FIRECLASS Addressable Fire Alarm Control Panels

Firmware version 31

Fault Finding Guide

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1 Overview

This document gives a list of the possible fault states from FIRECLASS panels using version 31 firmware.

Faults are reported on the FIRECLASS panel in two distinct ways:

- Using specific points used solely for fault reporting.
- Setting a 'standard' point into a fault state.

This document covers panels using the CPU800 and CPU801 processor cards and panels that use the FC-FI Field Interface processor card. For example, FC600 and FC700 series panels.

1.1 Fault Reporting, pseudo, points

Pseudo points are activated when a monitored event occurs. Depending on the firmware driver, they may be cleared after a predetermined time, or they may only clear when the monitored condition clears. These conditions are reported by activating the processing assigned to the point.

There are pseudo points within each point region, for example, the Field Interface Module (FIM) pseudo points and the RBUS pseudo points. Each region has a section below.

1.2 Placing standard points into Fault

The system can also report faults on other points in the system. It does this by placing that point into a special fault condition. This is different from standard point activation.

The software driver can place a point into different faults depending on the device being monitored.

Examples include 'NO RESPONSE' and 'RELAY STUCK'.

The Cause linked to the fault state is not visible to the FIRECLASS Express user.

2 Pseudo Points

2.1 System Pseudo Points

When reported on the user interface or via printers, the output format used for System pseudo points is:

'Pn' where n is the point number.

Point Address	Label	Use
1	Data Packet Error	The required point command processing could not be completed; the state of at least one output point was not updated as required.
2	FIFO Full	This fault is raised when the panel firmware reaches an internal limit and is unable to perform an 'action' required by the configuration. The configuration may be too complex for the panel to deal with. Check the general processing options in the user Causes to see if multiple Causes in the chain are linked to alarm processing.
3	Not used	
4	NET Data Path Flt	The required Network Broadcast of one or more events (state changes) could not be completed; the state of the network is now unreliable until it re-synchronises after the successful completion of a 'Fire Reset'.
5	Not used	
6	Configuration Store	Panel configuration is stored in Flash chips and the data is covered by a checksum. The panel regularly calculates the checksum and compares it to that which has been stored. If different, this point is activated. The panel will also start a shutdown procedure which will result in it restarting and locking into a 'safe state'. It is considered unsafe to use a configuration that is known to be bad.
7	FIM Comms Failed'	This fault is raised if the SPI channel is held busy by the FIM Local I/O processor for more than a second. It is cleared when communication resumes.
8–24	Not used	
25	FIM Bad Packet	CPU800/CPU801 based panels The main CPU communicates to the local I/O processor located on the FIM using data packets on the loop Bus link. If three consecutive bad packets are received corrupt this fault is raised. The fault is self-clearing after 10 seconds, controlled by monitor point code. FC-FI based panels. As above
26	FIM Fault	The FIM Local I/O chip regularly sends a health status about itself to the main processor. If this status indicates a fault has been detected, this point is activated. It is cleared if the health report indicates OK. The states monitored are the RAM and the firmware checksum.

Table 1: FIM Local I/O Pseudo Points

Point Address	Label	Use
27	MP ROM Fail	The firmware checks its own checksum regularly. If it is different to the values stored within the firmware chip, this fault is raised. The firmware then places itself into a 'safe state'. This involves restarting in a 'locked' state. It is not deemed safe to use firmware known to be corrupt.
28	MP System RAM	The panel regularly checks each byte of RAM with fixed sequences to check that each bit can be written to and read independently. If a fault is detected, it is raised and the system is placed into the 'safe state' as described above.
29	MP Clock	This point is not used for fault reporting. It is used in the process of changing the current time within the panel.
30	Not used	
31	Battery Low	If the battery is present but the reported voltage has dropped below a threshold value, this point is activated. The fault is cleared once the voltage is greater than the threshold.
32	RBus Circuit Fault	The Remote Bus (RBus) connections on the FIM/ FC-FI are split between RBus 0 and non-zero nodes. If RBus 0 is configured and faults are detected on all external nodes, a relay on the FIM is tripped to isolate (protect) RBus 0 communications. If this happens, this point is activated. The relay returns to its normal state on Fire Reset. Perform basic wiring checks; check end-of-line and line isolators as appropriate.
33	Stack Overflow	If the firmware monitoring process discovers that one or more of the task stacks is near the full condition, the fault point is activated. This fault is not cleared.
34	System Heap Error	If the area of RAM within the panel that is used for system 'heap' is found to be corrupt, this point is activated. The point is not cleared.
35	Not used	
36	FCRemote Connected	The point is set when FireClass Remote (the Remote User Interface) starts communication and is cleared when communication ends. This point is only set while FireClass Remote is in communication with the panel.
37–39	Not used	
40	Local I/O F/W	The compatibility between the firmware on the FIM Local I/O chip and the main firmware is checked. If they are not compatible, the fault is raised. This type of processing is used on both CPU80x and FC-FI systems.
41	Panel Incompatible	This fault is raised if the panel hardware is a restricted low- end model, but the configuration is for a full product. Exact panel types are not checked.
42	Not used	
43	Walktest Sounders	Sounders are walk-tested using standard point commands as directed from the User Interface. This point is sent at the beginning of a walk test and cleared at the end of it. This is to place events in the event log.

Table 1: FIM Local I/O Pseudo Points (cont.)

Point Address	Label	Use
44	Inhibit Sound LED	The system monitors the isolation status of sounder devices. If all sounders are disabled, this point is set. Once one sounder is available, the point is cleared. The activation of this point inhibits the activation of the sounder LED. The goal is not to indicate that sounders are active on the front panel, when the system knows they are all disabled.
45	Commissioning	The system monitors the commissioning states. If any are active, this point is raised.
46	Download Required	In network configurations all panels broadcast issue details relating to their core functionality. If this differs between panels then the network will not operate as intended and full upload may not be possible. Known issue In some situations, when using Representative Points, the fault is not fixed by a simple download. The work around is as follows: ■ Change a point and 'OK' the change on each panel. Note: You need to make a change. For example, you can add an 'a' to a point name, OK the change, then delete the 'a'. ■ Save the configuration. ■ Download to all panels.
47	Test Equipment	This point is activated when FireClass Checker is connected to the panel.
48	Walktest Outputs	This point is activated when an output test is started from the panel user interface.
49–53	Not used	
54	Force Day Mode	If the panel is in day mode and a panel restart is performed. This point is activated to return to panel to day mode.
55	Not used	
56	Isolation For Test	This point is activated if the menu option to disable non-LED outputs is selected.
57	Not used	
58	FCExpress Download	This point is activated while a download from Express is active on the panel.
59	FCExpress Upload	This point is activated while Express is reading a configuration from the panel.
60	Inhibit No Response faults	During commissioning, the system can be set not to report no response faults for devices missing at restart. Devices that do reply, then stop replying are still reported. This point is linked to commissioning state and records an entry in the panel log.
61	Config File Fail	This point is activated while a download from Express is active on the panel.
62	Stage 1 Image Fail	Validation of the panel firmware loader program (stage 1) failed. Action: In all cases, source a replacement board as it is not easily serviceable.
63	Stage 2 Image Fail	Validation of the panel firmware loader program (stage 2) failed. Action: In all cases, source a replacement board as it is not easily serviceable.

Table 1: FIM Local I/O Pseudo Points (cont.)

Point Address	Label	Use
64	App. Image Fail	Validation of the panel firmware failed. Action: Attempt to correct by downloading the panel firmware again. If this fails, source a replacement board.
65	X501 Service Mode	This point activates if the Service mode link on the CPU801 is fitted at panel restart.
66	Not used	
67-76		These points are available for user configuration. One use is for the processing required on fire reset or panel restart. For more information, see the Express help file tutorial.
77	MAC Address Error	At panel start-up it has detected that the Ethernet MAC address is invalid. Note: If this occurs, contact the Field Support team to replace the board.
78	Panel Incompatible	The fault is raised if the panel and configuration are incompatible. For example, if the number of loops configured exceeds the panel capability.
79	Rx Comms. Lock Up	Panel has detected serious issue with UART. If you see this fault, the panel needs a restart. Use the reset button on the CPU card.
80	Output Self-Test	This point activates when a sounder quick-test is started from the panel user interface.
81	H/W Incompatible	An issue has been detected with the hardware which means that it's deemed incompatible. This is intended to be a generic fault point used by different feeds. Currently, it is only set if the manufacturer values are deemed incorrect. Note: If this occurs, contact the Field Support team to replace the board.
82	Reserved	
83	Reserved	
84	Reserved	
85	Reserved	
86	Reserved	
87	Unexpected Restart	This point is used to log an 'UNEXPECTED RESTART' fault which the CPU card will raise when it determines, during its software initialization, that the restart was not expected. This fault remains until a Fire Reset.

Table 1: FIM Local I/O Pseudo Points (cont.)

2.2 RBUS Node Pseudo Points

When reported on the user interface or via printers, the output format used for faults reported from RBus node points is:

'RBnn.Pmm'

Where nn is the node number 0–15 and mm is the point on that node, 1–8.

This section refers to faults reported from a node, not the higher level monitoring which detects the presence or absence of complete nodes.
Some configurations will not have some of these faults set up.

Point Address	Label	Use
1	Display Fail	If configured as a display module, the firmware monitors the link to the LCD module. If a problem is found, this point is set.
2	ROM Fail	The MPM regularly checks the checksum on the firmware held in ROM. If the value calculated differs from the value stored in the ROM, this point is activated.
3	RAM Fail	The MPIM regularly checks each RAM byte with fixed bit patterns. If it encounters read or write problems, this point is activated. If this fault occurs, contact the Product Support team.
4	N/A	Not used.
5	N/A	Not used.
6	Bad packet	Bad packet.
7	MultiCast Seq Err	Much of the LCD information is transferred with a system called 'multi-cast'. This allows the same information to be sent to multiple RBUS units with a single data packet. If the sequence identifier in a packet indicates a packet has been lost, this fault is raised. It is automatically cleared within 60 seconds. This fault may be a sign of bad RBUS wiring. Check end-of-line and isolator devices are fitted as appropriate to the site wiring.
8	Char CHIP CSum Err	The MPM, if configured as an OCM, performs a checksum on the data in the character set EEPROM. If the calculated value does not match the value stored within the device, this fault is raised. Note: Report this error to Product Support.

Table 2: RBUS Node Pseudo Points

2.3 RBUS Node Pseudo Points (Comms)

When reported on the user interface or via printers, the output format used for faults reported from RBus node faults is:

RBnn'

where nn is the node number 0–15.

This section refers to faults regarding the presence or absence of complete nodes. It is NOT an indication of faults held by the node.

This set of points uses a different address structure. Because the RBUS units can be addressed from 0–15, the first address is 'Zero'.

Point Address	Label	Use
0–15	RBUS Fault	Used by the RBUS or the COMMS driver to indicate loss of configured nodes or the presence of unconfigured nodes and other fault states such as 'F/W INCOMPATIBLE'. The logged event text will give more details on the specific fault that is detected. Options include 'NO RESPONSE' and 'UNCONFIGURED DEVICE'. The UNEXPECTED DEVICE fault will be raised if the configured device does not match the personality of the physical device.

