RMS Mors Smitt
A Wabtec Company

## Features

- 4, 8 or 16 alarm points
- Rack or panel mount draw out case design
- LED indication for each alarm point with space for custom label text
- Non volatile memory ensures last recorded alarm states are restored on power up
- Wide range status input to initiate each alarm point with selectable instantaneous or time delayed operation
- Repeat output contact(s) for each alarm point (Latch or S/R)
- Common alarm output contact for use with external audible or visual device or SCADA input
- Front panel acknowledge button & status input
- Front panel reset button & status input
- Self supervision watchdog with healthy LED & alarm contact
- Built in test sequence
- Wide range auxiliary supply

Technical Bulletin

# 1A54

## 4, 8 & 16 Point Alarm Panels


1A54 8 alarm point versions
with custom alarm text

## Description

The 1A54 is a station alarm panel which can be supplied with either 4, 8 or 16 alarm points. Each alarm point comprises a status input, red LED alarm indicator & a minimum of one repeat output contact.

In addition to the 4, 8 or 16 alarm points, front mounted push buttons & status inputs are provided for alarm acknowledge & reset. A single common output contact is provided for operation of an external lamp or audible device.

Configuration of the 1A54 is completed by the factory in accordance with the customer ordering code & through a set of internal configuration switches accessible to the user by withdrawing the module from the outer case.

Continuous self testing is used to maintain the front panel healthy LED & self supervision alarm contact for increased system security.

A self test routine may be manually initiated at the front panel to check that all alarm LED's & output contacts are functioning correctly.

## Application

Made in Australia

The 1A54 is a flexible & cost effective choice for the annunciation of alarms & operating events. The 1A54 can be scaled for 4, 8 or 16 alarm points to indicate as few or as many points as needed for a specific application. Alarm groups can be configured for instantaneous or time delayed operation. Multiple alarm panels can be used for high density alarm applications.

The following examples represent examples of typical alarm panel installations. Use the 1A54 alarm panel for indication of a wide variety of conditions including:

- **Transformer alarm panel;**
- **Quantity high / low;**
- **Timing status;**
- **Intrusion / security status;**
- **Device operational status;**
- **Breaker / switch position;**
- **Protection relay status;**
- **Trip & alarm contact multiplication.**

A switchmode power supply provides a very wide auxiliary operating range which combined with the heavy duty output contacts & rugged draw out case construction makes the protection class 1A54 suitable for sub station applications.

A relay fail alarm is provided in the form of a N/C contact which is picked up when the auxiliary supply rail & CPU watchdog status is healthy.

**ALARM STATUS INPUTS – APPLY VOLTS TO INITIATE**
Each alarm point has an associated status input. An alarm is initiated with the application of a control voltage to the status input.

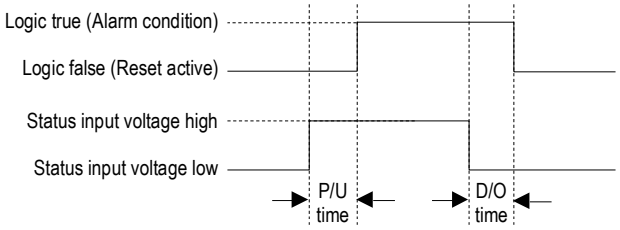



Figure 1: Status input timing definition

Status inputs are arranged in groups of four. Each group is isolated from all other groups, alarm contacts & auxiliary supply.

**ALARM STATUS INPUTS – REMOVE VOLTS TO INITIATE**
It is also possible for some of the status inputs to be configured to operate upon removal of a control voltage (Refer to section on configuration switches).

It should be noted that if the 1A54 auxiliary power is also used to energize the external Status Input circuits, loss of the external auxiliary supply will remove the initiate voltage from the Status Inputs before the 1A54 CPU shuts down. This will cause these Status Inputs to pick up & signal the CPU to record an alarm event in non volatile memory (EEPROM). When the auxiliary power is restored all alarm point LED's with Status Inputs configured to operate on removal of volts will re-activate.

This is not an issue if the Status Input initiate voltage remains applied when the external 1A54 auxiliary supply is removed or when the Apply Volts to initiate Status Inputs setting is employed.

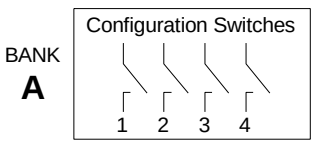
**ACKNOWLEDGE STATUS INPUT**
A status input is provided for remote acknowledgement of an alarm condition. This input functions in the same way as pressing the front panel acknowledgement push button.

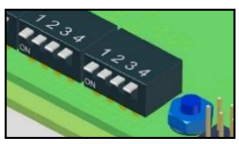
**RESET STATUS INPUT**
A status input is provided for remote reset of an alarm condition. This input functions in the same way as pressing the front panel reset push button.

**STATUS INPUT TIME DELAY**
Status input groups 2, 3, 4 & 5 can be independently set for time delayed or 'instantaneous' operation by setting the appropriate configuration switch. This feature is useful where high speed is not necessary such that a fixed time delay can be employed to allow transient signals to clear & thus avoid nuisance alarms from being generated. When a delay is selected for a status input group the standard time delay setting is 10s. The status input must be continuously picked up for this period before the alarm is activated. Other definite time delays may be specified in the ordering information section.

