

## Driver Manual

# FS-8700-03 DF1

### **APPLICABILITY & EFFECTIVITY**

Effective for all systems manufactured after March 2021.



Driver Revision: 2.21  
Document Revision: 5.A



**fieldserver**

MSA Safety  
1000 Cranberry Woods Drive  
Cranberry Township, PA 16066 USA  
Website: [www.MSAsafety.com](http://www.MSAsafety.com)

U.S. Support Information:  
+1 408 964-4443  
+1 800 727-4377  
Email: [smc-support@msasafety.com](mailto:smc-support@msasafety.com)

EMEA Support Information:  
+31 33 808 0590  
Email: [smc-support.emea@msasafety.com](mailto:smc-support.emea@msasafety.com)

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## 1 Description

The DF1 driver allows the FieldServer to transfer data to and from devices over RS-232 using DF1 protocol. The FieldServer can emulate either a Server or Client.

The information that follows describes how to expand upon the factory defaults provided in the configuration files included with the FieldServer.

## 2 Driver Scope of Supply

### 2.1 Supplied by MSA Safety

Part #	Description
FS-8915-10	UTP cable (7 foot) for RS-232 use
FS-8917-06	RJ45 to DB9M connection adapter

### 2.2 Provided by the Supplier of 3<sup>rd</sup> Party Equipment

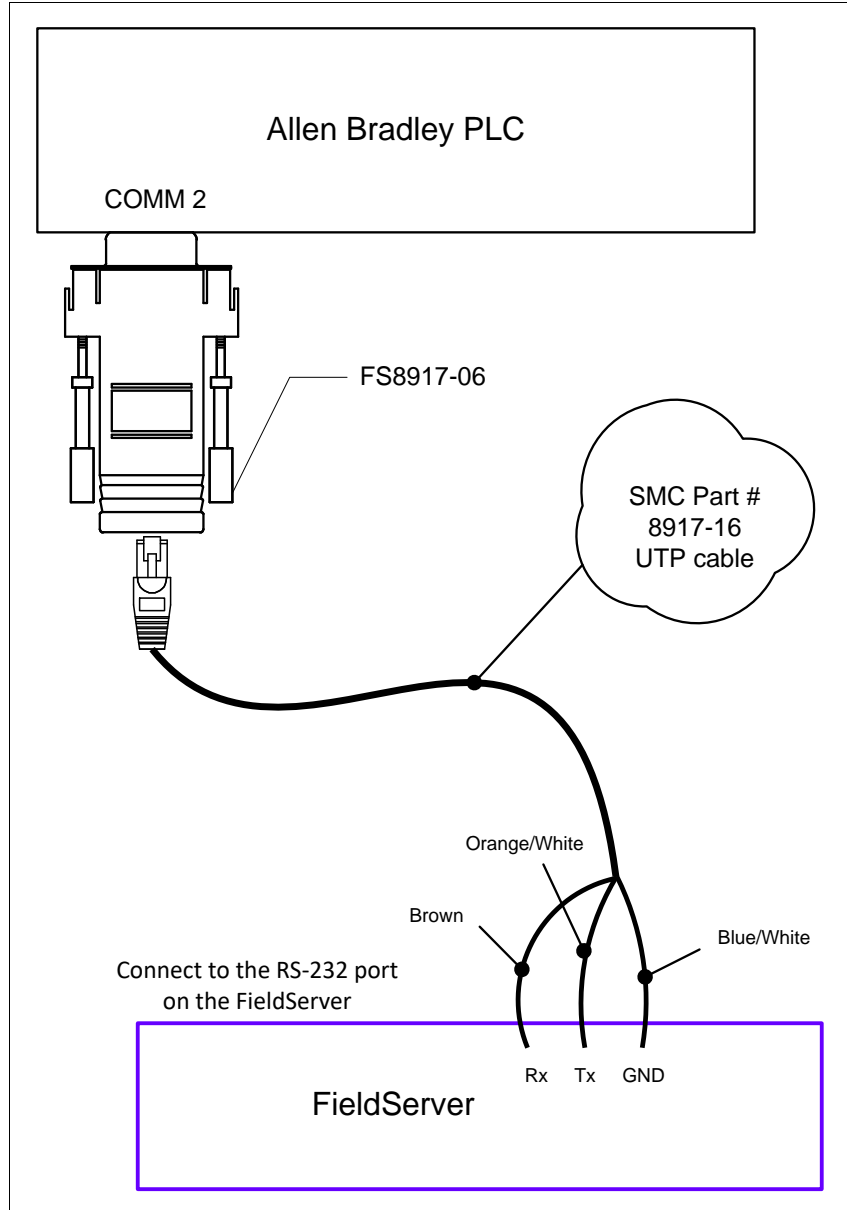
Description
AB DF1 compatible PLC, e.g. SLC5/03, PLC 5/40, etc. <sup>1</sup>
DF1 Client, e.g. Wonderware, Intellution FIX, GE Cimplicity, etc. <sup>2</sup>

