



**FieldServer**  
**FS-8700-124 Toshiba UPS**  
**Driver Manual**  
(Supplement to the FieldServer Instruction Manual)

**APPLICABILITY & EFFECTIVITY**

Effective for all systems manufactured after August 2017.

Driver Version: 1.01  
Document Revision: 2.B

---

## Technical Support

Please call us for any technical support needs related to the FieldServer product.

Sierra Monitor Corporation  
1991 Tarob Court  
Milpitas, CA 95035

Website: [www.sierramonitor.com](http://www.sierramonitor.com)

U.S. Support Information:

+1 408 262-6611

+1 800 727-4377

Email: [support@sierramonitor.com](mailto:support@sierramonitor.com)

EMEA Support Information:

+44 2033 1813 41

Email: [support.emea@sierramonitor.com](mailto:support.emea@sierramonitor.com)

**TABLE OF CONTENTS**

**1 TIC UPS Driver Description ..... 4**

**2 Driver Scope of Supply ..... 4**

    2.1 Supplied by Sierra Monitor Corporation ..... 4

    2.2 Provided by the Supplier of 3<sup>rd</sup> Party Equipment..... 4

        2.2.1 Required 3<sup>rd</sup> Party Hardware..... 4

        2.2.2 Required 3<sup>rd</sup> Party Configuration..... 4

**3 Hardware Connections..... 5**

    3.1 Hardware Connection Tips / Hints..... 5

**4 Data Array Parameters ..... 6**

**5 Configuring the FieldServer as a TIC UPS Client ..... 7**

    5.1 Client Side Connection Parameters ..... 7

    5.2 Client Side Node Parameters ..... 8

    5.3 Client Side Map Descriptor Parameters ..... 8

        5.3.1 FieldServer Related Map Descriptor Parameters ..... 8

        5.3.2 Driver Related Map Descriptor Parameters ..... 8

    5.4 Map Descriptor Example 1 ..... 9

    5.5 Map Descriptor Example 2 ..... 9

**Appendix A. Useful Features ..... 10**

    Appendix A.1. Delay Poll Sequence..... 10

**Appendix B. Troubleshooting..... 11**

    Appendix B.1. Connection Tips & Hints ..... 11

**Appendix C. Reference ..... 12**

    Appendix C.1. Client Read Commands..... 12

        Appendix C.1.1. Bit Storage of Read Commands ..... 13

        Appendix C.1.2. Read Command Supported by Different Models ..... 14

    Appendix C.2. Client Write Commands..... 14

        Appendix C.2.1. Write Commands Supported by Different Models ..... 14

## 1 TIC UPS DRIVER DESCRIPTION

The serial TIC UPS driver allows the ProtoNode to transfer data to and from devices over RS-232 using TIC UPS protocol. The ProtoNode can emulate a Client.

This driver is intended for use with Toshiba models UPS.

It is intended to do the following:

- Read information from the UPS such as battery life, voltages etc. This will be done in user mode on the UPS.
- Write information and commands such as shutdown commands to the UPS.
- Advanced options such as reading/writing EEPROM is not supported. No date/time reads or writes will be supported. No string type commands will be supported.

FieldServer Mode	Nodes	Comments
Client	1	As the Toshiba protocol only allows for 1:1 communication at this stage, only 1 client is allowed per RS-232 port.
Server	1	The server only serves for emulation purposes. It will have a static address as per Toshiba spec.

## 2 DRIVER SCOPE OF SUPPLY

### 2.1 Supplied by Sierra Monitor Corporation

PART #	Description
FS-8917-16	RJ45 pigtail connector adapter
FS-8917-03	RJ45 to DB9M connector adapter