**CONFIGURATION SWITCHES**
Configuration switches are accessible to the user by first drawing out the 1A54 module from the outer case. Two banks of 4 switches (A & B) are provided on the size 2 case versions.

The 16 point alarm version has a further two banks of 4 switches (C & D).



While the function of the configuration switches may vary for special custom models, the standard settings are described in the wiring diagrams 5-7 & in the Factory Configuration section on page 10.

# Operation

**ALARM OUTPUT CONTACTS**
Each alarm point has one or more associated output contacts. These alarm contacts may be configured to pick up to a latched condition whenever its alarm LED is flashing (Slow)*, or on solid. Alternatively when configuration switch 2 is set to OFF, the output contacts will be self reset when the initiate input is removed.

Alarm output contacts are usually provided in N/O format although the 16 point version has provision for some C/O contacts. Refer to wiring diagrams in figures 5-7.

For C/O options on the 4 & 8 point versions consult the factory.

**COMMON ALARM OUTPUT CONTACT**
A single N/O alarm contact is provided which picks up whenever any LED is flashing. This contact is reset when all alarms are acknowledged or reset.

**OPERATING SEQUENCE**
When a signal is applied to an alarm status input the front panel LED will flash & the associated repeat output contact pick up. The common alarm output contact will also pick up.

Pressing the acknowledge push button or activating the acknowledge status input will change the front panel LED from flashing to solid on. The common alarm output will be reset.

Provided the abnormal condition has been cleared, pressing the reset push button or activating the reset status input will change the front panel LED from solid on to off. The repeat output alarm output will also be reset.

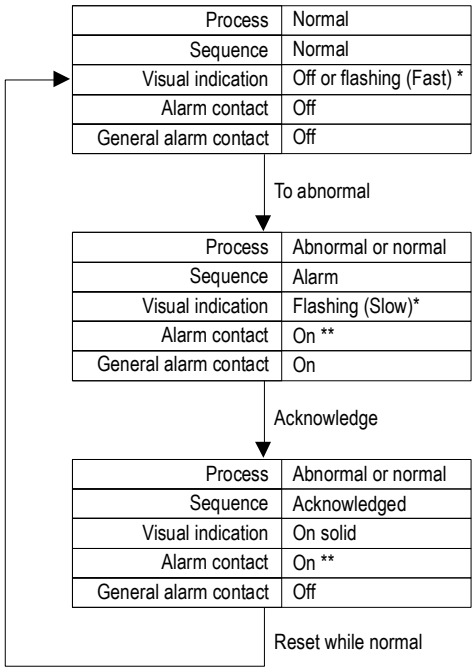



Figure 2: Reset state diagram

Notes:

* Where the status input time delay function has been invoked, the LED will flash 'fast' during timing & then flash 'slow' after time out (Abnormal condition).

** The operating sequence described above is valid when configuration switch B2 (Alarms 1-8) & D2 (Alarms 9-16), are set to ON for latching output contacts. When set to OFF the output contacts will self reset when the alarm initiate signal is removed.

**NON VOLATILE MEMORY**

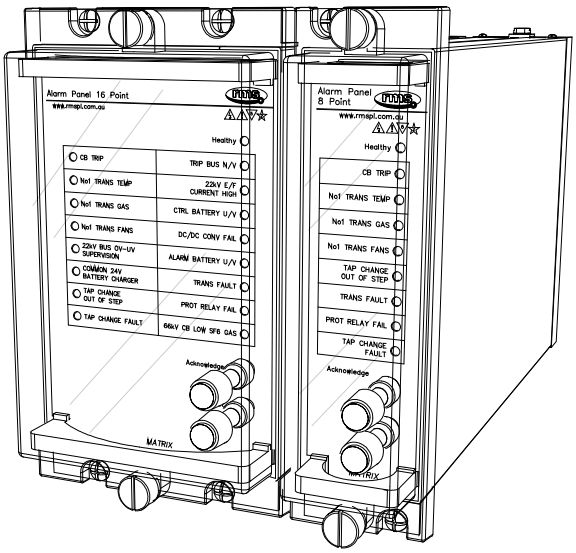
The status of each alarm point LED & output contact is saved to EEPROM memory whenever a channel changes from Normal to Alarm, from Alarm to Acknowledged, or from Acknowledged to Normal.

When the 1A54 is powered up after loss of the auxiliary supply the status of all LED's & output contacts are restored to the condition saved prior to power down. The preserved states are reset using the acknowledge button or status input.

**RELAY FAIL ALARM**
A N/C alarm contact is maintained in the energized state when all of the following conditions are met:

- The auxiliary supply is applied
- The internal 24V DC rail is within acceptable limits
- The CPU hardware watchdog maintains a pulsing output

A CPU software watchdog records "suspect" events to an assert register and if necessary performs a soft restart.




# Supervision & Testing

**LED TEST SEQUENCE**
The LED test sequence is initiated by pressing & holding the front panel reset button for ~8s. All LED's will flash until the acknowledge button is pressed causing all LED's to go on solid. The test sequence is terminated by pressing the reset button causing all LED's to go off.

