

VS-MKII Control System



Installation, Operation and Maintenance Manual

Publication Information

Development

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Pre-Face

Document History:

Version	Summary of Change
1.0	Original
1.1	Page 3 - Changed contact number Page 8 - Primary power monitoring - changed "<20 Volts" to "<17 Volts" Page 11 - Updated figure 9 Page 13 - Updated tables 2 & 3 Page 24 – Updated table 9

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About this manual:

This manual is written for those who perform tasks associated with the installation, operation and maintenance of the VS-MKII Control System.

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Intended use:

A VS-MKII Control System is installed as part of a fire risk reduction strategy, as defined in a Fire Risk Assessment.

Topic 1: VS-MKII Control System

Introduction

Designed to comply with and tested to the requirements AS 5062, the VS-MKII Control System (“MKII”) comprises a control module, a remote display panel and audible alarm unit. The display panel provides visual indication of system status, alarms, and faults and also allows manual extension of the equipment shutdown delay.

Most industrial environments produce high levels of electrical noise, so the MKII has been compliance tested to Australian Standard AS 61000.6.2:2006 for immunity to electromagnetic interference.

To minimize the effects of electromagnetic emissions from high energy sources the MKII input cables should **NOT** be run parallel, or in close proximity to any cables or equipment that may produce high RF (radio frequency) energy, e.g. cabling for RF transceiver antennas, inverters, motors etc.

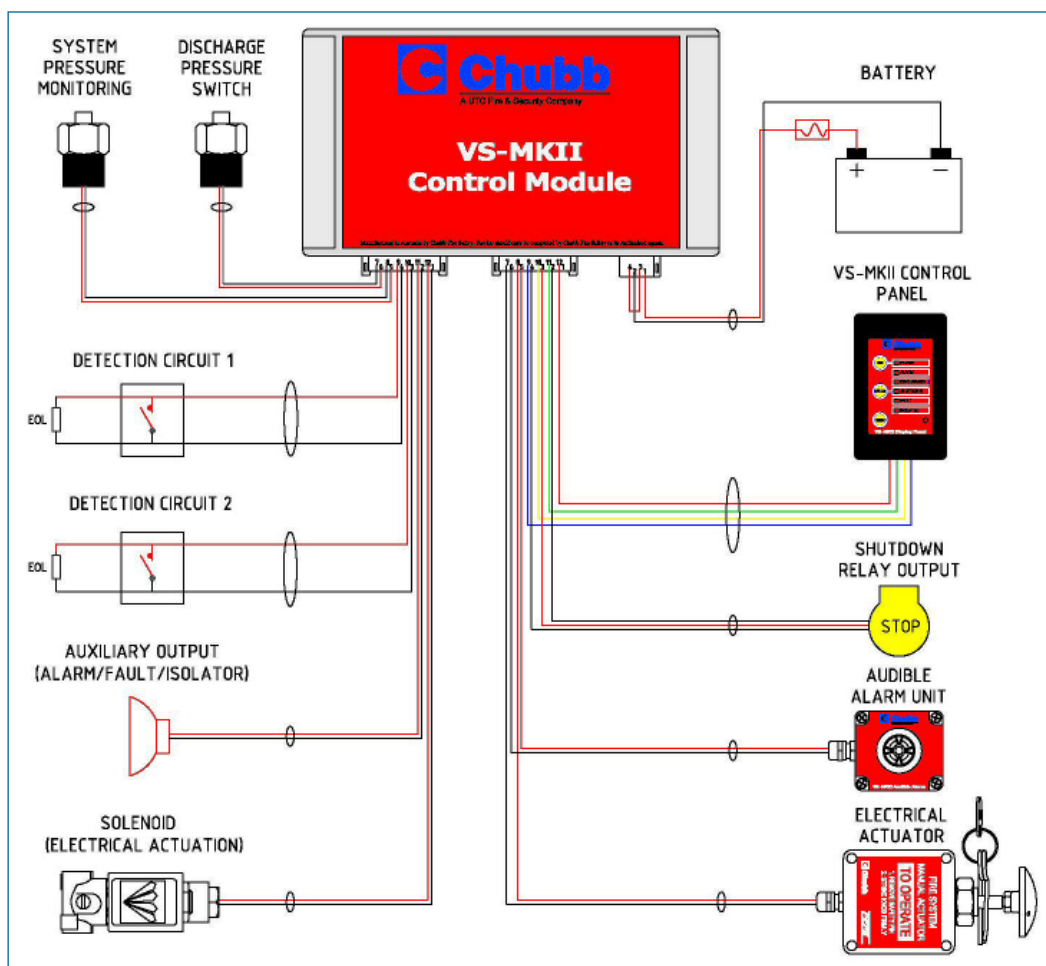


Figure 1 – Typical MKII layout

All wiring and electrical connections must be installed in accordance with the customers requirements and/or the equipment manufactures specifications. Power supply and equipment shutdown connections should either be completed by the Customer/OEM or an approved contractor.

The MKII incorporates a rechargeable back up battery which will ensure a reliable alternative power source if required.

The system design allows multiple configuration and programming options.

Standard features

- IP 65 rated control box
- Cylinder low pressure switch input
- Discharge pressure switch input
- Equipment shutdown output
- AS 5062 compliant features
- Supervised primary power supply
- Rechargeable Battery back-up
- Supports electrical detection
- Supervised detection circuit inputs
- Single or dual circuit detection options
- Supervised electrical manual release input
- Supports electrical actuation
- Supervised actuation output
- Variable engine shutdown delay periods 0 - 240 seconds
- Variable shutdown delay extension period 0 - 240 seconds
- Slimline operator display
- Ultrabrite mini LED's
- Auto diming of LED's
- Manual dim push button
- Discharged confirmation LED
- System isolated LED
- Varying audible alarms dependant upon operating state
- Vibration and shock tested
- Event log with time and date stamp
- IP65 rated Deutsch connectors
- Operates audible and visual alarms and engine shutdown even when manually discharged

Models

The VS-MKII control system is available in kit form and can be configured with one or two actuation outputs (for use with Dual agent systems).



Figure 2 - VS-MKII Control System kit - Part No. 001-998



Figure 3 - VS-MKII Dual Control System kit- Part No. 001-999

Power Supply

The MKII operates on a 24 Volt primary power supply (20-30 Volt range). If the system is installed in equipment that uses a 12 Volt power supply, a separate voltage converter will need to be installed to boost the voltage. The system is protected from voltage surges up to 58 Volts

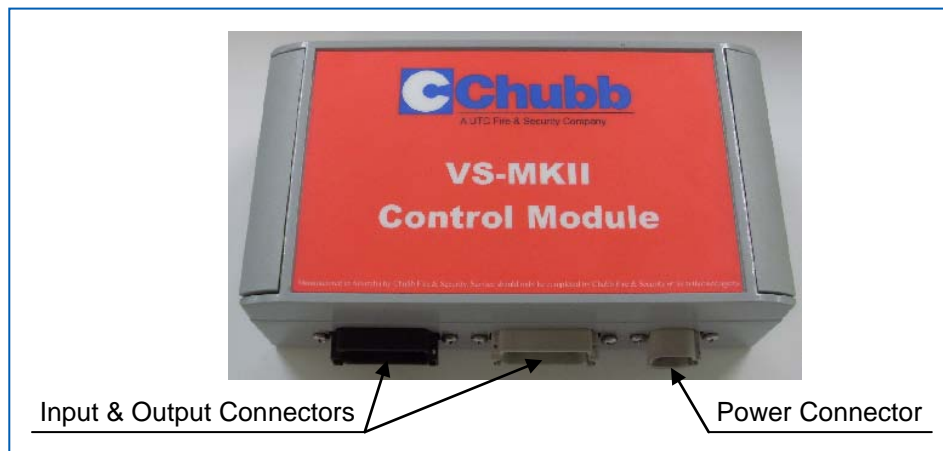


Figure 4 – Control module connections

The preferred power supply arrangement for the MKII is through an isolator or ignition circuit (Fig. 5).

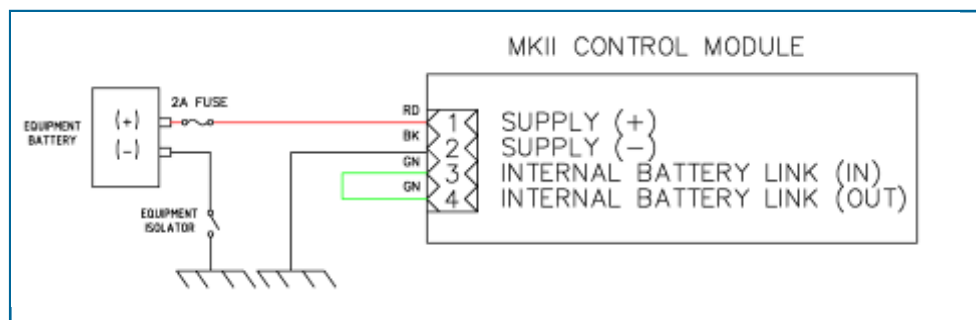


Figure 5 – Power connector

Primary power monitoring

- When primary power is low (<17 Volts), lost or isolated a visual and audible power fault will initiate after 10 seconds.
- All power faults are non-latching.
- The fault reporting of over a voltage condition is masked to allow for equipment that may be prone to power fluctuations during normal and peak operation

- When the panel receives > 31 volts for a period in excess of 10 seconds the amber 'POWER' LED will light up (Fig. 6) but no audible or visual fault will be generated. In this state, the batteries will not be under charge.

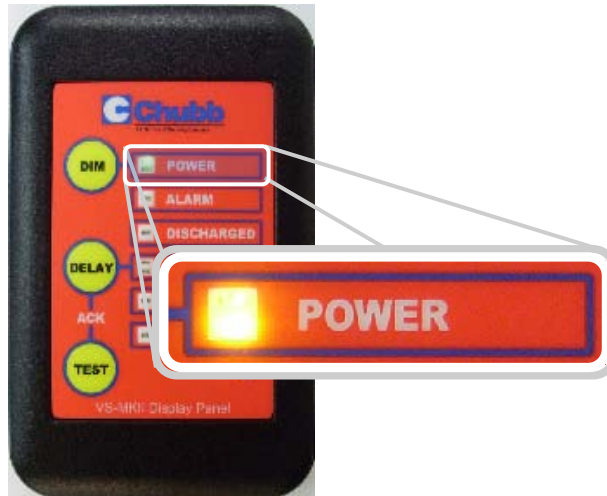


Figure 6 – Over voltage

Note: The green 'POWER' LED remains lit in this state to indicate that the panel is operable but visually the amber LED will appear brighter.

Rechargeable back up battery

The rechargeable battery pack provides an emergency power supply in the event that primary power is lost or isolated. The system will be in fault when it is being powered by the back up battery but will still be operable for a minimum 96 hours (typical) provided that the battery is fully charged (2 hour charge time).



Figure 7 – Back up battery

When the battery voltage drops below 11 volts the Amber Power LED will flash continuously until the voltage drops below 9.8 volts. At which time the system will shutdown to prevent over discharge or damage to the battery.

Topic 2: Installation

Depending on the type and size of equipment requiring protection, the MKII can be configured with multiple actuation and detection devices.

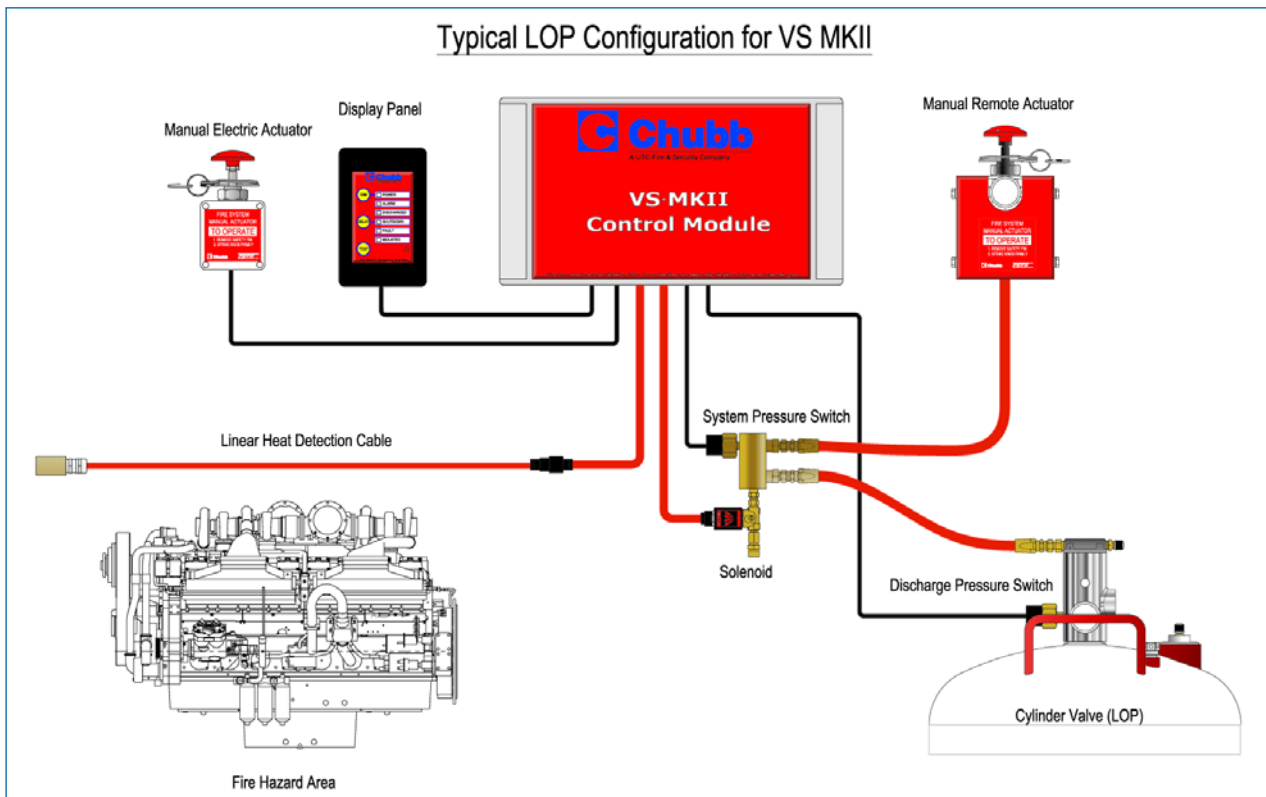


Figure 8 – Typical fire system configuration

The MKII can be customised to suit just about any application. The settings that can be altered and the degree to which they can be customised are detailed in the 'Channels' section on Page 11.

Each component of the MKII must be located and positioned according to its function.

Before installing any system component you should assess the intended location will;

- Provide access for operational and maintenance purposes.
- Provide a high degree protection from potential damage
- Be compliant with the Chubb specifications and customers requirements.

The recommended wire gauge size for all power, inputs and outputs of the MKII is as per the following table;

Diameter	AWG size	Amp Capacity
0.75mm	18	6

Table 1 – Wire gauge

Control Module

The control module (Fig. 4) comprises an IP65 rated enclosure and IP69 rated Deutsch DT series connectors and is the heart of the system. It can be installed with the factory (“default”) settings or configured to suit a specific requirement. The modules’ pin configuration is displayed in Figure 9.

Inputs

- **2 x detection circuit inputs** (supervised). Suitable for linear heat detection cable or thermal probes. The control panel can be configured for four different detection functions. The default configuration is single circuit detection.
- **1 x manual discharge input** (supervised). Operation of a switch connected to this input will initiate alarm, system discharge and equipment shutdown functions.
- **Cylinder pressure switch input**
- **Discharge pressure switch input**
 Note: both pressure switch inputs are configurable for N/O or N/C operation. The default configuration is N/C (contacts closed = normal operation, contacts open = fault/discharge).

Outputs

- **Actuation output** (supervised) 1A @12V DC. The actuation output is capable of operating:
 - A single 12V 12W solenoid, or
 - Up to 5 x .5amp squibs.**Note:** The MKII Dual system has a second actuation output with the same capability as the first.
- **Shutdown output.** Selectable contacts, N/O or N/C (default N/O), latching 3 pole relay clean contact capable of switching 2A @ 30V DC.
- **Auxiliary output.** Selectable N/O or N/C (default N/O), latching relay clean contact capable of switching 2A @ 30V DC.
- **Buzzer output (supervised).** Used to power buzzer for audible notification of fault, alarm and shutdown functions.







Pin	Description	Connector	Description	Pin
Connector 3 - Power (Grey)				
3	Internal battery link (in)		Power Supply 24vlt (+)	1
4	Internal battery link (out)		Power Supply 24vlt (-)	2
Connector 2 – Input/Outputs (Grey)				
12	Display Power (+ve) Red		'Unassigned'	1
11	Display Power (-ve) Green		Shutdown relay n/c	2
10	Display comms (low) Yellow		Shutdown relay com	3
9	Display comms (high) Blue		Shutdown relay n/o	4
8	Manual release input (-ve)		Audible alarm unit (+ve)	5
7	Manual release input (+ve)		Audible alarm unit (-ve)	6
Connector 1 - Input/Outputs (Black)				
12	Actuation output 1 (+ve)		Actuation output 1 (-ve)	1
11	Aux output relay		Aux output relay	2
10	Detection circuit 2 (+ve)		Detection circuit 2 (-ve)	3
9	Detection circuit 1 (+ve)		Detection circuit 1 (-ve)	4
8	Cylinder low pressure (+ve)		Cylinder low pressure (-ve)	5
7	Discharge pressure switch (+ve)		Discharge pressure switch (-ve)	6
Connector 4 – MKII Dual Only (Grey)				
2	Actuation output 2 (-ve)		Actuation output 2 (+ve)	1

Figure 9 - Control module pin configuration

Configuring the module

It is recommended that any configuration changes that are required to the default settings be carried out before installation. It is preferable to use an external power supply to make configuration changes. When a stable primary power supply is present the 'PRIMARY POWER OK' LED on the PCB (Fig. 10) will be lit.

