Rockwell Automation Allen-Bradley DF1-Full Duplex Driver

- This manual explains how to connect the target machine with other manufacturer devices. For information about how to use the Pro-Designer software, please refer to the Pro-Designer Online Help.
- The types of target machines that are compatible with Pro-Designer depends on the version of Pro-Designer. For information about the compatibility of target machines, please refer to the Pro-Designer Online Help.

1 System Structure

The following table describes the basic system setup for connecting the target machine to Rockwell Automation PLCs.

Series	CPU	Link I/F	Comm. Format	Diagram
ControlLogix Series	Logix5550	CPU Direct	RS-232C	Cable Diagram 1
MicroLogix Series*1	MicroLogix 1000 MicroLogix 1200 MicroLogix 1500	Channel 1	RS-232C	Cable Diagram 1
PLC-5 Series	All PLC-5 CPU models	Channel 0	RS-232C	Cable Diagram 2
SLC500 Series	SLC 5/03 SLC 5/04 SLC 5/05	Channel 0	RS-232C	Cable Diagram 1
		1771-KGM	RS-232C	Cable Diagram 3
		1770-KF3 2760-RB 1775-KA 5130-RM	RS-232C	Cable Diagram 2

*1 Communication with the 8pin Mini DIN port on the Micrologix PLC is not supported.

2 Cable Diagrams

The illustrated cable diagrams and those recommended by Rockwell Automation may differ. However, Pro-face recommends using the following diagrammed connections.

- Ground the PLC's FG terminal according to your country's applicable standard. For details, refer to the PLC manual.
- When making your own communication cable, be sure to connect the SG signal.

Diagram 1 RS-232C

To connect the target machine and the PLC, use the recommended cable or create your own cable using the following specifications.

Target Machine	Cable / Adapter	Comments
GP, PS-P, PC/AT(PL), PS-G	RS-232C Cable (Proface: GP410-IS00-O 5m)	When connecting to a 9pin port on the target machine or PLC, use a 9/25 pin adapter.

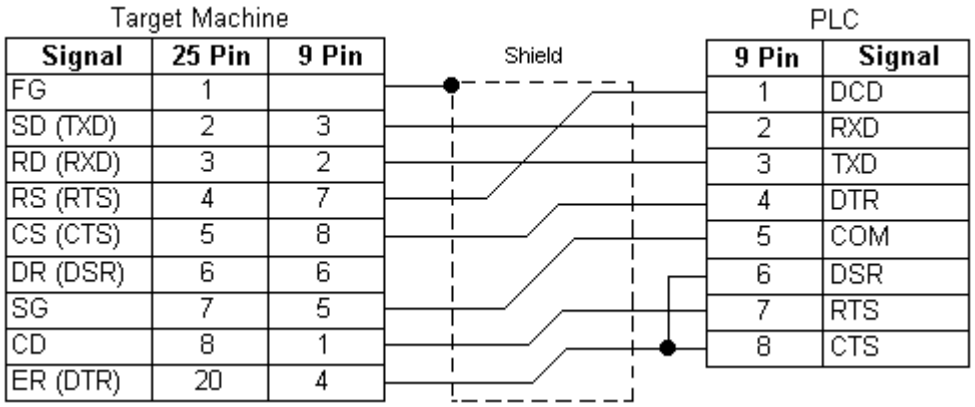


Diagram 2 RS-232C

To connect the target machine and the PLC, use the recommended cable or create your own cable using the following specifications.

Target Machine	Cable / Adapter	Comments
GP, PS-P, PC/AT(PL), PS-G	RS-232C Cable (Proface: GP410-IS00-O 5m)	When connecting to a 9pin port on the target machine, use a 9/25 pin adapter.