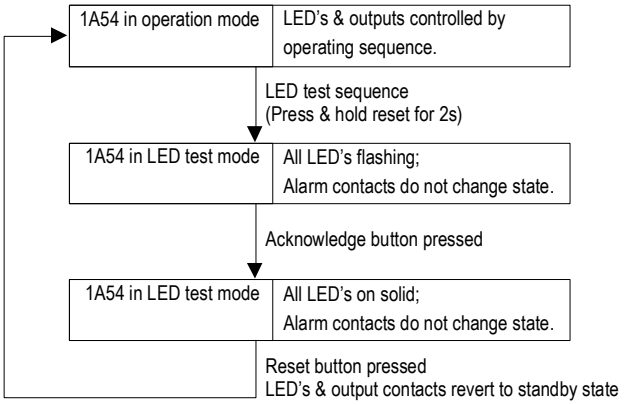



Figure 3: LED test logic diagram

**OUTPUT CONTACT TEST SEQUENCE**
Pressing & holding the front panel reset button & acknowledge button simultaneously for ~8s will cause the 1A54 to initiate an output contact test sequence. All alarm output contacts & LED's will operate. Pressing the acknowledge button will operate the common alarm output & change the LED's from solid to flashing. The test sequence is terminated by pressing the reset button causing all output contacts & LED's to reset.

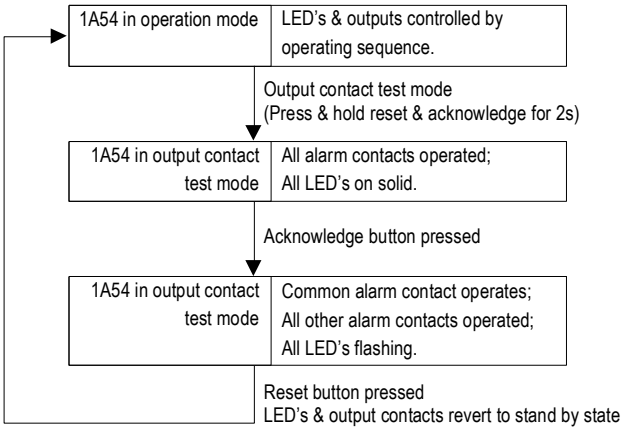



Figure 4: Output contact test logic diagram

**AUXILIARY SUPPLY**
A high efficiency switchmode power supply is incorporated which provides a low burden to the auxiliary supply.
Low range model: 20-70V DC
High range model: 40-300V DC & 40-275V AC

**AUXILIARY SUPPLY BURDEN** (At 110V DC)
Quiescent: Less than 3W
Maximum: Less than 10W

**FRONT PANEL LED's**
Green system healthy LED
One red LED per alarm point:
OFF Alarm point not active (Reset)
Flashing – fast: Status input timing
Flashing – low: Status input timer timed out
Solid: Alarm point acknowledged

**STATUS INPUT OPERATING VOLTAGE** (AC rejection filter)
The operating range of the status inputs are set using internal configuration switch 1. This setting may be pre defined when ordering.

18 - 300V DC Set Configuration Switch to **ON**
In this mode the universal status input will reject AC signals that may be induced on the control wiring. Suitable for high security applications where a DC battery supply is available.

18 - 300V DC & 18 – 275V AC Set Configuration Switch to **OFF**
In this mode the universal status input is designed to operate on both AC & DC input voltages. Suitable for applications where an AC auxiliary voltage is available such as transformer or generator control panels.

**STATUS INPUT MINIMUM OPERATING CURRENT**
10mA P/U for 1ms then reducing to1.5mA after 4ms.

While the function of the configuration switches may vary for special custom models, the standard functions & default settings are described in the Ordering Information section.

**STATUS INPUT OPERATING TIME** ( 'Instantaneous' )

| | | AC Rejection Filter | |
|---|---|---|---|
| Initiate input | Minimum | ON | OFF |
| DC | P/U | <16ms | <4ms |
| | D/O | <4ms | <16ms |
| AC | P/U | N/A | <23ms |
| | D/O | | <33ms |

**STATUS INPUT TIME DELAY SETTING**
Fixed time delay accuracy: ±0.1s
Timer reset characteristic: Refer status input drop out time
Default fixed delay setting: 'Instantaneous' or 10s
Optional fixed delay: 0.1 to 25.0s in 0.1s steps

**LED OPERATE TIME**
As per status input operating time

**OUTPUT CONTACT OPERATE TIME**
As per status input operating time + 11ms

**RESET**
Press the front reset button or pulse the reset status input.

**ACKNOWLEDGE**
Press the front acknowledge button or pulse the acknowledge status input.

.

# Technical Data

**CUSTOM ALARM TEXT** - Refer ordering information page

4 point alarm panels
Maximum characters: 4 lines x 15 characters per alarm point.
Maximum font size: 2 lines x 10 characters per alarm point.

8 & 16 point alarm panels
Maximum characters: 2 lines x 15 characters per alarm point.
Maximum font size: 1 line x 10 characters per alarm point.

**OUTPUT CONTACTS**
Alarm repeat contacts: 1, 2, 3, 4 or 6 contacts per alarm point
Refer wiring diagrams 5-7
Common alarm contact: 1 N/O
Fail alarm: 1 N/C for the power supply / CPU fail
Normally picked up & drops out to signal an alarm condition.