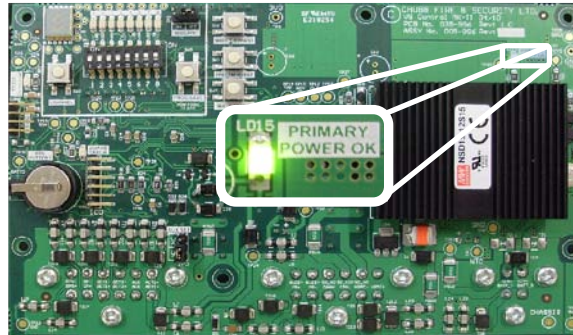


Figure 10 – Primary power LED

If an external power supply is not available, the back up battery circuit can be used to make the required configuration changes. All MKII modules are supplied from the factory with a charged battery

To activate the back up battery on the MKII module (Fig. 11), a loop (Fig. 12) must be made between terminal 3 & 4 (Fig. 13) on the module's power supply connector (Fig. 14).



Figure 11

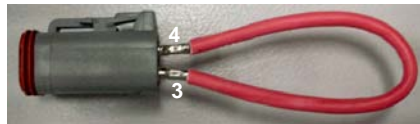


Figure 12



Figure 13



Figure 14

User interface

The default settings on the MKII can be changed via a software interface or manually via the user interface which is located on the PCB. Settings are manually configurable using a simple channel and dip switch system which is displayed in Figure 15.

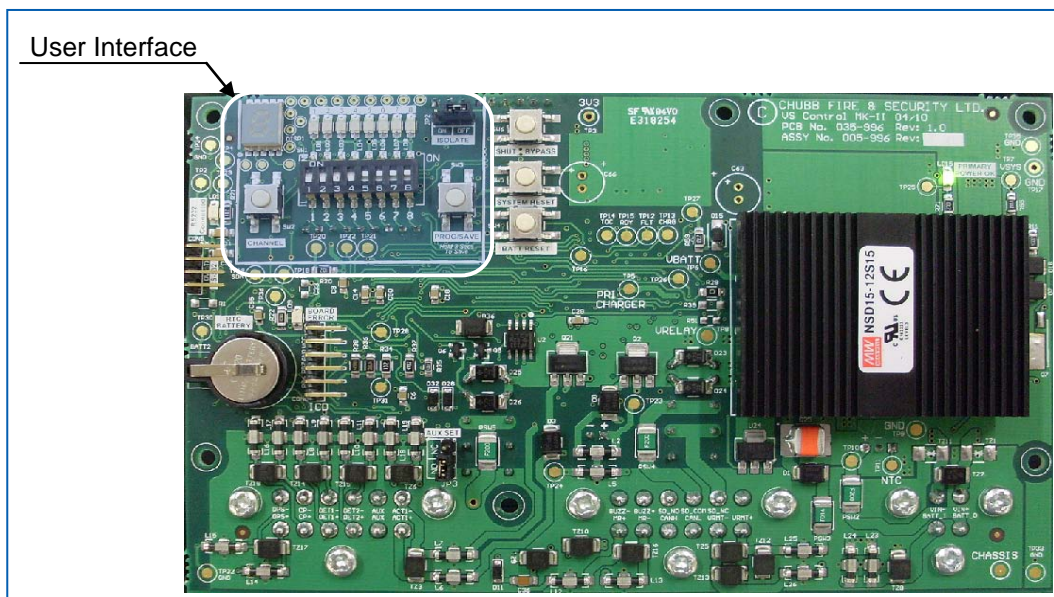


Figure 15 – User interface module PCB

The user interface is surrounded by a thick white border and the controls and indicators consist of;

- A push button labelled 'Channel'.
- A push button labelled 'PROG/SAVE'.
- A 7-segment display.
- 8 LED indicators numbered 1 to 8 from left to right.
- An 8-way DIP switch.

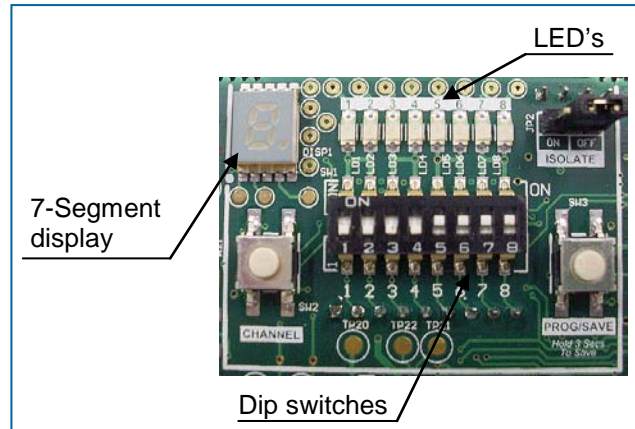


Figure 16 – User interface detail

Channels

There are two categories of 'Channels' used with the MKII.

1. Troubleshooting - Fault status, Test and Information channels

Channel #	Allocation
0	STATUS – Input / Output (I/O) Faults
1	STATUS – System Faults 1
2	STATUS – System Faults 2
3	STATUS – System Faults 3
4	STATUS – PSU Status
5	STATUS – Maintenance Log
6	STATUS – System Faults 4
7	'Reserved for future expansion'
8	TEST (LED'S & DIP Switches)
9	INFO – Firmware Version (Controller)

Table 2 – Troubleshooting channels

2. Programming - Configuration channels

Channel #	Allocation
A	CONFIGURATION – I/O
b	CONFIGURATION – I/O Modes
C	CONFIGURATION – Shutdown Delays
d	CONFIGURATION – Discharge Delays
E	CONFIGURATION – Battery Test
F	CONFIGURATION – I/O Polarity
H	CONFIGURATION – I/O Short Circuit
L	CONFIGURATION – Miscellaneous
n	CONFIGURATION – Acknowledge feature
o	CONFIGURATION – Trend logging
P	CONFIGURATION – Presets
U	CONFIGURATION – I/O Open Circuit
Y	SETTINGS

Table 3 – Programming channels

Each 'Channel' contains up to 8 different settings. When a channel is selected by the user, the information/settings for that particular channel are shown on the LED's. Settings are changed using the 8-way dip switch and loaded into the MKII memory with the 'PROG/SAVE' button.

The troubleshooting channels will be covered in detail in Topic 4 – Troubleshooting.

Programming - configuration channels

If the factory default settings are acceptable, no additional programming is required to the MKII before installation. If a new configuration is required your will need to re-program the system. It is recommended that a stable and constant power supply be present when programming the MKII.

Using the interface

The segment display (1) may not be lit when you first open the module cover or if the interface has been inactive for more then 10 minutes.

Press the 'Channel' button (2) to activate.

The channels are ordered as listed in Table 2 & 3 and each press of the 'Channel' button will advance to the next channel. You can also press and hold the button to scroll automatically.

The current configuration of the channel is shown on the LED indicators (3) when the channel is selected.

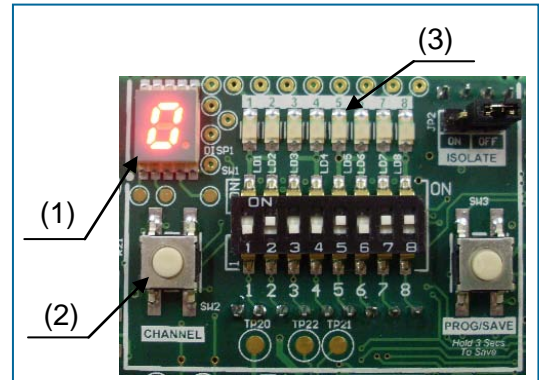


Figure 17 – User interface active

Programming

Step 1- Select a Channel

Press the 'Channel' button repetitively (or hold) to advance through to desired channel.

For example;

If you want to change the shutdown delay time from the default configuration of 30 sec to 60 sec – stop advancing at Channel 'C'.

Figure 19 shows the table that lists all of the configurations for Channel 'C'. For a complete list of each settings that are available for each configuration you will need to refer to the Configuration tables from page 16 onwards.

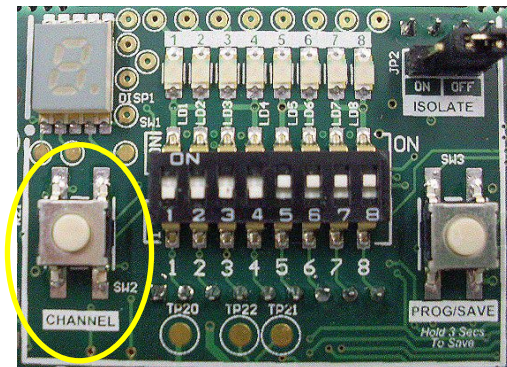


Figure 18 - Channel button

Channel	Time (Seconds)	Switch No.							
		Shutdown Delay - Initial				Shutdown Delay - Extension			
		1	2	3	4	5	6	7	8
C	0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
	5	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF
	10	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
	15	ON	ON	OFF	OFF	ON	ON	OFF	OFF
	20	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF
	30 (Default)	ON	OFF	ON	OFF	ON	OFF	ON	OFF
	40	OFF	ON	ON	OFF	OFF	ON	ON	OFF
	60	ON	ON	ON	OFF	ON	ON	ON	OFF
	80	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON
	100	ON	OFF	OFF	ON	ON	OFF	OFF	ON
	120	OFF	ON	OFF	ON	OFF	ON	OFF	ON
	140	ON	ON	OFF	ON	ON	ON	OFF	ON
	160	OFF	OFF	ON	ON	OFF	OFF	ON	ON
180	ON	OFF	ON	ON	ON	OFF	ON	ON	
210	OFF	ON	ON	ON	OFF	ON	ON	ON	
240	ON	ON	ON	ON	ON	ON	ON	ON	

Figure 19 - Example channel C

Step 2 - Pre-programming

When the desired channel is selected, change the dip switch positions using a flat bladed screwdriver (Fig. 20) to mirror the illuminated LED's. (On LED = On switch.) As some channels have configurations for more than one function, failure to perform this step may result in a undesirable configuration change

Note: Although the LED numbers are linked to the corresponding numbered switches they will not illuminate at this stage.

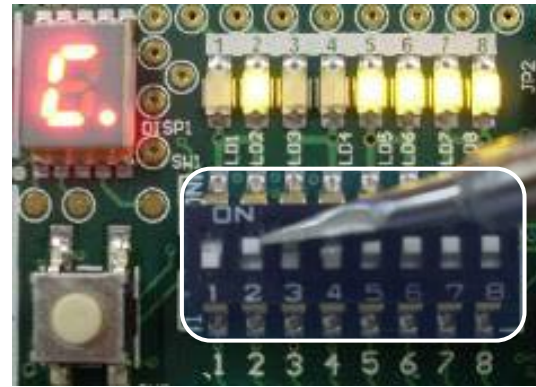


Figure 20 - Dip switches

Step 3 - Program mode

Press and hold the “PROG/SAVE” button (Fig. 21) for 3 seconds to activate **program** mode.

The ‘dot’ indicator light (Fig. 22) on the seven segment display (bottom right corner) will begin to flash.



Figure 21 - PROG/SAVE



Figure 22 - Dot indicator

Step 4 - Changing a configuration

Now move the dip switches (on or off) to match the positions in the desired row of the configuration table.

In programming mode the LED's will now light up when their numbered switch is turned on.

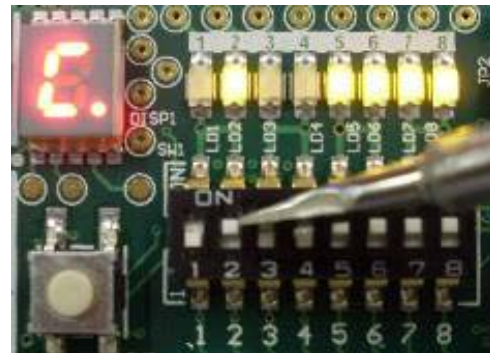


Figure 23 - LEDS & Dip switches

*Following on from the example in step 1; To change the 'Shutdown Delay – Initial' time from 30 seconds (default) to 60 seconds – Turn switch 1, 2 & 3 to the **ON** position and switch 4 to the **OFF** position.*

Channel	Time (Seconds)	Switch No.							
		1	2	3	4	5	6	7	8
C	0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
	5	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF
	10	OFF	ON	OFF	OFF	OFF	ON	ON	OFF
	15	ON	ON	OFF	OFF	ON	ON	OFF	OFF
	20	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF
	30 (Default)	ON	OFF	ON	OFF	ON	OFF	ON	OFF
	40	OFF	ON	ON	OFF	OFF	ON	ON	OFF
	60	ON	ON	ON	OFF	ON	ON	ON	OFF
	80	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON
	100	ON	OFF	OFF	ON	ON	OFF	OFF	ON
	120	OFF	ON	OFF	ON	OFF	ON	OFF	ON
	140	ON	ON	OFF	ON	ON	ON	OFF	ON
	160	OFF	OFF	ON	ON	OFF	OFF	ON	ON
	180	ON	OFF	ON	ON	ON	OFF	ON	ON
210	OFF	ON	ON	ON	OFF	ON	ON	ON	
240	ON	ON	ON	ON	ON	ON	ON	ON	

Figure 24 - Example channel C

Step 5 - Saving changes

After you have set the dipswitches to the desired positions, press and hold the “PROG/SAVE” button for 3 seconds to save the new configuration (Fig. 25).

The system will now generate a fault which is designed to prompt a user to perform the next step.

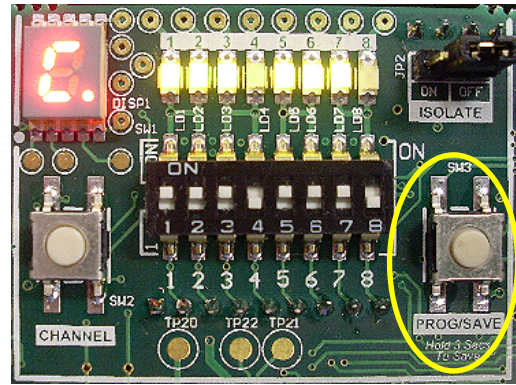


Figure 25 - 'PROG/SAV' button

Step 6 – System reset

Press and hold the “SYSTEM RESET” button for 2 seconds to clear the fault and commit the setting change to the modules memory (Fig. 26)

This step is required for each configuration change.

Note: If at any stage you need to cancel programming mode press the Channel button once.

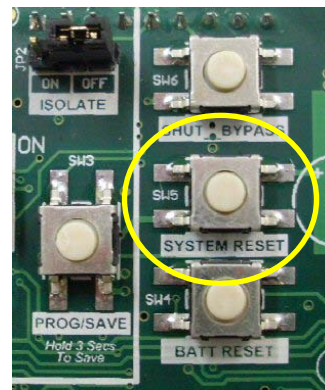


Figure 26 - SYSTEM RESET Module

A system reset can also be activated via the display panel by using the “TEST”, “DELAY” and “DIM” push buttons.

To prevent accidental operation, the ‘delay’ push button must be pressed prior to the other two buttons:

1. Press and hold the ‘DELAY’ button
2. Press and hold the ‘TEST’ and ‘DIM’ buttons
3. Wait 1 second.
4. Release all three buttons.



Figure 27 - SYSTEM RESET Display

Notes:

Configuration channels (A-Y)

A. Inputs and Outputs

1. The manual actuation input can be disabled when not in use.
2. The equipment shutdown output can be disabled when not in use. Upon alarm, the alarm indicator on the Display will be activated and the buzzer output will start to sound once every second but the shutdown sequence will not start and the shutdown indicators will remain in inactive state.
3. The actuation output (solenoid or squib) can be disabled when not in use.
4. Actuation output 1 can be configured to operate a solenoid or a squib detonator
5. A second actuation output is available on MKII Dual model and can be disabled when not in use.
6. A second actuation output is available on MKII Dual model and can also be configured for a solenoid or a squib detonator
7. The system discharged pressure switch input can be configured to operate for a normally open or closed circuit
8. The system pressure monitoring switch input can be configured to operate for a normally open or closed circuit

Channel	Switch No.	State	Function
A	1	ON (Default)	Manual Release Enable
		OFF	Manual Release Disable
	2	ON (Default)	Shutdown O/P Enable
		OFF	Shutdown O/P Disable
	3	ON (Default)	Actuation O/P 1 Enable
		OFF	Actuation O/P 1 Disable
	4	ON (Default)	Actuation O/P 1 Solenoid
		OFF	Actuation O/P 1 Squib
	5	ON	Actuation O/P 2 Enable
		OFF (Default)	Actuation O/P 2 Disable
	6	ON (Default)	Actuation O/P 2 Solenoid
		OFF	Actuation O/P 2 Squib
	7	ON (Default)	System discharged I/P Enable
		OFF	Cylinder discharged I/P Disable
	8	ON (Default)	System Low I/P Enable
		OFF	Pressure Low I/P Disable

Table 4 – Inputs and Outputs 1

b. Detection Mode and Auxiliary Output Mode

There are two detection circuits which can either be disabled completely or configured for;

1. Single Mode - If single circuit detection is selected, detection circuit 2 is disabled. If multiple detectors are required to cover additional hazard areas they will need to be wired in series

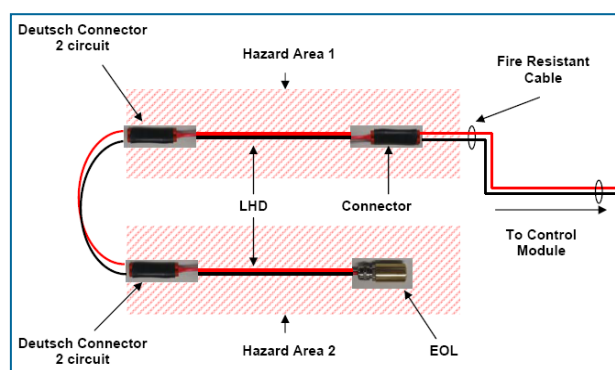


Figure 28 – Single Mode

- Single & Isolate Mode – As per single mode but detection circuit 2 is enabled to allow interface with an external switch that would be fitted for the purpose of isolating the MKII, thus preventing electrical actuation during routine maintenance on the equipment.