Table 3: RBUS Node Pseudo Points

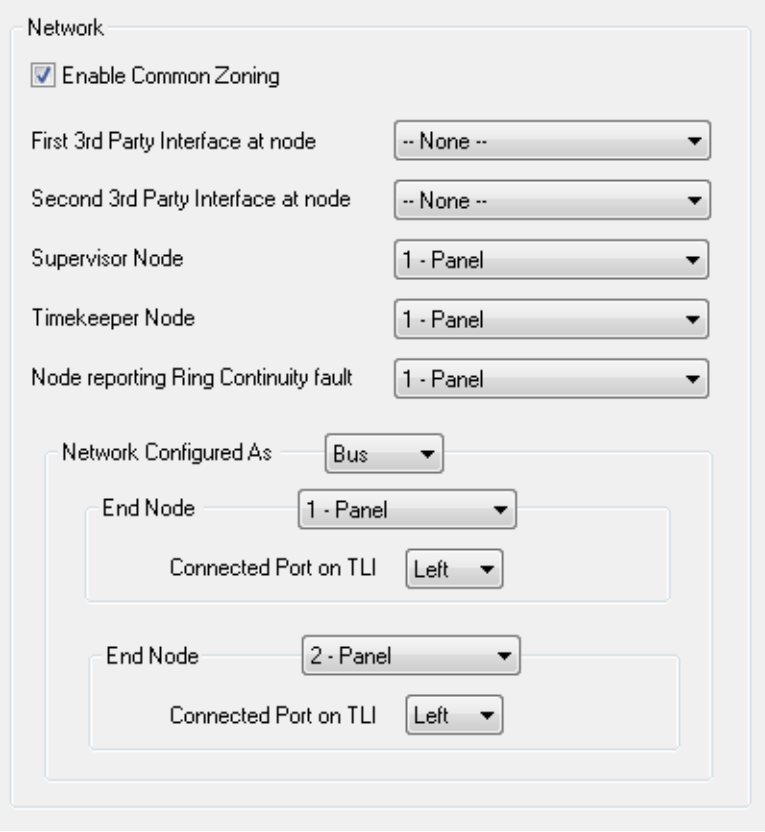
2.4 Network Card Fault Pseudo Points

When reported on the user interface or via printers, the output format used for faults reported from Network Card Fault points is:

'TLI Pnn'

where nn is the point number 01–08

This section refers to faults assigned to the network card. The configuration is controlled by the use of the options in the 'Site Details' dialog box in FireClass Express.



Point Address	Label	Use
1	Net Card Common	The Common fault is the 'OR' of all the other faults. The common fault condition becomes true if any of the other fault conditions are true. In practice, it is unnecessary to have a common fault message in addition to a detailed message. In these circumstances, the Common fault should be disabled.

Table 4: Network Card Pseudo Points

Point Address	Label	Use
2	Net Card Left	The Port Left Connection fault is raised when the TLI800EN Network Interface Module detects a short or open circuit condition on its left network port wiring. The fault may be disabled if the network is wired as a spur and the node is at the end of the spur. The network topology is configured on the Express Site Details screen.
3	Net Card Right	The Port Right Connection fault is raised when the TLI800EN Network Interface Module detects a short or open circuit condition on its right network port wiring. The fault may be disabled if the network is wired as a spur and the node is at the end of the spur. The network topology is configured on the Express Site Details screen.
4	Net Card Ground	The Network Ground fault is raised when the TLI800EN Network Interlace Module detects a ground fault condition on the network.
5	Net Card Data Trans	Data Transfer faults are generated on Node to Node transfers that do NOT receive acknowledgements from the destination panel.
6	Net Card Ring Cont	The Ring Continuity fault is raised when a transmitting panel does not receive its transmitted message back on its opposite channel in the required time. This option is only enabled for ring topologies.
7	Net Card Comms Fail	The Net Comms Failure fault is raised when a network card detects that it cannot communicate with other network cards.
8	Net Card F/W	Indicates the network card is incompatible with the panel firmware.

Table 4: Network Card Pseudo Points (cont.)

2.5 Network Node Pseudo Points



This section refers to faults regarding the presence or absence of panel nodes.

When reported on the user interface or via printers, the output format used for faults reported from network node points is:

'Net nnn'

where nnn is the panel node number

Point Address	Label	Use
1–99	Network Node	Used by the supervisor panel to indicate which panels are not responding to supervision or if the panels are being supervised but are reporting a lack of supervision.

Table 5: Network Node Pseudo Points

2.6 COM1 Pseudo Points

When reported on the user interface or via printers, the output format used for faults reported from COM1 is:

'COM1'



This section refers to a fault regarding the presence or absence of a printer connected to COM1

Point Address	Label	Use
1	Printer Comms	If a printer is configured and is not connected to the panel, this monitor point is activated.

Table 6: COM1 Pseudo Points

2.7 COM2 Pseudo Points

When reported on the user interface or via printers, the output format used for faults reported from COM2 is:

'COM2'



This section refers to faults regarding COM2 which is the configuration of the FIRECLASS Remote port.

Point Address	Label	Use
1	Comms Fault	Will report a fault if the packet retries exceed the maximum number (100).

Table 7: COM2 Pseudo Points

2.8 COM3 Pseudo Points

When reported on the user interface or via printers, the output format used for faults reported from COM3 is:

'COM3'



This section refers to faults regarding COM3 on the panel which is used to connect to the network card.

Point Address	Label	Use
1	Comms Fault	Will report a fault if the packet retries exceed the maximum number (100).

Table 8: COM3 Pseudo Points

2.9 Network Gateway Faults

When reported on the user interface or via printers, the output format used to report faults related to the Network Gateway is:

'NET'

Point Address	Label	Use
28	Network Gateway	TLI800EN - Will raise a fault if packet Retries exceed maximum (100). PNI800 - Will raise a fault if the panel is unable to make contact with the card. **Note**: The panel UI does not display the point address for the network gateway.

Table 9: Network Gateway Faults

2.10 SBUS Node Faults

When reported on the user interface, or via printers, the output format used for faults reported about an SBus node are:

'SBnn'

where nn is the node number 1 - 99.

- This section refers to faults generated by the FC600 and FC700 series of panels, although they can be reported and viewed on other panel types.
- This section refers to faults relating to the state of the node from the panel's perspective, for example, the presence or absence of the node over the service bus. It does NOT relate to faults detected by the node which are then subsequently reported to the panel from the node itself.
- It is possible that other, related no response faults are also raised whenever the SBUS address holds a particular card type. For example, for the PLX800 the panel can raise up to four more 'no response' events, one for each of the loops configured to the card.

Point Address	Label	Use
1-90	In the format: C nn-CardType: ■ C 02-PLX800 (Loop Card in Slot 2) ■ C 15-PNI800 (Network Card in Slot 15)	Used by the panel driver to indicate the loss of configured nodes or the presence of non-configured nodes. In addition, this point indicates other fault states such as incompatible firmware.
91	MCPU	Used by the panel SBUS / COMMS driver to indicate there is a node on the SBUS clashing with the address reserved for the Bus Master.
92		Used by the panel SBUS / COMMS driver to indicate the local I/O on the FIM is not answering or is running incompatible firmware.
93	Local Loops	Used by the panel driver to indicate that the local loops on the FIM/FC-FI are not answering or are running incompatible firmware.
94-99		Currently not used.

Table 10: SBUS Node Faults

2.11 GUI Pseudo Points

When reported on the user interface, or via printers, the output format used for faults detected and reported by a GUI are

LNnnPpp

where nn is the LNet node number 1 – 8, and pp is the point number

Point Address	Label	Use
1	Evacuate Button	This point is mapped to a screen button.
2		Currently not used.
3	Investigate Button	This point is mapped to a screen button.
4	Select Day Mode	This point is mapped to a screen button.
5	Select Night Mode	This point is mapped to a screen button.
6	Self Test Pass	This point activates if the GUI self-test activated by the user passes.
7	Self Test Fail	This point activates if the GUI self-test activated by the user fails.
8	Event Synch Fail	Currently not used.

Table 11: GUI Pseudo Points

3 Loop Status Faults

Each loop, and sub-loop had a single status point used to report the state of the loop itself, not the points on it.

The feeds to raise the fault can either come directly from the panel or via what the loop processor is telling the panel. This can be identified by the following colour key:

Root source of fault	
Panel (Light blue)	**Loop processor (Orange)**

When a state is raised for the loop, not a point in the loop then the address is simply the loop letter.

As there is only one status point per loop, every fault is allocated a priority. The tables below are arranged with the highest priority shown first.

For clarity, this section defines two tales. One for each of the platforms. These are:

- CPU800/801 + FIM800 platform
- FC-FI platform

For the FC-FI platform the additional loop processor "card fault" status is described as it is in context of loop faults, see Card Fault for Local Loops/PLX800.

3.1 CPU800/801 + FIM800 Platform

Logged message	Description
LOOP NO RESPONSE	The communications between the panel and local loops or loop expansion card is not working.
LOOP FAULT SHUTDOWN	The loop is shut down.
F/WARE INCOMPATIBLE	The loop processor firmware is deemed incompatible. It is possible to update the firmware in the card. If this fault is raised, contact the Product Support team.
FEATURE NO SUPPORT	A feature enabled cannot be supported by either the firmware of loop processor or the hardware on which it resides.
POLLING ERROR	A background monitor scans the last poll time of all points. If a point has not been polled within a time window, this fault is raised. It is not expected this fault will ever be announced, it is a required background process for approvals.
UNCONFIGURED DEVICE	This event will be raised in the case address 255 is detected on the loop.
LOOP S/C FAULT	Raised on the loop pseudo point if the loop processor detects higher than expected loop current.
LOOP O/C FAULT	Raised on the loop pseudo point if it is found to be 'Open Circuit' due to open loop polling.

Table 12: CPU800/801 + FIM Platform

3.2 FC-FI Platform

State	Description
LOOP NO RESPONSE	The communications between the panel and local loops or loop expansion card is not working.
LOOP FAULT SHUTDOWN	The loop / sub-loop is shut down.
F/WARE INCOMPATIBLE	The loop processor firmware is deemed incompatible. It is possible to update the firmware. If this fault is raised, contact the Product Support team.
FEATURE NO SUPPORT	A feature enabled cannot be supported by either the firmware of loop processor or the hardware on which it resides.
POLLING ERROR	A background monitor scans the last poll time of all points. If a point has not been polled within a time window, this fault is raised. It is not expected this fault will ever be announced, it is a required background process for approvals.
UNCONFIGURED DEVICE	If a device replies to polling that is not in the configuration and has an address between 1-250, the fault is raised on that address. If a device is present at address 255, then an UNCONFIGURED DEVICE fault is raised with the address of the loop.
LOOP S/C FAULT	If the loop processor detects higher than expected loop current which can occur in the following conditions: 1 If Over Current Protection is activated. 2 Loop Load Detection is enabled and the current exceeds 200mA.
LOOP O/C FAULT	Signalled when the loop processor detects 'Open Circuit' using its internal open loop detection algorithm.
CALIBRATION FAULT	Related to partial faults, where the fault can be raised for the following conditions: 1 There is a problem with loop calibration data in EEPROM or the loop has never been calibrated. 2 The loop is incorrectly calibrated (for example, the loop was calibrated in Open Circuit fault). 3 The loop quiescent current drops more than 10mA against the calibrated current. 4 The Open circuit Fault is detected by the Standard OC test, but not by the Partial OC test. Find the loop calibration feature on the GUI at Configure > Service > Calibrate Loop.