**OUTPUT CONTACT RATINGS** **IEC60255-0-2**

| | | |
|---|---|---|
| Carry continuously | 5A AC or DC | |
| Make & carry | 0.5s 20A AC or DC | |
| L/R ≤ 40ms & V ≤ 300V | 0.2s 30A AC or DC | |
| Break capacity I ≤ 5A & V ≤ 300V | AC resistive | 1,250VA |
| | AC inductive | 250VA @ PF ≤ 0.4 |
| | DC resistive | 75W |
| | DC inductive | 30W @ L/R ≤ 40ms<br>50W @ L/R ≤ 10ms |
| Minimum number of operations | | $10^6$ at maximum load |
| Minimum recommended load | | 0.5W limit 10mA / 5V |

**TRANSIENT OVERVOLTAGE** **IEC60255-5**
Between all terminals & earth 5kV 1.2/50us 0.5J
Between independent circuits without damage or flashover 5kV 1.2/50us 0.5J

**INSULATION COORDINATION** **IEC60255-5**
Between all terminals & earth 2.0kV RMS for 1 minute
Between independent circuits 2.0kV RMS for 1 minute
Across normally open contacts 1.0kV RMS for 1 minute

**AUXILIARY SUPPLY** **IEC60255-11**
Allowable breaks / dips in supply
Collapse to zero from nominal voltage ≤ 20ms

**HIGH FREQUENCY DISTURBANCE** **IEC60255-22-1 CLASS III**
2.5kV 1MHz common mode
1.0kV 1MHz differential mode No mal operation

**ELECTROSTATIC DISCHARGE** **IEC60255-22-2 CLASS III**
6kV contact discharge No mal operation

**FAST TRANSIENT** **IEC60255-22-4**
4kV, 5/50ns, 100KHz repetitive No mal operation

**TEMPERATURE RANGE** **IEC68-2-1/2**
Operating: -5 to +55°C
Storage: -25 to +75°C

**HUMIDITY** **IEC68-2-78**
40 °C & 95% RH non condensing

# 4 Point Alarm Panel Wiring

**TERMINATION SCREWS**

M4 Screws
An M4 screw kit is supplied as standard with each 1A54. Additional M4 screw kits may be purchased separately.

