

Remote Display Unit Installers Handbook

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Contact information and product documentation	For contact information or to download the latest product documentation, visit firesecurityproducts.com .

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Important information

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Advisory messages

Advisory messages alert you to conditions or practices that can cause unwanted results. The advisory messages used in this document are shown and described below.

WARNING: Warning messages advise you of hazards that could result in injury or loss of life. They tell you which actions to take or to avoid in order to prevent injury or loss of life.

Caution: Caution messages advise you of possible equipment damage. They tell you which actions to take or to avoid in order to prevent the damage.

Note: Note messages advise you of the possible loss of time or effort. They describe how to avoid the loss. Notes are also used to point out important information that you should read.

Product symbols



This symbol appears on the main board of the unit and indicates that the board contains static sensitive components.



This symbol indicates the Safety ground studs. These are for grounding cable screens, etc., and should not be connected to 0V or signal earth.

Chapter 1

Introduction

Summary

This chapter provides information about this manual.

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About this manual

This manual is to be used by qualified and factory-trained personnel, knowledgeable of NFPA standards and any other applicable standards in effect, and is intended to provide guidance to qualified technical professionals for the installation of the Remote Display Unit (RDU), referred to in this manual as the RDU.

Only qualified persons experienced, trained, and certified in the installation of this equipment should design, service, maintain, test, install, and configure any equipment component used as part of a High Sensitivity Aspirating Detection system. They must be familiar and experienced with the wiring diagrams and components, electrical installation, and familiar not only with NEC, relevant NFPA and local codes but also trained and qualified by the manufacturer and/or its associated operating companies. The manufacturer of the components that make up the RDU is not responsible for the configuration or installation of the product.

It is the responsibility of the professional installer (described above) to properly install, configure and test the systems. Under no circumstances will the manufacturer be liable for improper installation, maintenance, servicing, testing or configuration of the systems.

The technical data contained herein is provided for informational purposes only and should not be used as a substitute for professional judgment and training. Although the manufacturer believes this information to be true and correct, it is published and presented without any guarantee or warranty whatsoever. The manufacturer disclaims any liability for any use of the data other than as set out in this manual, foreword included.

Safety summary

General safety notices

The following general safety notices supplement specific warnings and cautions appearing in the manual. The safety precautions in this section must be understood and applied during operation and maintenance. This manual is to be used by trained distributors/technicians. The entire manual must be read and fully understood prior to installation.

First aid

Any injury, no matter how slight, should never go unattended. Always obtain first aid or medical attention immediately.

General precautions

The following general safety precautions are to be observed at all times:

- All electrical components associated with equipment should be installed and grounded in accordance with NEC and local regulatory requirements.
- Special precautionary measures are essential to prevent applying power to equipment at any time maintenance work is in progress.
- Before working on electrical equipment, use a voltmeter to ensure that the system is not energized.
- When working near electricity, do not use metal rulers, flashlights, metallic pencils, or any other objects having exposed conductive material.
- When connecting a meter to terminals for measurement, use a voltage range higher than the expected voltage to be measured.

Installation precautions

Adherence to the following will aid in problem-free installation with long-term reliability.

Several different sources of power can be connected to this detector.

WARNING: Disconnect all sources of power before servicing. Control unit and associated equipment may be damaged by servicing while the unit is energized. Do not attempt to install, service, or operate this control unit until this manual is read and understood.

System reacceptance test after reprogramming: To ensure proper system operation, this system must be retested in accordance with NFPA 72 Chapter 10 after any programming change. Reacceptance testing is also required after any addition or deletion of system components, and after any modification, repair, or adjustment to system hardware or wiring.

Caution: All components, circuits and system operations known to be affected by a change must be 100% tested. In addition, to ensure that other operations are not inadvertently affected, at least 10% of initiating devices in a single installation that are not directly affected by the change, up to a maximum of 50 devices, must also be tested and proper system operation verified, in accordance with NFPA.

This system meets FM and UL 268 requirements for operation at 32° to 100°F (0° to 38°C) and at a relative humidity of 90% (noncondensing) at 90°F (32.2°C). However, the useful life of the system's standby batteries and the electronic components may be adversely affected by continuous operation at these environmental limits. Therefore, it is recommended that this system and its peripherals be installed in an environment with a nominal room temperature of 60° to 80°F (15° to 27°C).

This product has been designed to meet the requirements of NFPA 72 National Fire Alarm Code, UL 864 Standard for Control Units for Fire Protective Signaling Systems, UL 268 Smoke Detectors for Fire Alarm Signaling Systems, UL 268A Smoke Detectors for Duct Application, and ULC S527 Standard for Control Units for Fire Alarm Systems.