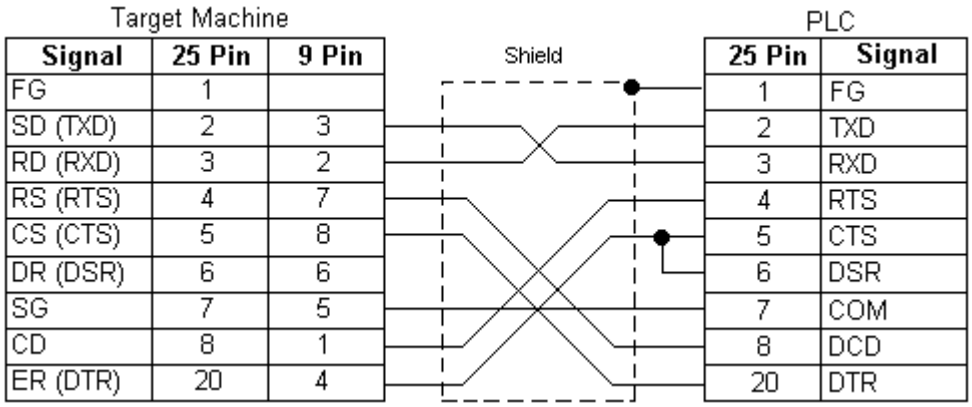
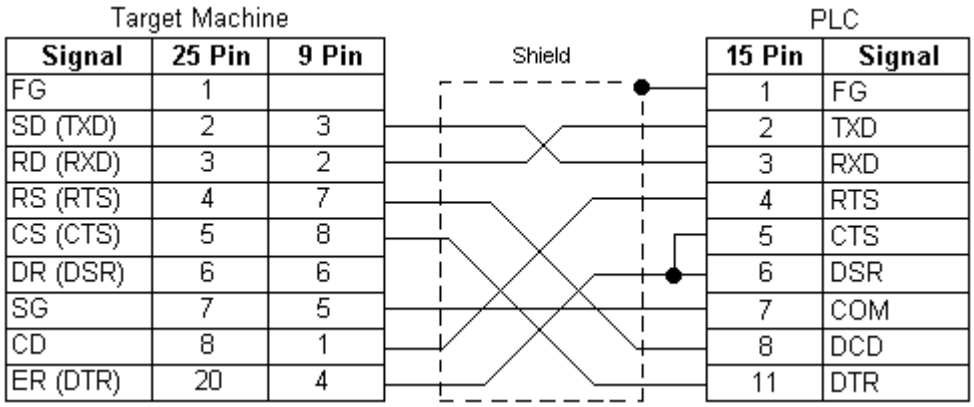


Diagram 3 RS-232C

To connect the target machine and the PLC, use the recommended cable or create your own cable using the following specifications.

Target Machine	Cable / Adapter	Comments
GP, PS-P, PC/AT(PL), PS-G	RS-232C Cable (Proface: GP410-IS00-O 5m)	When connecting to a 9pin port on the target machine, use a 9/25 pin adapter. On the PLC side, use a 15/25 pin adapter.



3 Supported Device Addresses

The following table lists the device address ranges you can enter from the Device Address keypad. For actual device address ranges supported by the PLC, refer to the corresponding PLC manual. Supported device addresses differ from protocol to protocol and between PLC models.

3.1 ControlLogix Series

Device	Bit Address[*1]	Word Address	16 bit	32 bit
BOOL	BOOL0:0/0–BOOL999:999/31	BOOL0:0–BOOL999:999	L/H[*3]	L/H[*3]
INT	INT0:0/0–INT999:999/15	INT0:0–INT999:999		
REAL	REAL0:0/0–REAL999:999/31	REAL0:0–REAL999:999		
DINT	DINT0:0/0–DINT999:999/31	DINT0:0–DINT999:999		
SINT[*2]	SINT0:0/0–SINT999:998/15	SINT0:0–SINT999:998		

*1 Read-modify-write. When you write to one of these bit addresses, the target machine reads the entire word address, sets the defined bit, then returns the word value to the PLC. If the ladder program writes data to this word address during the bit read/write process, the resulting data may be incrorrect.

*2 The element in SINT addresses must be even numbered. For example SINT0:11/5 is not valid. To access SINT file number 0, element 11, bit 5, define the address as **SINT0:10/13.**

*3 16-bit and 32-bit data, High and Low, refer to data as defined in the following examples.

16 bit

Byte				
0	7	. . .	0	L (Low)
1	15	. . .	8	H (High)

32 bit

Word				
0	15	. . .	0	L (Low)
1	31	. . .	16	H (High)

MEMO

- File numbers do not repeat. In the address BOOL7:12, the file number is 7. If the file number 7 is already used, then it is not possible to have the address REAL7:34, since file number 7 is used by BOOL.
- To be able to use a ControlLogix address on the PLC, the address must be mapped to ControlLogix using Allen-Bradley software. See Appendix, Section 2 - *Map ControlLogix PLC Addresses*.