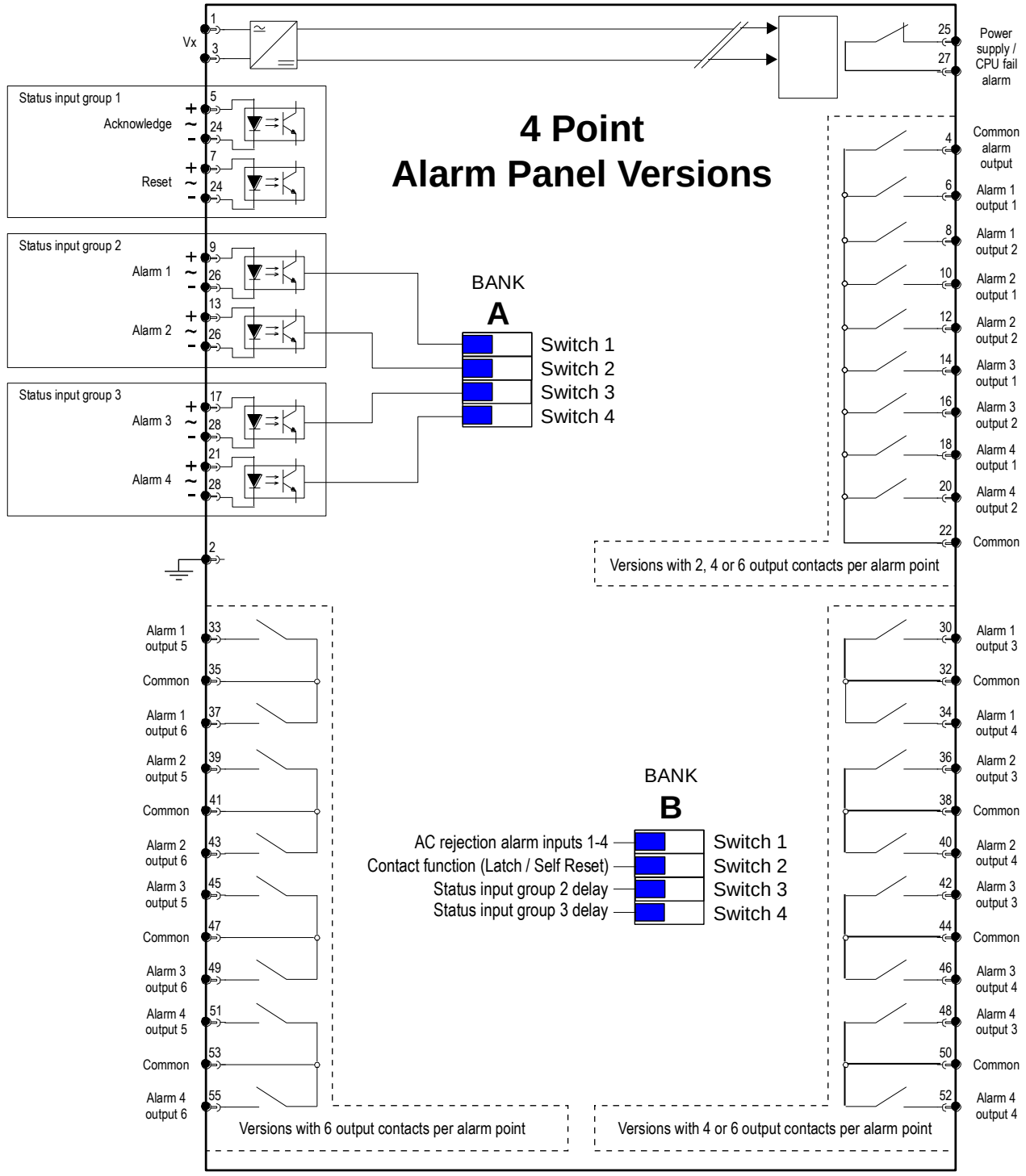



Figure 5: Wiring diagram for 1A54 four (4) point alarm panel with 2, 4 or 6 output contacts per point
Relays shown in de-energized condition

# 8 Point Alarm Panel Wiring

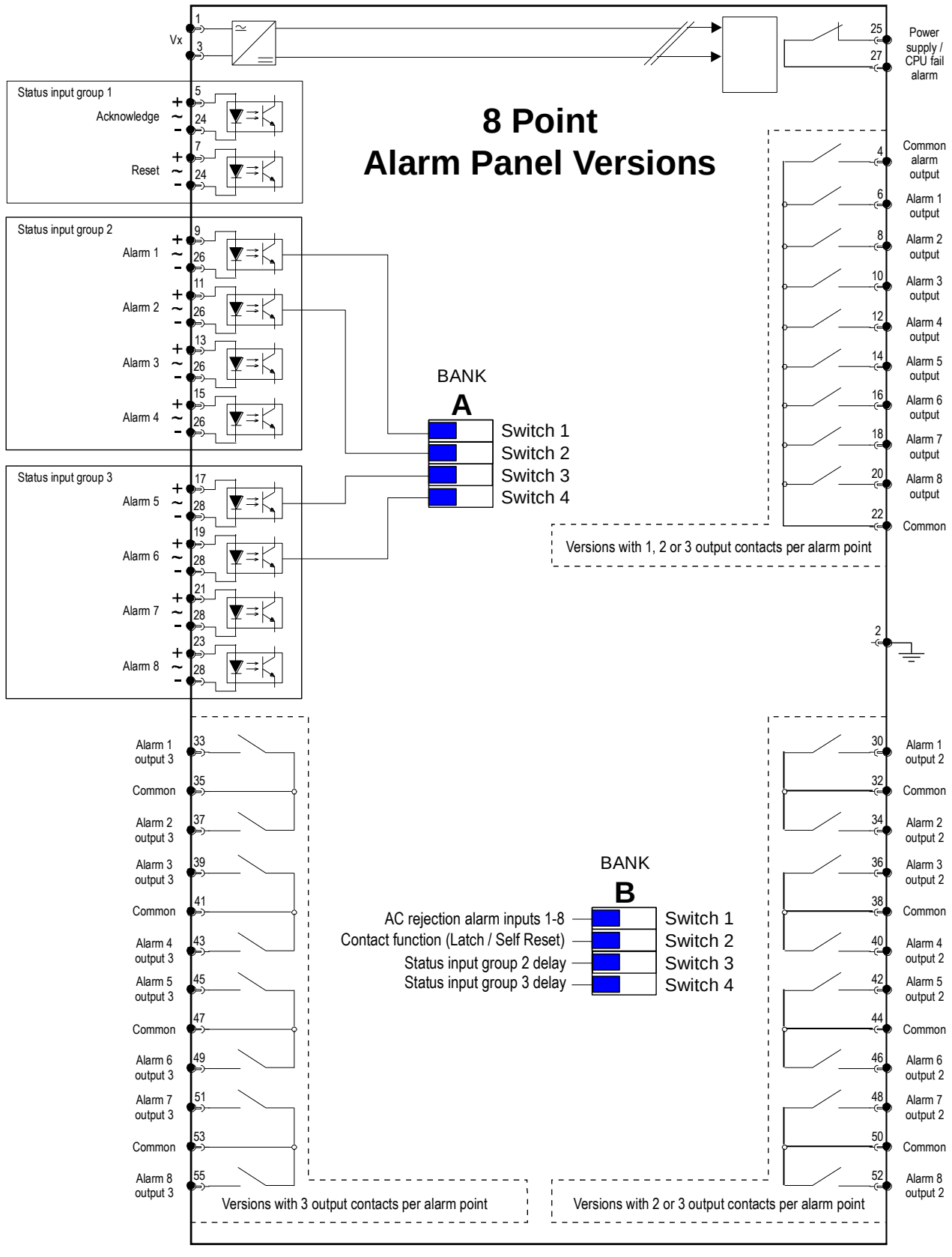



Figure 6: Wiring diagram for 1A54 eight (8) point alarm panel with 1, 2 or 3 output contacts per point
Relays shown in de-energized condition