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

#### 2.2.1 Required 3<sup>rd</sup> Party Hardware

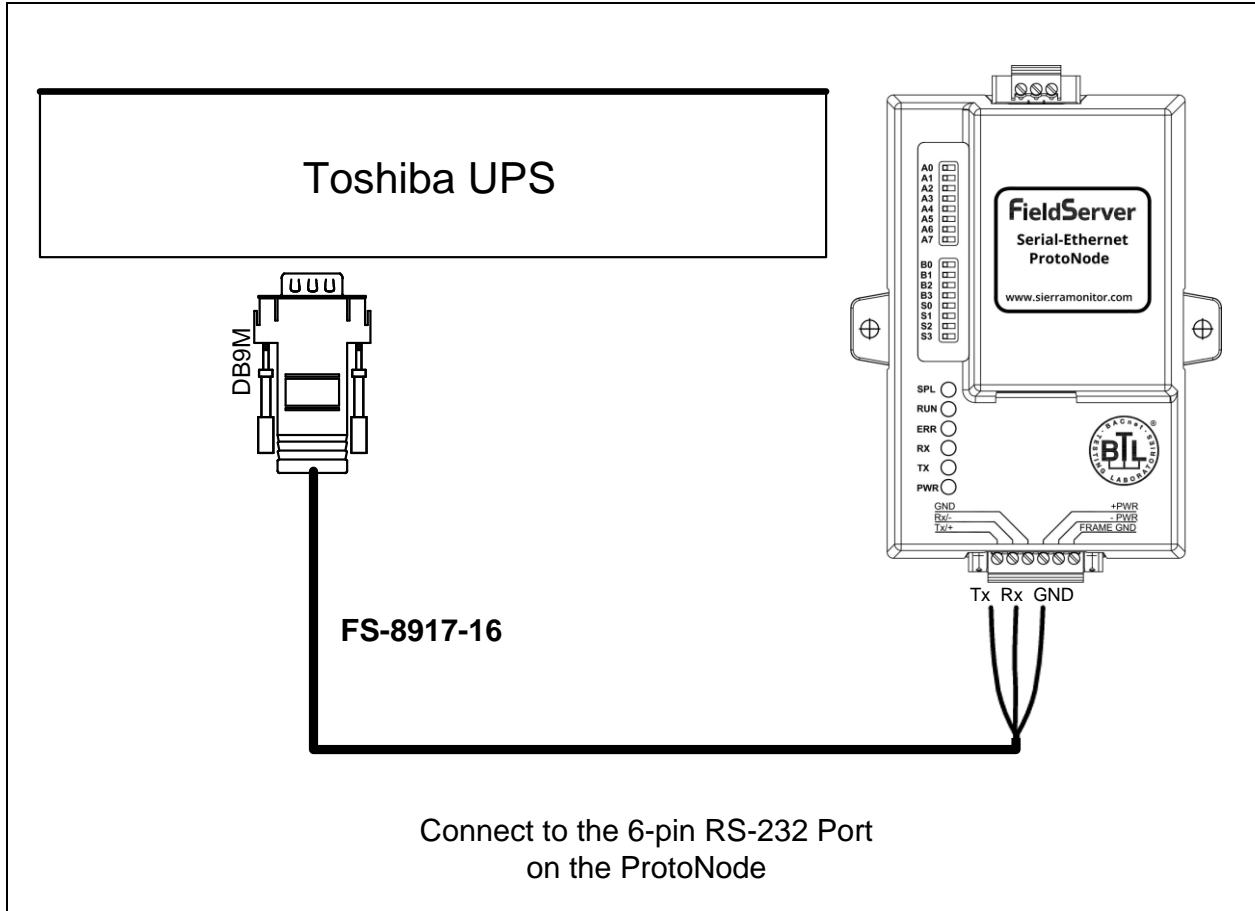
PART #	Description
-	TIC UPS model 1600/1800/4200/G8000/G8000MM/G9000

#### 2.2.2 Required 3<sup>rd</sup> Party Configuration

The baud rate of the UPS must match the configuration file of the ProtoNode.

### 3 HARDWARE CONNECTIONS

The ProtoNode is connected to the UPS as shown in the connection drawing.  
 Configure the TIC UPS according to the manufacturer’s instructions.



#### Connector Pinouts

RJ-45			ProtoNode Terminal
Wire Color	Pin	Signal	
Brown	1	Rx	Tx
White/Orange	8	Tx	Rx
Blue/White	4	GND	GND

#### 3.1 Hardware Connection Tips / Hints

- The RTS/CTS signals are not used by the driver. Make sure they are not connected and do not enable them in the configuration file.
- The cable must be a NULL modem cable (i.e. the Tx must be connected to the other connector’s Rx).

## 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
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.	1-10, 000

**Example**

```

// Data Arrays
Data_Arrays
Data_Array_Name , Data_Array_Format , Data_Array_Length
DA_AI_01 , Float , 200
DA_DI_01 , Bit , 200
```

## 5 CONFIGURING THE FIELDSEVER AS A TIC UPS CLIENT

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 ProtoNode to communicate with a TIC UPS Server.