3.2 MicroLogix Series

Device	Bit Address[*1]	Word Address	16 bit	32 bit
Status File	S:0/0–S:163/15	S:0–S:163	L/H[*4]	L/H[*4]
Bit File	B3:0/0-B3:0:0/15 B9:0/0–B999:999/15	B3:0 B9:0–B999:999		
Timer File	T4:0/BitField[*2] T9:0/BitField–T999:999/BitField[*2]	T4:0.WordField[*3] T9:0.WordField–T999:999.WordField[*3]		
Counter File	C5:0/BitField[*2] C9:0/BitField–C999:999/BitField[*2]	C5:0.WordField[*3] C9:0.WordField–C999:999.WordField[*3]		
Control File	R6:0/BitField[*2] R9:0/Bitfield–R999:999/Bitfield[*2]	R6:0.WordField[*3] R9:0.WordField–R999:999.WordField[*3]		
Integer File	N7:0/0N7:0/15 N9:0/0–N999:999/15	N7:0 N9:0–N999:999		
Floating Point File	--	F8:0 F9:0–F999:999		
String File	--	ST9:0–ST999:999		
Long Word File	L9:0/0–L255:255/31	L9:0–L255:255		

*1 Read-modify-write. When you write to one of these bit addresses, the target machine reads the entire word address, sets the defined bit, then returns the word value to the PLC. If the ladder program writes data to this word address during the bit read/write process, the resulting data may be incrorrect.

*2 BitField refers to a bit sub-element in the data. See Appendix, Section 1 - *Structured Files*.

*3 WordField refers to a word sub-element in the data. See Appendix, Section 1 - *Structured Files*.

*4 16-bit and 32-bit data, High and Low, refer to data as defined in the following examples.

16 bit

Byte				
0	7	. . .	0	L (Low)
1	15	. . .	8	H (High)

32 bit

Word				
0	15	. . .	0	L (Low)
1	31	. . .	16	H (High)

3.3 PLC-5 Series

Device	Bit Address*1	Word Address	16 bit	32 bit
Input File*2	I:0/0–I:377/17	I:0–I:377	L/H*5	L/H*5
Output File*2	O:0/0–O:377/17	O:0–O:377		
Status File	S:0/0–S:163/15	S:0–S:163		
Bit File	B3:0/0–B3:0/15 B9:0/0–B999:999/15	B3:0 B9:0–B999:999		
Timer File	T4:0/BitField*3 T9:0/BitField–T999:999/BitField*3	T4:0.WordField*4 T9:0.WordField–T999:999.WordField*4		
Counter File	C5:0/BitField*3 C9:0/BitField–C999:999/BitField*3	C5:0.WordField*4 C9:0.WordField–C999:999.WordField*4		
Control File	R6:0/BitField*3 R9:0/BitField–R999:999/BitField*3	R6:0.WordField*4 R9:0.WordField–R999:999.WordField*4		
Integer File	N7:0/0–N7:0/15 N9:0/0–N999:999/15	N7:0 N9:0–N999:999		
Floating Point File	--	F8:0 F9:0–F999:999		
String File	--	ST9:0–ST999:999		
ASCII File	A9:0/0–A999:999/15	A9:0–A999:999		
BCD File	D9:0/0–D999:999/15	D9:0–D999:999		

*1 Read-modify-write. When you write to one of these bit addresses, the target machine reads the entire word address, sets the defined bit, then returns the word value to the PLC. If the ladder program writes data to this word address during the bit read/write process, the resulting data may be incrorrect.

*2 Input (I) and Output (O) element addresses are defined using Octal data format. Valid word address ranges are: 0-7, 10-17, 20-27, ... 360-367, 370-377. Valid bit address ranges are: 0/0-0/7 and 0/10-0/17, 1/0-1/7 and 1/10-1/17, ... 377/0-377/7 and 377/10-377/17.

*3 BitField refers to a bit sub-element in the data. See Appendix, Section 1 - *Structured Files*.

*4 WordField refers to a word sub-element in the data. See Appendix, Section 1 - *Structured Files*.