Table 13: FC-FI Platform Points
[1] This fault will also trigger a card fault; see the 3.2.1 "Card fault for Local Loops/PLX800" section.

State	Description
CALIBRAT. SIGNATURE	This fault is related to EN54 Part 13 partial open/short wiring faults. This fault is raised by the panel if it deems that the signature stored in the loop processor does not match that of the panels (held in EEPROM). It means that a re-calibration of the loop will be required. Scenarios which can cause this are: 1 'New' project downloaded to panel. 2 Site details "Project name" change. 3 Loop cards swapped. Find the loop calibration feature on the GUI at Configure > Service > Calibrate Loop.
PARTIAL S/C	A partial short circuit has been detected on the loop. This is raised when the loop quiescent current is approximately 30mA higher than the expected calibrated value.
PARTIAL O/C	A partial open circuit on either the +Ve or –Ve side of the loop has been detected. This is raised when the loop resistance is increased by about 20ohms against the calibrated values.
DEVICE FAULT (1)	Loop processor has detected a problem with the ADC.
HIGH VOLTAGE (1)	The Loop processor is indicating the loop voltage is HIGH.
LOW VOLTAGE (1)	The Loop processor is indicating the loop voltage is LOW.
DEVICE DATA ERROR(1)	The loop processor is indicating an issue with configuration data held in EEPROM. This can be caused by missing/corrupted ADC calibration values or Loop Calibration data.

Table 13: FC-FI Platform Points
[1] This fault will also trigger a card fault; see the 3.2.1 "Card fault for Local Loops/PLX800" section.

3.2.1 Card fault for Local Loops/PLX800

The loop processor can raise a "card fault" for various conditions (outlined in the table below), there are two mechanisms to raise "card fault" depending on whether it's for the local loops (located on the FC-FI) or a PLX800 card sitting on the backplane as follows:

- The Local loops raise a "FC-FI Fault" (Local IO Real Point 39).
- The PLX800 card raises card fault on the common backplane signal "Card Fault" and Local IO Real Point 40 will be raised.

The loop processor can raise "card fault" for the conditions shown in the following table.

State	Description
FW/HW Fault	Watchdog, Crash.
Memory Tests Failed	ROM Checksum & EEPROM Checksum.
MCPU Offline	Used only on local loops/local IO when it is deemed that the MCPU is offline.
HW Version changed	The fixed hardware revision has changed since the first read after start-up.
ADC test failed	ADC Test voltage reference failure.
Loop Voltage HIGH	The loop voltage is deemed too high > 45V
Loop Voltage LOW	The loop voltage is deemed too low < 35V
High System Temperature	The temperature of the system is approximately >= 85°C
Wrong card address	The card address is deemed out of range address 0 > 99
ADC Calibration Data failed/corrupted	The ADC production calibration values are corrupted.
Loop Data failed or corrupted	Loop Configuration Data corrupted, includes currently: ■ Loop Calibration data (partial faults)

Table 14: Card faults

Loop Voltage

Too low could be raised if the loop 40V booster does not work correctly or if the loop is heavily overloaded. In this case you can disconnect the loops and see if the fault is cleared. If not, replace the card. If the loop voltage is reporting as too high contact Product Support regarding PSU calibration.

3.2.2 PLX800 LED States

This information is also in the PLX800 Fixing Instructions.

LED	State	Description
Status (of microprocessor), green	On	Microprocessor failed
	Blink	On 0.5, off 0.5 Normal function On 0.1, off 0.1 Firmware update mode On 0.9, off 0.1 Configuration mode On 0.1, off 0.1 Standby mode
	Off	5V or 3.3V missing
Alarm (on loop), red	On	Loop in alarm state. At least one alarm input device on the loop is active.
	Off	No alarm on loop
Fault (on loop), yellow	On	Loop in fault state, any of these: ■ Open circuit ■ Short circuit ■ Partial open circuit ■ Partial short circuit ■ 200mA quiescent current ■ Device data error (EEPROM) ■ ADC fault ■ Calibration required ■ Over -current fault
	Off	No fault on loop
Fault (card fault), yellow	On	PLX800 card fault
	Off	No fault

Table 15: PLX800 LED states

3.2.3 Loop Partial Faults (EN54-13)

The EN54-13 standard introduces the requirement to detect partial faults (partial open-circuit or partial short-circuit) on external wiring from the panel considered as part of the primary fire path. The addressable loop is such a path.

Note(s):

- This feature is only available on the FC600 and FC700 series of panels. They must have the correct revision of FC-FI and PLX800 hardware and the correct firmware version on the panel, the local loops and the PLX800.
- This feature is not supported on FIM800 based panels.

Enable/Disable Feature

In order to detect partial fault(s) on a loop, the Enable/Disable feature must first be enabled by the configuration tool.

Note(s):

- You can disable the Enable/Disable feature if the site does not require it.
- If the feature is enabled but cannot be supported because the panel does not meet the minimum hardware and firmware requirements, a 'panel feature not supported' fault is raised.

Loop calibration

A calibration procedure must be run on each loop that has the partial faults feature enabled before any partial fault detection can be applied. The purpose of loop calibration is to take and record a measurement of the loop's parameters in its quiescent state. If under normal operation a significant variation occurs in the loop's quiescent parameters, it is now possible to determine whether or not that variation is large enough to denote that either of the partial faults is present. Prior to invoking the loop calibration, observe the following system status:

- The system is in a quiescent state and no faults are present on the loop, or the loop pair being calibrated.

Note: If the loops are of the split type, then the calibration is done in pairs of loops.

On a system where this feature is enabled, a loop calibration can be invoked through the GUI user interface using the following procedure:

1 Log in.
2 Navigate to the Configure menu and select Service and Calibrate Loop.
3 Select the panel and loop(s) you want to calibrate.

Note: Typically loop calibration is not invoked until the later stages of a loop installation when it is most likely that the loop configuration is functioning.

System operation

During the normal operation of a calibrated loop, the loop processor (PLX800) is able to determine the presence of a partial type fault on the loop. This is then reported back to the panel. The panel raises faults related to this feature on the associated loop's loop status pseudo point. Please see Table 13: "FC-FI Platform Points".

4 FIM800/FC-FI Real Points

4.1 Overview

Section two covered Pseudo points, those points exist mainly just to give feedback of fault events into the system. This section of the document covers 'real' points on the main interface board.

- For CPU800 and CPU801 systems, this is the Field Interface Module, FIM.
- For the FC600 and FC700 series panels, this is the FC-FI.

If the point is configured the assigned effect or cause will be used for input or output as appropriate.

This section covers the additional fault monitoring of these points where provided.

4.2 FIM Real Points

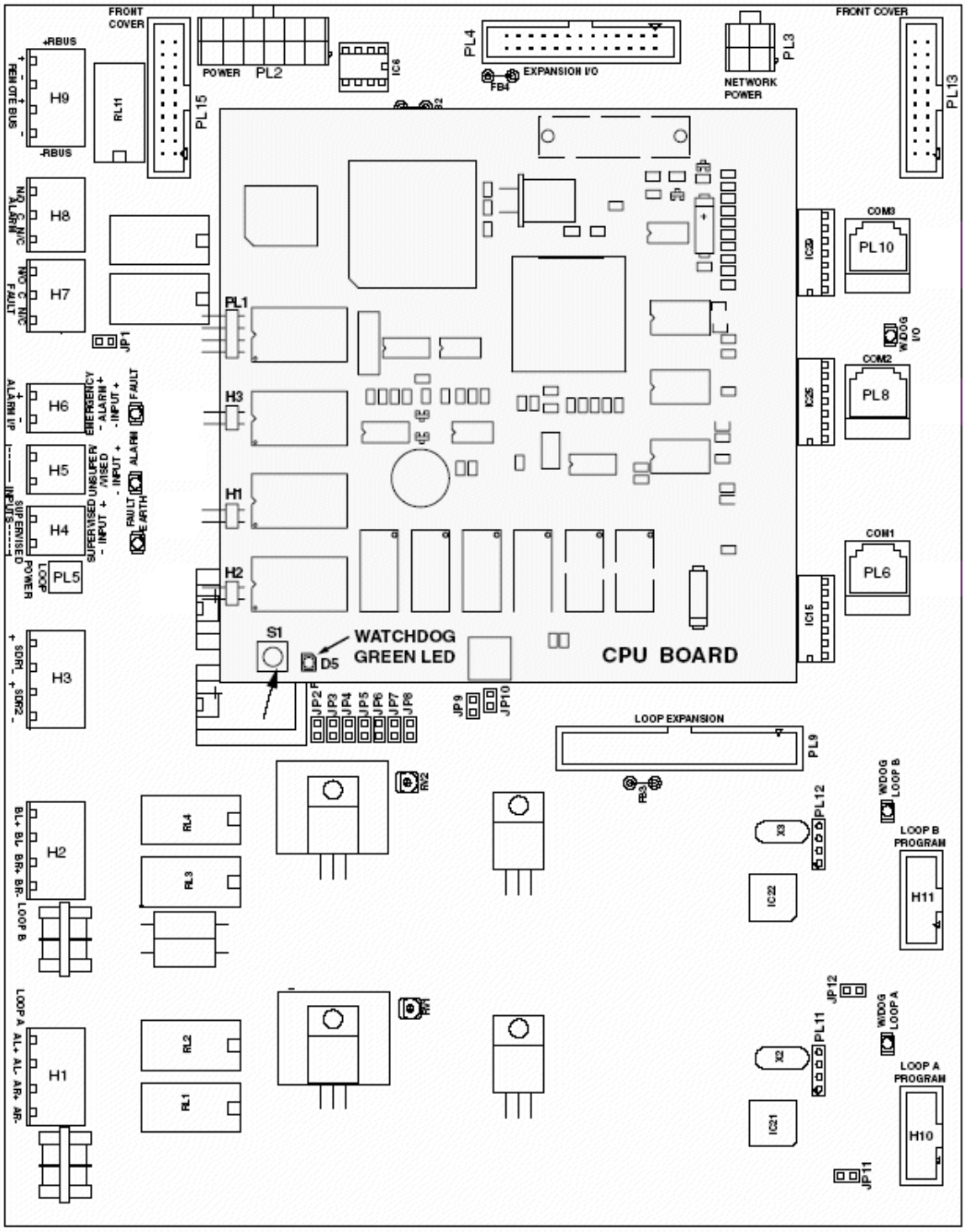


Fig. 1: FIM

Address	H/W Reference	Label	Description
1	H3	Sounder 1	The standard use for the point in the UK template is to control a circuit of conventional sounders. The 'use' and the associated faults can be changed by altering the assigned effect and the 'Device Mode'.
2	H3	Sounder 2	As point 1.
3	H8	Alarm Relay	The standard use is for connection to other equipment to indicate a fire condition. For fault information, see point 1.
4	H7	Fault Relay	The standard use is for connection to other equipment to indicate a fault condition. For fault information, see point 3.
5		PSU Monitor Input	This point is only present set empty and not used on FC-FI panels.
6	H4	Supervised Input	User defined.
7	H5	Unsuper-vised Input	User defined.
8	H6	Emergency Alarm I/P	On networked systems this connection is used for a physical link between the panel and the network card.
9		MP Earth Fault	
10		Battery Fault I/P	
11		Mains Supply I/P	
12		Charger Fault	

Table 16: FIM real points

Address	H/W Reference	Label	Description
13	Not used		
14		I/O 2	
15		I/O 1	
16	N/A	24V Reset	
17	Not used		
18	Not used		

Table 16: FIM real points

4.3 FC-FI Real Points

The FC-FI uses the same point configuration as the FIM800 for points 1 to 18, points 19 to 40 are additional and use their own configuration.