Like all solid-state electronic devices, this system may operate erratically or can be damaged when subjected to lightning induced transients. Although no system is completely immune from lightning transients and interference, proper grounding will reduce susceptibility.

WARNING: The use of overhead or outside aerial wiring is not recommended due to the increased susceptibility to nearby lightning strikes. Consult with the Technical Support department if any problems are anticipated or encountered.

Do not install electronic assemblies prior to mounting and attaching conduit for field wiring to the enclosure. Before making modifications, verify that they will not interfere with battery and printed circuit board locations. Do not overtighten screw terminals. Overtightening may damage threads, resulting in reduced terminal contact pressure and difficulty with screw terminal removal.

This system contains static-sensitive components. Always ground yourself with a proper wrist strap before handling any circuits so that static charges are removed from the body. Use static suppressive packaging to protect electronic assemblies removed from the control unit.

Follow the instructions in this manual. These instructions must be followed to avoid damage to the control unit and associated equipment. System operation and reliability depend upon proper installation.

Caution: While installing a fire alarm system may make lower insurance rates possible, it is not a substitute for insurance. An automatic fire alarm system or components of a system—smoke detectors, heat detectors, manual pull stations, notification appliances, and a fire alarm control unit with remote-notification capability—can provide early warning of a developing fire. Such a system, however, does not assure protection against property damage or loss of life resulting from a fire.

Aspirating smoke detection system limitations

An aspirating smoke detection system — which can be made up of smoke detectors, heat detectors, manual pull stations, notification appliances, and a fire alarm control unit with remote-notification capability — can provide early warning of a developing fire. Such a system, however, does not assure protection against property damage or loss of life resulting from a fire.

Any fire alarm system may fail for a variety of reasons. The following are only examples:

- Smoke detectors may not sense fire where smoke cannot reach the detectors, such as in chimneys, in walls, on roofs, or on the other side of closed doors.
- Smoke detectors on one level also may not sense a fire on another level or floor of a building. A second floor detector, for example, may not sense a first floor or basement fire.
- All types of smoke detectors — ionization, photoelectric and air aspirating — have sensing limitations. No type of smoke detector can sense every kind of fire caused by carelessness and safety hazards such as smoking in bed, violent explosions, escaping gas, improper storage of flammable materials, overloaded electrical circuits, children playing with matches, or arson.
- Notification appliances, such as bells, may not alert people if these appliances are located on the other side of closed or partly open doors, or are located on another floor of a building.
- A fire alarm system will not operate without electrical power. If AC power fails, the system will operate from standby batteries only for a limited time.
- Rate-of-Rise heat detectors may be subject to reduced sensitivity over time. For this reason, the rate-of-rise feature of each detector should be tested by a qualified fire protection specialist as recommended in NFPA 72.
- Auxiliary Equipment used in the system may not be technically compatible with the control unit. It is essential to use only equipment listed for service with your control unit.
- Telephone lines needed to transmit alarm signals from a premise to a central monitoring station may be out of service or temporarily disabled.

The most common cause of fire alarm malfunctions is inadequate maintenance. All devices and system wiring should be tested and maintained by professional fire alarm installers following the written procedures supplied with each device. System inspection and testing should be scheduled monthly or as required by national and/or local fire codes and standards. Adequate written records of all inspections should be kept.

Chapter 2

Product and component descriptions

Summary

This chapter provides descriptions of the detector features, specifications, and controls and indicators.

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Introduction

The Remote Display Unit (RDU) displays the operational status of an aspirating smoke detector connected to it on the RS-485 data bus: alternatively, if connected to a command module with a detector network, it displays the status of a single dedicated detector on the RS-485 bus.

The RDU provides LED indications for PreAlarm, Fire 1, Fire 2, Aux, and Fault, and a bar graph display showing any abnormal level of smoke detected. See Figure 1 below.

An additional relay PCB provides volt-free relay contacts for all four fire levels as well as Fault. This additional relay board is mounted on the main board using standoffs.

Depending on the detector which is being displayed by the RDU, the RDU either mimics the display and relay status which is already visible on the front of the detector or provides additional functionality over and above the detector's LED by way of the bar graph display.

The unit is powered from a 24 VDC nominal power supply. Power is distributed internally from an isolated converter.

Figure 1: Remote Display Unit



Specifications

Caution: This equipment is only to be used in accordance with this specification. Failure to operate the equipment as specified may cause damage to the unit, injury, or property damage.