*5 16-bit and 32-bit data, High and Low, refer to data as defined in the following examples.

16 bit

Byte				
0	7	...	0	L (Low)
1	15	...	8	H (High)

32 bit

Word				
0	15	...	0	L (Low)
1	31	...	16	H (High)

3.4 SLC500 Series

Device	Bit Address*1	Word Address	16 bit	32 bit
Status File	S:0/0–S:163/15	S:0–S:163	L/H*4	L/H*4
Bit File	B3:0/0–B3:0/15 B9:0/0–B999:999/15	B3:0 B9:0–B999:999		
Timer File	T4:0/BitField*2 T9:0/BitField–T999:999/BitField*2	T4:0.WordField*3 T9:0.WordField–T999:999.WordField*3		
Counter File	C5:0/BitField*2 C9:0/BitField–C999:999/BitField*2	C5:0.WordField*3 C9:0.WordField–C999:999.WordField*3		
Control File	R6:0/BitField*2 R9:0/BitField–R999:999/BitField*2	R6:0.WordField*3 R9:0.WordField–R999:999.WordField*3		
Integer File	N7:0/0–N7:0/15 N9:0/0–N999:999/15	N7:0 N9:0–N999:999		
Floating Point File	--	F8:0 F9:0–F999:999		
String File	--	ST9:0–ST999:999		
ASCII File	A9:0/0–A999:255/15	A9:0–A999:999		

*1 Read-modify-write. When you write to one of these bit addresses, the target machine reads the entire word address, sets the defined bit, then returns the word value to the PLC. If the ladder program writes data to this word address during the bit read/write process, the resulting data may be incrorrect.

*2 BitField refers to a bit sub-element in the data. See Appendix, Section 1 - *Structured Files*.

*3 WordField refers to a word sub-element in the data. See Appendix, Section 1 - *Structured Files*.

*4 16-bit and 32-bit data, High and Low, refer to data as defined in the following examples.

16 bit

Byte				
0	7	...	0	L (Low)
1	15	...	8	H (High)

32 bit

Word				
0	15	...	0	L (Low)
1	31	...	16	H (High)

4 Consecutive Device Addresses

The following table lists the maximum number of consecutive addresses that can be read by each PLC. Refer to this table when using block transfers.

MEMO

- To speed up data communication, use consecutive device addresses on the same panel screen.
- The following situations increase the number of times that the device is read, and reduces the data communication speed between the target machine and the PLC:
  - when the number of consecutive addresses exceeds the maximum
  - when an address is designated for division
  - when different device types are used

4.1 ControlLogix Series

Device	Words Per Element	Max. Consecutive Elements	Gap Span
BOOL	2	60	6
INT	1	120	12
REAL	2	60	6
DINT	2	60	6
SINT	1 byte	120	12

4.2 MicroLogix Series

Device	Words Per Element	Max. Consecutive Elements	Gap Span
Status File (S)	1	1	--
Bit File (B)	1	103	10
Timer File (T)	3	1	--
Counter File (C)	3	1	--
Control File (R)	3	1	--
Integer File (N)	1	103	10
Floating Point File (F)	2	51	5
String File (ST)	42	1	--
Long Word File (L)	2	51	5

4.3 PLC-5 Series

Device	Words Per Element	Max. Consecutive Elements	Gap Span
Input File (I)	1	120	12
Output File (O)	1	120	12
Status File (S)	1	1	--
Bit File (B)	1	120	12
Timer File (T)	3	1	--
Counter File (C)	3	1	--
Control File (R)	3	1	--
Integer File (N)	1	120	12
Floating Point File (F)	2	60	6
String File (ST)	42	1	--
ASCII File (A)	1	120	12
BCD (D)	1	120	12

4.4 SLC500 Series

Device	Words Per Element	Max. Consecutive Elements	Gap Span
Status File (S)	1	1	--
Bit File (B)	1	103	10
Timer File (T)	3	1	--
Counter File (C)	3	1	--
Control File (R)	3	1	--
Integer File (N)	1	103	10
Floating Point File (F)	2	51	5
String File (ST)	42	1	--
ASCII File (A)	1	103	10