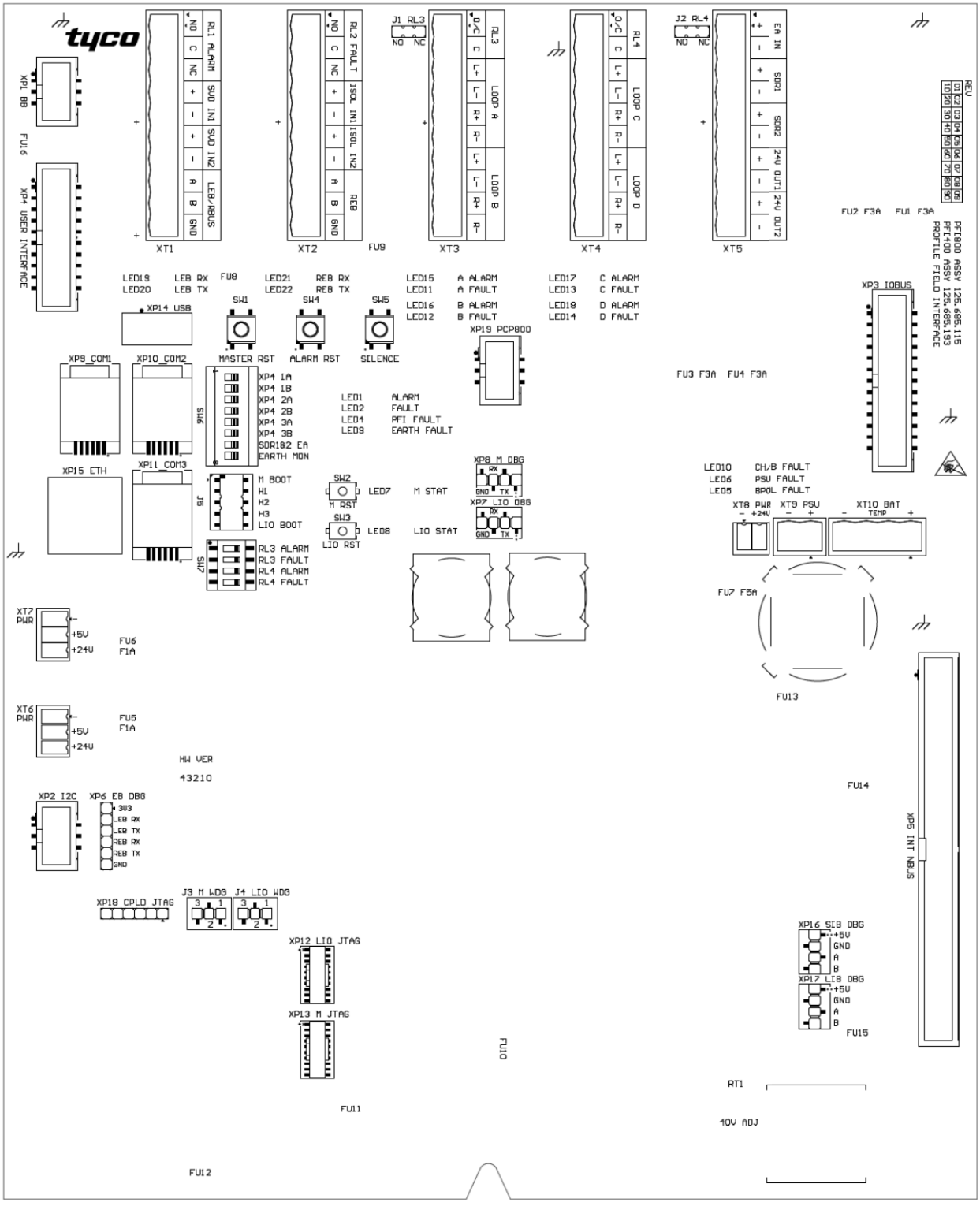


Fig. 2: FC-FI

Point Address	Point Label	H/W Reference (see Fig 2)	Description
1	Sounder 1	XT5 SDR1	The standard use for the point in the UK template is to control a circuit of conventional sounders. The 'use' and the associated faults can be changed by altering the assigned effect and the 'Device Mode'.
2	Sounder 2	XT5 SDR2	As point 1.
3	Alarm Relay	XT1 RL1 ALARM	The standard use is for connection to other equipment to indicate a fire condition. For fault information, see point 1.
4	Fault Relay	XT2 RL2 FAULT	The standard use is for connection to other equipment to indicate a fault condition. For fault information, see point 3.
5	PSU Monitor		This point is presently set to empty and not used on FC-FI panels.
6	Supervised Input	XT1 SVD IN1	User defined
7	Unsupervised Input	XT2 ISOL IN1	User defined
8	Emergency Alarm I/P	XT5 EA IN	On networked systems this connection is used for a physical link between the panel and the network card.
9	MP Earth Fault		

Table 17: FC-FI Real Points

Point Address	Point Label	H/W Reference (see Fig 2)	Description
10	Battery Fault I/P		
11	Mains Supply I/P		
12	Charger Fault		
13	IO-Fuse Fault		
14	I/O 2		
15	I/O 1		
16	24V Reset		
17	-		Not used.
18	-		Not used.

Table 17: FC-FI Real Points

Point Address	Point Label	H/W Reference (see Fig 2)	Description
19	Supervised I/P 2	XT1 SVD IN2	User Specific.
20	Unsupervised I/P 2	XT2 ISOL IN2	User Specific.
21	Fire Reset button		Label on FC-FI as 'ALARM RST', middle of the 3 buttons next to the USB connector. The button functions as Fire Reset
22	Sounder Sil button		Label on FC-FI as 'SILENCE', one of the 3 buttons located near the USB connector. The button functions as Silence Sounders.
23	Relay 3 Control	XT3 RL3	General purpose relay, can be operated as normally open or normally closed determined by the state of J1 RL3.
24	Relay 4 Control	XT4 RL4	General purpose relay, can be operated as normally open or normally closed determined by the state of J2 RL4.
25	24V Power Ctrl 1	XT5 24V OUT1	Supervised 24V power outputs for auxiliary devices. **Note:** The output of this point is inverted. Normally, it is active, supplying power; to remove the supply, switch the point on.
26	24V Power Ctrl 2	XT5 24V OUT2	Supervised 24V power outputs for auxiliary devices. **Note:** The output of this point is inverted. Normally, it is active, supplying power; to remove the supply, switch the point on.

Table 17: FC-FI Real Points

Point Address	Point Label	H/W Reference (see Fig 2)	Description
27	Charger OFF Control		Used to switch off battery charger. When active the charging is disabled and a charger fault is raised. Not used in firmware version 29 or later.
28	Sys Wrong Volt Flt		Monitors system voltage from the PSU adjusted for temperature.
29	Sys Volt Flt		System voltage: System voltage is expected to be in the range of 22-29V, otherwise a fault will be raised. Too Low ■ It is likely to be triggered when the system is running from batteries which are getting low. In such case the associated Battery fault should be displayed as well (battery voltage < 22V) ■ It is possible the PSU voltage is set incorrectly (less than 22V) at the factory. Consult with Product Support before adjusting the PSU. Too High If the system reports that the voltage is too high (>29V), it is possible that the unit has lost calibration. Contact Product Support for possible PSU adjustment.
30	5V Conv Fault		This fault Indicates an issue with the 5V voltage converter, that is, the hardware monitor for the 5V rail is indicating a fault. Action: If this fault is active then the only solution is to replace the board.
31	5V Current Fault		The auxiliary 5V on connectors XT6 and XT7 used for external devices requiring power has a current limiting output of 800mA. Action: If this fault is active then the proper connection of the external devices connected to either XT6/XT7 or both should be checked as well as their potential load requirement does not exceed the 800mA.

Table 17: FC-FI Real Points

Point Address	Point Label	H/W Reference (see Fig 2)	Description
32	5V USB Fault		The USB 5V on XP14 used for updating the firmware via flash drive has a current limiting output of 800mA, if this fault is active then the USB device is taking too much power and should be removed from the interface. Action: If this fault is active then the offending USB device should be removed from the USB interface XP14, if it persists with another device then replace the FC-FI board.
33	Battery Temp Fault		Monitor battery temperature. The battery temperature faults will be triggered if the battery temperature is lower than -8^{o}C or higher than +48^{o}C. The high battery temperature could be also caused by overcharging. Charger fault could be present in such cases. Check the battery voltage or the temperature sensor.
34	ADC Mux Fault		This fault relates to a number of self-checks performed on the ADC hardware, namely: ■ Microprocessor ADC fault. ■ External analogue multiplexor. ■ ADC reference voltage fault. Note(s): 1 If this fault is triggered, ignore analogue readings on the FC-FI such as battery voltage, loop voltage, system voltage and loop current. 2 "FC-FI Fault" real point 39 (see below) will also be raised with this fault.
35	Ext BUS Left Fault		Not used in this version of firmware.
36	Ext BUS Right Fault		Not used in this version of firmware.
37	FIC Signal I/P		Not used in this version of firmware.
38	Not used.		

Table 17: FC-FI Real Points

Point Address	Point Label	H/W Reference (see Fig 2)	Description
39	FC-FI Fault		Local IO point 39 "FC-FI Fault" is a catch all point for raising faults which can be split into hardware or software generated. The hardware generated faults can be from fuse monitoring circuits on some of the functionality provided by the board. The software generated faults come from the Local IO/ Local loop processor. Hardware: These sources all come from the FC-FI board. ■ XT8 (FB800 CONNECTOR) 5A fuse blown reference (5A/125V) FU7 replaceable. ■ 24V to 40V converter fuse blown reference FU15 (7A/63V) NOT replaceable. ■ 24V to 5V converter fuse blown reference FU10 (3A/63V) NOT replaceable. ■ XT5 "24V OUT 1" fuse blown reference FU3 (3A/125V) replaceable. ■ XT5 "24V OUT 2" fuse blown reference FU4 (3A/125V) replaceable. ■ XT5 "Sounder Output 1" fuse blown reference FU1 (3A/125V) replaceable. ■ XT5 "Sounder Output 2" fuse blown reference FU2 (3A/125V) replaceable. ■ 3.3V regulator fault NOT replaceable. Software: ■ Application memory checksum test failed. ■ Main CPU is deemed offline. ■ Hardware version changed. ■ ADC reference voltage | ADC multiplexer fault. ■ Wrong loop voltage. ■ High system temperature. ■ Local IO calibration data failed eeprom issues (checksum, blank) ■ Part 13 testing eeprom or incorrect loop data. Action: In all cases, source a replacement board as it is not easily serviceable.