<sup>1</sup> If FieldServer used as Allen Bradley DF1 Client.

<sup>2</sup> If FieldServer used as Allen Bradley DF1 Server.

## 3 Hardware Connections

It is possible to connect an Allen Bradley PLC to any of the RS-232 ports. These ports simply need to be configured for an Allen Bradley PLC in the configuration file.



### FS-8917-06 Pinouts

FS Function	RJ45 Pin#	DB9F Pin#	Color
RX	1	3	White
GND	4	5	Green
TX	8	2	Blue

## 4 Data Array Parameters

Data Arrays are “protocol neutral” data buffers for storage of data to be passed between protocols. It is necessary to declare the data format of each of the Data Arrays to facilitate correct storage of the relevant data.

Section Title		
Data_Arrays		
Column Title	Function	Legal Values
Data_Array_Name	Provide name for Data Array.	Up to 15 alphanumeric characters
Data_Array_Format	Provide data format. Each Data Array can only take on one format.	Float, Bit, Byte, Uint16, Uint32, Sint16, Sint32
Data_Array_Length	Number of Data Objects. Must be larger than the data storage area required by the Map Descriptors for the data being placed in this array.	1-10000

### Example

```
// Data Arrays
Data_Arrays
Data_Array_Name , Data_Array_Format , Data_Array_Length
DA_AI_01 , Uint16, , 200
DA_AO_01 , Uint16 , 200
DA_DI_01 , Bit , 200
DA_DO_01 , Bit , 200
```

## 5 Client Side Configuration

For detailed information on FieldServer configuration, refer to the FieldServer Configuration Manual. The information that follows describes how to expand upon the factory defaults provided in the configuration files included with the FieldServer (see “.csv” sample files provided with the FieldServer).

This section documents and describes the parameters necessary for configuring the FieldServer to communicate with a DF1 Server.

The configuration file tells the FieldServer about its interfaces, and the routing of data required. In order to enable the FieldServer for DH+ communications, the driver independent FieldServer buffers need to be declared in the “Data Arrays” section, the destination device addresses need to be declared in the “Client Side Nodes” section, and the data required from the servers needs to be mapped in the “Client Side Map Descriptors” section. Details on how to do this can be found below.

**NOTE:** In the following tables, \* indicates an optional parameter and bold legal values are default.

### 5.1 Client Side Connection Parameters

Section Title		
Connections		
Column Title	Function	Legal Values
Port	Specify which port the device is connected to the FieldServer.	P1-P2 <sup>3</sup>
Baud*	Specify baud rate.	300 to 115200; <b>9600</b>
Parity*	Specify parity.	Even, Odd, <b>None</b>
Data_Bits*	Specify data bits.	<b>8</b>
Stop_Bits*	Specify stop bits.	<b>1</b> , 2
Protocol	Specify protocol used.	DF1_FD, DF1_HD_MASTER, DF1_HD_SLAVE
Checksum	Specify Checksum – refer to <b>Section 7.2</b> .	<b>BCC</b> , CRC-16

#### Example

```
// Client Side Connections

Connections
Port          , Protocol  , Baud   , Parity  , Data_Bits , Stop_Bits
P1            , DF1_FD   , 38400  , None    , 8         , 1
```

<sup>3</sup> Not all ports shown are necessarily supported by the hardware. Consult the appropriate Instruction manual for details of the ports available on specific hardware.