5 Environment Setup

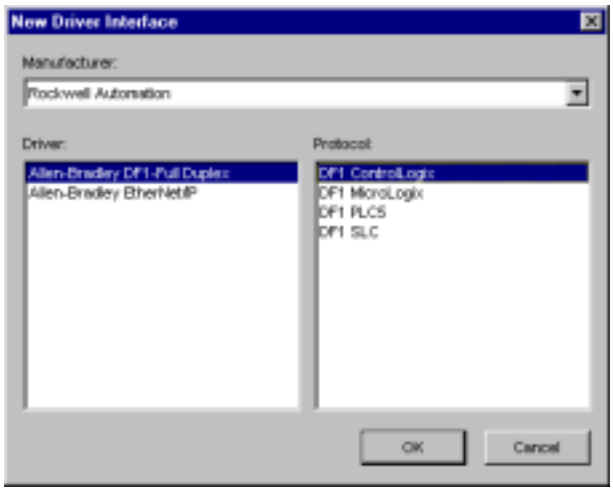
The following table lists the communication settings, recommended by Pro-face, for the target machine and Rockwell Automation PLCs.
For details, see Section 7 – *Driver Configuration*.

Target Machine Settings			PLC Settings	
Driver Interface	Serial Interface	RS-232C	—	
	Flow Control	DTR(ER)/CTS	—	
	Transmission Speed	19200 bps	Baud Rate	19200 bps
	Retry Count	2	—	
	Error Detection	CRC	Error Detection	CRC
	Parity Bit	None	Parity	None
	Stop Bit	1 bit	—	
	Data Length	8 bit	—	
	Rcv Time Out	10 s	—	
	TX Wait Time	0 ms	—	
	—		Node No.	0

6 I/O Manager Configuration

The driver and protocol, which enable communication between the target machine and the PLC, depends on the PLC type.

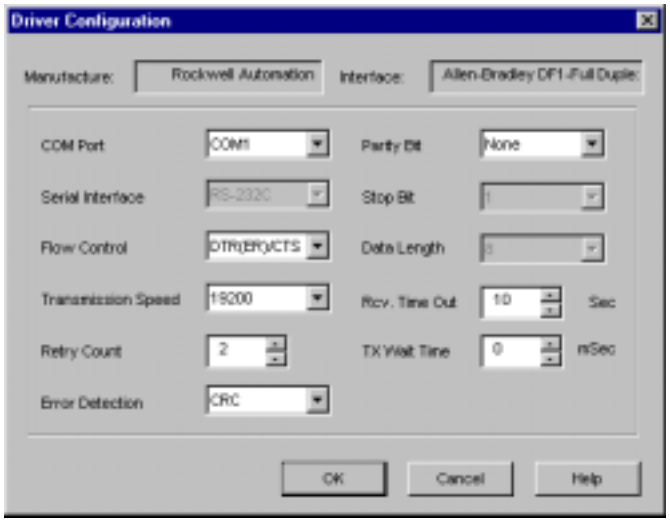
MEMO For information on how to display the [New Driver Interface] dialog box, see the online help.



7 Driver Configuration

To configure the communication settings of the serial driver in the target machine, use the [Driver Configuration] dialog box. Make sure the settings match those of the PLC.
For an overview of the driver and protocol settings, see Section 5 – *Environment Setup*.

MEMO For information on how to display the [Driver Configuration] dialog box, see the online help.



Manufacturer
Displays the name of the PLC manufacturer.

Interface
Displays the type of serial connection used to connect the target machine to the PLC.

COM Port
Defines which COM port to use on the target machine, for connecting to the PLC.

MEMO Select COM1 for PS Series Type G target machines. Connection is not possible using COM2.

Serial Interface
Defines the serial connection which is fixed to RS-232C.
For details about the supported connections, see Section 2 – *Cable Diagrams*.

Flow Control
Defines the signals that control the data flow.

Transmission Speed
Sets the communication speed in bits per second. This setting must match the PLC baud rate.

Retry Count
Defines the number of times the driver tries to send or receive data when there is an error.

Error Detection
For detecting communication errors, selects the error detection system: CRC or BCC.

Parity Bit
Select [Even] to use a parity bit for detecting communication errors, or [None].

Stop Bit
Defines the stop bit, which is fixed to 1 bit.

Data Length
Defines the length of each unit of data, which is fixed to 8 bits.