Table 17: FC-FI Real Points

Point Address	Point Label	H/W Reference (see Fig 2)	Description
40	Card Fault		The point represents the state of the 'Card Fault' signal on connector XP5 Int NBus. Any slot card can raise the fault indicating a serious h/w or s/w problem. If the communication is working between the card and the main CPU, it is expected that a more specific fault will also be raised. If a slot card is present and the green LED on the card is in quick flash mode, it is either unconfigured or in emergency mode. A fault will be raised on this point.

Table 17: FC-FI Real Points

4.4 FC-FI LED Indicators

Address	Label	Description
LED1	ALARM	OFF = Alarm relay not activated, that is, there is NO alarm in the system. ON = Alarm relay activated, that is, there is an alarm in the system. See note 1.
LED2	FAULT	OFF = Fault relay activated (No fault). ON = Fault relay de-activated (Fault), see note 2.
LED4	FC-FI FAULT	Raised by hardware | software faults, see point section 4.3 "FC-FI Real Points", point 39.
LED5	BPOL	OFF = Battery polarity correct. ON = Battery polarity incorrect.
LED6	PSU FAULT	Power supply fault.
LED7	M STAT	Main CPU status indicator: 500mS ON - 500mS OFF = Normal condition. ON = System Fault, emergency mode will ensue.
LED8	LIO STAT	FC-FI PLX800 Loop and Local IO status indicator see the 3.2.1 "Card fault for Local Loops/PLX800" section.
LED9	EARTH FAULT	Earth Fault, see point section 4.2 "FIM Real Points", point 9.
LED10	CH/B	OFF = No Charger or battery fault. 500mS ON - 500mS OFF = battery fault. See point section 4.2 "FIM Real Points", point 10. ON = Charger fault. See point section – 4.2 "FIM Real Points" point 12.
LED11	A FAULT	Loop pair 1 – sub-loop 1 fault. See Notes 3 and 4.
LED12	B FAULT	Loop pair 1 – sub-loop 2 fault. See Notes 3 and 4.
LED13	C FAULT	Loop pair 2 – sub-loop 1 fault. See Notes 3 and 4.
LED14	D FAULT	Loop pair 2 – sub-loop 2 fault. See Notes 3 and 4.
LED15	A ALARM	Loop pair 1 – sub-loop 1 alarm. See Note 5.
LED16	B ALARM	Loop pair 1 – sub-loop 2 alarm. See Note 5.
LED17	C ALARM	Loop pair 2 – sub-loop 1 alarm. See Note 5.
LED18	D ALARM	Loop pair 2 – sub-loop 2 alarm. See Note 5.

Table 18: FC-FI LED Indicators

1. The local loop driver can also switch on this LED in the case it is running in Emergency mode and an alarm is detected.

2. The hardware can drive the fault relay directly when a system fault is present, that is, the MCPU is dead.

3. Local PLX has deemed there is a loop fault. See PLX800 LED States.

4. For the faults raised in the system please see the section on loop status fault for FC-FI Platform.

5. At least one device on the sub-loop is in alarm, under normal conditions the LED is controlled directly from the local PLX but it is the MCPU who decides whether it is to be switched ON/OFF. However in emergency mode the PLX can also switch this LED on if an alarm device goes active.

5 General Fault Overview

5.1 Fault Conditions on Devices

Logged Message	Use
ALARM CTRL AUX.VOLT	Raised on FC410QIO, FC410QMO, FC410QRM and FC410SNM when configured as alarm control units and indicates the Auxiliary voltage is not present.
ALARM CTRL FAULT	Raised on FC410SNM devices if configured as an Alarm Control. The Auxiliary voltage is not present.
ALARM CTRL NO RESP	FC410RIM and FC410SNM if configured as alarm control units.
ALARM CTRL OPEN CCT	Raised on FC410SNM devices if configured as an Alarm Control and the supervised output is open.
ALARM CTRL SHRT CCT	Raised on FC410SNM devices if configured as an Alarm Control and there is a short circuit present on the supervised output.
ALARM CTRL STUCK	Raised on FC410RIM and FC410SNM devices. It indicates that the relay cannot be switched in the state which is required by the firmware.
AUTO TEST FAILED	Devices which offer a self-test feature are tested automatically on a regular basis. This fault is raised if one of these regular tests fail. In such circumstances, the user should replace the device.
AUX. VOLTAGE FAULT	This fault is raised by the FC410TSM, QIO and QRM devices if the auxiliary voltage falls below 21V and AVM is enabled for that point. If the supply voltage of the FC410DDM drops below 21.2V If configured for 'Low Voltage detectors only' the fault is raised if the supply voltage drops below 14.5V.
BEACON FAULT	This fault is raised if the monitoring of the beacon on an LPAV device indicates that it is in fault.
BEAM FAULT	The Beam Detector Module has detected that the FIRERAY (Beam detector) has raised a fault.
CALIBRATION FAULT	Raised on the loop devices if the calibration value stored by the factory is outside of the expected range. The device cannot be used.
CALLPOINT ACTIVE	This fault can be raised by a FC410DDM when the device type is configured to 'Fast CallPoints' mode. In this mode, callpoints and detectors are mixed on one single conventional line which is connected to a FC410DDM input. On the fire panel, it is also possible to isolate the callpoints and detectors of the line separately. In the case where the callpoints are activated but isolated, it is not possible to detect an active state of the connected conventional detectors. In this case, the 'Callpoint Active' fault is raised.
CO ELEMENT FAULT	Raised on PC detectors when the CO sensor part has a failure. When the fault is raised, the evaluation algorithm uses the HPO mode for alarm detection.
CONTACT WIRING OPEN	This fault is raised on the FC410MIM, FC410SIO, FC410TSM and QIO devices if the supervised input is open.
CONTACT WIRING SHRT	Raised on the FC410MIM, FC410SIO, FC410TSM and QIO devices if a short circuit is present on the supervised input.

Table 19: Standard Point Fault States

Logged Message	Use
DET LTA HI WARNING	The dirtiness value of the photo detector is at 80% or more. If Detector Condition Monitoring is enabled for the point, this condition is raised before the device raises High LTA. The detector is still working, but should be replaced at the next regular maintenance. The current dirtiness value can be viewed using the panel interface or printed in a report.
DET LTA LO WARNING	This fault is raised on photo devices. If Detector Condition Monitoring is enabled for the point, the fault is triggered if the LTA falls below the warning threshold. At this threshold level the device is still working but it should be replaced at the next service.
DETECTOR REMOVED	This fault is used by the FC410DDM when configured to monitor circuits of conventional devices with a diode base.
DEVICE FAULT	The device is present and replying, but the reply indicates a device error. This is the catch-all fault when a more meaningful fault cannot be raised.
DEVICE POWER UP	If one loop device was removed and re-inserted again. The fault is cleared after the initialisation of the device.
DISABLED FOR TEST	If the user isolates non-LED outputs, the state is logged. The panel is also placed into Commissioning Mode.
DOOR CTRL AUX.VOLT	Raised on FC410QIO, FC410QMO, FC410QRM and FC410SNM when configured as door control units and indicates the Auxiliary voltage is not present.
DOOR CTRL FAULT	Raised on an FC410SNM if configured as a door control. The Auxiliary voltage is not present.
DOOR CTRL NO RESPNS	This fault is raised by FC410RIM and FC410SNM units if configured as door control units and not responding to polls.
DOOR CTRL OPEN CCT	Raised on an FC410SNM or FC410QMO if configured as a door control if the supervised output is open.
DOOR CTRL SHORT CCT	Raised on an FC410SNM or FC410QMO if configured as a door control if a short circuit is present on the supervised output.
DOOR CTRL STUCK	If the monitored contact is stuck on a FC410RIM or FC410SNM. The relay cannot be switched in the state which is required by the firmware.
DOOR FAULT	This fault is raised on 410QIO devices when their 'Device Mode' is configured as 'Door Control'. The fault is raised when it has been determined there is a problem with the door being monitored.
EXT PSU LOST	Reported by the FC410DIM and FC410DDM if it has problems with its external power source.
EXT. CTRL FAULT	Raised on FC410SNM devices if configured as an Extinguishing Control unit.
EXT. CTRL NO RESPNS	Raised on an FC410SNM if configured as Extinguishing control. LAV800 currently raises the general fault, 'No Response'.
EXT. CTRL OPEN CCT	Raised on FC410SNM devices if configured as an Extinguishing control unit.If supervised output is open.
EXT. CTRL SHORT CCT	Raised on FC410SNM devices if configured as an Extinguishing control unit. There is a short circuit present on the supervised output.
EXT. CTRL STUCK	Raised on FC410SNM devices if configured as an Extinguishing control unit. The relay cannot be switched in the state which is required by the firmware.

Table 19: Standard Point Fault States (cont.)

Logged Message	Use
EXTG.CTRL AUX.VOLT	Raised on FC410QIO, FC410QMO, FC410QRM and FC410SNM when configured as extinguishing control units and indicates the Auxiliary voltage is not present.
FAULT CTRL AUX.VOLT	Raised on FC410QIO, FC410QMO, FC410QRM and FC410SNM when configured as fault control units (fault signaling) and indicates the Auxiliary voltage is not present.
FAULT CTRL FAULT	Raised on FC410SNM devices if configured as a Fault Control (fault signaling). The Auxiliary voltage is not present.
FAULT CTRL NO RESP	FC410RIM and FC410SNM if configured as fault control units (fault signaling).
FAULT CTRL OPEN CCT	Raised on FC410SNM devices if configured as a Fault Control (fault signaling) and the supervised output is open.
FAULT CTRL SHRT CCT	Raised on FC410SNM devices if configured as a Fault Control (fault signaling) and there is a short circuit present on the supervised output.
FAULT CTRL STUCK	Raised on FC410RIM and FC410SNM devices if configured as a Fault Control (fault signaling). It indicates that the relay cannot be switched in the state which is required by the firmware.
F/W INCOMPATIBLE	This fault is used to indicate an incompatibly between the main panel firmware and the firmware in a support chip. Compatibility requirements are given within the documentation covering the particular version of FIRECLASS firmware.
H/W ISOLATOR AUTO	This event is raised by devices with monitored internal line isolator. This includes the FC410DDM, FC410TSM and 'Q' devices. It is not used for standard line isolators or isolator bases. If the internal isolator is activated, the system raises this event.
HIGH CURRENT	This fault is raised by the FC410DDM when operating in 4-20mA mode if the current measured is higher than the expected range.
HI T.TERM AVG FAULT	The dirtiness value of the photo detector is at 100%. This is only generated if Condition Monitoring is enabled for the point. The detector is still working, but should be replaced at the next regular maintenance. The current dirtiness value can be viewed using the panel interface or printed in a report.
GENERAL FAULT	This fault is raised by the FC410DDM if the current measured is below the expected range.
LATE POLL	There is a background monitor of loop point polling. This process checks when a device is polled and how long it has been since its last poll. If that time is outside a tight time scale, this fault is raised. This fault will clear when polling is within expected parameters. It is not expected that this fault will ever be announced. It is a required background process for approvals.
LOW TEMPERATURE FLT	Raised on PC detectors when the temperature sensor part has a failure or in environmental conditions below -20° C. When the fault is raised, the evaluation algorithm uses the HPO mode for alarm detection.