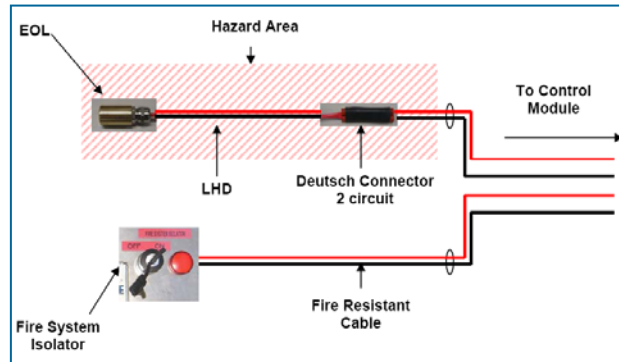


Figure 29 – Single and Isolate mode

- Dual Detection, single zone - In this mode, one detector circuit operating will cause a fire alarm condition. Once in alarm, operation of the second detection circuit will initiate a system discharge. This configuration reduces the risk of an accidental discharge and equipment shutdown but should only be used when both detections circuits are located in the same hazard area.

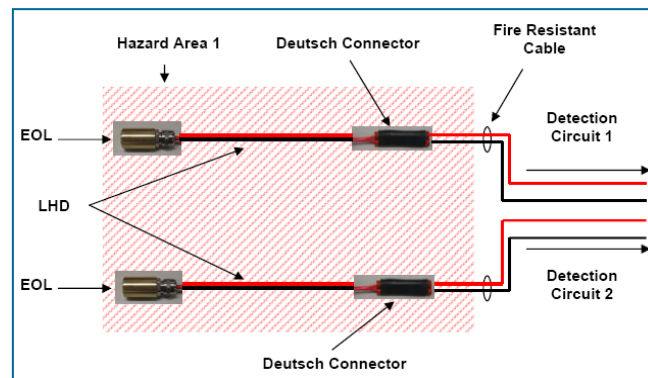


Figure 30 – Dual detection, single zone

- Single Detection, two zones - In this mode, either detector circuit operating will cause a fire alarm and initiate a system discharge.

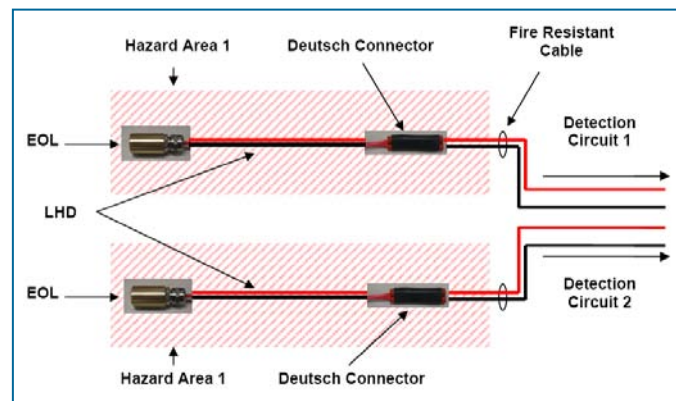


Figure 31 – Single detection, two zones

Upon any detector operation, the display panel and buzzer will initiate an audible and visual fire alarm consisting of illumination and latching of the Alarm LED and sounding of the buzzer once per second.

Description - Auxiliary Mode

The MKII incorporates an auxiliary output 'AUX' that can be interfaced with the engine management system of a third party device to signal one of the following events;

1. Alarm
2. System Fault
3. Alarm and/or Fault
4. Alarm and/or Fault and/or Isolation.

The auxiliary output will deactivate when the event is cleared.

Channel	Function	Detection Input 2	Detection Input 1	Switch No.									
				1	2	3	4	5	6	7	8		
b	Detection Mode	Disabled	Disabled	Disabled	OFF	OFF	OFF	'Unassigned'					
		Single Detection (Default)	Disabled	Detection	OFF	ON	OFF						
		Single Detection plus External Isolate	External Isolate	Detection	ON	OFF	OFF						
		Dual Detection Single Zone	Detection	Detection	ON	ON	OFF						
			Both inputs are required to initiate discharge										
	Single Detection Two Zones	Detection	Detection	X	X	ON							
		Either input will initiate discharge											
	AUX Output Mode	Fault							OFF	OFF			
		Alarm (Default)							ON	OFF			
		Fault or Alarm							OFF	ON			
Fault or Alarm or Isolate								ON	ON				

Table 5 - Detection Mode and Auxiliary Output Mode

Notes:

C. Shutdown delays

Shutdown Delay – Initial

The default setting for the shutdown delay (the time it takes for the shutdown relay to operate after a fire alarm) is 30 secs. Shutdown delay times can be chosen in **5 second intervals from 0 to 20 seconds, 10 second intervals from 20 to 40 seconds, 20 second intervals from 40 to 180 seconds and 30 second intervals from 180 to 240 seconds.**

Shutdown Delay – Extension

The default setting for the shutdown time delay extension is 30 secs.

Shutdown extension times can be chosen in **5 second intervals from 0 to 20 seconds, 10 second intervals from 20 to 40 seconds, 20 second intervals from 40 to 180 seconds and 30 second intervals from 180 to 240 seconds.**

The MKII control system is configured by default to allow only one time delay extension period to the equipment shutdown. The number of engine shutdown delay cycles can be increased using **Channel L**. The initial and extended delay periods can be independently set to different values. Both delay periods should be kept as short as safely possible.

Channel	Time (Seconds)	Switch No.							
		1	2	3	4	5	6	7	8
		Shutdown Delay – Initial				Shutdown Delay - Extension			
C	0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
	5	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF
	10	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
	15	125	ON	OFF	OFF	ON	ON	OFF	OFF
	20	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF
	30 (Default)	ON	OFF	ON	OFF	ON	OFF	ON	OFF
	40	OFF	ON	ON	OFF	OFF	ON	ON	OFF
	60	ON	ON	ON	OFF	ON	ON	ON	OFF
	80	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON
	100	ON	OFF	OFF	ON	ON	OFF	OFF	ON
	120	OFF	ON	OFF	ON	OFF	ON	OFF	ON
	140	ON	ON	OFF	ON	ON	ON	OFF	ON
	160	OFF	OFF	ON	ON	OFF	OFF	ON	ON
	180	ON	OFF	ON	ON	ON	OFF	ON	ON
	210	OFF	ON	ON	ON	OFF	ON	ON	ON
240	ON	ON	ON	ON	ON	ON	ON	ON	

Table 6 – Shutdown delays

Notes:

d. Discharge delays

Immediate discharge gives the suppression system the best chance of suppressing the fire in its early stages; however, in special circumstances delaying the discharge of the suppression system may be desirable. To cater for such circumstances, (such as operator safety) a discharge delay timer is provided with selectable delay periods - see Table 7. The default setting is 0 seconds.

The MKII is able to operate a solenoid or a squib detonator.

If the discharge delay is enabled, the actuation 1 delay time commences from when the first alarm is registered.

MKII Dual

If using the MKII Dual model, the two actuation outputs cannot activate simultaneously. There will be a time delay depending on the device that is in use (solenoid or squib). The time delay is necessary to ensure that a solenoid or squib is energised long enough to allow the system to actuate.

- Time delay for solenoid = 15 seconds
- Time delay for squib = 1 second

When calculating the time delays for both actuation circuits it is important to take into consideration the holding time for each type of actuation device (Fig. 32)

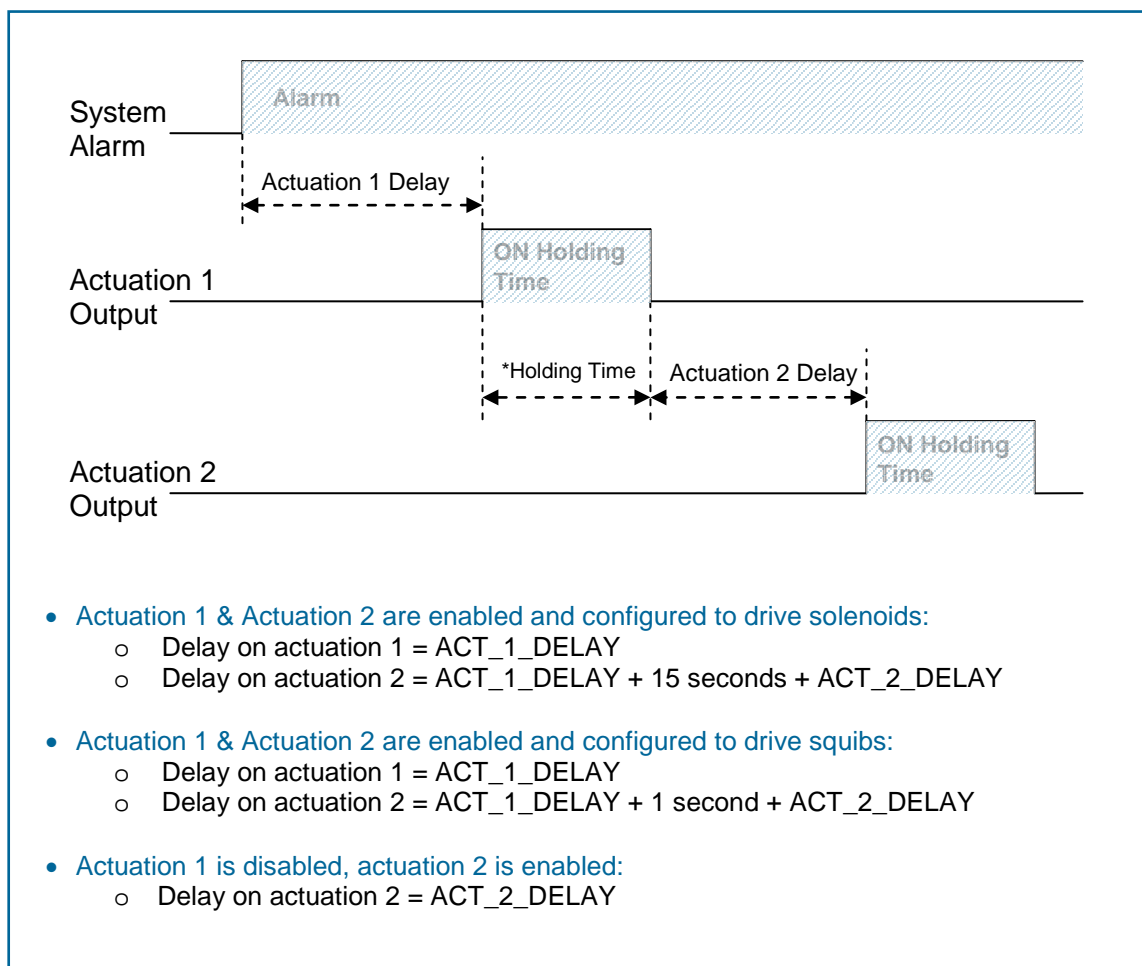


Figure 32 – MKII Dual actuation holding times

Channel	Time (Seconds)	Switch No.							
		1	2	3	4	5	6	7	8
		Actuation 1 Discharge Delay				Actuation 2 Discharge Delay MKII Dual only			
d	0 (Default)	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
	5	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF
	10	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
	15	ON	ON	OFF	OFF	ON	ON	OFF	OFF
	20	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF
	30	ON	OFF	ON	OFF	ON	OFF	ON	OFF
	40	OFF	ON	ON	OFF	OFF	ON	ON	OFF
	60	ON	ON	ON	OFF	ON	ON	ON	OFF
	80	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON
	100	ON	OFF	OFF	ON	ON	OFF	OFF	ON
	120	OFF	ON	OFF	ON	OFF	ON	OFF	ON
	140	ON	ON	OFF	ON	ON	ON	OFF	ON
	160	OFF	OFF	ON	ON	OFF	OFF	ON	ON
	180	ON	OFF	ON	ON	ON	OFF	ON	ON
	210	OFF	ON	ON	ON	OFF	ON	ON	ON
240	ON	ON	ON	ON	ON	ON	ON	ON	

Table 7 – Actuation time delays

E. Battery test

An automated battery test is conducted automatically by the MKII software on the 15th day of every month at 9am. The test is necessary to ensure that battery integrity is maintained. There is no indication on the display that this test is being carried out.

The test is performed in the background by disconnecting the primary input power and running the system from the internal battery pack continuously for the configured test period (See table 8 - Battery test).

When commissioning or performing maintenance on the MKII, one of the checks is to verify that a stable primary power supply is connected. If the automated battery test is running, this check cannot be performed. Indication that the test is running is displayed on Channel 4 LED 6 and the test can be cancelled by pressing the 'BATT RESET' push button on the Module. It is also possible to permanently disable automatic battery test from the configuration but this would only be recommended for short periods where the testing cycle may interfere with commissioning or routine maintenance.

To assist in battery longevity, it is also possible to adjust the test threshold level that is used to assess the battery condition from the configuration. These settings will not normally need to be changed and should only be done after consultation with technical support.

The Battery test will not commence if any of the following conditions exist,

- Primary power fault (battery is not fully charged)
- System is in alarm
- Fast charging is in progress (battery is low and may have discharged earlier).
- System has been powered up for less than 15 minutes (This allows time for the charger to determine the battery condition; otherwise the test would be carried out on a battery that is only partially charged).

If any of these conditions prevents the battery test from commencing, it is rescheduled to commence 25 hours later. *This is to overcome situation where primary power is regularly being isolated prior to the 9am designated test time. By offsetting the test time by an extra hour, eventually it will get a time slot to start the test.*

Rescheduling of battery test shall continue indefinitely until it has successfully started a test and then it shall resume the normal test cycle (15th day of every month).

The battery test will also terminate pre-maturely if any of the following events occurred during the test period,

- Battery voltage drops below expected value (failed)
- Any alarm is detected.
- Cancelled (using the 'BATT RESET' push button).
- CPU reset (using the 'SYSTEM RESET' push button).
- Remote reset request (from Display unit).

A 'battery capacity low' event is logged to the maintenance log if the internal battery's terminal voltage drops below the configured voltage. The 'Battery capacity low' maintenance log shall be cleared when a battery replacement sequence is performed. A 'battery capacity low' fault is reported as a system fault after 60 days if the 'battery capacity low' maintenance log is not cleared.

The following battery test related events shall be logged to the history log with voltage reading where applicable,

- Started
- Completed
- Failed
- Terminated due to an alarm
- Cancelled by user
- Rescheduled

NOTE: PC terminal software is required to access the history log.

Channel	Function		Switch No.								
			1	2	3	4	5	6	7	8	
E	Battery Test Threshold	11.4V	OFF	OFF	OFF						
		11.6V	ON	OFF	OFF						
		11.8V	OFF	ON	OFF						
		12.0V	ON	ON	OFF						
		12.2V (Default)	OFF	OFF	ON						
		12.4V	ON	OFF	ON						
		12.6V	OFF	ON	ON						
	12.8V	ON	ON	ON							
	Internal 15V Battery Test	Disable				OFF					
		Enable (Default)				ON					
	Test Period	24 Hours				OFF	OFF				
		36 Hours				ON	OFF				
		48 Hours (Default)				OFF	ON				
		72 Hours				ON	ON				

Table 8 – Battery test

F. Input polarity

Each input (device) connected to the MKII uses a pair of contacts that are either ‘normally closed’ (N/C) to **allow** current to flow from one contact to the other, or, ‘normally open’ (N/O) to **prevent** current from flowing.

The default settings for this channel will not normally need to be changed.

Channel	Switch No.	State	Function
F	1	ON	Detection 1 – N/C
		OFF (Default)	Detection 1 – N/O
	2	ON	Detection 2 – N/C
		OFF (Default)	Detection 2 – N/O
	3	ON (Default)	Discharged input – N/C
		OFF	Discharged input – N/O
	4	ON (Default)	Pressure Low input – N/C
		OFF	Pressure Low input – N/O
	5	ON	Manual Discharge input – N/C
		OFF (Default)	Manual Discharge input – N/O
6		<i>‘unassigned’</i>	
7			
8			

Table 9 – Input polarity

H. Short circuit supervision

All of the inputs and outputs can be enabled or disabled for short circuit supervision.

The default settings will not normally need to be changed.

Channel	Switch No.	State	Function
H	1	ON (Default)	Manual Discharge – Enable S/C supervision
		OFF	Manual Discharge – Disable S/C supervision
	2	ON	Detection 1 – Enable S/C supervision
		OFF (Default)	Detection 1 – Disable S/C supervision
	3	ON	Detection 2 – Enable S/C supervision
		OFF (Default)	Detection 2 – Disable S/C supervision
	4	ON (Default)	Actuation 1 – Enable S/C supervision
		OFF	Actuation 1 – Disable S/C supervision
	5	ON (Default)	Actuation 2 – Enable S/C supervision
		OFF	Actuation 2 – Disable S/C supervision
	6	ON	Discharged input – Enable S/C Supervision
		OFF (Default)	Discharged input – Disable S/C Supervision
	7	ON	Low Pressure input – Enable S/C Supervision
		OFF (Default)	Low Pressure input – Disable S/C Supervision
	8	ON (Default)	Buzzer output – Enable S/C Supervision
		OFF	Buzzer output – Disable S/C Supervision

Table 10 - Short circuit supervision

U. Open circuit supervision

All of the inputs and outputs can be enabled or disabled for open circuit supervision.

