate
3	Invalid command	Invalid data type for item name	Specify the correct data type in front of the item name (INT, SINT, DINT, REAL, BOOL, STRING)
4	Invalid number of stop bits	The number of stop specified is invalid	Specify the correct number of stop
5	Invalid parity	The Invalid parity specified is invalid	Specify the correct Invalid parity
6	Invalid irq	Internal error	Contact Technical Support and send your published application
7	Invalid block size	Internal error when generating the protocol block sizes	Contact Technical Support and send your published application
8	Invalid write command	The PLC does not recognize the tag that the application is trying to write to	• Check the tag data type in the item name • Check the PLC tag name in the item name
9	Out of memory	There is not enough memory for the I/O Server	Check the amount of RAM memory available for your system

Error Code	Description	Possible Causes	Procedure to Solve
10	Fail to allocate memory	HMI ran out of memory	Contact Technical Support and send your published application
11	Invalid read command	The PLC did not recognize the tag that the application is trying to read from	• Check the tag data type in the item name • Check the PLC tag name in the item name
12	Rx buffer empty	Internal error	Contact Technical Support and send your published application
13	Rx buffer full	Internal error	Contact Technical Support and send your published application
14	Time out waiting CTS	CTS signal was not received, could not send request	• Check the cable • Check if the communication line is busy
15	Time out waiting to start a message	Response was not received from the device	• Check the cable connection • Make sure that the I/O Server settings match the PLC configuration
16	Time out waiting for Time out message to finish	Started receiving a response but communication was suspended	• Check the cable connection • Make sure that the I/O Server settings match the PLC configuration
17	Time out between rx char	Response was not received from the device	• Check the cable connection • Make sure that the I/O Server settings match the PLC configuration
18	Time out between tx char	Started receiving a response but communication was suspended	• Check the cable connection • Make sure that the I/O Server settings match the PLC configuration

Error Code	Description	Possible Causes	Procedure to Solve
19	No carrier detected	Started receiving a response but communication was suspended	• Check the cable connection • Make sure that the I/O Server settings match the PLC configuration
22	Invalid data type	Invalid data type for item name	Specify the correct data type in front of the item name (INT, SINT, DINT, REAL, BOOL, STRING)
23	Error in send_RR_data function	The driver is not getting the logical connection to the PLC	• Check cable wiring • Check the PLC state and ensure it is set to RUN • Check the Station address in the I/O configuration • Use the ping command to verify if the PLC is online
32	Time out waiting for a tx message to finish	Started receiving a response but the communication was suspended	• Check the cable connection • Make sure that the I/O Server settings match the PLC configuration
33	Invalid driver configuration file	Internal error	Please contact Technical Support and send your published application
34	Invalid/unsupported item name	Item name specified is either invalid or unsupported	Check item names for unsupported or invalid items
35	Driver API not initialized	Internal error	Please contact Technical Support and send your published application
36	Invalid/unsupported item name	Item name specified is either invalid or unsupported	Check item names for unsupported or invalid items
37	Invalid/unsupported item name	Item name specified is either invalid or unsupported	Check item names for unsupported or invalid items
38	Invalid station	Station specified for this driver is invalid	Check the I/O driver configuration and specify a valid Station Address

Error Code	Description	Possible Causes	Procedure to Solve
39	Invalid block size	Internal error when generating the protocol block sizes	Contact Technical Support and send your published application
1004	Time out	IP Address may be wrong or the SLOT configuration in STATION field may be incorrect	• Check cable wiring • Check the PlC state and ensure it is set to RUN • Check the Station address in the I/O configuration • Use the ping command to verify if the PLC is online
1005	Time out	IP Address may be wrong or the SLOT configuration in STATION field may be incorrect	• Check cable wiring • Check the PlC state and ensure it is set to RUN • Check the Station address in the I/O configuration • Use the ping command to verify if the PLC is online
-15	Time out start message	• Disconnected cables PLC is turned off, in stop mode, or in error mode • Wrong station number	• Check cable wiring • Check the PlC state and ensure it is set to RUN • Check the station address in the I/O configuration • Use the ping command to verify if the PLC is online

Error Code	Description	Possible Causes	Procedure to Solve
-17	Time out between rx char	• PLC in stop mode or in error mode • Wrong station number	• Check cable wiring • Check the PlC state and ensure it is set to RUN • Check the station address in the I/O configuration • Use the ping command to verify if the PLC is online

Appendix

ABCIP Item References

This section lists the item names supported by the ABCIP driver. This driver only supports item names from the PLC5, SLC500, ControlLoxic, and MicroLogix families of Allen-Bradley PLC's.

If an "OUT OF RANGE" item is used in an InTouch Compact Edition application, then the quality for that item is shown as 0 or BAD. It is also possible that the quality of one or more valid items goes to 0 or BAD due to an "OUT OF RANGE" item being used.

Invalid item values (with/without suffixes) can return unpredictable results. You should ensure that valid values are written for each data type. For example, 0 to 65535 is the valid value range for 'word' type of data.

The ABCIP driver supports float values with 4 bytes with up to 7 digits. Therefore, the valid range for float values is 3.4E +/- 38 (7 digits). Values outside this range result in an invalid value written to the tag. Furthermore, values with more than 7 digits of precision are rounded at the seventh digit.

The ABCIP driver can poke any output items when it is communicating w-ith PLC5, SLC500, and MicroLogix1000 PLCs.

The timer, counter, and control file types are read-only when specified without a dotfield value. For example, T4:1, C5:2, and R6:3.