# 16 Point Alarm Panel Wiring

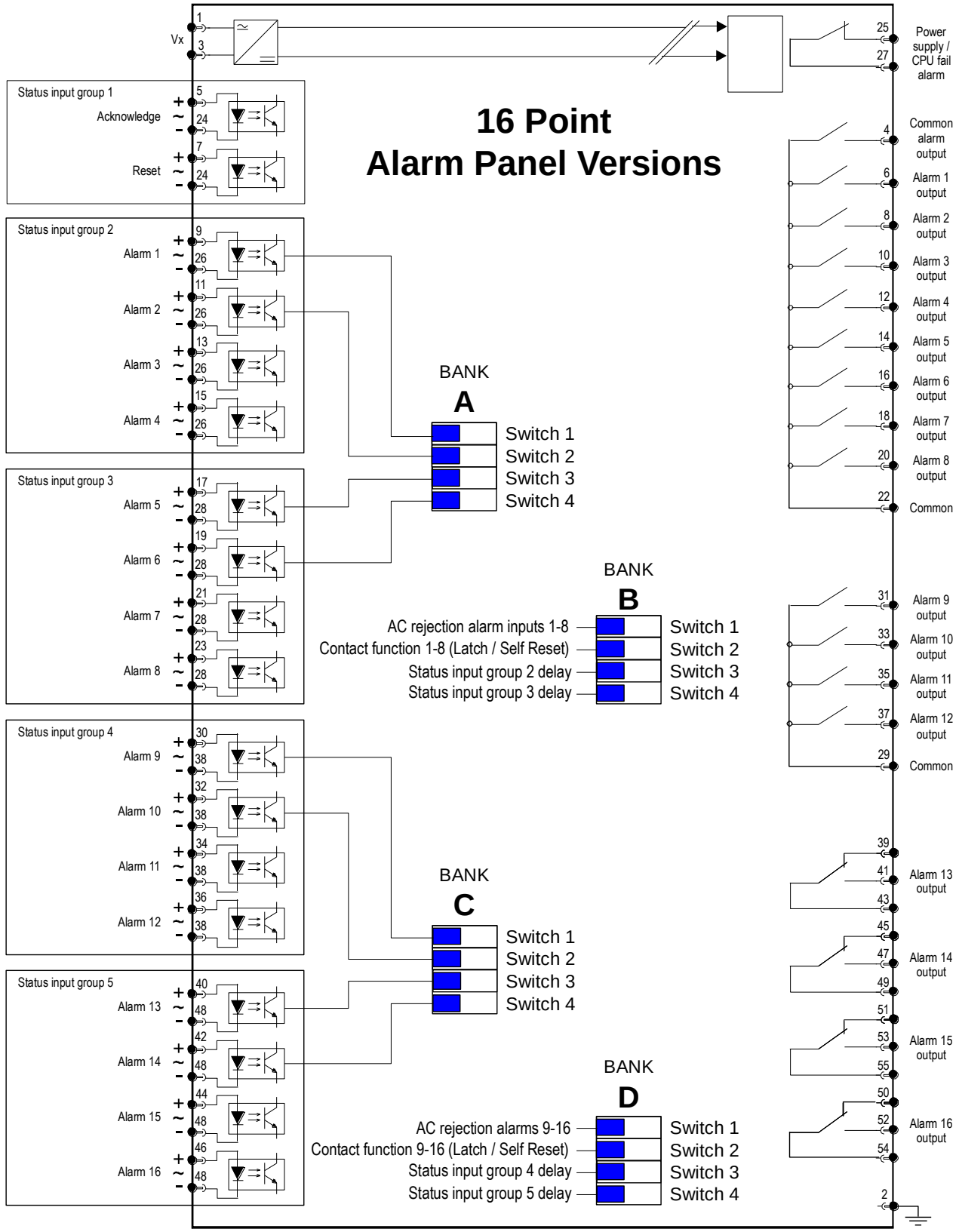



Figure 7: Wiring diagram for 1A54 sixteen (16) point alarm panel with one (1) output contact per point
Relays shown in de-energized condition

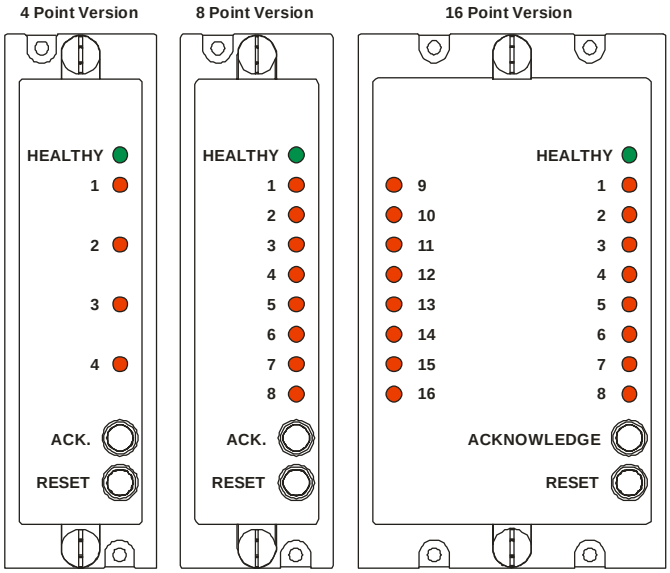



Figure 8: Alarm text position layout

# Case Mounting

**CASE SIZE**
2M28-S or 4M56-S draw out case depending on the number of alarm points & output contacts as follows:

| Alarm Points | Output contacts per point | Case size |
|---|---|---|
| 8 | 1 | 2M28-S |
| 16 | 1 | 4M56-S |
| 4 | 2 | 2M28-S |
| 8 | 2 | 4M56-S |
| 8 | 3 | 4M56-S |
| 4 | 4 | 4M56-S |
| 4 | 6 | 4M56-S |