Table 1: Specifications

Specification	Value
RDU board	
Nominal operating voltage	24 VDC $\pm$ 10%
Maximum input voltage range	18 to 30 V DC
Maximum operating current	40 mA
Operating temperature range	32 to 100°F (0 to 38°C) (UL 268 compliance)
Storage temperature range	-25 to +85° C
Operating humidity range	0 to 90% noncondensing
RELAY card	
Maximum switching voltage	200 V DC
Maximum switching current	0.5 A
Minimum life expectancy	1 x 10 ⁸ activations
Maximum contact resistance	100 milliohms

Construction

Stand-alone RDU

A single RDU main board and optional relay board are mounted inside a sturdy metal back box fitted with a number of knockouts to permit the fitting of cable glands. See Figure 2.

Figure 2: Stand-alone RDU mounting



Rack mounted RDU

The unit consists of a metal front panel plate covered with a self-adhesive graphics overlay and a main PCB that has LEDs mounted through holes in the front panel. The main PCB has terminals for the power supply input and connection to the detector or command module's RS-485 bus. An additional PCB provides volt-free relay contacts. These relays mimic the action of the signal relays within a detector, or the input states of a contact monitor. This additional relay board is mounted on the main board using standoffs.

Chapter 3

Installation and configuration

Summary

This chapter provides information necessary to install and configure the RDU.

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Introduction

This chapter provides information necessary to install the RDU.

Installation should only be done by factory-trained technicians in accordance with applicable installation requirements. These include:

- NFPA 70, *National Electrical Code*
- NFPA 72, *National Fire Alarm and Signaling Code*
- Any other local, national, or installation requirements or standards.

Note: Power should be turned off during installation.

Antistatic precautions

This system contains static-sensitive components. Always ground yourself with a proper wrist strap before handling any circuits.

Caution: When handling any electric components or printed circuit boards, antistatic precautions must be followed. Failure to do so may result in component damage.

Electro-static discharge can be reduced by adhering to the following guidelines:

- Always use conductive or antistatic containers for transportation and storage, if returning any item.
- Wear a wrist strap while handling devices and ensure that a good ground is maintained throughout the installation process.
- Never subject a static sensitive device to sliding movement over an ungrounded surface and avoid any direct contact with the pins or connections.
- Avoid placing sensitive devices onto plastic or vinyl surfaces.
- Minimize the handling of sensitive devices and printed circuit boards (PCBs).

Installation

The RDU may be ordered as a stand-alone unit in a single metal enclosure or up to eight may be mounted in a 19 in. rack enclosure.

RS-485 wiring should be made using screened twisted pair cable. The cable screens should be connected locally and not to power supply 0V or to mains earth.

The RS-485 connections form part of a SenseNET Bus. All other devices on this bus must have an isolated RS-485 port.

Cabling

The SenseNET data cable should be shielded (screened) twisted pair such as Belden 9841 24 AWG.

RS-485 wiring should be made using shielded (screened) twisted pair cable. The cable screens should be connected locally and not to power supply 0V or to mains earth.

The RDU has no built-in repeater, so the maximum length of cable that can be connected to an RDU is 3,937 ft. (1.2 km). An optional repeater unit is available if a cable run longer than 3,937 ft. (1.2 km) is unavoidable.

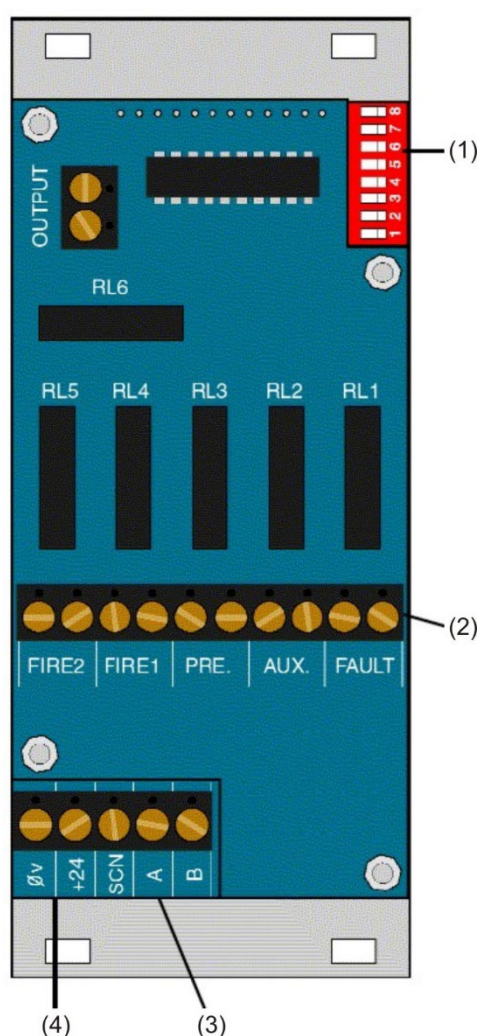
Connections

The following wiring connections are available on the RDU. See Figure 3 on page 14.