The default settings will not normally need to be changed.

Channel	Switch No.	State	Function
U	1	ON (Default)	Manual Discharge – Enable O/C supervision
		OFF	Manual Discharge – Disable O/C supervision
	2	ON (Default)	Detection 1 – Enable O/C supervision
		OFF	Detection 1 – Disable O/C supervision
	3	ON (Default)	Detection 2 – Enable O/C supervision
		OFF	Detection 2 – Disable O/C supervision
	4	ON (Default)	Actuation 1 – Enable O/C supervision
		OFF	Actuation 1 – Disable O/C supervision
	5	ON (Default)	Actuation 2 – Enable O/C supervision
		OFF	Actuation 2 – Disable O/C supervision
	6	ON	Discharged input – Enable O/C Supervision
		OFF (Default)	Discharged input – Disable O/C Supervision
	7	ON	Low Pressure input – Enable O/C Supervision
		OFF (Default)	Low Pressure input – Disable O/C Supervision
	8	ON (Default)	Buzzer output – Enable O/C Supervision
		OFF	Buzzer output – Disable O/C Supervision

Table 11 – Open circuit supervision

L. Primary power fault mask, Engine shutdown cycles and Real time clock

Masking Primary Power Faults

If 'Mask Primary Power' is set beyond the default setting (0min), a fault will not activate on the MKII display unless the condition exists for longer than the configured period in Table 12 - Primary power fault mask, Engine shutdown cycles and Real time clock

For maintenance and troubleshooting purposes, a primary power fault will still be displayed on the fault status indicators on the Module.

Engine Shutdown Delay Cycles

A shutdown time delay is incorporated in the MKII to allow the equipment operator to safely bring the equipment to rest before the shutdown is activated. A delay button is provided for the operator on the display panel (Fig. 33) if they need to postpone the shutdown of the equipment. The delay button can be disabled or configured for multiple, or infinite delay presses.



Figure 33 – Delay button

Real Time Clock

The MKII incorporates an Event Logger and Real Time Clock (RTC) which allows up to 80 faults, alarm, shutdown, isolation and other maintenance events to be date and time stamped and stored in system non-volatile memory for later retrieval and analysis. The RTC is kept by an onboard battery (Fig. 34). If a fault is detected with this battery, it is reported immediately as a system fault.



Figure 34 - RTC battery

If the fault cannot be rectified or reset immediately, The RTC can be disabled in the field using switch 8 on channel L to suppress RTC related faults. Disabling the RTC shall clear all RTC related faults, (RTC battery low, Date and Time not set, etc). If the RTC module is disabled, an entry is made to the maintenance log and will not be removed until the RTC is re-enabled.

NOTE: PC terminal software is required to reset the Real Time Clock.

Channel	Function		Switch No.																									
			1	2	3	4	5	6	7	8																		
L	Mask Primary Power Fault	0 min (Default)	OFF	OFF	OFF	OFF																						
		5 min	ON	OFF	OFF	OFF																						
		15 min	OFF	ON	OFF	OFF																						
		30 min	ON	ON	OFF	OFF																						
		1 hr	OFF	OFF	ON	OFF																						
		2 hr	ON	OFF	ON	OFF																						
		3 hr	OFF	ON	ON	OFF																						
		4 hr	ON	ON	ON	OFF																						
		5 hr	OFF	OFF	OFF	ON																						
		6 hr	ON	OFF	OFF	ON																						
		7 hr	OFF	ON	OFF	ON																						
		8 hr	ON	ON	OFF	ON																						
		10 hr	OFF	OFF	ON	ON																						
		12hr	ON	OFF	ON	ON																						
		14 hr	OFF	ON	ON	ON																						
	18 hr	ON	ON	ON	ON																							
	The number of Engine Shutdown Delay Cycles Allowed	0 (DELAY key disabled)							OFF	OFF	OFF																	
		1 (Default)							ON	OFF	OFF																	
		2							OFF	ON	OFF																	
		3							ON	ON	OFF																	
		4							OFF	OFF	ON																	
		5							ON	OFF	ON																	
		6							OFF	ON	ON																	
	Unlimited							ON	ON	ON																		
	Real Time Clock	Disable																									OFF	
		Enable (Default)																									ON	

Table 12 - Primary power fault mask, Engine shutdown cycles and Real time clock

n. Acknowledge feature settings

An event acknowledgement function is provided on the MKII keypad using a combination button press (Fig. 35). Once an event is acknowledged, the audible alarm unit will be silenced for the configured time period.

Pressing the “DELAY” and “TEST” button will acknowledge the event that has been selected in Table “n”.

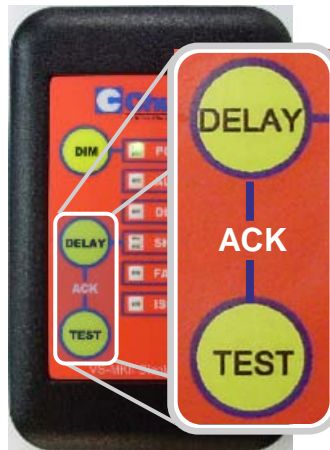


Figure 35 – Acknowledge feature

The system shall exit acknowledged state if one or more of the following conditions occurred,

- All previously acknowledged events are cleared.
- Acknowledgement period expired
- A new acknowledgeable event is active.

This function will not work if there is no acknowledgeable event active.

An option is also provided to link the AUX output to the acknowledgement function so that external devices or interfaces can also be silenced.

Channel	Function		Switch No.							
			1	2	3	4	5	6	7	8
n	Acknowledgement Timeout (minutes)	15	OFF	OFF	OFF	'Unassigned'			'Unassigned'	
		30 (Default)	ON	OFF	OFF					
		45	OFF	ON	OFF					
		60	ON	ON	OFF					
		90	OFF	OFF	ON					
		120	ON	OFF	ON					
		150	OFF	ON	ON					
		180	ON	ON	ON					
	Acknowledgeable Events	Disabled					OFF	OFF		
		Faults only (Default)					ON	OFF		
		Alarms only					OFF	ON		
		Faults and alarms					ON	ON		
	Acknowledge linked to Aux output	Not Linked (Default)								OFF
		Linked								ON

Table 13 – Acknowledge settings

P. Configuration preset

Channel 'P' allows a user to reset all of the configurations back to the default (factory) settings.

Changing the configuration preset can only be performed while the system is isolated to ensure that there is an additional level of protection against unintentional changes and to also prevent the system from discharging on reset.

This channel can be extended to accommodate up to at least 7 additional configuration presets which will be made available in future releases.

Channel	Configuration Preset	Switch No.							
		1	2	3	4	5	6	7	8
P	Factory Default	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
	'unassigned'								

Table 14 - Configuration preset

Y. System Settings

The MKII history log can be disabled to preserve the data in situations where the module is removed for remote testing.

Channel	Switch No.	State	Function
Y	1	ON (Default)	History Log Enabled (Controller)
		OFF	History Log Disabled (Controller)
	2		'Unassigned'
	3		
	4		
	5		
	6		
	7		
8			

Table 15 - History log

Notes:

Jumper links

The MKII module PCB is installed with two jumper links. One link is used to isolate the MKII for maintenance purposes and the other to change contacts on the auxiliary output.

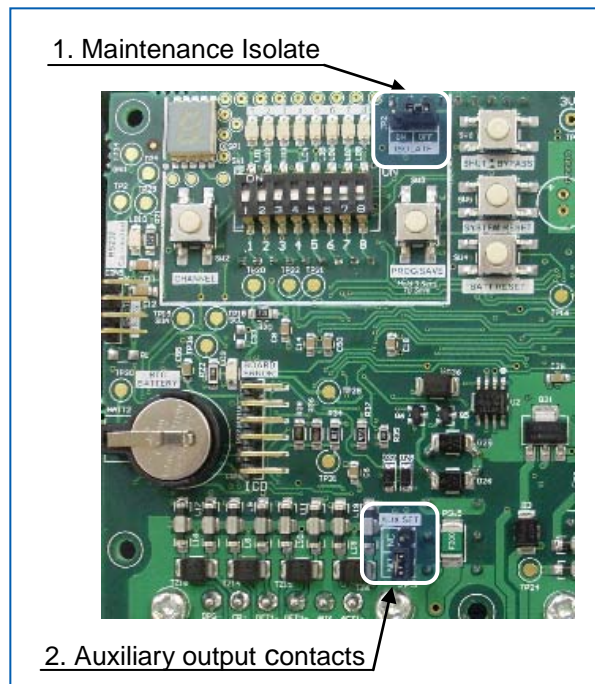


Figure 36 - Module PCB Jumper links

1. Maintenance isolate

An internal system isolate input link is provided on the module PCB. This link isolates the actuation, auxiliary alarm and shutdown outputs from the MKII control module and illuminates the ISOLATED LED on the display panel. All inputs remain enabled along with the audible alarm unit output, fault output and the display panel LED's. This switch allows testing of manual release and detection inputs as well as fault conditions without causing the discharge of the system, initiating equipment shutdown or auxiliary alarm outputs (if configured - see Channel b). In this state the ISOLATED LED on the display panel will remain illuminated and the audible alarm unit will beep once per minute.

To initiate, change the position of the link from “NOR” to “ISO” (Table 16).



 Normal	 Isolated	Function	State	Link Position
		Isolate	OFF	NOR (Default)
ON	ISO			

Table 16 - Maintenance isolate

2. Auxiliary output

The contacts of the Auxiliary output can be set for N/C or N/O with this jumper to allow flexibility in connectivity when interfacing with an external device or system.


 Normally Closed	 Normally Open	Function	State	Link Position
		Contacts	Normally Closed	NC
Normally Opened	NO			

Table 17 - Aux Contact settings

Shutdown bypass

This button returns the shutdown relay output to normal condition. This is to allow temporary movement of equipment after an alarm for safety or maintenance purposes.

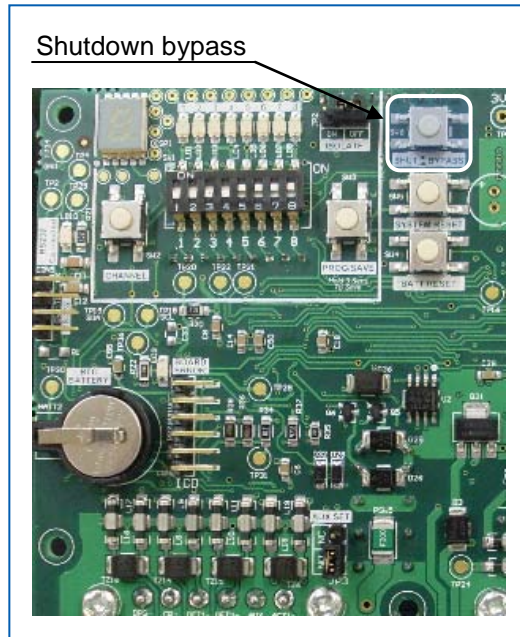


Figure 37 – Module PCB Shutdown bypass

To initiate, press and hold the button for once (1) second. In this condition the audible alarm unit will beep once per minute to provide audible indication the overridden condition until the panel is reset.

	<p>Function</p>
	<p>Shutdown bypass</p>

Table 18 – Shutdown bypass button

Activating this switch while the system is not in an Alarm state will cause an “Override Switch On” fault.

The shutdown bypass will deactivate once the system has been reset.

Notes:

Installing the MKII Module

Mount the MKII control module at a suitable location in the equipment away from the fire hazard area. For wiring purposes the preferred location is within the equipments cabin.

- The module can be secured on any surface of the equipment using the four mounting holes and the bolts supplied.
- When installing the module the recommended orientation is for the connectors to be facing down.
- The module will not charge the back up battery pack when the ambient temperature inside exceeds 40 °C. Therefore it should not be positioned in direct sunlight or in contact with surfaces that are likely to exceed this temperature on a regular basis.
- To minimize the effects of electromagnetic emissions from high energy sources, the VS-MKII control system input cables should NOT be run parallel or in close proximity to any cables or equipment that may produce high RF (radio frequency) energy, e.g. cabling for RF transceiver antennas, inverters, motors etc.

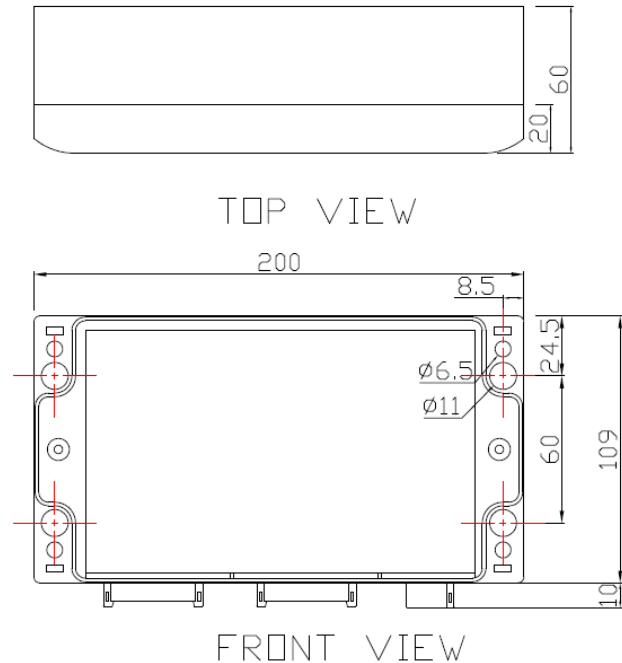


Figure 38 - Module dimensions

VS-MKII Display Panel & Audible Alarm

Display settings

The MKII display panel has a series of dip switches located on the PCB (Fig. 41). To access the PCB, remove the four screw covers (Fig. 39), screws, rear and frame covers (Fig. 40).



Figure 39 - Screw covers & screws



Figure 40 - Display cover

The PCB on the display panel also has a system reset button as indicated in Figure 39.

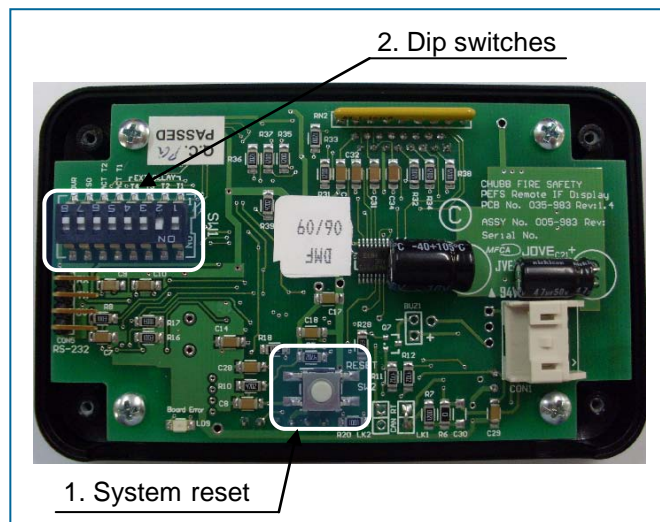


Figure 41 - Display PCB

The eight (8) DIP switches in Table 25 are used to operate the following functions:

1. Event Log
2. Maintenance isolate
3. Shutdown bypass

Switch No.	Function
1	Enable Event Logging
2	'Unassigned/not used'
3	
4	
5	
6	Maintenance Isolate
7	
8	Shutdown bypass

Table 19 - Display DIP switches

1. Event log

This switch performs the same function as switch 1 on Channel Y of the MKII module. Its purpose is to disable the History log to preserve the data in situations where the module needs to be removed for remote testing.

Function	Switch Number	State	Setting
Event Log	1	ON	Normal (default)
		OFF	Isolated

Table 20 - Display event log

2. Maintenance isolate

This switch performs the same function as the “Isolate” link of the MKII module. The switch isolates the actuation, auxiliary alarm and shutdown outputs from the control module and illuminates the ISOLATED LED on the display and the audible alarm unit will beep once per minute. All inputs remain enabled along with the audible alarm unit output, fault output and display panel LED’s. This switch allows testing of manual release and detection inputs as well as fault conditions without causing discharge of the system, initiating equipment shutdown or auxiliary alarm outputs (if configured - see Channel b).

Function	Switch Number	State	Setting
Maintenance Isolate	7	OFF	Normal (default)
		ON	Isolated

Table 21 - Display maintenance isolate

3. Shutdown override (bypass)

This switch performs the same function as the “Shutdown bypass” button on the MKII module. The switch returns the shutdown relay output to a normal condition to allow temporary movement of equipment after an alarm for safety or maintenance purposes. To initiate, change switch from off (default) to on then off again. In this condition the audible alarm unit will beep once per minute to provide audible indication the overridden condition until the panel is reset.

