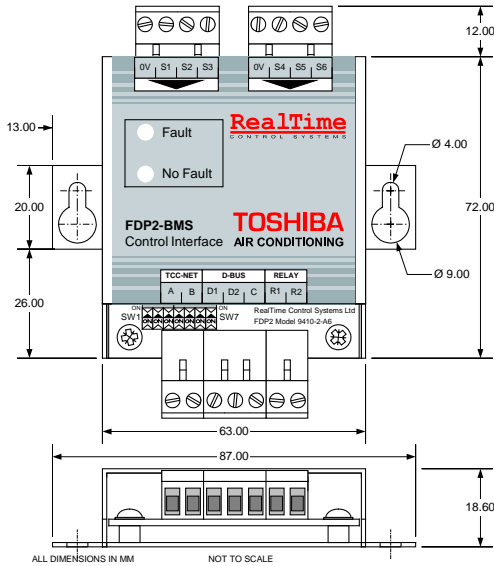


RBC-FDP2-BMS-PE Interface

Installation and Operating Instructions



FDP2 Description

The FDP2-BMS is a monitoring and control interface for the Toshiba Digital Inverter, SHRM and SMMS range of air-conditioners.

Fault Reporting

The FDP2-BMS Interface detects all indoor and outdoor faults occurring in TCC-NET compatible Toshiba air-conditioners and reports them by closing relay contacts R1-R2. The FDP2-BMS is connected on the TCC-NET network with or without a standard remote controller and detects any faults that can be displayed on the controller for up to 8 units. Red and Green LEDs Indicate Fault/No Fault state.

Control Functions

HARDWIRED CONTROL. Unit control can be achieved through resistance inputs using potentiometer and volt-free contact inputs.

BMS INTEGRATION. Unit control can be achieved through 1-10V voltage inputs integrated with BMS control outputs.

GROUP CONTROL. Multiple FDP2 Interfaces can be connected to form large groups of units.

CUSTOM CONTROL. FDP2 interfaces can be supplied in custom configurations to suit specific applications.

CONFIGURATION. The FDP2 has a number of standard configurations that can be set using switches SW1 to SW7.

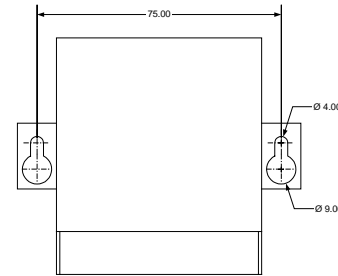
Warnings and Cautions

Do not exceed the specified fault relay ratings

Mounting

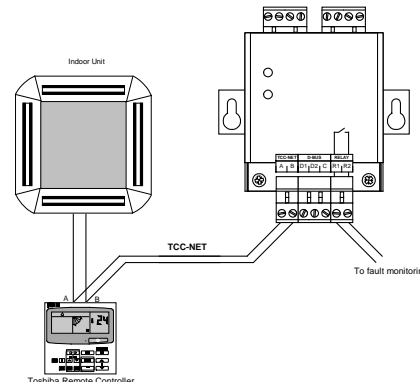
The FDP2 should be mounted using the keyhole mounting points as indicated in the adjacent diagram.

The FDP2 can be mounted horizontally or vertically.



Basic Cable Installation

Cabling should be a minimum 0.75mm² throughout. Terminals TCC-NET A/B connect to the Toshiba TCC-NET. TCC-NET installation should follow Toshiba installation specifications. Terminals R1-R2 connect to fault monitoring or indication equipment according to the specified rating of the relay. The FDP2 is powered from the TCC-NET and requires no extra power supply.



LED Functionality



Normal Operation

R:	G:	Power-Up sequence Factory Configuration	R:	G:	No Fault State
R:	G:	Power-Up sequence Custom Configuration	R:	G:	Unit Fault
R:	G:	TCC-NET Holdoff, After power-up and during unit configuration			

Error Conditions

R:	G:	Device configuration error
R:	G:	No unit master found on TCC-Net
R:	G:	D-BUS Communications timeout
R:	G:	Duplicate D-BUS Address detected

FDP2-BMS Standard Operation



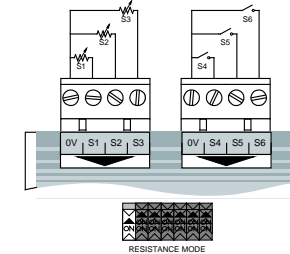
The FDP2-BMS Inputs S1 to S6 allow individual control of various unit operating parameters. Each input corresponds to a specific unit setting shown in the table to the right. If an input is left unconnected then the corresponding setting will remain at a preset value.

S1	Setpoint
S2	Fanspeed
S3	Mode
S4	Louvre
S5	On/Off
S6	Local unlock

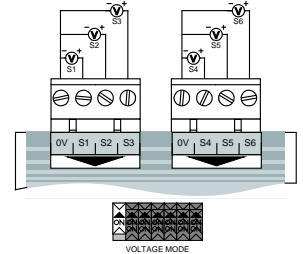
S1 to S6 cables should be 0.5 to 1.0 mm² multi-stranded screened twisted pair. The screen should be earthed at one end only. The maximum distance from the FDP2 to the input source is 200m.