Table 2: Wiring connections

Name	Description
0V	Power supply 0 V. This must not be connected to data SCN.
+24	Power supply 24 V input
SCN	Data cable shield (screen)
A	Data loop A circuit
B	Data loop B circuit

Figure 3: Main board (rear view)



- (1) DIP switch segments 1 through 7 set the address for the detector to be mounted. Segment 8 sets the RDU to poll the detector without the need for a command module.
- (2) Optional relay board relay outputs
- (3) RS-485/SenseNET bus connections
- (4) 24 VDC inputs

Power supplies

The power requirement for the RDU is 40mA max. at 24 VDC $\pm$ 10%. Failure of the power supply to the RDU will cause the fault relay contact to open (if the optional relay card is fitted).

Address switch settings

Figure 4 below shows a sample DIP switch setting.

The address equates to 01100011 in binary, or:

$$(1 \times 1) + (1 \times 2) + (0 \times 4) + (0 \times 8) + (0 \times 16) + (1 \times 32) + (1 \times 64) + (0 \times 128) = 99$$

The full range of available addresses and their relevant switch settings are provided in Table 3 below for reference.

Addresses chosen for detectors do not have to be consecutive or in a given order as long as they are all different.

Figure 4: Sample DIP switch settings

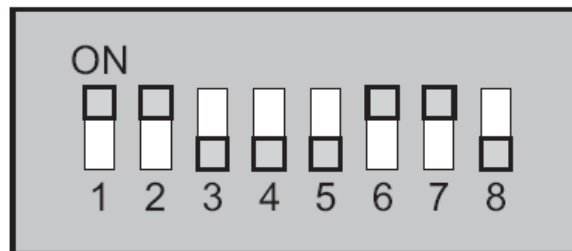


Table 3: Address table

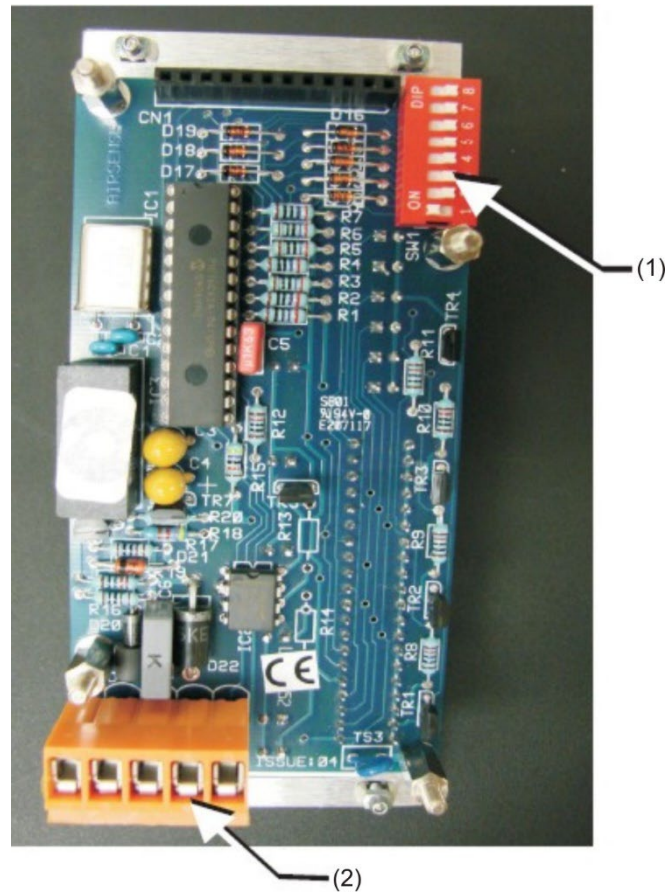
Address	1	2	3	4	5	6	7	8
1	1	0	0	0	0	0	0	0
2	0	1	0	0	0	0	0	0
3	1	1	0	0	0	0	0	0
4	0	0	1	0	0	0	0	0
5	1	0	1	0	0	0	0	0
6	0	1	1	0	0	0	0	0
7	1	1	1	0	0	0	0	0
8	0	0	0	1	0	0	0	0
9	1	0	0	1	0	0	0	0
10	0	1	0	1	0	0	0	0
11	1	1	0	1	0	0	0	0
12	0	0	1	1	0	0	0	0
13	1	0	1	1	0	0	0	0
14	0	1	1	1	0	0	0	0
15	1	1	1	1	0	0	0	0
16	0	0	0	0	1	0	0	0
17	1	0	0	0	1	0	0	0
18	0	1	0	0	1	0	0	0
19	1	1	0	0	1	0	0	0
20	0	0	1	0	1	0	0	0
21	1	0	1	0	1	0	0	0
22	0	1	1	0	1	0	0	0
23	1	1	1	0	1	0	0	0
24	0	0	0	1	1	0	0	0
25	1	0	0	1	1	0	0	0
26	0	1	0	1	1	0	0	0
27	1	1	0	1	1	0	0	0
28	0	0	1	1	1	0	0	0
65	1	0	0	0	0	0	1	0
66	0	1	0	0	0	0	1	0
67	1	1	0	0	0	0	1	0
68	0	0	1	0	0	0	1	0
69	1	0	1	0	0	0	1	0
70	0	1	1	0	0	0	1	0
71	1	1	1	0	0	0	1	0
72	0	0	0	1	0	0	1	0
73	1	0	0	1	0	0	1	0
74	0	1	0	1	0	0	1	0
75	1	1	0	1	0	0	1	0
76	0	0	1	1	0	0	1	0
77	1	0	1	1	0	0	1	0
78	0	1	1	1	0	0	1	0
79	1	1	1	1	0	0	1	0
80	0	0	0	0	1	0	1	0
81	1	0	0	0	1	0	1	0
82	0	1	0	0	1	0	1	0
83	1	1	0	0	1	0	1	0
84	0	0	1	0	1	0	1	0
85	1	0	1	0	1	0	1	0
86	0	1	1	0	1	0	1	0
87	1	1	1	0	1	0	1	0
88	0	0	0	1	1	0	1	0
89	1	0	0	1	1	0	1	0
90	0	1	0	1	1	0	1	0
91	1	1	0	1	1	0	1	0
92	0	0	1	1	1	0	1	0
93	1	0	1	1	1	0	1	0