## 5.2 Client Side Node Parameters

Section Title		
Nodes		
Column Title	Function	Legal Values
Node_Name	Provide name for node.	Up to 32 alphanumeric characters
Node_ID	Node ID of physical Server node (PLC).	1-255
Protocol	Specify protocol used.	DF1_FD, DF1_HD_MASTER, DF1_HD_SLAVE
Port	Specify which port the device is connected to the FieldServer.	P1-P2 <sup>4</sup>
PLC_Type	Specify PLC Communications type.	PLC3, PLC5, SLC5, Control_Logix

### Example

```
// Client Side Nodes

Nodes
Node_Name , Node_ID , Protocol , PLC_Type , Port
PLC_01 , 1 , DF1_FD , SLC5 , P1
```

<sup>4</sup> Not all ports shown are necessarily supported by the hardware. Consult the appropriate Instruction manual for details of the ports available on specific hardware.



## 5.3 Client Side Map Descriptor Parameters

### 5.3.1 FieldServer Specific Map Descriptor Parameters

Column Title	Function	Legal Values
Map_Descriptor_Name	Name of this Map Descriptor.	Up to 32 alphanumeric characters
Data_Array_Name	Name of Data Array where data is to be stored in the FieldServer.	One of the Data Array names from <b>Section 4</b>
Data_Array_Offset	Starting location in Data Array.	0 to (Data_Array_Length -1) as specified in <b>Section 4</b>
Function	Function of Client Map Descriptor.	Rdbc, Wrbc, Wrbcx

### 5.3.2 Driver Related Map Descriptor Parameters

Column Title	Function	Legal Values
Node_Name	Name of Node to fetch data from.	One of the Node names specified in <b>Section 5.2</b>
File_Type	File type in PLC.	N, F, B, I, O <sup>5</sup>
File_Number	File Number in PLC.	0-255
Address	Starting address of read block.	0 – 255
Length	Length of read block.	1-255
Scan_Interval	Rate at which data is polled.	0-32000s, <b>1.0s</b>
Data_Array_Low_Scale*	Scaling zero in Data Array.	-32767 to 32767, <b>0</b>
Data_Array_High_Scale*	Scaling max in Data Array.	-32767 to 32767, <b>100</b>
Node_Low_Scale*	Scaling zero in Connected Node.	-32767 to 32767, <b>0</b>
Node_High_Scale*	Scaling max in Connected Node.	-32767 to 32767, <b>100</b>

## 5.4 Map Descriptor Example

```
// Client Side Map Descriptors
Map_Descriptors
Map_Descriptor_Name , Data_Array_Name , Data_Array_Offset , Function , Node_Name , File_Type
CMD_AI_01 , DA_AI_01 , 0 , Rdbc , PLC 1 , N
CMD_AO_01 , DA_AO_01 , 0 , Rdbc , PLC 1 , N
CMD_DI_01 , DA_DI_01 , 0 , Rdbc , PLC 1 , B
CMD_DO_01 , DA_DO_01 , 0 , Rdbc , PLC 1 , B

, File_Number , Address , Length , Scan_Interval
, 10 , 0 , 16 , 1.0s
, 11 , 0 , 16 , 1.0s
, 12 , 0 , 16 , 1.0s
, 13 , 0 , 16 , 1.0s
```

<sup>5</sup> Not all PLC's can support all File\_Types. Refer to DFS for further information.

## 6 Configuring the FieldServer as a Server

For detailed information on FieldServer configuration, refer to the FieldServer Configuration Manual. The information that follows describes how to expand upon the factory defaults provided in the configuration files included with the FieldServer (see “.csv” sample files provided with the FieldServer).

This section documents and describes the parameters necessary for configuring the FieldServer to communicate with a DF1 Client.