Table 19: Standard Point Fault States (cont.)

Logged Message	Use
MULTIPLE DEVICES	Used on the loop driver to indicate more than one device is replying to the polled address. This fault is detected only during the 120 second loop initialisation after a panel restart. It is not detected on a loop restart after a loop shutdown. The only way to clear the fault is a panel restart.
NET NO SUPERVISION	This fault is raised if a networked panel fails to receive the regular supervision poll.
NO RESPONSE	This is a general fault state used by all the point drivers. It is raised if a configured device does not respond to a poll. The device could be on the loop, an RBus unit, or a panel not responding to network supervision.
OPTICAL ELEMENT FLT	Raised on PC detectors when the optical sensor part has a failure. When the fault is raised, the evaluation algorithm uses the compensated CO mode for alarm detection.
OVERLAPPING DEVICES	This fault is raised if a second physical device is located on the loop at an address covered by the multi-IO device.
PERFORMANCE FAULT	This fault is used by the FC410DDM when monitoring a 4-20mA device. The processing bands are configured within Express.
POWER WIRING OPEN	This fault is used for the FC410BDM and is raised if the device detects a supply open circuit.
POWER WIRING SHORT	This fault is used for the FC410BDM and is raised if the device detects a supply short circuit.
RELAY COIL FAULT	Used for fault reporting on the two sounder circuits and the alarm relay on the FIM.
RELAY OR SDR STUCK	Used on the FC410SNM, FC410SIO, FC410MIO, FC410QMO, FC410QRM and FC410TSM devices. Relay cannot be switched to the state which is required by the firmware.
SIGNALLING FAULT	This fault is raised for supervised digital inputs if set for signalling operation.
SINGLE POINT POLL	If the user opts to poll a single device, the state is logged with the point address. The panel is also placed into Commissioning Mode.
SOUNDER AUX.VOLT	Raised on FC410QIO, FC410QMO, FC410QRM and FC410SNM when configured as sounder units and indicates the Auxiliary voltage is not present.
SOUNDER FAULT	Used to report faults on the sounders and AV devices, AV Bases, the FC410SNM and with the sounder circuits on the FIM. A reason for this fault could be that the auxiliary voltage is not present for the loop device.
SOUNDER LINE OPEN	Used to report faults on sounders, FC410QMO and the FC410SNM if the supervised output is open.
SOUNDER LINE SHORT	Used to report faults on sounders, FC410QMO and the FC410SNM if a short circuit is present on the supervised input.
SOUNDER NO RESPONSE	Sounder and AV devices, and the FC410SNM if configured as DC sounders or AC speakers. This fault is not raised when the device not responding has a sounder base.
TEMP TOO LOW CO FLT	Raised on PC detectors during short periods: < 10h of operation at low temperatures (-10°Cto -20°C). If the period of 10 h is exceeded, a Low Temperature Fault is produced and the evaluation algorithm uses the HPO mode for alarm detection.

Table 19: Standard Point Fault States (cont.)

Logged Message	Use
UNCONFIGURED DEVICE	This is a general fault state used by all of the point drivers. It is raised if a device responds to polls although it was not configured by EXPRESS or by the panel configuration menu. The device could be on the loop, an RBus unit, or a panel responding to network supervision.
WIRING FAULT	This fault is raised if one of the FIM sounder circuits on the FIM is configured as a 'general' output and an open or short circuit is detected.
WIRING O/C FAULT	As above, indicating the supervised input is open.
WIRING S/C FAULT	This fault applies to FC410CIM, FC410DIM, FC410BDM, FC410MIO, FC410DDM and FC410SIO devices and indicates that a short circuit is present on the supervised input.
WRONG CHAR SET CHIP	Raised by the panel if the OCM does not contain a character set chip which supports the codepage the panel wishes to use.

Table 19: Standard Point Fault States (cont.)

6 Network Card Fault Handling



6.1 TLI800EN LEDs

	ON = Emergency CPU Fault
	ON = Main CPU Fault
	Flashing = Emergency CPU running normally
	Flashing = Main CPU running normally
	Network Tx Right
	Network Rx Right
	Network Tx Left
	Network Rx Left

Left and right network LEDs pulse for each data bit. At high network baud rates on networks running normally, they appear to be ON.

CPU Fault LEDs are hardware watchdog circuit outputs. If a CPU Fault is indicated, the watchdog is holding the CPU in its reset condition until the reset button is pressed.

For normal operation:

Test mode	SW3-8 = OFF
Firmware download	SW1-8 = OFF SW2-8 = OFF
Watchdog	SW2-6 = ON SW2-7 = OFF
Test mode	SW3-8 = OFF

The following sections cover the faults raised when a monitored condition fails.

6.2 PNI800 LEDs and Switches

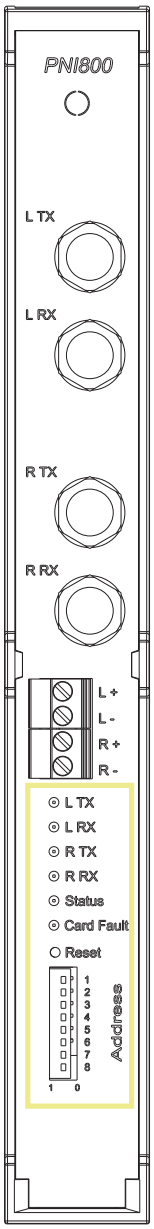


Fig. 3: PNI800 Network Interface Card

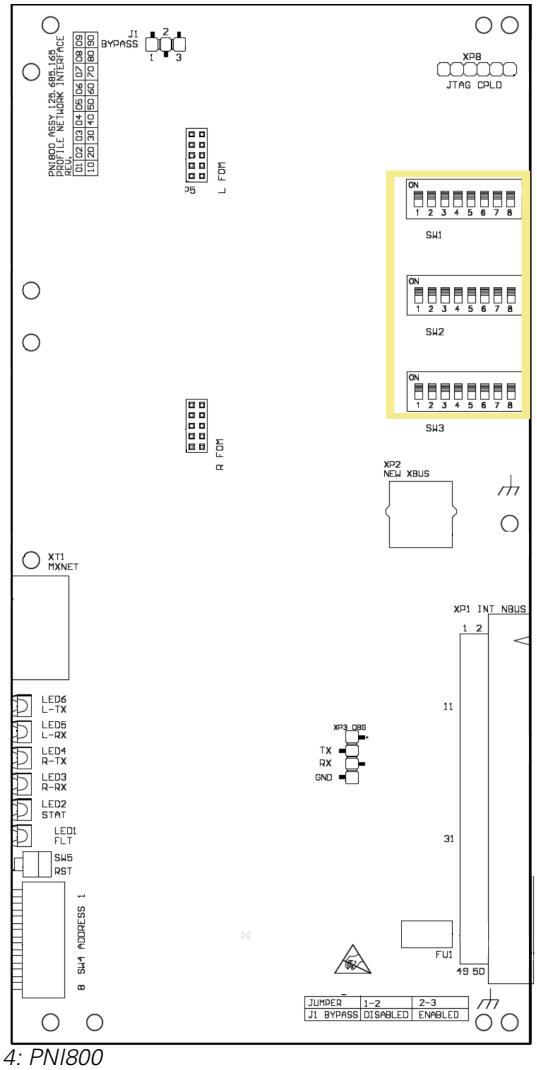


Fig. 4: PNI800

LED		State	Description
Red LED	Network Tx Left		Left and Right network LEDs pulse for each data bit. At high network baud rates on networks running normally they appear to be ON.
	Network Rx Left		
	Network Tx Right		
	Network Rx Right		

LED		State	Description
Green LED	Status (of microprocessor), green	On	Microprocessor failed (Emergency MCU)
		Blink	On 0.5, off 0.5 Normal function On 0.1, off 0.1 Emergency operating mode – Emergency MCU is active On 0.9, off 0.1 Configuration mode – in standby waiting for network configuration On 0.1, off 0.9 Firmware Update Fault – the emergency MCU is different to the main MCU firmware
		Off	Loss of power or in firmware update mode
Yellow LED	Card fault	On	PNI800 processor failed – system fault from main MCU or emergency MCU
		Off	No fault

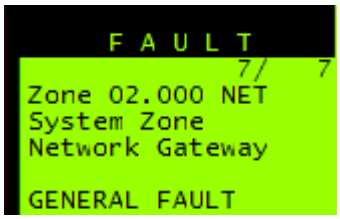
Card Fault LED is a hardware watchdog circuit indicator.

If a Card Fault is indicated the watchdog is holding the CPU in its reset condition until the reset button is pressed

For Normal Operation:

Network Left and Network Right Terminators enabled (Default)	SW2-3 = OFF SW2-4 = OFF SW2-5 = OFF
Network Left Terminator disabled	SW2-3 = OFF SW2-4 = ON SW2-5 = OFF
Network Right Terminator disabled	SW2-3 = OFF SW2-4 = OFF SW2-5 = ON
Network Left and Network Right Terminators disabled	SW2-3 = OFF SW2-4 = ON SW2-5 = ON
Commissioning mode	Address SW4-8 = 0 (OFF)
firmware download	SW1-8 = OFF SW2-8 = OFF
Test mode	SW3-8 = OFF

6.3 Comms Fault

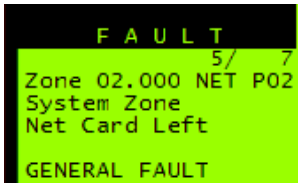


"Network Gateway" indicates a problem between the panel and the TLI800EN card, or the panel and the PNI800 card.

Actions:

- Check the cable connection between TLI800EN card and FIM COM3.
- PNI800 check that the card address switch setting (next to the LEDs) matches the card address for the PNI800 in Express.
- Check that the TLI800EN/PNI800 has a power supply and that the CPUs are running (Status LEDs).
- Check that the TLI800EN Dip Switch settings for 'Host interface baud rate' as set in FireClass Express, Panel Details dialog box.

6.4 Open or Short Circuit - Left



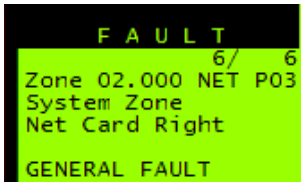
"Net Card Left", there is an open or short circuit from panel 3 to the adjacent panel.

This applies to open circuit on FOM800 connections.

Action:

- On a Star or a Bus: the last node on the left should have left fault reporting disabled in Express.
- If the next node on Left is a PNI800: check PNI800 network terminator SW2 settings.