Function	Switch Number	State	Setting
Shutdown Override	8	OFF	Normal (default)
		ON	Overridden

Table 22 - Display shutdown override

Display controls and indicators

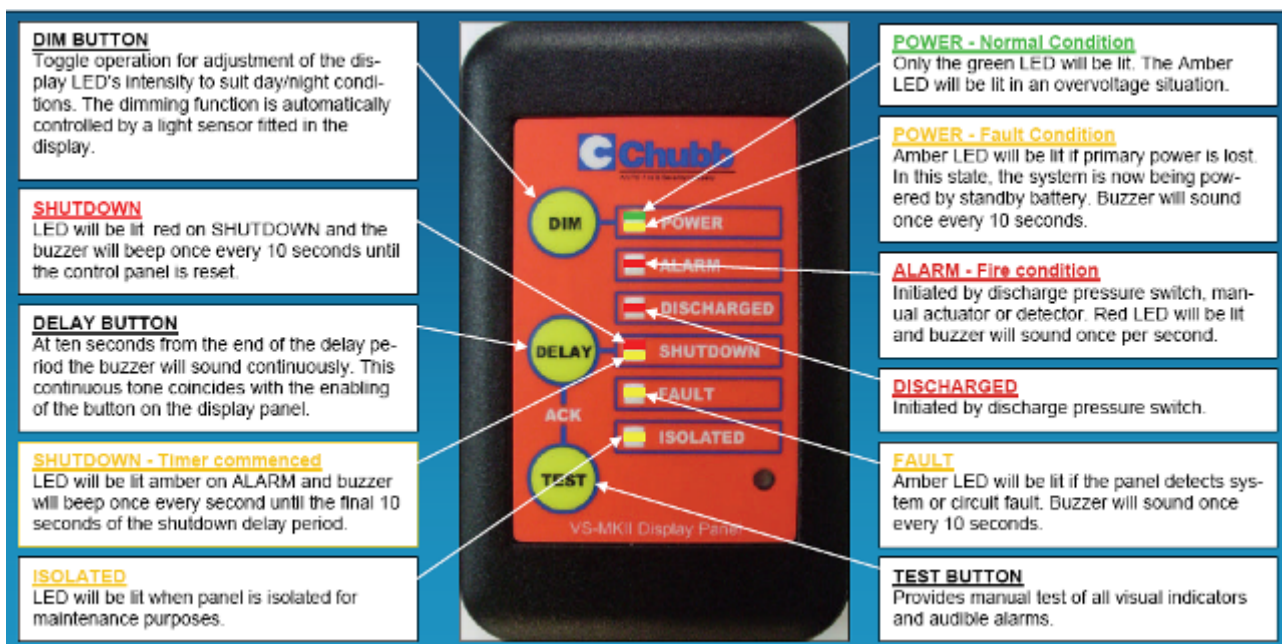


Figure 42 - Display controls and indicators

Audible Alarm

The audible alarm unit (Fig. 43) is IP65 rated enclosure, supplied with a 6 metre long cable and 4 x M4x25mm Stainless Steel Bolts and nuts.



Figure 43 - Audible alarm unit

If required, it is possible to connect up to five (5) alarm units in parallel. When installing multiple alarm units, switch '1' on each PCB (Fig. 44) must be turned off on all but the last unit (Fig. 45).



Figure 44 - Audible alarm unit PCB

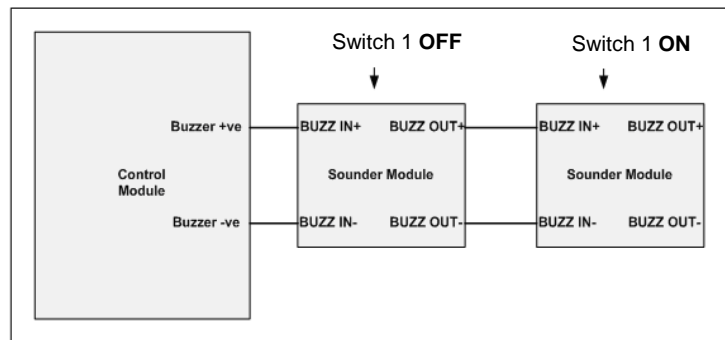


Figure 45 - Audible alarm units in parallel

Installing the display and audible alarm

Mount the MKII display using the bracket shown in figure 45. Its positions should be visible and accessible from the equipment operator's station. The display is not IP rated and should only be mounted on a location protected from water and dust.

Connect the display to the control module by cutting the fly lead to length and connecting it to the input connector of the control module.

Mount the audible alarm unit adjacent to the display or at a suitable location in the equipment operator's cabin.

Connect the audible alarm unit to the control module by cutting the fly lead to length and connecting it to the output connector of the control module.



Figure 46 - Display and audible alarm unit

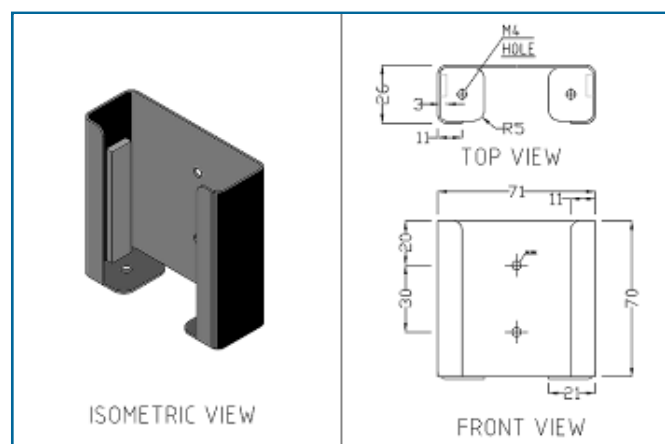


Figure 47 - Display bracket dimensions

Connecting the display panel to the control module

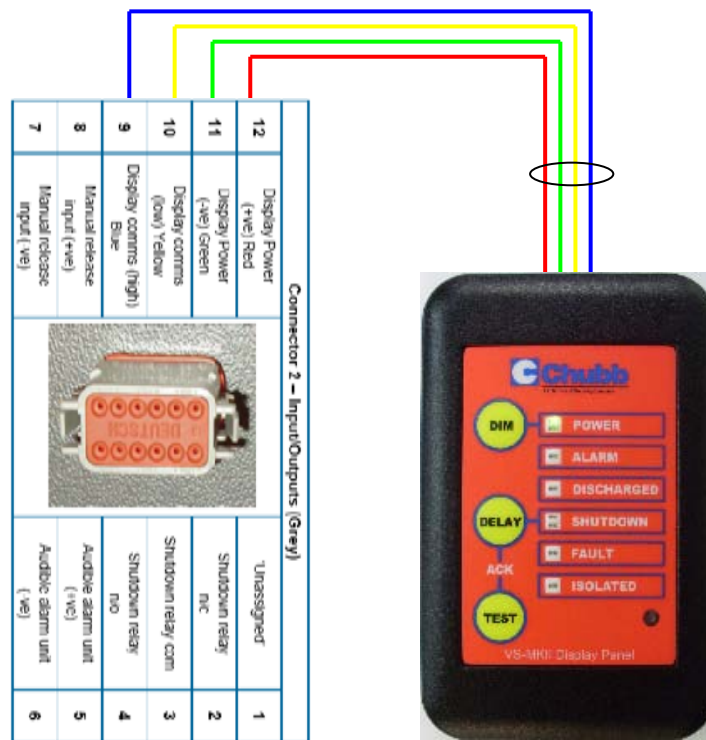


Figure 48 - Display wiring

Connecting the buzzer to the control module

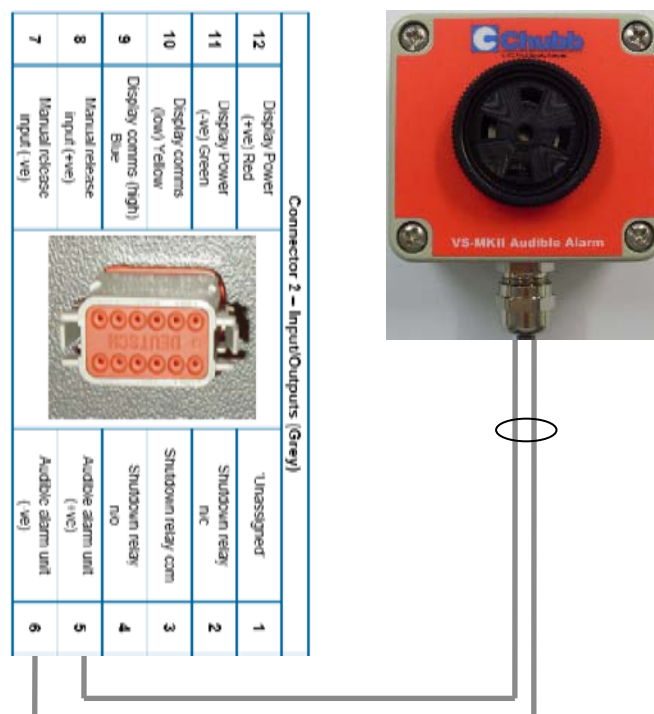


Figure 49 - Audible alarm wiring

Electrical Manual Release Unit

The manual release unit consists of an IP65 rated metal enclosure with a glanded cable entry. A M18 cable gland and two bolts are also provided with each unit. It incorporates a switch fitted with a series and a parallel EOL resistor to allow it to be monitored for both open and short circuit faults. Once activated, all MKII control system functions, including system discharge, alarms and equipment shutdown (if configured) will occur.



Figure 50 - Electrical actuator

Multiple units can be connected in series provided that the EOL's are removed from all but the last unit.

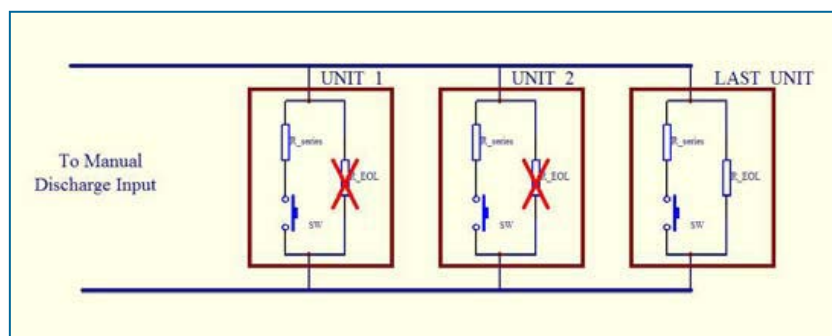


Figure 51 - Multiple electrical actuators

A manual release unit may also be fitted to the end of the detection circuit(s). In such installations, the manual release is used in place of the EOL resistor (part number 87003) to provide monitoring of the detection circuit.

The MKII uses 5-band axial resistors in EOL's for;

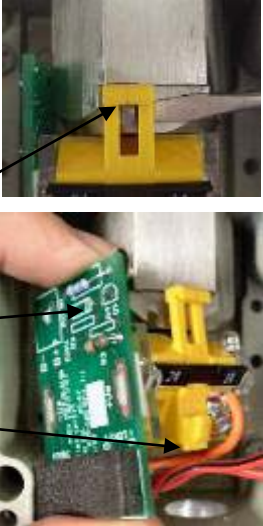



- Detection 1, 2 and Manual Release inputs, 1K Ohms, 250mW, 5% tolerance.

If required, the manual release unit can be flush mounted in a cab without the enclosure. If then unit is mounted without the enclosure, ensure that the circuit card remains insulated and protected from damage.

Operation

When activated, the switch will change the circuit resistance (to approx 33 ohms) so that the panel can no longer see the EOL resistor (1000 ohms). The panel will interpret this new resistance as an **Alarm** condition. If the circuit is disconnected or shorted, the panel will interpret no resistance as a **Fault** condition in this circuit.

Installing the electrical manual release unit

<p><u>Step 1.</u></p> <p>The cable gland is not fitted to allow flexibility in cable routing To install gland(s);</p> <ol style="list-style-type: none"> 1. Remove the unit cover by unscrewing the four locking bolts. 2. Using a flat bladed screwdriver, gently lever the visible plastic locking arm towards you until it dislodges. 3. Twist the assembly slightly to disconnect the rear locking arm and remove the switch assembly. 4. Drill a 16mm \varnothing hole in the enclosure in the desired position and fit the cable gland (spanner tight) 5. Refit the switch assembly. 	
<p><u>Step 2.</u></p> <p>Mark cable at desired length for stripping.</p> <p>Cable sheath should be stripped to enclosure to allow wire to flex when connecting to terminal block.</p>	
<p><u>Step 3.</u></p> <p>Once outer sheath has been removed mark the core wires insulation for stripping.</p> <p>Only required to strip enough insulation for screw terminal to make contact.</p>	
<p><u>Step 4.</u></p> <p>Twist the exposed wires together using a set of blunt nose pliers.</p> <p>This will ensure that all of the wires in the core are in the best position for clamping in the screw terminal</p>	




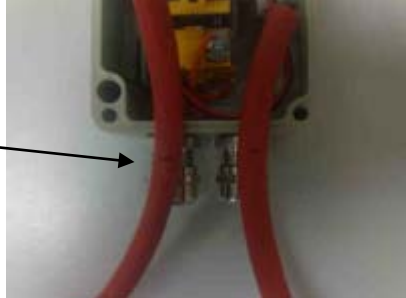
<p><u>Step 5.</u></p> <p>Thread the cable through the gland and check that length and flexibility of the wires.</p>	
<p><u>Step 6.</u></p> <p>Connect the wires to the terminal block.</p> <p>A slight tug on the cable will confirm that the wires are securely clamped.</p> <p>Tighten the grommet and replace the cover</p>	

Table 23 - Installing an electrical actuator

Installation – Multiple Units

<p><u>Step 1.</u></p> <p>Drill two holes in the enclosures at 16mm \varnothing and fit glands.</p> <hr/> <p>The last enclosure or EOL only requires one gland.</p> <p>The following steps will set the connection up for a parallel circuit.</p>	
<p><u>Step 2.</u></p> <p>For every actuator unit before the EOL one, mark cables at desired length for stripping.</p> <hr/> <p>Cable sheath should be stripped to enclosure to allow wire to flex when connecting to terminal block.</p>	




<p><u>Step 3.</u></p> <p>Remove safety pin and loosen lock nut.</p> <hr/> <p>Rotate switch assembly so that the circuit card is accessible.</p> <p>Remove resistor (R1) on each unit before the last.</p> <hr/> <p>The last unit's resistor remains to act as the EOL.</p>	
<p><u>Step 4.</u></p> <p>Twist the two white wires together and the two red wires together from each cable.</p> <p>This is what will set the parallel circuit up to read the EOL.</p>	
<p><u>Step 5.</u></p> <p>Connect the wires to the terminal block.</p> <p>A slight tug on the cable will confirm that the wires are securely clamped.</p> <p>Tighten the grommets and replace the cover</p>	

Table 24 - Installing multiple electrical actuators

Note: If an electrical actuator is not being used the circuit will need to be switched off using Channel A.

Notes:

Connecting manual electric actuator to the control module

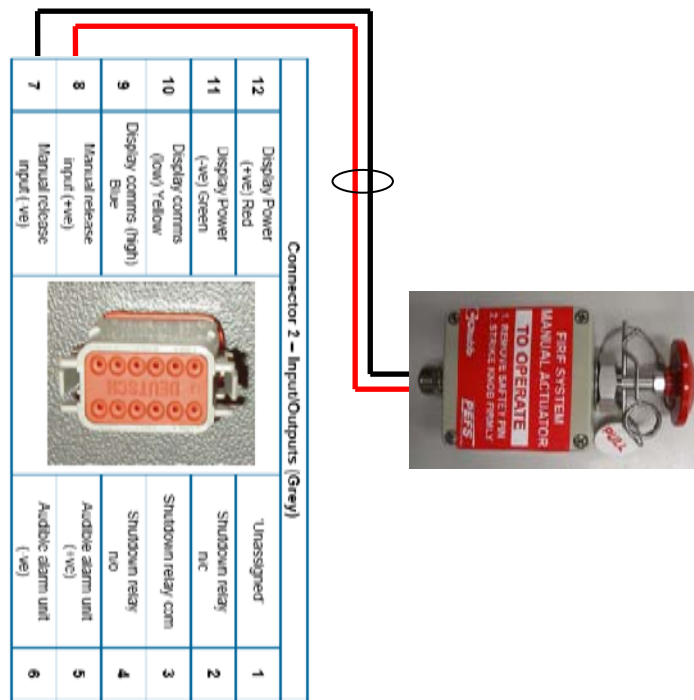


Figure 52 - Electrical actuator wiring

Solenoids

Electric actuation of both ROP and LOP PEFS systems is achieved using a 12V DC10W solenoid operated valve. Terminals 1 and 2 of the solenoid coil are used to connect it to the MKII. The earth terminal of the coil is not used. When energised the solenoid valve will initiate discharge of the system.



Figure 53 - Solenoid valve

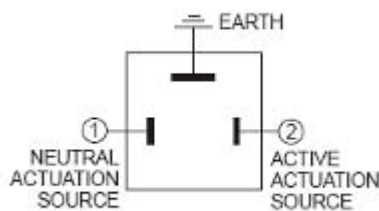


Figure 54 - Solenoid contacts



Figure 55 - Solenoid installed

ROP and LOP solenoid valve assemblies are available, complete with the necessary fittings required to fit them. The LOP solenoid valve assembly may be fitted anywhere in the LOP actuation network and includes a SureSpray nozzle fitted to the solenoid valve outlet to prevent blockage of the valve outlet by contaminants. Care should be taken to direct the outlet of the solenoid valve so that its discharge does not cause a hazard to personnel.

Installing a solenoid

Step 1.

Strip the outer cable sheath to expose wires and pass the cable (7) through the gland (4), washer (5), rubber seal (6), housing (2) in this order and connect to terminal block (3) to the housing (2).

Ensure that the cable insulation is glanded correctly when tightened.

Push it down the housing (s) until you hear the click.

Step 2.

Put the rubber seal (6), plain washer (5), in this order into the cable introducing port on the housing (2), then further tighten the cable gland (4) securely

Step 3

Insert the gasket (8) between the solenoid and the terminal block (3) and attach the plug to the solenoid, and then screw (1) in from the top of the housing (2) to tighten.

Note: Connection orientation can be changed by 180° depending on the required cable route

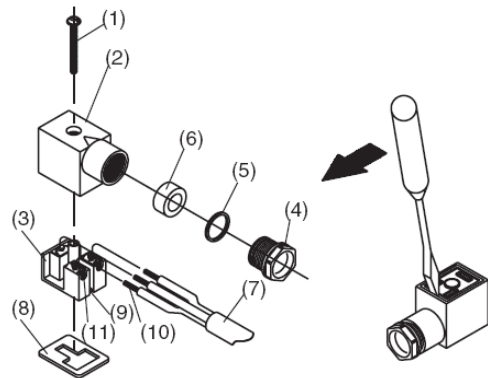


Table 25 - Solenoid installation

Note: If a solenoid is not being used the circuit will need to be switched off using Channel A.