The configuration file tells the FieldServer about its interfaces, and the routing of data required. In order to enable the FieldServer for DF1 communications, the driver independent FieldServer buffers need to be declared in the “Data Arrays” section, the FieldServer virtual node(s) needs to be declared in the “Server Side Nodes” section, and the data to be provided to the Clients needs to be mapped in the “Server Side Map Descriptors” section. Details on how to do this can be found below.

**NOTE:** In the tables below, \* indicates an optional parameter with the bold legal value as default.

### 6.1 Server Side Connection Parameters

Section Title		
Connections		
Column Title	Function	Legal Values
Port	Specify which port the device is connected to the FieldServer.	P1-P2 <sup>6</sup>
Baud*	Specify baud rate.	300 to 115200; <b>9600</b>
Parity*	Specify parity.	Even, Odd, <b>None</b>
Data_Bits*	Specify data bits.	<b>8</b>
Stop_Bits*	Specify stop bits.	<b>1</b> , 2
Protocol	Specify protocol used.	DF1_FD, DF1_HD_MASTER, DF1_HD_SLAVE
Checksum	Specify Checksum – refer to <b>Section 7.2</b> .	<b>BCC</b> , CRC-16

#### Example

```
// Server Side Connections

Connections
Port          , Protocol  , Baud    , Parity   , Data_Bits , Stop_Bits
P1           , DF1_FD   , 38400  , None    , 8         , 1
```

<sup>6</sup> Not all ports shown are necessarily supported by the hardware. Consult the appropriate Instruction manual for details of the ports available on specific hardware.

## 6.2 Server Side Node Parameters

Section Title		
Nodes <sup>7</sup>		
Column Title	Function	Legal Values
Node_Name	Provide name for node.	Up to 32 alphanumeric characters
Node_ID	Node ID of physical Server node.	1-255
Protocol	Specify protocol used.	DF1_FD, DF1_HD_MASTER, DF1_HD_SLAVE
PLC_Type	Specify PLC Communications type.	PLC3, PLC5, SLC5

### Example

```
// Server Side Nodes

Nodes
Node_Name      , Node_ID  , Protocol  , PLC_Type
DF1_Srv_11    , 11      , DF1_FD   , SLC5
```

<sup>7</sup> Port is not declared in the Server Side Nodes.

## 6.3 Server Side Map Descriptor Parameters

### 6.3.1 FieldServer Specific Map Descriptor Parameters

Column Title	Function	Legal Values
Map_Descriptor_Name	Name of this Map Descriptor.	Up to 32 alphanumeric characters <sup>8</sup>
Data_Array_Name	Name of Data Array where data is to be stored in the FieldServer.	One of the Data Array names from <b>Section 4</b>
Data_Array_Offset	Starting location in Data Array.	0 to (Data_Array_Length-1) as specified in <b>Section 4</b>
Function	Function of Server Map Descriptor.	Passive

### 6.3.2 Driver Specific Map Descriptor Parameters

Column Title	Function	Legal Values
Node_Name	Name of Node to fetch data from.	One of the Node names specified in <b>Section 6.2</b>
File_Type	File type in PLC.	N, F, B, I, O <sup>9</sup>
File_Number	File number in PLC.	0-255
Address	Starting address of read block.	0 - 255
Length	Length of read block.	1 - 255
Data_Array_Low_Scale*	Scaling zero in Data Array.	-32767 to 32767, <b>0</b>
Data_Array_High_Scale*	Scaling max in Data Array.	-32767 to 32767, <b>100</b>
Node_Low_Scale*	Scaling zero in Connected Node.	-32767 to 32767, <b>0</b>
Node_High_Scale*	Scaling max in Connected Node.	-32767 to 32767, <b>100</b>

## 6.4 Map Descriptor Examples

```
// Server Side Map Descriptors

Map_Descriptors
Map_Descriptor_Name , Data_Array_Name , Data_Array_Offset , Function , Node_Name , File_Type
SMD_AI_01 , DA_AI_01 , 0 , Passive , DF1_Srv_11 , N
SMD_AO_01 , DA_AO_01 , 0 , Passive , DF1_Srv_11 , N
SMD_DI_01 , DA_DI_01 , 0 , Passive , DF1_Srv_11 , B
SMD_DO_01 , DA_DO_01 , 0 , Passive , DF1_Srv_11 , B

, File_Number , Address , Length
, 10 , 0 , 200
, 11 , 0 , 200
, 12 , 0 , 200
, 13 , 0 , 200
```

<sup>8</sup> Object\_Name values of any length may be written via BACnet (subject only to memory and message length constraints).