6.5 Open or Short Circuit – Right



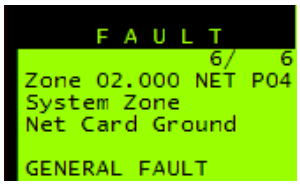
"Net Card Right", there is an open or short circuit from panel 2 to the adjacent panel.

This applies to open circuit on FOM800 connections.

Action:

- On a Star or a Bus: the last node on the right should have left fault reporting disabled in Express.
- If the next node on Right is a PNI800: check PNI800 network terminator SW2 settings

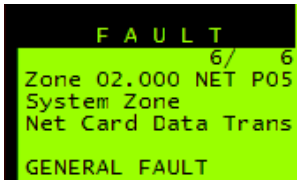
6.6 Network Ground Fault



The network card connected to panel 2 is reporting an earth fault (pseudo point 4: 'Net Card Ground').

The fault is enabled as option for 'Network Ground' on the network card configuration dialog.

6.7 Network Card Data Transfer Fault



The network card connected to panel 2 is reporting a data transfer fault (pseudo point 5: 'Net Card Data Trans').

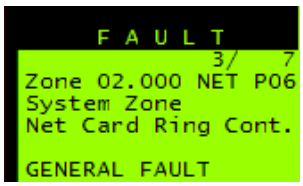
Failures could be:

- Failure to obtain a correct network acknowledgement to transmitted data, that is, a network supervision reply.
- Network data is being received with incorrect sequence numbers, indicating data is being lost. Broadcast messages use sequence numbers.
- Corrupt packet detected inside TLI800EN buffer, data is being lost.

Actions:

- Check all network cards use the same configuration settings.
- Check all nodes are online.
- Check for any ground faults.

6.8 Ring Continuity



The network card connected to panel 2 is reporting a network wiring fault (pseudo point 6: 'Net Card Ring Cont.').

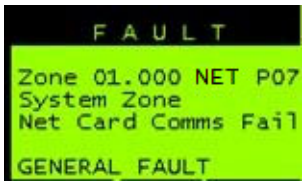
It is expected that the network is wired as a ring and data sent one direction is received back at the network card from the other direction.

Transmissions from this panel's network card are failing to make a full circuit around the Ring. Packets sent to one side of the Ring are not detected from the opposite side of the Ring.

Action:

- It is important that network cards use the correct SW1-6 setting: SW1-6 = OFF if the part of the network at this node could possibly have a return path to that node. SW1-6 = OFF if this node does not.

6.9 Net Card Comms Fail



Comms fault reported from the network card to panel 1 (pseudo point 7: 'Net Card Comms Fail').

Causes:

- The link between Emergency CPU and Main CPU if Emergency CPU Fault LED = ON.
- The link between Emergency CPU and Emergency Display if used (SW2-2 = ON).
- The link between Main CPU and local panel (Fault Report used in the absence of other traffic to retry serial communications).

Action TLI800EN:

- Check the serial connection to the TLI800EN card for any damage.

6.10 Network traffic diagnostics

From Version 22.0 a panel menu option is available to print information from all the network cards in the system.

The function is accessed by first logging in to the panel and then selecting:

7-Service > 3-Diagnostics > 8-Net Card Info

The information is on the GUI at System Status > Network > FC Net.

These network statistics indicate how well the panel network has been running before waiting to see if any new faults are logged in the Fire Panels or starting new tests for network performance.

The counters continually increment in each network card gathering numbers of good and bad messages from the left and from the right network ports.

Error counts are accumulated into different groups to help to pinpoint network sections suffering from noisy interference or intermittent faults.

It is not necessarily the counts themselves that are important but changes to the values. Get a printout of the network state, then another after a period of time and compare the figures.

The figures for each node include:

- The state of all monitored network fault events.
- Next Active Logical Address.
- Source of 'Flow Control = On'.
- Left/Right Port:
  - Good Messages
  - Serial Errors
  - Incomplete Messages
  - Checksum Errors
- Packet counts:
  - Sent
  - Received
- Seconds Count:
  - 'Count Up Time' time since the figures were reset.
  - Full Up Time, time since the network card was restarted.
- Analogue Measurements:
  - Left ADC, Right ADC and Network Ground.

Left ADC, Right ADC and Network Ground are 10 bit average values of multiple readings taken over the last few seconds that are used to help detect network partial open circuit and partial short circuit faults and earth leakage faults.

The fault thresholds are:

- OPEN CIRCUIT FAULT = 12F or less (303 in decimal)
- SHORT CIRCUIT FAULT = 281 or greater (641 in decimal)
- GROUND LEAKAGE FAULT = 26C or less (620 in decimal)
- Once in fault there is hysteresis used in the processing of these averages, so faults should clear when:
- Left/Right readings are within 134 to 27D (308 to 637 decimal)
- Ground readings are above 28B (651 in decimal)

Network statistics are also available from Checker. Checker provides figures and highlights changes between readings.

6.11 High Level Checks

General

- Are all the network cards connected L to R of their neighbouring card throughout the ring network?
- If there is a Graphics system on the network has its network parameters been updated?
- Are the network cables screened and if so is the screen correctly connected to a clean earth?
- Are the network cables routed away from power and data cables that can be a source of inference?

TLI800EN Specific

- Is the host interface baudrate of the TLI800EN set to match that set for COM3 in the configuration tool for this node?
- Has the network card been reset after downloading an updated network configuration to the panel?
- If the network card has previously been connected to a different host panel have you performed a SW1-7=ON reset (or an address 127 reset) procedure to erase any old data?
- Are the network cables within the required resistance and capacitance values as specified in the TLI800EN Fixing Instructions?

PNI800 Specific

- Is the Address switch on the front of the card set to the address of the PNI800 slot card address configured in Express.
- The SW3 settings are used for the network panel or node address as necessary. It is not always required for the panel but to use the network card in commissioning mode (SW4-8 = ON) then SW3 should be set for the panel address.

7 Wiring Reminders

Summary of EOL and Alarm Resistors used with various Modules. For more information, refer to the individual device document.

RBus (FIM80x)	Terminate 150Ω at FIM and 120Ω at last device on Bus.
RBus (FC-FI)	Terminate 120Ω at last device on Bus (no termination required at FC-FI).
FC410CIM	EOL 200Ω / Alarm 100Ω
FC410DIM	EOL 4k7
FC410MIM	EOL 200Ω / Alarm 100Ω
FC410MIO	EOL 330Ω / Alarm 150Ω
FC410DDM	EOL 4k7 / Alarm 560Ω
FC410QIO	EOL 3k3 / Alarm 680Ω
FC410QMO	EOL 27k
FC410TSM	EOL 3k3 / Alarm 680Ω
FC410SNM	EOL 27k Note: 0.5w
FC410SIO	EOL 3k3 / Alarm 680Ω
SB520	EOL 270Ω Note: 6w

FIM80x connectors

Sounders 1 and 2 Real points 1 and 2	EOL 2.7k
Supervised I/P Real point 6	EOL 10k / Alarm 2k

FC-FI Connectors

Sounders 1 and 2 Real points 1 and 2	330 uF / 50V capacitor
Supervised I/P Real points 6 and 19	EOL 10k / Alarm 2k

7.1 RBus units

If the RBus is not used, a 150 Ohm resistor should be fitted at the panel.

If the RBus is used for items such as DCMs, CUIs and MPMs, the last unit should be fitted with a 120 Ohm resistor

The FC1D2 has a built-in EOL.

All end-of-line components are supplied in the package with the panel.

8 System Fault

8.1 Overview

Within the FIRECLASS panel there are both visible and audible indications for 'System Fault', which are required for compliance with the EN54 standard. This section outlines the functionality of the visual indications.

The "System fault" LED is visible on the front door of the panel. The drive to the LED is a latching circuit which turns on the LED when triggered and pulses the buzzer. To clear the LED and silence the buzzer, reset the latching circuit by using the push button on the back of the board.

8.2 Hardware

The drive to the latching circuit is effectively a wired OR'ed connection of all the system processors watchdog drives. It is arranged so that if any processor resets, a "System Fault" will be indicated.

A limitation is that the "System fault" LED cannot indicate exactly which processor has reset, just that one of the processors has reset. The panels log can report if the main CPU has reset, but there is no mechanism to indicate which peripheral processor has reset.

8.3 Software Triggers

The panel firmware is designed so that under extreme circumstances it can generate a "System Fault". There-are two levels of system fault:

- The "Partial Operation" indication of "System Fault. The panel is partially functioning.
- The "Safe State" indication of "System Fault". The panel has stopped running.

These are described in the following sections.

8.3.1 Partial Operation

If the front cover display test fails, a fault is raised. Additionally, as required by EN54, the panel firmware detects this and triggers a "System Fault". The system is still functioning albeit with a corrupt or non-existent display (that is, the primary fire display has been lost).

8.3.2 Safe State

The following fault conditions place the system into "Safe State":

- Firmware Boot ROM Checksum failure
- Firmware RAM test failure.
- Firmware FLASH test Failure
- Configuration FLASH test failure.
- Configuration RAM test failure.

If the firmware encounters any of these conditions, the system is held in a "Safe State" (panel not running) by performing the following actions:

- Write to Non-Volatile memory a signature indicating that a "System Fault" has occurred.
- Reset the system via watchdog timeout. This will cause a "System Fault" indication.
- On restart, the Non-Volatile memory is read. The signature ID is found indicating a fault and the system halts.

8.3.3 Recovery From Safe State

To recover the system from "Safe State" (as described above) the system state must be cleared. Perform these actions:

- Fit header link H2 on the CPU card.
- Reboot the system and wait at least 30 seconds.
- Remove header link H2 and reboot the system.

9 Emergency Mode

If the Panel's main processor (MCPU) stops working for any reason, the loop processor and network card will switch into emergency mode after a short period of time. This happens unless emergency mode has been disabled in the configuration. For the loop processor, emergency mode means that fire alarms can still be raised on loop input devices which have been designated as fire inputs, and the switch on outputs that have been designated emergency outputs whenever a fire alarm is raised.

When the panel switches into emergency mode, the only way to exit it is by operating the MCPU master reset button.

9.1 Enabled/Disabled Feature

The following table contains information about the different platform capabilities regarding enablement/disablement of the emergency mode feature.

Platform base	Ability to disable
FIM80x + CPU80x based	This feature can be enabled/disabled freely in the configuration tool.
FC-FI based	The feature is permanently enabled in the configuration tool since the hardware has been designed for the watchdog to permanently hold the MCPU in reset (until a manual intervention).