Connecting the solenoid actuator to the control module

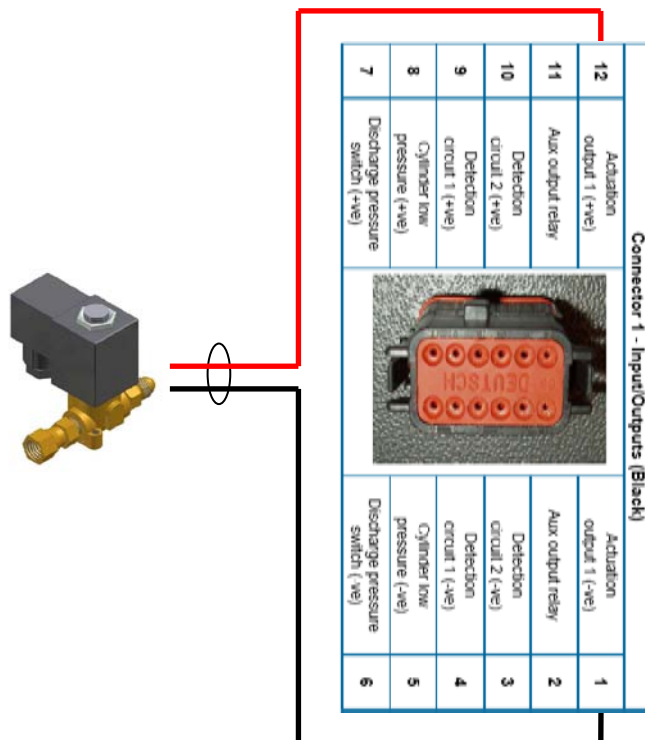


Figure 56 - Solenoid wiring

Linear Heat Detection Cable (LHD)

LHD cable consists of two insulated conductors (black and black with white stripes) twisted together and sheathed in a red PVC casing and senses a fire when heated to a temperature between 168°C and 180°C anywhere along its length. At this temperature the insulation around the two conductors melts and the conductors touch.



Figure 57 - LHD cable

The LHD cable is connected; by way of supervised detection circuits to the MKII control module. When the LHD melts (short circuits) the MKII energises the actuation output allowing a solenoid or squib to activate and discharge the fire system.

LHD cable is non-resettable. Once the insulation has melted, the melted section must be replaced. Either the entire length of cable or just the melted section can be replaced.

LHD cable should be positioned to provide optimum fire detection. LHD cable must be located above the fire hazards. It is recommended that an ambient temperature survey of all hazards be conducted prior to installation of the LHD cable. Do not position the LHD cable such that it will be exposed to in excess of a maximum ambient temperature of 105°C and ensure that it is clamped adequately at distances no greater than 500mm. The minimum bending radius for the cable is 50mm and where the cable passes through bulkheads or holes in panels or frame members, a rubber grommet should be used in the hole to ensure that the sheath of the cable is not braded.



Figure 58 - LHD cable installed

Installing LHD cable

<p><u>Step 1.</u></p> <p>Cut the LHD cable to the desired length(s) and strip the insulation back on all ends ready for termination</p>	
<p><u>Step 2.</u></p> <p>Pass the LHD cable through the EOL module gland, strip and expose the core on each wire.</p> <p>Terminate the LHD cable with an EOL resistor module.</p>	



<p>Step 3.</p> <p>Refit brass cover and tighten the gland until cable is sealed.</p>	
<p>Step 4.</p> <p>Use jiffy splice or Deutsch cable connectors to connect the LHD cable to field wiring back to the VS-MKII control module.</p> <p>Deutsch connectors should always be used where a break away connection is required. Connector pin size - 0.5 to 1.0 mm</p> <p>Remember: Always check crimp integrity by giving a slight tug on each wire.</p>	

Table 26 - Installing LHD cable

Note: If electrical detection is not being used the circuit needs to be switched off using Channel b.

Connecting LHD cable to the control module

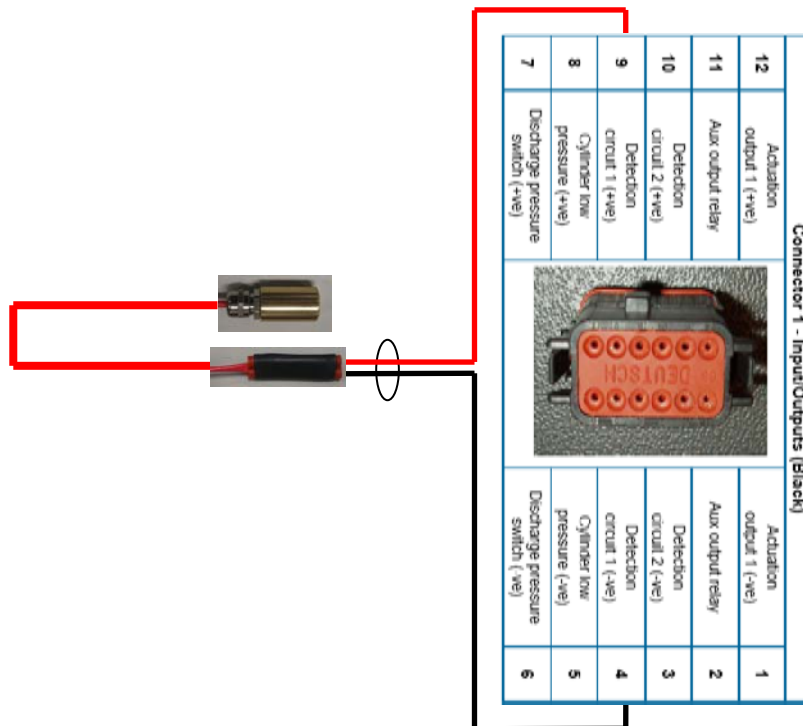


Figure 59 - Detection circuit 1 wiring

Pressure switches

Two pressure switches inputs are available for use in the VS-MKII Control system:

The two pressure switches that are being used in the PEFS system are;

1. "Pressure Low", 1,200kPa setting (part number 87042)
2. "Discharge", 200kPa setting (part number 87041)

Both switches have a 1/8"NPT connection, are configurable for NO or NC, and are provided with a IP65 rated Deutsch DTM series connector. The default configuration for the control module monitoring circuit is N/C (contacts closed = normal operation, contacts open = fault/discharge).



Figure 60 - PEFS pressure switch

Pressure low switch

The "Pressure Low" switch will open circuit if the system develops a pressure leak or if the system discharges. This open circuit will place the VS-MKII Panel into fault.

Discharge pressure switch

When a system is actuated, the "Discharge" pressure switch(s) are used to confirm that agent has been released from the cylinder(s) by illuminating and latching the Discharged LED on the MKII Display.

Operation of the discharge pressure switch also provides the following functions:

- In the case of electrical actuation of the cylinders:
 - Confirms that the cylinders have discharged.
- In the case of manual (mechanical) or automatic pneumatic (ROP or LOP detection) actuation of the cylinders:
 - Confirms that the cylinders have discharged by operating the fire alarm visual and audible indications
 - If connected, initiates equipment shutdown.

Examples of pressure switch installations for PEFS systems are depicted in Figure 56 below.

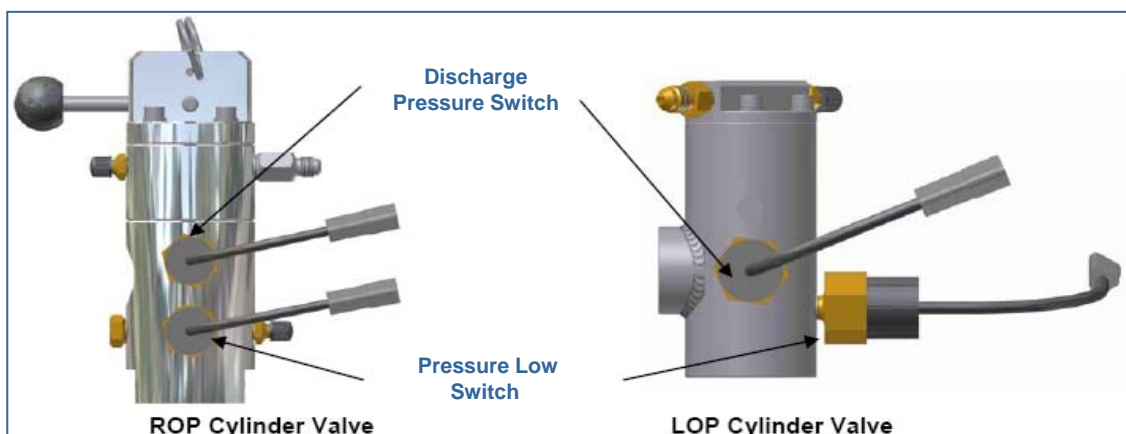


Figure 61 - PEFS pressure switch arrangements

Multiple PEFS Cylinder Installations

Pressure Low switch

For multiple LOP cylinder installations, which have a common LOP actuation system, a single cylinder low pressure switch may be fitted either to:

- one of the cylinder valves' low pressure switch ports
- at any suitable point in the LOP actuation system

For multiple ROP cylinder installations, a cylinder low pressure **MUST** be fitted to each cylinder valve.

Discharge Pressure Switch

For multiple LOP and ROP cylinder installations a discharge pressure switch **MUST** be fitted to each cylinder valve to allow redundancy in shutdown should a valve fail to operate correctly.

The activation of a discharge pressure switch (opening of circuit) will initiate the Discharged LED on the MKII display and also the Alarm LED. The Alarm sequence is linked to Engine shutdown.

This pressure switch arrangement allows the equipment to shutdown if a pneumatic or manual actuation device is operated.

Connecting PEFS pressure switches to the control module

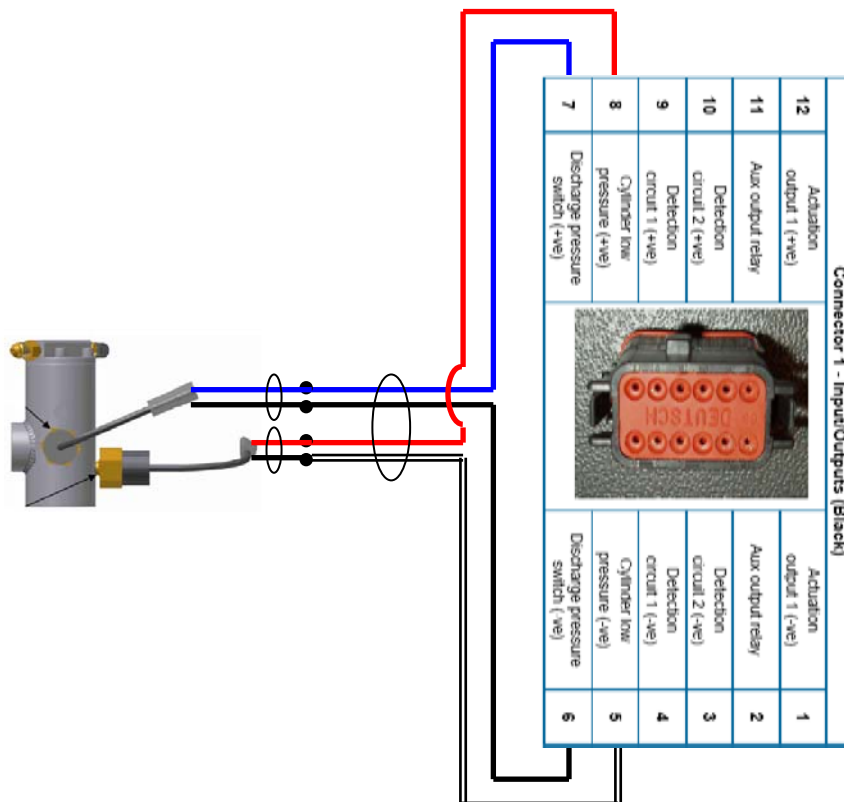


Figure 62 - PEFS pressure switch wiring

Connecting multiple PEFS pressure switches to the control module.

Multiple switches must always be installed in series (Fig. 63).

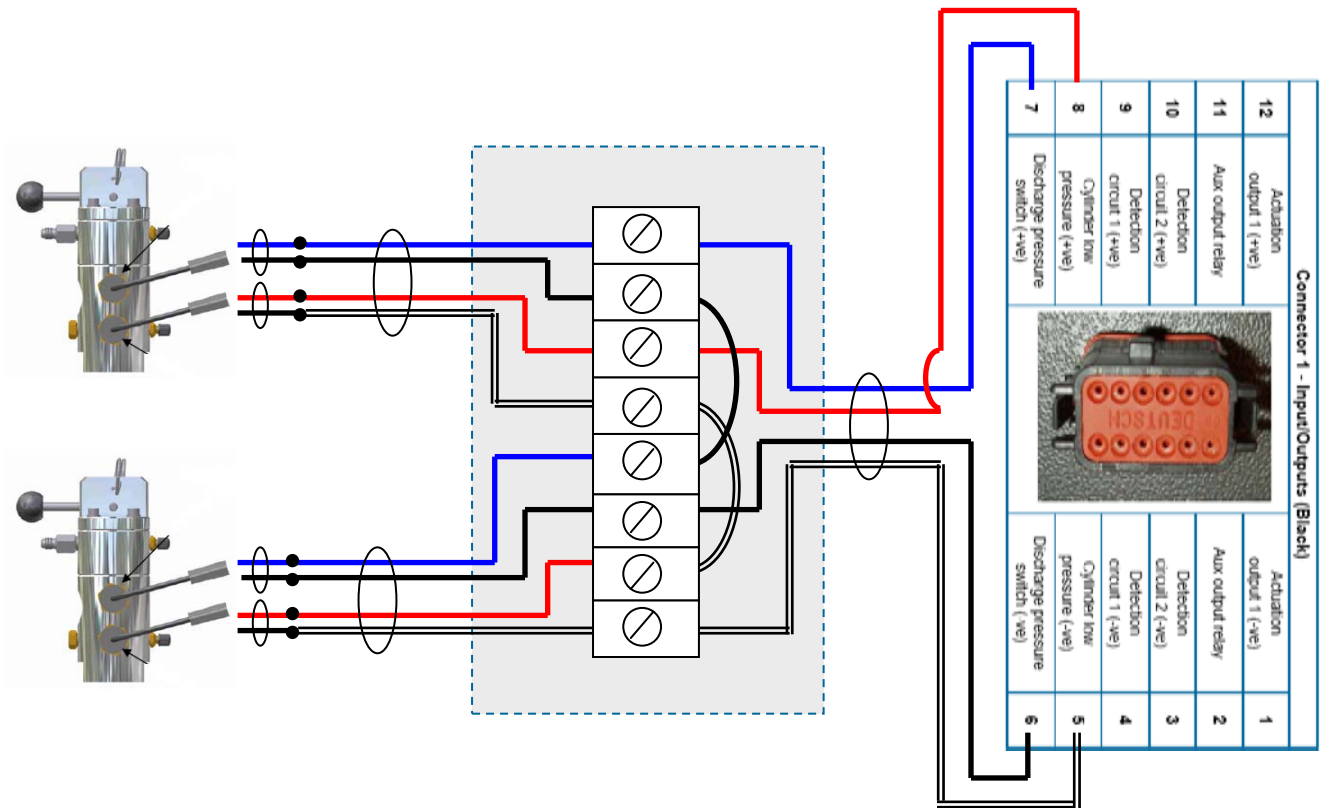


Figure 63 - PEFS multiple cylinder pressure switch wiring

Notes:

Topic 3: Commissioning

The VS-MKII Control System can be installed as a stand alone detection system but will more than likely be installed as part of a fire suppression system. Regardless of the configuration or complexity of the fire system, a full commissioning test must be completed prior to placing the system in service to ensure that the system is installed correctly, meets design specifications and is fully functional. A commissioning checklist is used to confirm that:

1. Installation requirements have been adhered to.
2. System components have been correctly installed and tested.

The minimum commissioning checks that need to be carried out on an a MKII are;

<p>Electric Detection, Actuation and Alarm Systems</p> <ul style="list-style-type: none"> · Manual actuators provided at specified locations and easily accessible · Linear Heat Detection (LHD) cable fitted in fire hazard areas · VS-MKII Control Module fitted at specified location · VS-MKII Display Panel and buzzer unit installed at operators location · Solenoid actuator fitted into actuation network · Equipment shutdown output connected <p>Function Tests</p> <ul style="list-style-type: none"> · VS-MKII Control System function tested · Audible and visual fire and fault alarms · Time delay periods tested & recorded · Discharge delay ____sec. · Shutdown delay ____sec. · Shutdown delay extension ____sec. · Manual actuators initiate alarms, system discharge & equipment shutdown · Each actuation and detection method tested <p>System Configuration and Signage</p> <ul style="list-style-type: none"> · System configuration as per design · Signs and warning labels installed
--

Figure 64 - Commissioning schedule

Acceptance of Test

Commissioning serves as the historical record of an owner's expectations for the fire system entering into service. The objective is to provide confidence that the system meets the customers' requirements. The commissioning test may also act as the final quality gateway, where any defects not previously detected may be uncovered. Once completed successfully, and provided any additional (contractually agreed) criteria are met, the customer will then sign off on the system as satisfying the original specification and deliver final payment. The customer or a representative appointed by them may not be able to sign off unless they can witness the commission test first hand.