### 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>1</sup>
Protocol	Specify protocol used.	TOSHIBA_UPS, TOSH_UPS
Baud*	Specify baud rate.	1200–9600, standard baud rates only (Vendor Limitation)
Parity*	Specify parity.	<b>Even</b> (Vendor Limitation)
Data_Bits*	Specify data bits.	<b>7</b> (Vendor Limitation)
Stop_Bits*	Specify stop bits.	<b>1</b> (Vendor Limitation)
Poll_Delay*	Time between internal polls.	0-32000 seconds, <b>0.05</b> seconds

#### Example

```

// Client Side Connections

Connections
Port , Protocol , Baud , Parity , Data_Bits , Poll_Delay
P1 , TOSH_UPS , 1200 , Even , 7 , 0.100s

```

<sup>1</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	Modbus station address of physical server node.	1
Protocol	Specify protocol used.	TOSH_UPS, TOSHIBA_UPS
Node_Type	The model of the TIC UPS.	1600, 1800, 4200, G8000, G8000MM, G9000
Connection	Specify which port the device is connected to the FieldServer.	P1-P2 <sup>2</sup>
Toshiba_Seq_Delay*	Specify the time in seconds that must elapse before the FieldServer starts the polling sequence after sending a selection sequence. Refer to <a href="#">Appendix A</a> .	Any value with the format 0.050s, 0.100s, etc., <b>0.00s</b>

### Example

```
// Client Side Nodes

Nodes
Node_Name , Node_ID , Protocol , Node_Type , Connection
PLC 1 , 1 , TOSH_UPS , 1600 , P1
```

## 5.3 Client Side Map Descriptor Parameters

### 5.3.1 FieldServer Related 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 “Data Array” section above
Data_Array_Offset	Starting location in Data Array.	0 to maximum specified in “Data Array” section above
Function	Function of Client Map Descriptor.	Rdbc, Wrbc, Wrbx

### 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 <a href="#">Section 5.2</a>
Toshiba_Command	Type of information on UPS.	OV1, OV2, OV3 etc. (refer to <a href="#">Appendix C.1</a> )
Length	Length of Map Descriptor.	1 – All value commands 24 – All bit commands

<sup>2</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.



### 5.4 Map Descriptor Example 1

```
// Client Side Map Descriptors

Map_Descriptors
Map_Descriptor_Name , Data_Array_Name , Data_Array_Offset , Function , Node_Name , Toshiba_Command , Length , Scan_Interval
A1 , DA_AI_01 , 0 , Rdbc , Node_A , OV1 , 1 , 5
```

For all commands except FAULT and ALARM, ensure that the Data\_Array\_Name points to an array of type float.

Make sure the Toshiba command supports the selected function.

For a list of commands, see [Appendix C](#).

All commands except ALARM and FAULT have length 1.

### 5.5 Map Descriptor Example 2

```
// Client Side Map Descriptors

Map_Descriptors
Map_Descriptor_Name , Data_Array_Name , Data_Array_Offset , Function , Node_Name , Toshiba_Command , Length , Scan_Interval
B1 , DA_DI_01 , 23 , Rdbc , Node_A , ALARM , 1 , 5
B2 , DA_DI_01 , 15 , Rdbc , Node_A , ALARM , 4 , 5
B3 , DA_DI_01 , 0 , Rdbc , Node_A , ALARM , 23 , 5
```

For ALARM and FAULT, use bit arrays.

Use the offset to read a specific bit or start reading at a specific bit. Use in conjunction with length. Max value is 23.

Specify number of bits to read. Maximum for Offset + Length is 24.

## Appendix A. Useful Features

### Appendix A.1. Delay Poll Sequence

The Toshiba protocol specifies that 2 different sequences are required to poll a single point, a point selection sequence and a data poll sequence. By default, the time that elapses between these sequences is a single bridge cycle (about 5-10 ms). This is too fast for the larger UPS models. The data poll sequence can be delayed using the optional Toshiba\_Seq\_Delay parameter. If this parameter is required, it is recommended that it is set to at least 50ms in the format 0.050s.

#### **Example**

```
// Client Side Nodes

Nodes
Node_Name , Node_ID , Protocol , Node_Type , Connection , Toshiba_Seq_Delay
PLC 1 , 1 , TOSH_UPS , 1600 , P1 , 0.050s
```

## Appendix B. Troubleshooting

### Appendix B.1. Connection Tips & Hints

Consult the UPS manual for the default baud rate of the UPS and use this value to set the configuration file baud rate.