**ACCESSORIES SUPPLIED WITH EACH RELAY**

2M28 case versions
1x M4 self threading mounting screw kit P/N 290-406-151
1x M4 terminal screw kit (28 per kit) P/N 290-407-153

4M56 case versions
1x M4 self threading mounting screw kit P/N 290-406-151
2x M4 terminal screw kit (28 per kit) P/N 290-407-153

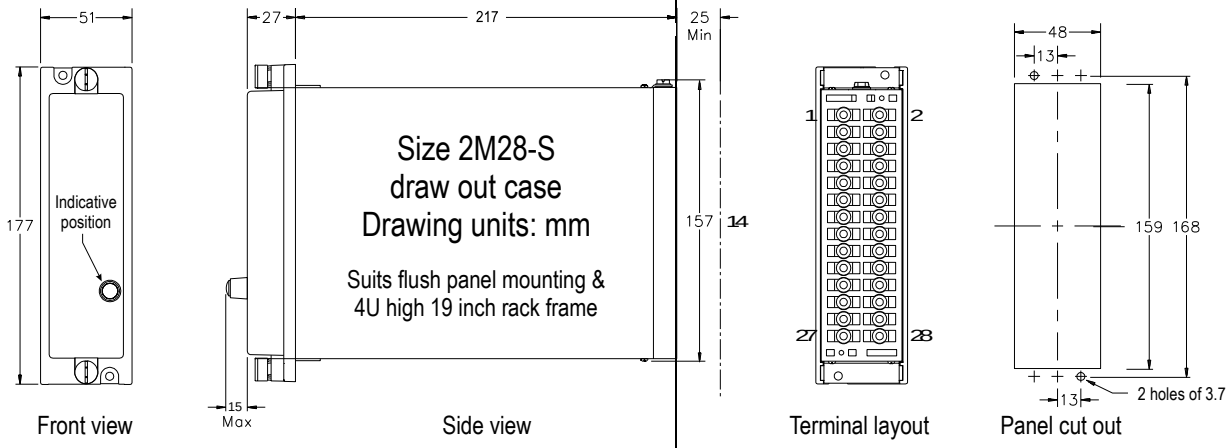



Figure 10: Case mounting details for 2M28-S case versions

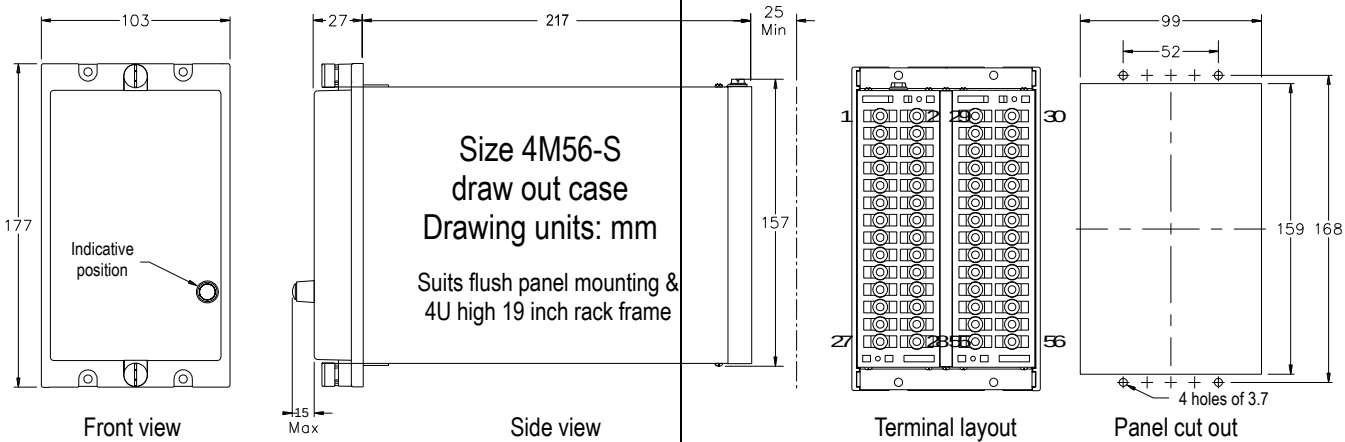



Figure 10: Case mounting details for 4M56-S case versions

**ALARM TEXT LABELS**
The 1A54 front panel has provision for custom text to identify the function of each alarm LED. The required text may be engraved on the front panel by the factory if specified at time of order. Alternatively the front panel may be removed for engraving by the user or contractor. The RMS web site provides an ACAD file for this purpose.

The front panel is fabricated from flexible plastic sheet with a white surface & black substrate to provide high contrast black text when engraved.

