# 1. Product Range

| Catalogue No. | Product name | Description |
|---|---|---|
| T8240 | Power Shelf | 19 inch x 1U chassis for up to 3 Power Packs. Includes Power Port + 10-way cable connector, 3 off mains plugs and retaining clips. |
| T8231 | Power Pack 24 Vdc | 750 W, universal input, 24 Vdc out. |
| T8232 | Power Pack 28 Vdc | 750 W, universal input, 28 Vdc out. |
| T8243 | Power Port | Plug in diagnostic interface + 10-way cable connector. |
| T8234 | Power Controller | For live adjustment of output voltage. 19 inch x 1U. 1 x 5 way ribbon cable. |
| T8235 | Power Shield | Covers unused Power Pack positions. |
| TC-323 | Power Shelf Interconnect | 1 x 5 way ribbon cable for current sharing between shelves and connection to a Power Controller. |
| T8247 | Power Shelf support brackets | A pair of brackets that can support up to 4 Power Shelves. |

**Table 1 T824X Power System Product Range**



**Figure 1 Front View - Power Shelf with Power Packs**

# 2. Description

A pair of brackets mounted in to a 19 inch frame supports up to 4 Power Shelves.

Power Packs are slotted into the 1U Power Shelf with the first Power Pack in the right hand slot, as shown in Figure 2. Each Power Pack provides 750 W (31.25 A at 24 Vdc) to the DC output on the Power Shelf.

The standard AC input connection to the Power Shelf is through IEC 60320 type connectors rated at 10 A/250 Vac in Europe/Asia and 15 A/120 Vac in North America.

Output terminal blocks on each Power Shelf have three M4 screw connections. Ring type connectors should be used when connecting from the Power Shelf to system power distribution busbars.

The Power Port plugs into the back of the Power Shelf and requires a 24 V supply. The Power Port can provide monitoring and control via a 25 way D connector when connected to a Power Controller. A separate connector (CON3) provides DC and AC fail contacts. When more than one Power Shelf is used, Power Ports are linked using a Power Shelf Interconnect ribbon cable to enable current sharing.

Spare slots in the Power Shelf are normally covered by Power Shields and the appropriate fault relays are linked on the Power Port.

The 824X system includes an optional 1U Power Controller that is connected via the Power Port, using a TC-323 Power Shelf Interconnect cable, and allows online setting of output voltage. The Power Controller can monitor up to 12 Power Packs in 4 Power Shelves. Each Power Shelf is identified by the Power Controller by selecting addresses on the Power Port as described in paragraph 5.2.4.

Unused slots in the 4U brackets may be used for other equipment or fitted with blanking plates.

Unused connectors on the TC-323 cable should be tied back and left unused.

# 5. Power Port

## 5.1. General Description

The Power Port is an accessory that fits onto the rear of the Power Shelf. It converts alarm signals produced by the Power Packs and Power Shelf into volt-free alarm contacts for use by the system. It consists of a printed circuit board (PCB) fitted with connectors, relays and miscellaneous electronic components. The shape and size of the Power Port is shown in Figure 8 Power Port Outline Drawings.

The alarm contacts are made available on a connector for ease of wiring into the system. The system provides a supply for the Power Port, which is wired to the same connector. The connector pin-outs are shown in section 5.3.

The Power Shelf is fitted with a 25 way D female connector to which the Power Port connects. The Power Port is retained to the Power Shelf by means of the Dsub jack screws. The Power Port is fitted with a 25 way D female connector to allow the Power Shelf connectivity to be extended to a Power Controller, or to other Shelves to current share, using a Power Shelf Interconnect cable.

The Power Controller is powered from the Power Port 24 V supply via pin 7, when connecting CON 2 on the Power Port to the Power Controller.