**Appendix C. Reference**

**Appendix C.1. Client Read Commands**

The following commands are supported with the RDBC function:

<b>Command</b>	<b>Description</b>
ALARM	Alarm data
BC	Battery current
BECR	Battery estimated charge remaining
BEMR	Battery estimated minutes remaining
BLR	Battery life remaining
BPV1	Bypass voltage phase 1
BPV2	Bypass voltage phase 2
BPV3	Bypass voltage phase 3
BPC	Bypass current
BPFREQ	Bypass frequency
BRHT	Battery rated holding time
BT	Battery temperature
BV	Battery voltage
BVP	Battery voltage percentage
DCBV	DC bus voltage
FAULT	Fault data
IC1	Input current phase 1
IC2	Input current phase 2
IC3	Input current phase 3
IFRQ	Input frequency
IV1	Input voltage phase 1
IV2	Input voltage phase 2
IV3	Input voltage phase 3
OC1	Output current phase 1
OC2	Output current phase 2
OC3	Output current phase 3
OFRQ	Output frequency
OLP1	Output load percent phase 1
OLP2	Output load percent phase 2
OLP3	Output load percent phase 3
OV1	Output voltage phase 1
OV2	Output voltage phase 2
OV3	Output voltage phase 3
SOB	Seconds on battery
SAD	Shutdown after delay
OV12	Output
OV23	Output
OV31	Output

**Appendix C.1.1. Bit Storage of Read Commands**

Ensure Data\_Array\_Length is 24 for Fault and Alarm Commands and 8 for Status Commands and Data\_Array\_Format is Bit.

Bit #	Fault command	Alarm Command	Status Command
Bit 23	Not used	Not used	
Bit 22	1	1	
Bit 21	Input over current	Low battery voltage	
Bit 20	DC over current	Battery replacement alarm	
Bit 19	DC bus over voltage	Parallel running mode	
Bit 18	DC bus under voltage	0	
Bit 17	Phase rotation error	0	
Bit 16	DC Bus imbalance	UPS lifetime alarm	
Bit 15	Not used	Not used	
Bit 14	1	1	
Bit 13	EEPROM error	Asynchronous operation	
Bit 12	Battery or charger circuit fault	Ambient overheat	
Bit 11	Battery overheat	Overload accumulation started	
Bit 10	UPS overheat	0	
Bit 9	0	0	
Bit 8	Fuse has opened	0	
Bit 7	Not used	Not used	Not used
Bit 6	1	1	1
Bit 5	Inverter over current	Countdown started for shutdown	UPS fault detected
Bit 4	UPS overload	0	Input voltage out of spec
Bit 3	Inverter overload	0	Low battery voltage detected
Bit 2	Inverter under voltage	0	UPS output from bypass
Bit 1	Overload 110% load	0	UPS output from inverter
Bit 0	Inverter over voltage	0	UPS input and output voltage sync

**Appendix C.1.2. Read Command Supported by Different Models**

1600	1800	4200	G8000 & G8000MM	G9000
ALARM	ALARM	BC	BC	BC
BC	BC	BPV1	BECR	BECR
BEMR	BECR	BPV2	BPV1	BPC
BLR	BEMR	BPV3	BPV2	BPFREQ
BPV1	BLR	BPC	BPV3	BRHT
BPC	BPV1	BPFREQ	BPC	BV
BPFREQ	BPC	BRHT	BPFREQ	BVP
BRHT	BPFREQ	BV	BRHT	DCBV
BT	BRHT	BVP	BV	FAULT
BV	BT	DCBV	BVP	IC1
BVP	BV	FAULT	DCBV	IC2
FAULT	BVP	IC1	FAULT	IC3
IC1	DCBV	IC2	IC1	IFRQ
IFRQ	FAULT	IC3	IC2	IV1
IV1	IC1	IFRQ	IC3	IV2
OC1	IFRQ	IV1	IFRQ	IV3
OFRQ	IV1	IV2	IV1	OC1
OLP1	OC1	IV3	IV2	OC2
OV1	OFRQ	OC1	IV3	OC3
SAD	OLP1	OC2	OC1	OFRQ
STATUS	OV1	OC3	OC2	OLP1
	SOB	OFRQ	OC3	OLP2
	SAD	OLP1	OFRQ	OLP3
	STATUS	OLP2	OLP1	OV1
		OLP3	OLP2	OV2
		OV1	OLP3	OV3
		OV2	OV1	OV12
		OV3	OV2	OV23
		SAD	OV3	OV31
		STATUS	STATUS	STATUS

**Appendix C.2. Client Write Commands**

The following commands are supported with the WRBC functions.

Command	Description
SAD	Shutdown after delay
BTEST	Battery Test <sup>3</sup>

**Appendix C.2.1. Write Commands Supported by Different Models**

1600	1800	4200	G8000 & G8000MM
SAD	SAD	SAD	No Write commands supported
BTEST	BTEST	BTEST	

<sup>3</sup> Due to battery health, this point can only be tested as specified by TIC.