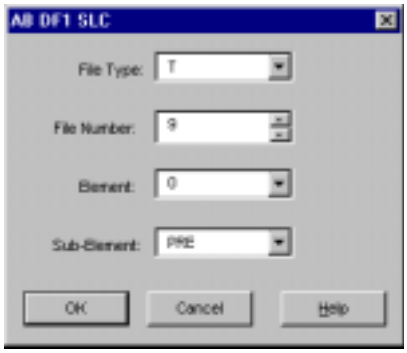
Rcv. Timeout
Defines the length of time the target machine waits for a response before it outputs a timeout error or sends another communication.

TX Wait Time
Defines the number of milliseconds that the target machine waits, after receiving a communication packet, before sending a response.

8 Device Address Configuration

To set up a PLC variable in the Variable List, use the Device Address Keypad from the variable properties.
See Section 3 – *Supported Device Addresses*.

MEMO For information on how to display the Device Address Keypad, see the online help.



File Type

Lists file identifiers supported by the PLC.

File Number

Defines the file number. PLC types may support different ranges of file numbers.

Element

Defines the word element.

Sub-Element

This field becomes available only when the variable data type is discrete, or you select a structured file type.
When the variable data type is a discrete file type, defines the bit position.

```
B9:3/15
  B = Bit File
  9 = File Number
  3 = Element Number
  / = Bit indicator
  15 = Sub-Element (Bit)
```

When the File Type is a structured file type, defines the structured element.

```
T9:3/EN
  B = Bit File
  9 = File Number
  3 = Element Number
  / = Bit indicator
  EN = Sub-Element (Enable)
```

Appendix

1 Structured Files

Structured files are supported by MicroLogix, PLC-5, and SLC500 Series PLCs.
The following file types are structured files.

- Timer
- Counter
- Control

Each element in a structured file has sub-elements that show the status of an operation, • trigger operations, or store information.

To access a sub-element:

- Use a slash (/) to denote a discrete sub-element.

```
T4:5/EN        // Timer File 4, Timer Element 5, Sub-element EN
                  (discrete)
R255:255/FD    // Control File 255, Control Element 255, Sub-element
                  FD (discrete)
```

- Use a period (.) to denote a word sub-element.

```
C12:1.POS      // Counter File 12, Counter Element 1, Sub-element POS
                  (word)
```

Timer

The following structured elements are available in a Timer file.

Mnemonic	Structured Element	Size	Format
.EN	Enable	1 bit	Discrete
.TT	Timing	1 bit	Discrete
.DN	Done	1 bit	Discrete
.PRE	Preset Value	2 bytes	2's Complement Integer
.ACC	Accumulated Value	2 bytes	2's Complement Integer

Counter

The following structured elements are available in a Counter file.

Mnemonic	Structured Element	Size	Format
.CE	Up Enable	1 bit	Discrete
.CD	Down Enable	1 bit	Discrete
.DN	Done	1 bit	Discrete
.OV	Overflow	1 bit	Discrete
.UN	Underflow	1 bit	Discrete
.UA		1 bit	Discrete
.PRE	Preset Value	2 bytes	2's Complement Integer
.ACC	Accumulated Value	2 bytes	2's Complement Integer