Supported PLC5 Item Names

X	File Type	Default File#	.Fields	Supported by InTouch Compact Edition
O	Output	0		Yes
I	Input	1		Yes (Read-only)
S	Status	2		Yes
B	Binary	3		Yes
T	Timer	4	.PRE .ACC .EN .TT .DN	Yes
C	Counter	5	.PRE .ACC .CU .CD .DN .OV .UN	Yes
R	Control	6	.LEN .POS .EN .EU .DN .EM .ER .UL .IN .FD	Yes
N	Integer	7		Yes
F	Floating point	8		Yes
A	ASCII	None		No
D	BCD	None		No
ST	ASCII string	None	.LEN	No
PD	PID	None	.ADRF .ADRE .BIAS .CA .CL .CT .DB .DO .DVDB .DVN .DVNA .DVP .DVPA .EN .ERR .EWD .INI .KD .KI .KP .MAXI .MAXO .MAXS .MINI .MINO .MINS .MO .OLH .OLL .OUT .PE .PV .PVDB .PVH .PVHA .PVL .PVLA .PVT .SO .SP .SPOR .SWM .TIE .UDP	No
SC	SFC status	None	.DN .ER .FS .LS .OV .PRE .SA .TIM	No
BT	Block transfer (Read-only)	None	.EN .ST .DN .ER .CO .EW .NR .RW .TO .RLEN .DLEN .FILE .ELEM	No

Note The output and input file types work only when the format is <FileType>:<Slot Number>.<Octet Number>/[Bit]

Supported SLC500 Item Names

X	File Type	Default File#	.Fields	Supported by InTouch Compact Edition
O	Output	0		Yes
I	Input	1		Yes (Read-only)
S	Status	2		Yes
B	Binary	3		Yes
T	Timer	4	.PRE .ACC .EN .TT .DN	Yes
C	Counter	5	.PRE .ACC .CU .CD .DN .OV .UN .UA	Yes
R	Control	6	.LEN .POS .EN .DN .ER .UL .IN .FD	Yes
N	Integer	7		Yes
F	Floating point	8		Yes
A	ASCII	None		No
ST	ASCII string*	None		No

Note The output and input file types work only when the format is <FileType>:<Slot Number>.<Octet Number>/[Bit].

Supported ControlLogix Item Names

The ABCIP driver does not support DBCS, only ANSI characters for ControlLogix.

The syntax of the item to communicate with ControlLogix on the Panel must include <DataType>, where <DataType> can be BOOL, SINT, INT, DINT, REAL and STRING. If an item is not prefixed by data type, then it will show quality as Bad.

Reference	Syntax	Supported by InTouch Compact Edition
Program tag	<DataType>:Program:<Program_Name>.<Tag_Name>	Yes
Module tag	<Location>:<slot_#>:<Data_Type><Member_Name>.<SubMember_Name>.[<bit_#>]	No
Entire tag	<DataType>:<Tag_Name>	Yes
Member of structure tag	<DataType>:<Tag_Name>.<Member_Name>	Yes
Array element	<DataType>:<Tag_Name>[<element_X>]	Yes
Two-dimensional array element	<DataType>:<Tag_Name>[<element_X>,<element_Y>]	Yes
Three-dimensional array element	<DataType>:<Tag_Name>[<element_X>,<element_Y>,<element_Z>]	Yes
Block reads/writes of one-dimensional arrays (supported types: BOOLS, SINTS, INTS, DINTS, REALS)	<Tag_Name>[<element_X>],L<number_of_items_#>	No

Reference	Syntax	Supported by InTouch Compact Edition
String tag	<DataType>:<String_Tag_Name>[.DATA[[<element_#>]]][,SC<string_length_#>] <DataType>:<String_Tag_Name>[.DATA[[<element_#>]]][,SP<string_length_#>] <DataType>:<String_Tag_Name>[.DATA[[<element_#>]]][,SS<string_length_#>]	Yes
String tag array	<DataType>:<String_Tag_Name>[<element_X>][.DATA [[<element_#>]]][,SC<string_length_#>] <DataType>:<String_Tag_Name>[<element_X>][.DATA [[<element_#>]]][,SP<string_length_#>] <DataType>:<String_Tag_Name>[<element_X>][.DATA [[<element_#>]]][,SS<string_length_#>]	Yes
Bit within integer	<DataType>:<Tag_Name or Member_Name>.<bit_#>	Yes

Supported MicroLogix Item Names

Identifier	File Type	Default File #	.Fields	Supported by InTouch Compact Edition
O	Output	0	N/A	Yes
I	Input	1	N/A	Yes (Read-only)
S	Status	2	N/A	Yes
B	Binary	3	N/A	Yes
T	Timer	4	.PRE .ACC .EN .TT .DN	Yes
C	Counter	5	.PRE .ACC .CU .CD .DN .OV .UN	Yes
R	Control	6	.LEN .POS .EN .EU .DN .EM .ER .UL .IN .FD	Yes
N	Integer	7	N/A	Yes
F	Floating point	8	N/A	Yes
A	ASCII	None	N/A	No
D	BCD	None		No
L	Long	None	N/A	No
ST	ASCII string	None	.LEN	No
PD	PID	None	.TM .AM .CM .OL .RG .SC .TF .DA .DB .UL .LL .SP .PV .DN .EN .SPS .KC .TI .TD .MAXS .MINS .ZCD .CVH .CVL .LUT .SPV .CVP	No
MG	Message	None	.IA .RBL .LBN .RBN .CHN .NOD .MTO .NB .TFT .TFN .ELE .SEL .TO .CO .EN .RN .EW .DN .ER .ST	No
SC	SFC status	None	.DN .ER .FS .LS .OV .PRE .SA .TIM	No
BT	Block transfer (Read-only)	None	.EN .ST .DN .ER .CO .EW .NR .RW .TO .RLEN .DLEN .FILE .ELEM	No

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