The configuration switch SW1 changes the inputs S1 to S6 between Resistance and Voltage modes.

Resistance Mode



Voltage Mode



With SW1 OFF the inputs S1 to S6 operate in Resistance Mode, unit operation can be controlled by connecting fixed or variable resistors to inputs S1 to S3 and latching switch inputs to inputs S4 to S6.

With SW1 ON inputs S1 to S6 operate in Voltage Mode. Voltage ranges between 1V and 10V can be used to modulate each input. This mode is designed for interfacing the FDP2-BMS to BMS voltage outputs.

Each control input has a defined control range under voltage and resistance mode as outlined in the following tables. Default settings are applied if the input remains unconnected. These are indicated in the table by the symbol ●.

S1	Resistance	Voltage
Setpoint	Ω/Ohms	V
18	≤=0.4kΩ	1.4
19	1.3kΩ	2.1
20	2.1kΩ	2.9
21	2.9kΩ	3.6
22	3.8kΩ	4.4
23	4.6kΩ	5.1
24	5.4kΩ	5.9
25	6.3kΩ	6.6
26	7.1kΩ	7.4
27	7.9kΩ	8.1
28	8.8kΩ	8.9
29	9.6kΩ	≥=9.6
Default	●21	>200kΩ <1.0

S2	S3	Resistance	Voltage
Fanspeed	Mode	Ω/Ohms	V
AUTO	HEAT	≤=1kΩ	1.75
HIGH	COOL	2.2kΩ	3.25
MED	FAN	3.3kΩ	4.75
LOW	DRY	4.7kΩ	6.25
LOW	AUTO	6.8kΩ	≥=7.75
Default	●AUTO	●AUTO	>200kΩ <1.0

S4	S5	S6	Resistance	Voltage
Louvre	On/Off	Local	Ω/Ohms	V
●OFF	●OFF	●LOCK	≥=10kΩ	<3.5
ON	ON	UNLOCK	<1kΩ	>6.5

Resistances should be within +/-250 ohms of the quoted value. Open circuit is R>200kΩ. Voltages should be within +/- 0.25V of the quoted value. Open circuit for V<1V. Under open circuit conditions the input will revert to its default value.

S1 in resistance mode is designed to be operated using a linear 10kΩ variable resistance.

It is recommended that volt-free contacts or switch mechanisms connected to S4, S5 and S6 have gold plated contacts to ensure a low resistance circuit when the switch is made.

FDP2-BMS Advanced Operation

ADDRESSING

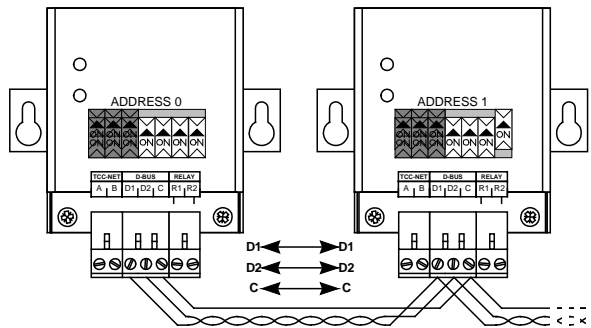
The FDP2 has the facility to create control groups using multiple FDP2s connected together on the D-Bus network. In standard configuration up to 16 FDP2 devices can be connected together. Each FDP2 is assigned a D-Bus address using the configuration switches SW4 to SW7. Unit addresses are shown below.



Address 0 is the FDP2 MASTER address. Address 1 to 15 are FDP2 SLAVE addresses that can be used to create large control groups.

NETWORK INSTALLATION

The D-Bus network requires a twisted pair cable connecting terminals D1 and D2 on each FDP2 as shown below. Terminal D1 must be connected to all other D1 terminals. Terminal D2 must be connected to all other D2 terminals. In addition the common terminal C on all devices must be connected together. If a shielded cable is used then the shield can be used for this purpose. The network must be installed as a point to point BUS configuration, Star and Ring connections must NOT be used.



SPECIFICATION

Use solid or stranded 24awg shielded or unshielded twisted pair to Cat3, Cat4 or Cat5 specification. Use a twisted pair for connections D1, D2 and an extra core for connection C.

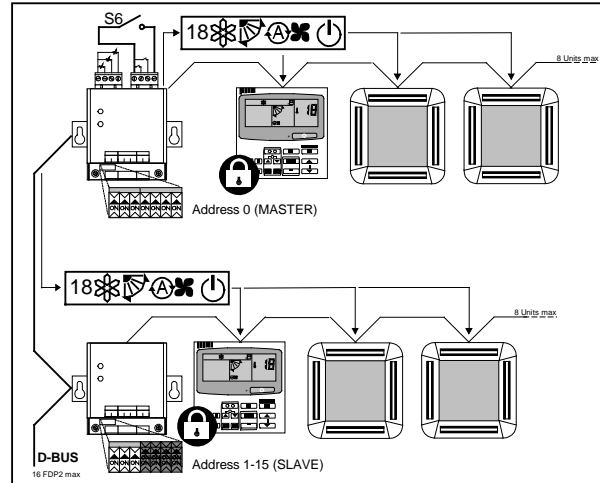
NETWORK LENGTH

Standard installation for total network distances of up to 500m can be achieved following the basic daisy-chaining method showed in the above diagram. Network layout should follow a point-to-point connection, 'T' and star connections are not supported.