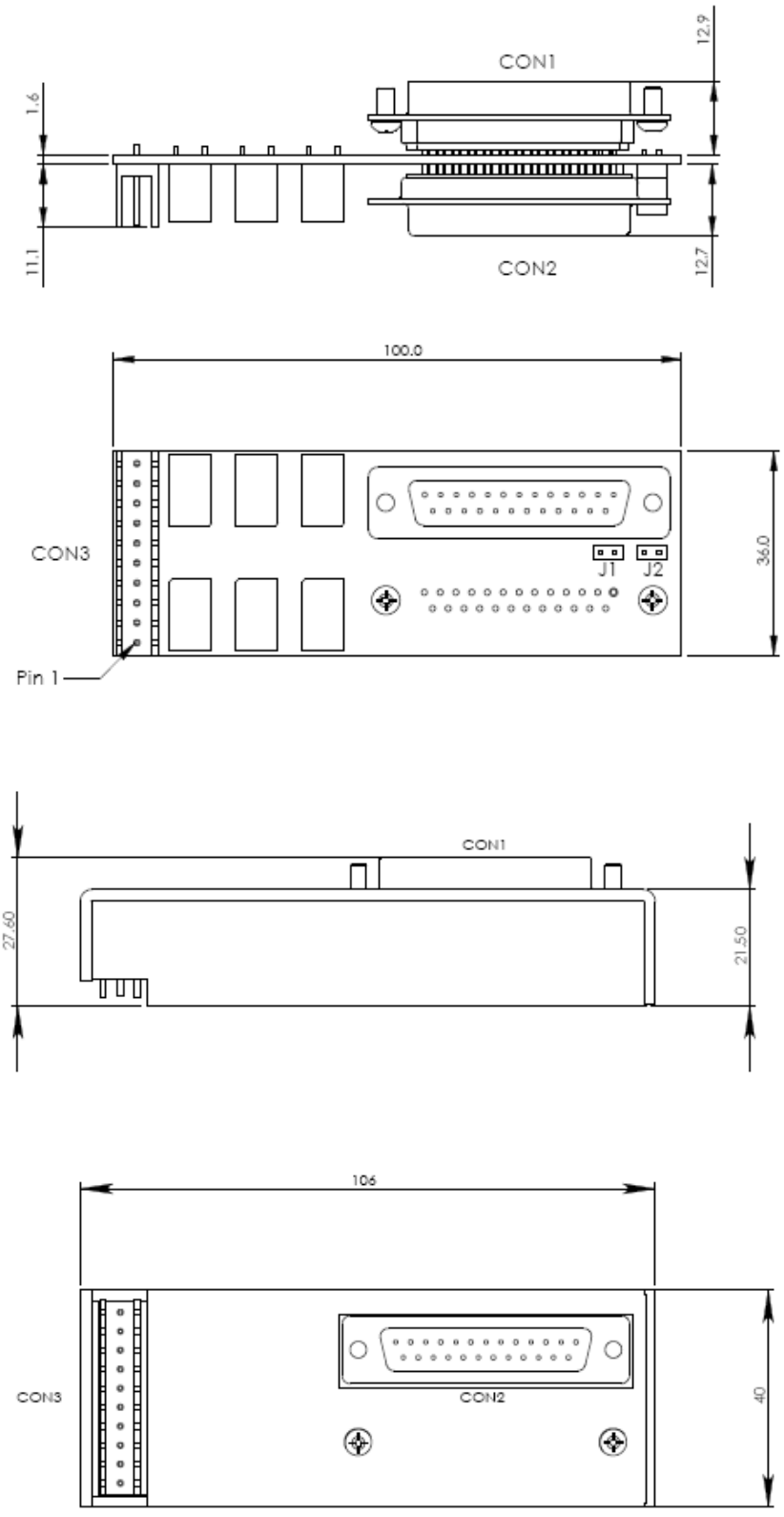



**Figure 8 Power Port Outline Drawings**

## 5.2. Circuit Description

The circuit is split into four functional sections: supply, dc alarms, ac alarms and jumpers.

### 5.2.1. Supply

The 24 V supply is connected to CON3 pins 1 and 6. The supply should be fused close to its source, using a 500 mA F-rated fuse. It is nevertheless protected by a non-replaceable fuse on the Power Port. The 24 V is regulated down to 5 V with decoupling provided. The 5 V+ is used to supply the low voltage electronics. The 24 V is used to supply the relays and is connected through CON2 to power the optional Power Controller. Pins 19, 20 and 25 of the interface are linked within the Power Port.

### 5.2.2. DC Alarms

CON1 is the 25 way D male interface to the Power Shelf. The Power Pack and Power Shelf alarm outputs are derived from here. There are two DC alarms per Power Pack: DCFAIL (DC output fail) and OTP (over-temperature protection). The Power Port ORs together DCFAIL and OTP to give one DC fail alarm. If either alarm triggers, the corresponding relay de-energises.

Each relay operates a volt-free contact. These are closed when healthy (relay energised) and open in alarm.

### 5.2.3. AC Alarms

In a similar manner, each Power Pack generates an AC alarm. When an alarm is triggered, the corresponding relay de-energises. Each relay operates a volt-free contact. These are closed when healthy (relay energised) and open in alarm.

| Fault Condition | Output OK LED | OTP Alarm | AC Fail Alarm | DC Fail Alarm | DC Output |
|---|---|---|---|---|---|
| No fault | Green | Low | Closed | Closed | ON |
| Fan locked rotor | Amber | Low | Closed | Closed | ON |
| Secondary over temperature | Amber | High | Closed | Open | OFF |
| Primary over temperature | Off | High | Closed | Open | OFF |
| AC Feeder Fail | Off | Low | Open | Open | OFF |

**Table 7 Alarm Conditions**

### 5.2.4. Jumpers

There are two jumpers, J1 and J2.