Control

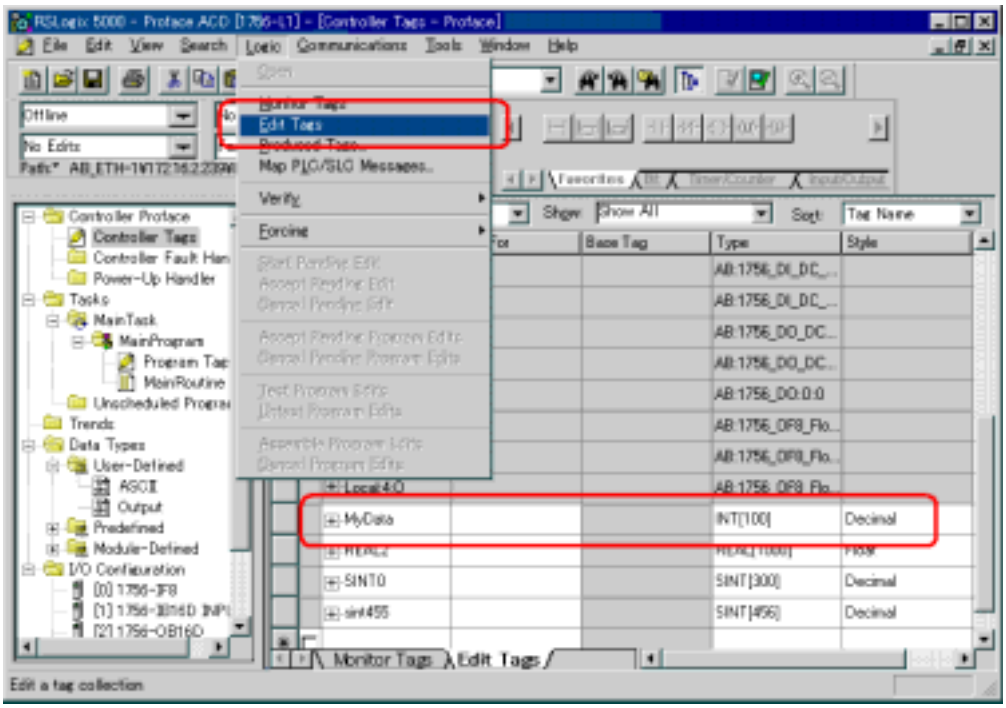
The following structured elements are available in a Control file.

Mnemonic	Structured Element	Size	Format
.EN	Enable	1 bit	Discrete
.EU	Enable Unloading	1 bit	Discrete
.DN	Done	1 bit	Discrete
.EM	Empty	1 bit	Discrete
.ER	Error	1 bit	Discrete
.UL	Unload	1 bit	Discrete
.IN	Inhibit Comparison	1 bit	Discrete
.FD	Found	1 bit	Discrete
.LEN	Length	2 bytes	2's Complement Integer
.POS	Position	2 bytes	2's Complement Integer

2 Map ControlLogix PLC Addresses

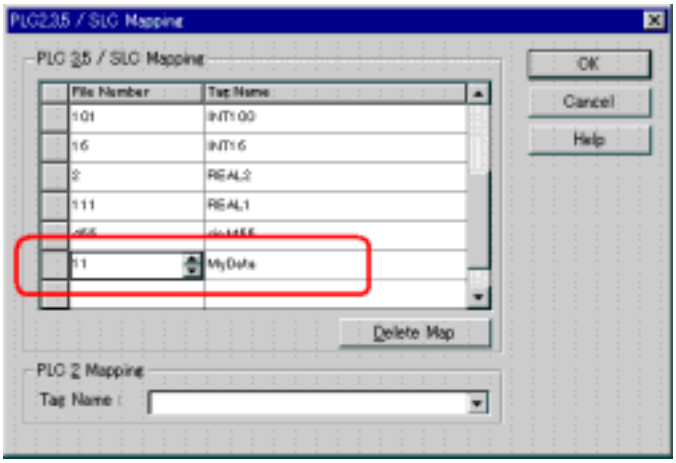
The following defines how to map the address used in Pro-Designer with the PLC, using RSLogix5000 software.

1. In RSLogix5000, create tag definitions and define the number of array elements.



In the example, the **Tag Name** is MyData, and in the **Type** we defined 100 elements of type DINT.

2. After defining the Tag Name, map the **Tag Name** to a **File Number**.

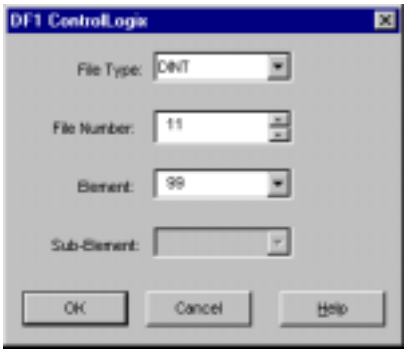


In the example, MyData is mapped to File Number 11.

3. Save the project and download it to the ControlLogix PLC.

ControlLogix can now use MyData tags in its logic program.

4. In Pro-Designer, ignore the Tag Name defined in RSLogix5000. Use the File Number (11) and the data type to work with the PLC data.



For example, to access the hundredth element in the tag MyData, enter **DINT11:99** as the word address.