Removal of the front label is achieved by drawing out the 1A54 module from the outer case & pulling the label from the edges at the mid point between the top & bottom draw out handles. This will cause the label to bend & disengage from the top & bottom handle retention points. Once free from the 1A54 module the front label can be placed on an engraving table. Additional factory engraved labels may be sourced from RMS for later field installation.

While an engraved label provides the most permanent record other methods such as laser printed stick on labels or indelible marker pen may be satisfactorily employed.

**CUSTOM ENGRAVED TEXT DEFINITION**
Complete the following tables with one character per box. Refer to the front panel alarm point layouts depicted in figure 6. Submit completed labeling information with the 1A54 product ordering code. For maximum font size limit text for each alarm point to 1 line x 10 characters.

Text for the left hand side alarm points will be left justified.
Text for the right hand side alarm points will be right justified.

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | | | |

# Ordering Information

**ORDER CODE**
The order code determines the hardware build in the factory & cannot be changed in the field.

Generate the required order code as follows: e.g. 1A54 ABAA

| General Type | | Order Code | | | |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 |
| 1A54 | - | | | | |

**1 ALARM POINTS**

| | |
|---|---|
| A | 8 with 1 output per point |
| B | 16 with 1 output per point |
| D | 4 with 2 outputs per point |
| E | 8 with 2 outputs per point |
| J | 8 with 3 outputs per point |
| L | 4 with 4 outputs per point |
| P | 4 with 6 outputs per point |

**2 AUXILIARY SUPPLY RANGE**

| | |
|---|---|
| A | 20 - 70V DC |
| B | 40 - 300V DC & 40 – 275V AC |

**3 CUSTOM ENGRAVED TEXT**

| | | |
|---|---|---|
| A | Not required | No engraving - factory default |
| B | Required | Complete the custom text details at left |

**4 STATUS INPUT TIME DELAY SETTING**

| | | |
|---|---|---|
| A | Instantaneous or 10s | (Default) |
| B | Instantaneous or _ _ . _s | (0.1 to 25.0s with 0.1s resolution) |

**CONFIGURATION CODE** (Optional specification)
Refer to the wiring diagram for each 1A54 model for details on configuration switch setting.

The configuration code can be set in the field by withdrawing the relay module & following the instructions on the side plate label for setting the configuration switches.

The configuration code may be specified at time of order so that the relay will be shipped from the factory pre-set to meet customer pre-determined operating requirements.

e.g. CONFIG A - 0101

If a configuration code is not specified the factory default will be set as indicated below:

CONFIG A - 1111 All alarm panel versions
CONFIG B - 1111 All alarm panel versions
CONFIG C - 1111 16 point alarm panel versions
CONFIG D - 1111 16 point alarm panel versions

# Factory Configuration

| Specify Factory Configuration | | Configuration Switches | | | |
|---|---|---|---|---|---|
| | | A1 | A2 | A3 | A4 |
| CONFIG A | - | | | | |

**A1-4** **ALARM INITIATE INPUT FUNCTION** (Refer wiring diag.)

1 ON Apply volts to initiate (Default)
0 OFF Remove volts to initiate

| Specify Factory Configuration | | Configuration Switches | | | |
|---|---|---|---|---|---|
| | | B1 | B2 | B3 | B4 |
| CONFIG B | - | | | | |

**B1** **ALARM INITIATE INPUT SENSITIVITY** (Groups 1-3)

1 ON DC operation only - AC rejection ON (Default)
0 OFF AC / DC operation - AC rejection OFF

**B2** **ALARM OUTPUT CONTACTS 1-8 FUNCTION**

1 ON Latching (Default)
0 OFF Self reset

**B3-4** **ALARM INITIATE TIME DELAY** (Groups 2-3)

1 ON Instantaneous (Default)
0 OFF Time delayed

| Specify Factory Configuration | | Configuration Switches | | | |
|---|---|---|---|---|---|
| | | C1 | C2 | C3 | C4 |
| CONFIG C | - | | | | |

**C1–4** **ALARM INITIATE INPUT FUNCTION** (Refer wiring diag.)

1 ON Apply volts to initiate (Default)
0 OFF Remove volts to initiate

| Specify Factory Configuration | | Configuration Switches | | | |
|---|---|---|---|---|---|
| | | D1 | D2 | D3 | D4 |
| CONFIG D | - | | | | |

**D1** **ALARM INITIATE INPUT SENSITIVITY** (Groups 4-5)

1 ON DC operation only - AC rejection ON (Default)
0 OFF AC / DC operation - AC rejection OFF

**D2** **ALARM OUTPUT CONTACTS 9-16 FUNCTION**

1 ON Latching (Default)
0 OFF Self reset

**D3-4** **ALARM INITIATE TIME DELAY** (Groups 4-5)

1 ON Instantaneous (Default)
0 OFF Time delayed

**RMS Mors Smitt**
**19 Southern Court**
**Keysborough, VIC 3173, Australia**
**Tel: +61 (0)3 8544 1200**
**sales.rms@wabtec.com**

**Wabtec Netherlands B.V.**
**Darwinstraat 10**
**6718 XR Ede, Netherlands**
**Tel: +31 (0)88 600 4500**
**sales.msbv@wabtec.com**

Visit www.morssmitt.com/rms for the latest product information.
Due to RMS continuous product improvement policy this information is subject to change without notice.