J1 and J2 set the Power Shelf address lines for the $I^2C$ control bus. With J1 and J2 fitted the Pack addresses are 1, 2 and 3, which is the default. Other addresses may be set by removing one or both of J1 and J2, up to 4 Shelves worth (or 12 Power Packs).

| Power Shelf | J1 | J2 |
|---|---|---|
| 1 | fitted | fitted |
| 2 | fitted | removed |
| 3 | removed | fitted |
| 4 | removed | removed |

**Table 8 Power Shelf Addressing**

## 5.3. Mechanical

### 5.3.1. Pin-out CON 1, CON 2

CON 1 on the Power Port connects to the Power Shelf. The pin-out details are shown in Table 2 Pin Assignment of the Interface Connector.

CON 2 is used to connect to other Power Shelves to current share or to connect to a Power Controller.

| Number | Signal Name | Description |
|---|---|---|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | ON SYNC | Not Used |
| 5 | SDA | I2C Serial data bus |
| 6 | SCL | I2C Clock |
| 7 | 24v | Supply from Power Port |
| 8 | | |

| Number | Signal Name | Description |
|---|---|---|
| 9 | | |
| 10 | | |
| 11 | | |
| 12 | | |
| 13 | | |
| 14 | | |
| 15 | | |
| 16 | INT BUS | Not Used |
| 17 | | |
| 18 | | |
| 19 | SRTN | Signal return and $V_{aux}$ return * |
| 20 | RS- | Remote sense for V- * |
| 21 | | |
| 22 | RS+ | Remote sense for V+ |
| 23 | | |
| 24 | CS | A single wire interface for current sharing |
| 25 | V- | V- * |

* linked within a Power Port

**Table 9 Connected Pins on CON 2**

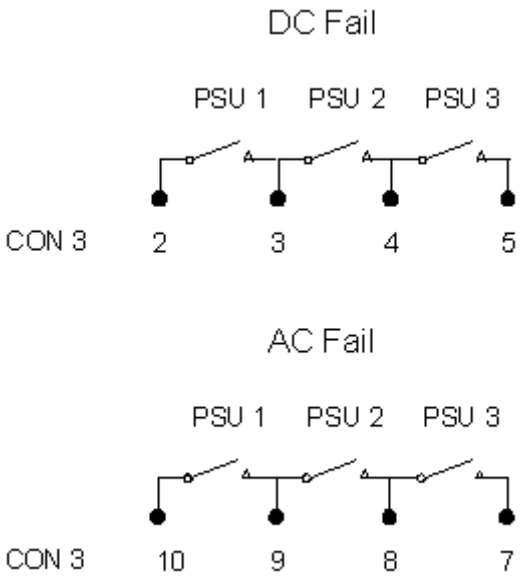
### 5.3.2. Pin-out CON 3

| Pin | Description |
|---|---|
| 1 | +24V system supply |
| 2/3 | DCFAIL_1 |
| 3/4 | DCFAIL_2 |
| 4/5 | DCFAIL_3 |
| 6 | 0V system supply return |
| 7/8 | ACFAIL_3 |
| 8/9 | ACFAIL_2 |
| 9/10 | ACFAIL_1 |

**Table 10 Connector 3 Pin-out**

CON 3 provides volt-free alarm contacts as detailed in section 5.2.2 and 5.2.3 for use by the system. These are made available on a connector for ease of wiring into the system.

CON 3 connector cable block is Weidmuller type BLZF3.5/10.




The relays are energised (contacts closed) when a PSU is fitted in a Power Shelf and healthy. Link across those contacts that do not have a corresponding PSU fitted.

### 5.3.3. Fault Relay Technical Specifications

| | |
|---|---|
| Contact Form | SPDT |
| **Resistive Load**<br>at 125 Vac<br>at 24 Vdc | <br>0.5 A<br>1 A |
| Max Switching Power | 62.5 VA, 30 W |
| Rated Voltage | 3 Vdc to 24 Vdc |
| Power Consumption | 150 mW |
| Mechanical Endurance | 5,000,000 operations min |
| Electrical Endurance | 100,000 operations minimum |
| Operating temperature | -40 °C to 70 °C (-40 °F to 158 °F) |

# 8. Power Shelf Interconnect

A ribbon cable is required to connect Power Shelves together in order to current share, or to connect shelves to a Power Controller.

The supplied ribbon cable has 5 connectors, to allow the maximum of 4 Shelves and a Power Controller to be connected.

Do not connect the TC-323 cable between ‘A’ and ‘B’ supplies or between two sets of Shelves which connect to separate busbars. The supplies will attempt to share current between the two busbars, which may damage the Power Packs and Shelves’ sensing circuits.

Unused connectors on the TC-323 cable should be tied back and left unused.