System Commissioned By: _____	_____	_____
Name	Signature	Date
<p>The Customer acknowledges that they have read and understood the risk as identified in the Fire Risk Assessment document which has been completed for this equipment. The customer also acknowledges that the PEFS system will assist in fire risk reduction but will not prevent a fire occurring.</p>		
Customer: _____	_____	_____
Name	Signature	Date

Figure 65 - Commissioning report

Topic 4: Troubleshooting

Audible and visual fault indications, consisting of illumination of the MKII display's Fault LED and sounding of the buzzer once every 10 seconds, will be generated when the system detects an abnormal condition or a defect, which may impair the efficiency of the system, or potentially lead to a failure.

Faults within the VS-MKII control system can be displayed using either the LED's on the display panel or the control module user interface LED's. If a fault condition exists where the Aux Output Mode is configured, (Channel b), the relay will also be energized to allow auxiliary remote fault indications.

Display Panel – Fault Indications

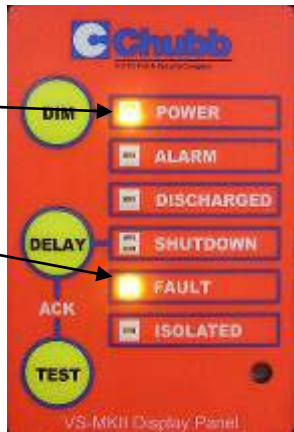

<p>In normal operating mode, the display panel will indicate a loss of primary power by turning off the green "POWER" LED and illuminating the amber "POWER" LED and "FAULT" LED.</p> <hr/> <p>All other faults are reported by illuminating the amber "FAULT" LED.</p>	
<p>The common fault conditions can be displayed by holding down both the 'DIM' and 'TEST' buttons on the keypad.</p> <hr/> <p>The fault conditions indicated by the display LED's are shown in table 28.</p> <p>A total of 14 fault conditions can be displayed and these indications are split into 2 sets of 7 x faults. Each set of 7 faults are displayed at 2 seconds intervals. The set being displayed is indicated by the status (on or off) of the green "POWER" LED on the display panel.</p>	

Table 27 - Display panel fault indications

DISPLAY LED's	GREEN POWER LED STATUS	
	OFF	ON
Power - Amber	Manual release input fault	Display flash checksum error
Alarm	Display/control module communications fault	Actuation Output 2 Fault (MKII Dual only)
Discharged	RTC Battery Fault	Other (refer below)
Shutdown - Red	Internal battery fault	Detection circuit 2 fault
Shutdown - Amber	Cylinder low pressure	Shutdown override activated
Fault	Detection input 1 fault	Real Time Clock fault
Isolated	Actuation output 1 fault	Audible alarm output fault

Table 28 - Display panel fault indications

If 'Other' is being indicated by the display the user interface on the control module will need used to find the cause of the fault.

Control module – Fault Indications

Refer to page 13, 'Programming - configuration channels', 'Using the interface' for instructions on using the interface.

The following troubleshooting channels can be used to find the 'Other' fault that is displayed on the display panel or in general, they can be used as the sole means of troubleshooting a fault. With the exception of channel 8 (Test channel) the current status of the channel shall be shown on the LED indicators when the channel is selected

The fault conditions, which are indicated by any illuminated LED's, are shown on channels 0, 1, 2 and 3.

0. Input and Output faults

Channel	LED No.	Fault
0	1	Manual release input
	2	Detection 1 input
	3	Detection 2 input
	4	Actuation output 1
	5	Actuation output 2
	6	Buzzer output
	7	Cylinder pressure low
	8	System Configuration

Table 29 - Input & Output faults

1. System faults

Channel	LED No.	Fault
1	1	CAN Communication Channel
	2	Primary input power
	3	Battery charger circuit
	4	Internal battery pack
	5	Internal battery power
	6	Battery install date
	7	15V DC-DC Module
	8	System Reset Required

Table 30 - System faults 1

2. System faults 2

Channel	LED No.	Fault
2	1	RTC - Time & Date
	2	RTC - Oscillator
	3	RTC - Battery
	4	Discharge pressure switch input
	5	Shutdown Override ON
	6	Failed BIT – Controller
	7	Failed BIT – Display
	8	Cylinder pressure low input

Table 31 - System faults 2

3. System faults 3

Channel	LED No.	Fault
3	1	History Log Disabled – Controller
	2	History Log Disabled – Display
	3	EEPROM Checksum Error – Controller
	4	FLASH Checksum Error – Controller
	5	EEPROM Checksum Error – Display
	6	FLASH Checksum Error – Display
	7	Controller Unit
	8	Display Unit

Table 32 - System faults 3

Control module – Status Indications

4. Power Supply Status

Channel 4 allows status viewing of battery related conditions and power supply faults

Channel	LED No.	Fault
4	1	Ready To Charge
	2	Fast Charge
	3	Top-Off Charge
	4	Charger Fault
	5	Force Battery ON
	6	Battery Test In Progress
	7	Primary Overvoltage
	8	Battery Voltage Low

Table 33 - Power supply status

5. Maintenance Log

The maintenance log records events that need to be rectified at the next scheduled maintenance routine. With the exception of the 'Internal battery capacity low' these events are not reported as faults. An 'Internal battery capacity low' fault will be reported as a system fault after 60 days if the 'Internal battery capacity low' maintenance log is not cleared.

Disabling the RTC (Refer Table 34) will clear all RTC related faults (RTC battery low, Date and time not set, etc...).

Channel	LED No.	Fault
5	1	Internal battery more than 2 years old (Replace the battery)
	2	Internal battery capacity low (Replace the battery)
	3	RTC Disabled
	4	'Unassigned'
	5	
	6	
	7	
	8	

Table 34 - Maintenance log

8. Test Channel

Channel 8 is the test channel that allows a user to check the LEDs and the segment display for faults.

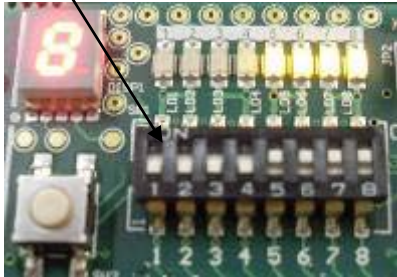
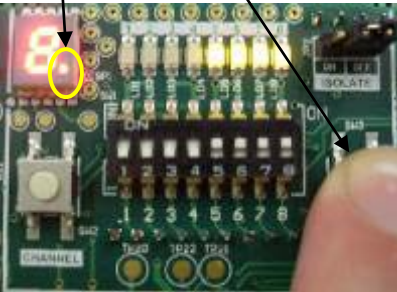


Channel	Display	Description
8		<p>Any Segments missing on the display will indicate a display hardware fault that will require repair at the factory.</p> <p>All LEDs can be checked by changing the dipswitches (1) to the 'ON' position. If a LED does not light up in the "ON" position a hardware fault exists that will require repair at the factory.</p>
		<p>The segment display also has a 'Dot' indicator (2) that is used in programming mode. To test that this indicator is working press and hold the 'PROG/SAVE' button (3) to turn the indicator on.</p> <p>Releasing the button will turn it off.</p>

Table 35 - test channel

Replacing the internal back up battery

If the 'Internal battery pack' or 'Internal battery capacity low' faults are displayed, the battery pack may need to be replaced.

<p><u>Step 1.</u></p> <p>Disconnect all three Deutsch connectors and remove the module cover.</p> <p>Unscrew the 6 screws beside each connector.</p>	
<p><u>Step 2.</u></p> <p>Gently grasp each side of the PCB, lift and slide backwards until the connectors clear the enclosure.</p>	





<p><u>Step 3.</u></p> <p>Turn the card over and locate the battery connector.</p>	
<p><u>Step. 6</u></p> <p>Pinch the connector to disengage locking mechanism and remove.</p>	
<p><u>Step 7.</u></p> <p>Remove the old battery pack and fit the new battery using the adhesive tape provided.</p> <p>Note: Check the voltage in the new pack with a multimeter before fitting.</p> <p>Re-connect the battery, re-fit the PCB and re-connect the modules power supply</p>	
<p><u>Step 8.</u></p> <p>When replacing the internal battery pack, the battery life monitor must be reset using the following procedure:</p> <ol style="list-style-type: none"> 1. Ensure the system real time clock is correctly set for the current time and date (Refer page 59) 2. Completely power off the module by removing the power connector. 3. Wait 5 seconds then re-connect the power connector 4. Within another 5 seconds press and hold the “BATT RESET” push button on module PCB for 3 seconds 5. Confirm all battery related faults have cleared. (Refer Channels 1, 4 and 5.) 6. Re-fit the module cover 	

Table 36 - Replacing the back up battery pack

Notes:

Troubleshooting with Terminal software

The VS-MKII control module includes an RS232 connection to allow interrogation and download of system status and event history. Firmware updates can also be uploaded using the RS232 connection. A cable (part number 87012) to connect to a laptop computer is required for this purpose. The software that interfaces with the Module is called "TeraTerm4". This interface **can only be made** when the module is powered up. Primary Power is preferred but if required the Back up battery can be used as the only power source by placing an external wire link between Pins 4 & 3 on the power supply connector (See page 11).

Step 1.

Open the VS-MKII Control Module and connect the RS232 cable (Fig. 66) to the RS232 connector on the PCB (Fig.67). The RS232 LED will illuminate when a successful connection has been made from the module to a PC COMMS Port (Fig. 68)



Figure 66 - RS232 cable



Figure 67 - RS232 PCB LED



Figure 68 - PC COMMS port

Step 2.

If this is the first time that you are using Teraterm4, create a new folder on your PC and extract all of the files from the archive 'TeraTerm4 - V1.1.zip' by right clicking on the icon and selecting "Extract Here" from the shortcut menu.

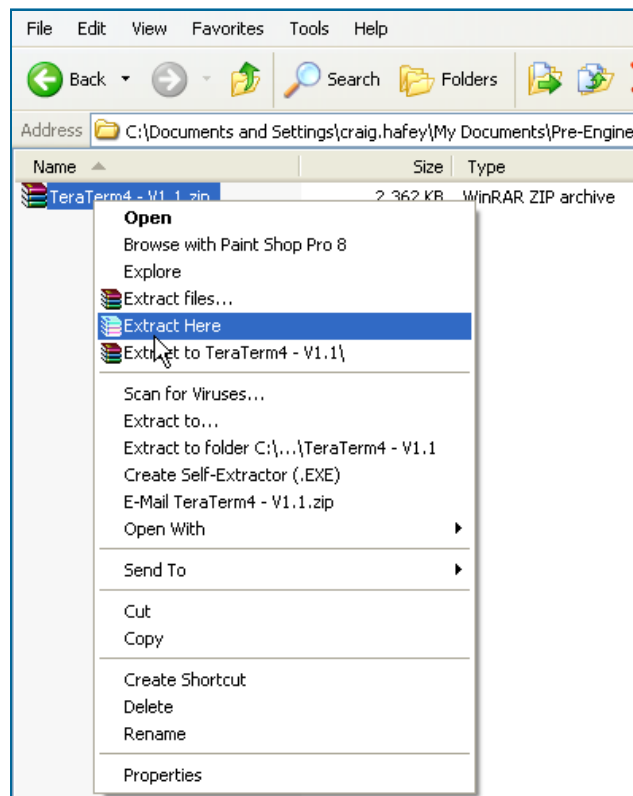


Figure 69 - Extract file

Step 3.

Open the 'TeraTerm' folder by double clicking on the icon to reveal the directory structure contained within;

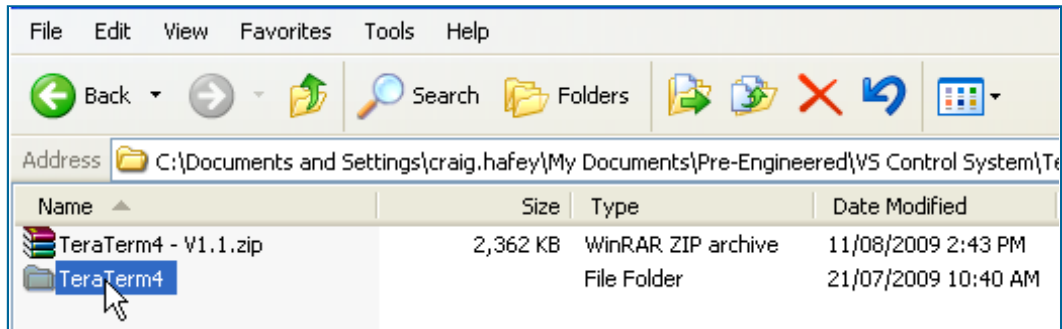


Figure 70 - TeraTerm folder

Step 4.

Open the terminal software by double clicking on the "ttermpro.exe" icon.

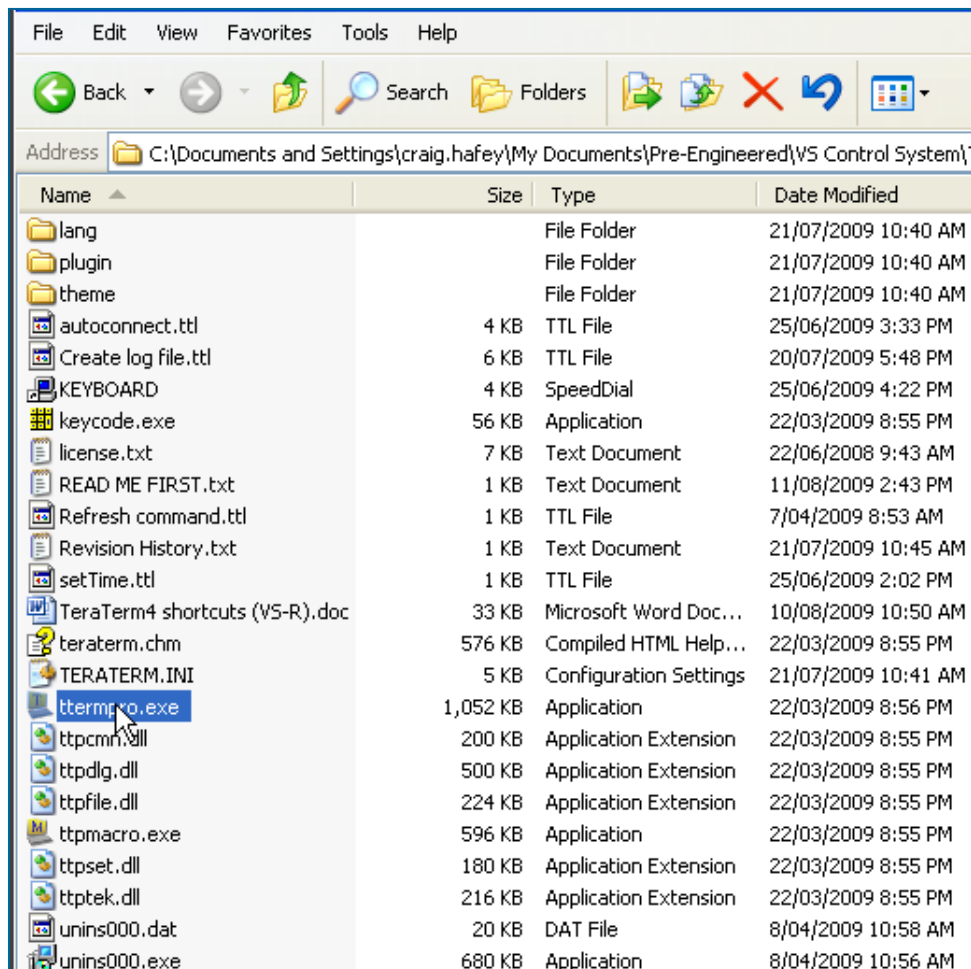


Figure 71 - ttermpro.exe

When the program starts it will automatically start searching for the VS-MKII control module (device).

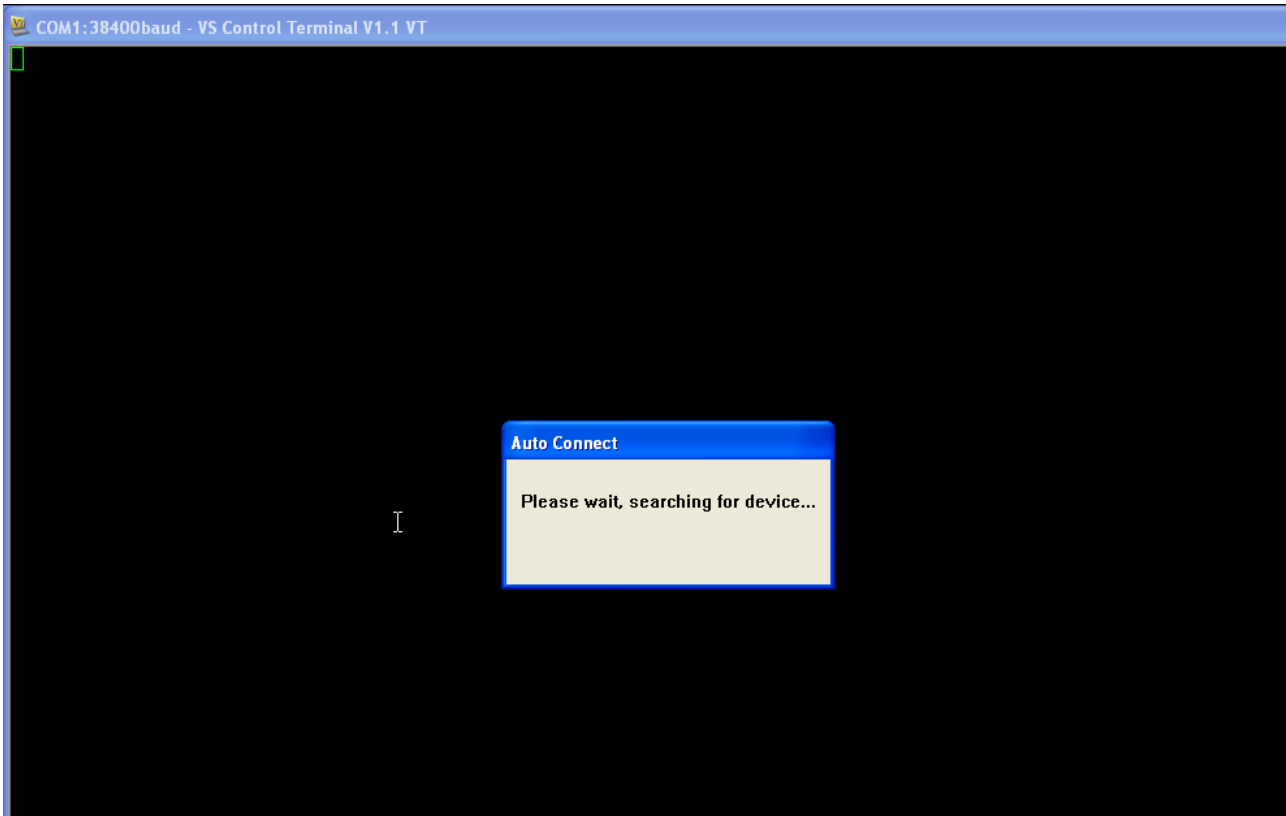


Figure 72 - Searching for device

A status window will pop up when a successful connection has been made. The command prompt will also appear 'Cmd>>'.