<sup>9</sup> Not all PLC's can support all File\_Types. Refer to DFS for further information.

## 7 Troubleshooting

### 7.1 Continuous Map Descriptors

The Driver is not able to split data between 2 Data Arrays when writing, or to read a Server mapping that is discontinuous.

For example, on the Server Side:

Server map 1: N21: 0-31

Server map 2: N21: 32-100

This will panic the FieldServer and crash RS view as the DH+ will attempt to map N21: 0-100. If set up as Server Map 1: N21: 0-100, no problems are experienced.

Similarly, on the Client Side, it is not possible to read sections (e.g. 32bits to one array and then 16bits from the same file type to another array etc.). Read Blocks must be contiguous.

### 7.2 Checksum

It is possible to specify a checksum parameter for the serial connection.

#### Example

```
// Client Side Connections

Connections
Port          , Protocol  , Baud   , Parity  , Data_Bits , Stop_Bits , Checksum
P1           , DF1_FD   , 38400 , None   , 8         , 1         , CRC-16
```

### 7.3 Reading B File Types

It is advisable to read all data from one B type file into the same data array in one contiguous read if possible. Doing otherwise may result in problems when reading these points.

## 8 Reference

### 8.1 Command Support

The following commands are supported by the FieldServer for the various PLC types:

PLC_Type	File_Type	FNC	Read	FNC	Write	Typical Command
PLC3	N	1	Range Read	0	Range Write	N7: 3, L5
	F	1	Range Read	0	Range Write	F12: 3, L5
	B	1	Range Read	2	Bit Write	B3/4: 5, L5
PLC5	N	1	Range Read	0	Range Write	N7: 3, L5
	F	1	Range Read	67	Typed Write	F12: 3, L5
	B	1	Range Read	26	Read Modify Write	B3/4: 5, L5
SLC5	N	A2	Protected Typed Logical Read	AA	Protected Typed Logical Write	N7: 3, L5
	F	A2	Protected Typed Logical Read	AA	Protected Typed Logical Write	B3/4: 5, L7
	B	A2	Protected Typed Logical Read	AB	Protected Typed Logical Write	B3/4: 5, L8
	I	A2	Protected Typed Logical Read	-	-	I: 13, L5
	O	A2	Protected Typed Logical Read	-	-	O: 13, L5

## 8.2 Error Messages

DF1 Rem STS err F0-> Extended error code – Refer to following table.

EXT STS Codes for CMD 0F	
Hex Code	Explanation
0	Not used
1	A field has an illegal value
2	Less levels specified in address than minimum for any address
3	More levels specified in address than system supports
4	Symbol not found
5	Symbol is of improper format
6	Address doesn't point to something usable
7	File is wrong size
8	Cannot complete request, situation has changed since the start of the command
9	Data or file is too large
A	Transaction size plus word address is too large
B	Access denied, improper privilege
C	Condition cannot be generated - resource is not available
D	Condition already exists - resource is already available
E	Command cannot be executed
F	Histogram overflow
10	No access
11	Illegal data type
12	Invalid parameter or invalid data
13	Address reference exists to deleted area
14	Command execution failure for unknown reason; possible PLC-3 histogram overflow
15	Data conversion error
16	Scanner not able to communicate with 1771 rack adapter
17	Type mismatch
18	1771 module response was not valid
19	Duplicated label
22	Remote rack fault
23	Timeout
24	Unknown error
1A	File is open; another node owns it
1B	Another node is the program owner
1C	Reserved
1D	Reserved
1E	Data table element protection violation
1F	Temporary internal problem

*These codes are for passthru from a DH+ link to a remote I/O link.*