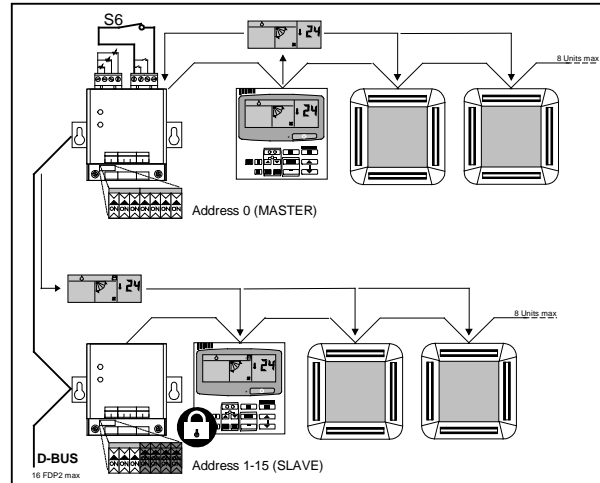
FDP2-BMS Group Control

Connecting additional FDP2-BMS or FDP2-F controllers as slaves allows larger groups of units to be controlled from the master.

With S6 open (LOCKED) units operate to the settings S1 to S5 from the FDP2-BMS master.



With S6 closed (UNLOCKED) the remote controller on the master FDP2 is unlocked and all slaves operate to the master remote controller settings.



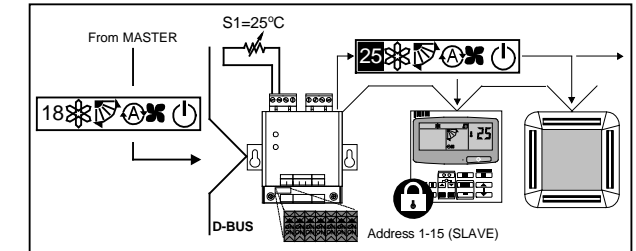
The switch SW2 on the master allows remote controllers on slave units to be unlocked. With SW2 ON on the master FDP2-BMS, slave remote controllers will unlock when the master remote controller unlocks



NOTE ON FDP2-F SLAVE OPERATION: FDP2-F interfaces can be used as slaves to FDP2-BMS interfaces, however the duty/standby mode available in the FDP2-F will no longer operate.

FDP2-BMS Slave Input Control

With no inputs connected the FDP2-BMS slave will duplicate the settings of the FDP2 master. If one or more slave inputs S1 to S6 are connected then each input on the slave will override the corresponding value sent from the master. For example if S1 on a slave is connected, then the units attached to the slave will be sent the local S1 setpoint rather than the master setpoint. Similarly slave inputs S2 and S3 will override the corresponding values from the master. If an ON signal is applied to inputs S4 to S6 then this will override an OFF value sent from the master. The example below shows a setpoint override on a slave.

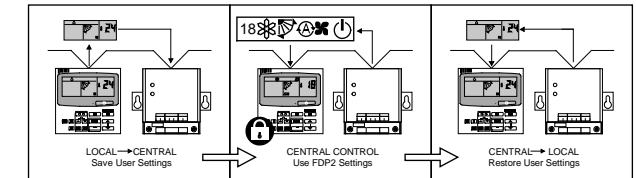


Local Restore Mode SW3

SW3 enables Local Restore Mode on master and slave FDP2-BMS. In this mode the remote controller settings are saved when the FDP2 enters central/locked operation. When the remote controller returns to local operation the saved settings are restored to the remote controller.



When operating in this mode, a 15 second delay will occur when unlocking the keypad to allow the previous user settings to be restored. Local Restore operation is shown in the following figure.



Functional Specification

Electrical		Environmental	
Supply	18V DC from TCC-NET	Temperature Storage Operation	-10oC to 50oC 0oC to 50oC
Power	<1VA	Humidity	0-90% RH non-condensing
Relay	1A, 24VAC max 1A, 30VDC max	Protection	IP30
Mechanical		EMC Emissions	EN61000-6-1
Dimensions	H72 x W87 x D19 mm	EMC Immunity	EN61000-6-3
Mounting	Two keyhole mounting flanges	Inputs	
Casing	Zinc coated mild steel	Voltage Mode	S1..S6 0..10VDC <1mA
Weight	80g	Resistance Mode	S1..S5 5V, 1mA S6 5V, 10mA
Connectors	Rising clamp to 0.75mm ² cable		