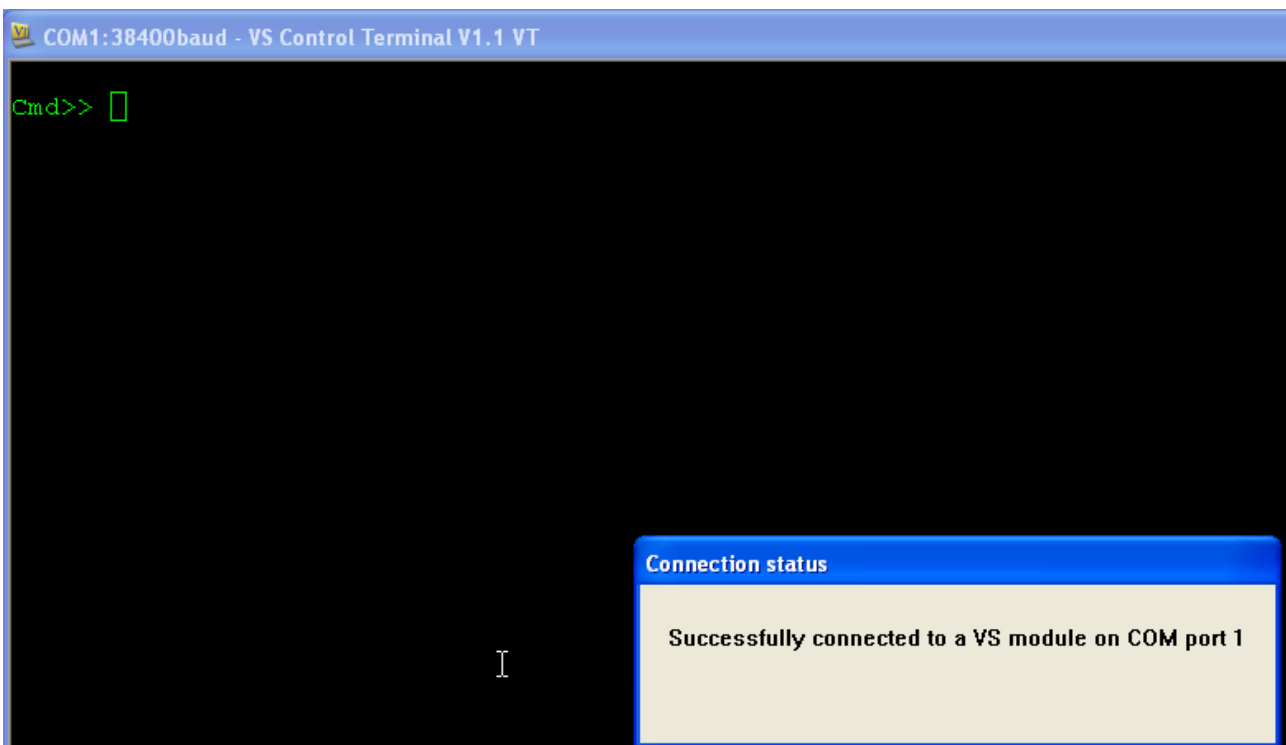


Figure 73 - Command prompt

If you receive the message show in Figure 69 then you may need to re-install the driver of any USB to RS232 connector or change your Window's port settings. For further assistance contact the Chubb Helpdesk or Tech Services in Silverwater to resolve.

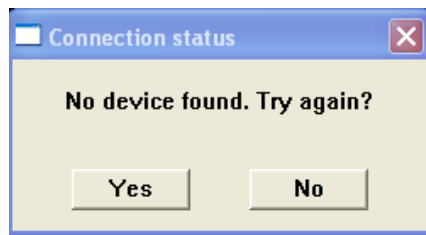


Figure 74 - No device

If the terminal window doesn't maximise correctly to your screen, left click on the blue menu bar and hold whilst moving the window to the right. Once you see the maximise button (middle button, top right corner) click on it.

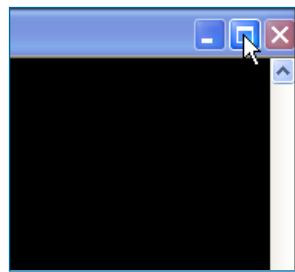


Figure 75 - No device

TeraTerm commands

The function (F keys) shortcuts that are available for use through the TeraTerm are;

Function Key	Function Description	Notes
F1	System Report	For troubleshooting and log
F2	History log	For troubleshooting and log
F3	Error log	For troubleshooting and log
F4	Active faults	For troubleshooting and log
F5	Current time and date	For troubleshooting and log
F6	I/O raw readings	For troubleshooting and log
F7	System Configurations	For troubleshooting and log
F8	Maintenance Log	For troubleshooting and log
F10	Battery Test Info	For troubleshooting and log
F11	Set time and date	The PC time & date is used to set the RTC
F12	Capture relevant system info to a log file	A new log file is created and placed on the users desktop every time this command is executed. The output file will be date and time stamped and follow the following convention 'VSC_log_YYYYMMDD_HHMMSS.txt' where, YYYY = Year MM = Month DD = Date HH = Hour (24 hour format) MM = Minute SS = Second

Table 37 - TeraTerm PC function (F) keys

F11 - Set time and Date

A RTC fault occurs when the system detects an incorrect date setting. This could indicate that the time and date has not been set correctly or that the RTC battery (small battery on the VS-MKII control module PCB) is faulty.



Figure 76 - RTC battery

To diagnose the cause of the RTC fault follow the instructions below:

1. Use the 'F5' command to check the current time and date.
2. If the time and date is incorrect, use the 'F11' command to set the current time and date. Check first that the PC you are using has the current time and date set correctly.
3. Verify that the time and date are now correct by again using the 'F5' command.
4. Perform a system restart (refer Page 16, Step 6)

NOTE: The RTC battery has an expected life of 10years but if the Real Time Clock has defaulted to the date of "01/01/00" it is necessary to replace the RTC battery and then follow the steps detailed above.

F12 - Capture log file

The F12 key will capture all of the relevant system data and event log for troubleshooting purposes and will also automatically save a text file for later analysis.

```

COM1:38400baud - VS Control Terminal VT
Cmd>> i
=====
SYSTEM INFO
=====
FAULT:      No
ISOLATE:    No
ALARM:      No

FIRMWARE VERSION:  V2.0-02f (0xAFDA)
EEPROM VERSION:    V128
FLASH INTEGRITY:   OK
EEPROM INTEGRITY:  OK
SYSTEM CONFIGURATION: OK
SERIAL NUMBER:     11

PRIMARY VOLTAGE:   27.28V (832)
BATTERY VOLTAGE:  14.19V (730)
BATTERY INSTALLED: 21/05/10 (11 da
TEMPERATURE:      24.00C
ONLINE TIME:      8221 seconds
PRODUCTION TEST:  PASSED 30/12/63

SYSTEM RESET:     0
IIC ERRORS:       0
ADC ERRORS:       0
CAN COMMS ERRORS: Tx=0 Rx=0

Cmd>> f
ACTIVE FAULTS
No.      Circuit      Board  Addr.  Value
=====
Cmd>> r
Name      Addr.  SYSTEM STATUS (CONTROLLER)
Enable  State  Fault  Iso   Latch  Data
=====
BUILT-IN-TEST  12    1      0      0      0      0

```

Figure 77 - F12 Capture

Understanding log events

The events recorded in the history log are the most useful in troubleshooting faults. In TeraTerm the event log will be displayed in the format displayed in Table 38.

Event Number	Type	Board /Unit	Address	Condition	Status	Value	Time	Date
73	DETECTION 1	CTRL	41	STATE	ON	150	16:25:48	01/06/10
74	DETECTION ALARM	CTRL	7	STATE	ON	0	16:25:48	01/06/10
75	PRE ALARM	CTRL	5	STATE	ON	0	16:25:48	01/06/10
76	COMMON ALARM	CTRL	4	STATE	ON	0	16:25:48	01/06/10
77	AUX OUTPUT	CTRL	45	STATE	ON	0	16:25:48	01/06/10
78	ACTUATION OUTPUT 1	CTRL	46	STATE	ON	0	16:25:48	01/06/10
79	ACTUATION OUTPUT 1	CTRL	46	STATE	OFF	0	16:25:53	01/06/10
80	SHUTDOWN OUTPUT	CTRL	44	STATE	ON	0	16:25:58	01/06/10

Table 38 - Event log

And example of a common power fault (loss of primary power) stored in log is displayed in Figure 76.

76	POWER SAVING MODE	CTRL	34	STATE	ON	0	16:24:04	01/06/10
77	PRIMARY SUPPLY	CTRL	21	FAULT	ON	0	16:24:04	01/06/10
78	FAST CHARGING	CTRL	25	STATE	ON	0	16:24:11	01/06/10
79	POWER SAVING MODE	CTRL	34	STATE	OFF	2704	16:24:19	01/06/10
80	PRIMARY SUPPLY	CTRL	21	FAULT	OFF	2704	16:24:19	01/06/10

Figure 78 - Event log power faults

Event Log Memory

The log memory allows up to 80 fault, alarm, shutdown, isolation and other maintenance events to be date and time stamped and stored in system non-volatile memory for later retrieval and analysis with 1 being the first occurring event and 80 being the last.

Note: If the module is removed from the equipment for troubleshooting purposes, each time it is powered up it will write to log, potential overwriting data that may be necessary for troubleshooting. Ensure that you disable the event log via the display or the module to preserve the data

Notes:

Troubleshooting Tables

Failure of the VS-MKII Control system to function properly will usually be caused by one or more of the following faults:

1. Failure of the Power Supply
2. Incorrect Installation
3. Damaged Wiring or Corrosion
4. Component Failure

When a failure occurs and the cause is not known, check as many of these items as is practical before starting a detailed check.

If possible, obtain information about any changes taking place that may have affected the system. When troubleshooting, the fault may often be discovered through visual inspection alone. Some faults, such as burned out relay tracks or wiring can be located by sight or smell. Check for smoke or the odour of burned or overheated parts. Look for loose connections. Visual inspection is also useful in avoiding damage to the system which could occur through improper servicing methods. Many faults on the system can be caused by problems with power. Ensure battery and line voltages are checked prior to troubleshooting the system.

The effectiveness of the following tables is greatly increased by first reading the entire manual. A service technician must have a sure understanding of the purpose and correct functionality of the VS-MKII Control System before attempting corrective maintenance. These tables contain instructions to aid a technician in the causes of common system faults.

Power supply problems

Symptom	Probable Cause	Corrective Action
No LED's on	1. No primary power to system and internal battery disconnected or flat	1. Check power supply and connections. 2. Check equipment isolation switches and back up battery link circuit 3. Replace internal battery
Green Power LED off and, Amber Power LED, Amber Fault LED all on . Buzzer sounding once every 10 seconds	1. No primary power	1. Run fault LED analysis on display or module to determine which circuit is in fault. 2. Check power supply and connections. 3. If Fault is intermittent, check equipment battery voltage in operation. Voltage should be over 20 or under 30. If outside limits, install a converter to boost or regulate voltage.
Green Power LED on and, Amber Power LED on	1. Over voltage	1. Run fault LED analysis on module to confirm probable cause. No immediate action required but continual overvoltage could eventually cause a 'Battery Voltage Low' as the charger will not operate in this state.

Table 39 - Power supply problems

Alarm problems

Symptom	Probable Cause	Corrective Action
Green Power LED on and, Red Alarm LED, Red Discharged LED, Red Shutdown LED all on . Buzzer sounding once every 10 seconds.	1. Discharge Pressure Switch operated 2. Manual release initiated by operator. 3. Detector operated.	1. Investigate cause of discharge 2. Service system. 3. Check Discharge pressure switch for correct operation and module settings (Channel F) 4. Check that the control module and pressure switch Deutsch pins are in the correct position:

Table 40 - Alarm problems

Other fault indicators

If there are no power or alarm problems and the system is still in fault, run the fault analysis on the display or the control module to determine which condition(s) exist and perform the suggested corrective action.

Fault	Probable Causes		Corrective Action
	1	2	
Manual release circuit	Open circuit	Short circuit	<ol style="list-style-type: none"> 1. Check release circuit, connectors and cable. 2. Check that the control module Deutsch pins are in the correct positions. 3. Replace manual actuator
CAN Communication	A Display unit is missing	Controller is missing	<ol style="list-style-type: none"> 1. Check display wiring and control module Deutsch pins are correct. 2. Check that the connector in the back of the display is fitted correctly. 3. Replace display panel
Charger	Charger faulty	-	<ol style="list-style-type: none"> 1. Replace module
Detection circuit 1	Open circuit	-	<ol style="list-style-type: none"> 1. Check EOL resistor(s), connectors and cable.
Detection circuit 2	Open circuit	-	<ol style="list-style-type: none"> 2. Check that the module pins are correct
Actuation output 1	Open circuit	Short circuit	<ol style="list-style-type: none"> 1. Check actuator circuit, connectors and cable. 2. Check that the control module Deutsch pins are in the correct positions. 3. Replace actuation device.
Actuation output 2	Open circuit	Short circuit	<ol style="list-style-type: none"> 1. Check actuator circuit, connectors and cable. 2. Check that the control module Deutsch pins are in the correct positions. 3. Replace actuation device
EEPROM Checksum Error	Memory corrupted	-	<ol style="list-style-type: none"> 1. Replace module
Flash Checksum Error	Memory corrupted	-	<ol style="list-style-type: none"> 1. Replace module
Internal battery power	Battery failure	Battery age	<ol style="list-style-type: none"> 1. Replace battery
Shutdown override/bypass activated	Shutdown override switch left on	-	<ol style="list-style-type: none"> 1. Check display panel dipswitch 8. 2. Perform a system reset.
Time & Date	Date & Time not set		<ol style="list-style-type: none"> 1. Reset RTC clock with RS-232 interface 2. Replace RTC Battery if fault does not clear 3. Replace the Module if fault does not clear
Audible circuit	Open circuit	Short circuit	<ol style="list-style-type: none"> 1. Check audible alarm circuit, connectors and cable. 2. Check that the control module Deutsch pins are in the correct positions. 3. Replace audible alarm unit.
Display keypad	Key stuck	-	<ol style="list-style-type: none"> 1. Replace display
RTC Battery fault	RTC battery faulty or missing	-	<ol style="list-style-type: none"> 1. Replace or fit new RTC battery.
Battery install date	Battery has been installed for more than 2 years.	RTC time and date not set correctly therefore causing battery install date to expire after reset the time and date.	<ol style="list-style-type: none"> 1. Fit new RTC battery. Reset time and date.
RTC Oscillator	Hardware failure	-	<ol style="list-style-type: none"> 1. Replace module
Internal 15V module	Hardware failure	-	<ol style="list-style-type: none"> 1. Replace module
Configuration error/fault	Configuration data is corrupted	Configuration data hasn't been set	<ol style="list-style-type: none"> 1. Replace module

Fault	Probable Causes		Corrective Action
	1	2	
History log disabled	History log on one of the units has been disabled.	-	1. Check display and module. Re-enable logging
Controller unit fault	Unrecoverable errors.	-	1. Replace module
Display unit fault	Unrecoverable errors.	-	1. Replace display

Table 41 - Other fault indicators

Hardware Problems

Symptom	Probable Cause	Corrective Action
No Buzzer sound	<ol style="list-style-type: none"> 1. Incorrect pin/wire installation 2. Faulty buzzer 	<ol style="list-style-type: none"> 1. Check buzzer wires on module are RED (+ve) in Pin 11 and BLACK (-ve) in Pin 2. Check buzzer wires on circuit card are RED (+ve) and BLACK (-ve) 2. Replace buzzer
Solenoid doesn't fire on alarm.	<ol style="list-style-type: none"> 1. Faulty solenoid 2. Discharge delay set 	<ol style="list-style-type: none"> 1. Replace solenoid 2. Check the module - Actuation output settings for correct operation (Channel A).
Electric Manual release unit does not activate alarm	<ol style="list-style-type: none"> 1. Faulty switch 2. Incorrect wiring 	<ol style="list-style-type: none"> 1. Check that the switch is attached correctly to actuator body 2. At the module end of the circuit - Check circuit for open or short condition. Check for approx 33 ohms of resistance when activated. 3. Replace manual release unit

Table 42 - Hardware problems

Feedback Form

We welcome feed back regarding this manual. If you have any recommendations for improvement please provide details using this form.

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1. PART NUMBER		2. TITLE: <i>VS-MKII Control System - Install, Operations and Maintenance Manual</i>		3. VERSION: <i>v1.0</i>	
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