9.2 Feature Capabilities and Constraints

Feature	Platform Base	
	FIM80x + CPU80x	FC-FI
Every configured point on the Loop Processor is sent its full panel address, including its Zone. **Note(s)**: This does not include the point and zone labels because the space required would be prohibitive.	×	✓
Ability to drive the user interface (GUI) with point alarm information so it is displayed to the user. For more information, see the "User Interface Capability in Emergency Mode" section.	×	✓
Loop Output control: Outputs on other loops are affected regardless of the alarm source, for example, it is possible for an alarm originating on L01 to activate one or more outputs on L04. **Note(s)**: ■ Requires the ability for each card to read emergency alarm signal. ■ If this feature is not supported then only outputs on the loop where the alarm originated will be activated.	×	✓
Non-Loop Output control: When an emergency alarm is generated, activate the local sounders when the relevant switch/jumper is set appropriately.	✓	✓
Non-Loop Output control: Routing of signalling acknowledge (FIC) to the 'local' user interface for the signalling acknowledgment LED.	✓	✓

Table 20: Feature capabilities and constraints

[1] GUI version 2.7 or later supports the ability to silence sounders, to disable active points and to perform a fire reset while the panel is running in emergency mode (main CPU failure). It can do this from Ethernet GUIs that have been configured with a monitored backup RBus connection. This function requires a panel with firmware version 29 or later and Loop Driver firmware v1.11 or later.

Non-Loop Output control: Routing of emergency alarm signal to the 'local' user interface for the ALARM LED.	✓	✓
Non-Loop Output control: Front Cover Buzzer Activated.	✓	✓
Ability to silence sounders once an emergency alarm has been activated.	×	✓ See note 1.
Alarm coincidence between zones.	×	×
Alarm coincidence within same zone.	×	×

Table 20: Feature capabilities and constraints
[1] GUI version 2.7 or later supports the ability to silence sounders, to disable active points and to perform a fire reset while the panel is running in emergency mode (main CPU failure). It can do this from Ethernet GUIs that have been configured with a monitored backup RBus connection. This function requires a panel with firmware version 29 or later and Loop Driver firmware v1.11 or later.

9.3 Configuration

Correct emergency mode operation depends on configuration, which ultimately is controlled by the configuration tool. The settings of the cause and effect control which points are classified in emergency mode as "Alarm inputs" and/or "Alarm outputs".

As an example, in order for points that are assigned to a cause which has the checkbox "points in this cause are Alarm input" checked provides call-point behaviour to also raise an alarm in emergency mode. Similarly, for an alarm output point to be activated on a fire alarm when emergency mode is running, the effect must have the checkbox "Emergency Output Processing" checked.

Without the correct configuration setup any of the following is possible:

- Inputs that you want to raise alarms in emergency mode don't raise alarms.
- Outputs that you want to switch on due to an alarm don't get switched on in emergency mode.
- Inputs that you do not want to have activation processing on in emergency mode are processed in emergency mode.
- Outputs that you do not want to be switched on in emergency mode switch on in emergency mode.

9.4 Card Support

9.4.1 Local Loops/PLX800

The switch over to emergency mode operation occurs automatically after it detects a period of silence for 90 seconds between itself and the Main CPU (MCPU).

Indication

A loop processor shows it is running in emergency mode using an LED. The lit LED depends on the platform, see the table below:

Platform base	Emergency Mode Indicator LED
FIM80x	An emergency mode status LED associated with each loop is switched ON when running emergency mode.
FC-FI	Each processor controlling the Local Loops/PLX800 has its own common status LED which blinks at a rate of 100mS On, 100mS Off when in emergency mode.

Alarm Detection

The loop driver provides simple threshold detection for all the devices marked as "Alarm Inputs". It is not possible to have complex algorithms in the loop driver due to program space constraints. On detection of an alarm condition, two things happen:

1 The local "Emergency Alarm" bus signal is driven.

2 The Activation of "Alarm outputs" see the Output Activation section.

Output Activation

Outputs such as sounders are marked as "fire outputs" on the Effects dialogue box. These outputs are activated by the loop driver in the case of emergency mode alarm detection.

Note(s):

- In the case of the FIM80x/XLM800 card, the activated outputs are restricted to those on the same loop as the detected alarm. On a FC600 and FC700 series system, outputs activated in this way can cover all the loops.

9.4.2 Network Card

The switch over to emergency mode operation occurs after a period of 50 seconds silence on the connection between itself and the panels Main CPU (MCPU).

Note: The PNI800 has the signals required for emergency mode built in to the backplane. The TLI800-EN must be manually wired to achieve emergency mode functionality.

Indication

The network card shows it is running in emergency mode using an LED if one or other of the local processors is held in reset by its watchdog. The lit LED depends on the platform, see the table below:

Net Card Type	Emergency Mode Indicator LED
TLI800EN	Either green LEDs will be OFF or steady state ON. **Note**: Under normal operation the LED is pulsing 0.5S On / 0.5S Off.
PNI800	The card has a common status LED. If the cards main processor fails with watchdog then the emergency processor blinks the status LED at a rate of 100mS On / 100mS Off indicating emergency mode. **Note**: Under normal operation the LED is pulsing 0.5S On / 0.5S Off.

Alarm Detection

The network card continually monitors the state of its local panel's emergency alarm signal. This signal combined with a defective network card host link determines whether additional action is necessary.

Output Activation

The network card has the capability to drive the emergency alarm signal if and when it deems it necessary. This line will be driven by the network card if it finds an 'alarm in panel' packet has been received from the network at the same time it has a defective network card host link. In addition, the PNI800 has the capability to drive an 'alarm in panel' LED display board.

Scenarios

- There are a number of panels on a network and one of the panels has a faulty MCPU. As a result, the PNI800 is unable to communicate with the panel and the panel's Local Loops/PLX800 enter emergency mode due to the lack of communication with the MPCU. If an alarm is raised by, for example, the PLX800, the EMERGENCY ALARM signal is driven. Under these conditions the PNI800 determines if it needs to broadcast an 'alarm in panel' packet to the network.

- There are a number of panels on a network and one of the panels has a faulty MCPU, resulting in the PNI800 card being unable to communicate with the panel. Under these conditions the network card will go into emergency mode (the emergency processor takes over). Although the host link is down, if there is now an alarm raised from another panel on the network, on receiving this alarm the network card drives its EMERGENCY ALARM signal thereby raising an alarm in its local panel.

9.5 User Interface Capability in Emergency Mode

In both sections below, any communication with the user interface is achieved using the emergency RBUS driver in local loop/IO processor.

9.5.1 GUI and Display Repeater

On a FC700 series panels (FC-FI based) the GUI can display alarm point information (Note 1) on its LCD display when the panel is in emergency mode. To do this, these are the requirements:

- A FC1DS GUI fitted as the primary GUI, running version 2.5 or greater firmware.
- Local Loop/IO firmware must be at version V1.8 or higher, so that it can utilise RBUS transport to get the information to the GUI and provide the 'emergency' loop bus master polling of local PLX800 cards.
- FC-FI switch settings: Set the SW6 switch according to instructions in the FC700 Series Panels Installation Guide.

- Optionally if fitted, the display only repeater(s) GUI also displays the alarm point information (Note 2) since they are connected via RBUS.

Operation

On entering emergency mode the 'local' Loop and I/O processor takes over as the 'emergency' loop bus master. This maintains its own loop(s) and also polls other PLX800 cards fitted locally to see if they have an alarm condition present. In the event of an alarm condition being detected by either itself or by another PLX800, it broadcasts the fire information to the GUI using the RBUS multicast facility, targeting all nodes. This information contains the address of the point which is reporting the alarm, including the logical point and logical zone if configured. On receipt of this information the GUI displays the alarm on the LCD display along with any associated point data it has in its database (this would have been previously cached from the MCPU prior to its failure (Note 3). An example of this data would be the zone and point label. In addition, if the fire is in the first limited set of zones (1-16), the GUI sets its appropriate zone LED flashing.

Note(s):

1 Alarms from other panels on the network only display as a basic alarm, there is no point address information.
2 Only the basic point address information is displayed since the display only repeater(s) do not hold the additional data for zone and point labels locally.
3 The universal address string for the point in alarm is displayed even if the string descriptions are not available from cache. The display repeater does not receive / cache the strings or FC1DS which was power cycled after the MCPU failure.

Panel monitoring of RBUS connection

Under normal operation the GUI uses Ethernet as its primary communication path with the panel MCPU. However, when the system is operating in emergency mode it uses the RBUS to communicate with the GUI.

Even when the panel is operating normally, the expectation is that the RBUS emergency node connection is monitored by the MCPU. This allows a fault to be raised as soon as possible after an RBUS communication problem arises. To ensure it works correctly, add the GUI RBUS node to the configuration. This RBUS node will effectively have no point configuration.

Old User Interface OCM800/DCM800

On a FC-FI based panel, all the old user interface styles based on and including the OCM800 provide the following indications that emergency mode is running.

- The Fault LED flashes 0.5 secs On, 0.5 secs Off. See Note 1.
- The LCD display will show "SYSTEM FAULT". See Notes 2 and 3.

Note(s):

1 The system fault LED is not directly controllable, therefore it is not used for this purpose.
2 The message SYSTEM FAULT is not translatable, that is it's a fixed string held by the local IO/Loops processor on the FC-FI.
3 There is no point information about the source of the alarm on display.

9.6 Additional notes

When the system enters emergency mode, if an alarm is raised, the sounder circuits can be driven automatically by hardware.

The FC-FI local I/O processor monitors the sounder states. The activation of sounders directly by the hardware will be registered as a change from their expected (software controlled) values. This difference will be reported as a fault to the main processor.

If the reason the system is in emergency mode is the loss of the main CPU, then that is okay.

If the reason is the failure of another card, then an alarm in emergency mode will raise the 'Relay or SDR Stuck' fault.

10 System Processor 'UNEXPECTED RESTART' Fault

From Version 30.0 the new event 'UNEXPECTED RESTART' has been added and will be raised whenever it has been determined that a processor on the panel has restarted unexpectedly.

10.1 FIM80x and FC-FI Based Panels

The table below outlines how 'UNEXECTED RESTART' can be produced by each processor in the system for both the FIM80x and FC-FI based panels:

Processor in system	CPU80x + FIM80x based panels, how fault is raised	FC-FI based panels, how fault is raised	Point on which fault is raised	Applicable Note(s)
Local IO	Hardware Watchdog.	'Local' associated reset button pressed.	System Pseudo Point 26	[1]
Loop	Hardware Watchdog.	'Local' associated reset button pressed. If PLX800 Card is 'Hot' unplug and plug back in.	The Loops Pseudo Status Point	[1]
OCM/DCM800	Hardware Watchdog. Live cable removal then re-connect.		The RBus addresses Node point, for example "RBus 00"	[1],[2]
CUI		Hardware Watchdog. Live cable removal then reconnect.	The Service Bus addresses Node point, for example "RBus 00"	[1],[2]
MCPU	Power-up reset. Hardware Watchdog. Master Reset button.	Power-up reset. Live cable removal then reconnect.	System Pseudo Point 87	[1],[3]

Notes:
[1] In all cases the UNEXPECTED RESTART fault can and should be cleared by a fire reset.
[2] UNEXPECTED RESTART fault currently only applicable to RBus 00 (Front Cover).
[3] The UNEXPECTED RESTART fault is always raised when the restart is triggered by hardware, if the restart is triggered by software from an expected source, for example from Express, then the fault will not be raised.
This feature is only available to projects created by Version 30.0 or later Express.

FC-P-FF, doc. version 7.0, 23. March 2022
Further information about FIRECLASS can be found on the Internet at
www.fireclass.com

Company stamp

FIRECLASS