29	1	0	1	1	1	0	0	0
30	0	1	1	1	1	0	0	0
31	1	1	1	1	1	0	0	0
32	0	0	0	0	0	1	0	0
33	1	0	0	0	0	1	0	0
34	0	1	0	0	0	1	0	0
35	1	1	0	0	0	1	0	0
36	0	0	1	0	0	1	0	0
37	1	0	1	0	0	1	0	0
38	0	1	1	0	0	1	0	0
39	1	1	1	0	0	1	0	0
40	0	0	0	1	0	1	0	0
41	1	0	0	1	0	1	0	0
42	0	1	0	1	0	1	0	0
43	1	1	0	1	0	1	0	0
44	0	0	1	1	0	1	0	0
45	1	0	1	1	0	1	0	0
46	0	1	1	1	0	1	0	0
47	1	1	1	1	0	1	0	0
48	0	0	0	0	1	1	0	0
49	1	0	0	0	1	1	0	0
50	0	1	0	0	1	1	0	0
51	1	1	0	0	1	1	0	0
52	0	0	1	0	1	1	0	0
53	1	0	1	0	1	1	0	0
54	0	1	1	0	1	1	0	0
55	1	1	1	0	1	1	0	0
56	0	0	0	1	1	1	0	0
57	1	0	0	1	1	1	0	0
58	0	1	0	1	1	1	0	0
59	1	1	0	1	1	1	0	0
60	0	0	1	1	1	1	0	0
61	1	0	1	1	1	1	0	0
62	0	1	1	1	1	1	0	0
63	1	1	1	1	1	1	0	0
64	0	0	0	0	0	0	1	0

94	0	1	1	1	1	0	1	0
95	1	1	1	1	1	0	1	0
96	0	0	0	0	0	1	1	0
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99	1	1	0	0	0	1	1	0
100	0	0	1	0	0	1	1	0
101	1	0	1	0	0	1	1	0
102	0	1	1	0	0	1	1	0
103	1	1	1	0	0	1	1	0
104	0	0	0	1	0	1	1	0
105	1	0	0	1	0	1	1	0
106	0	1	0	1	0	1	1	0
107	1	1	0	1	0	1	1	0
108	0	0	1	1	0	1	1	0
109	1	0	1	1	0	1	1	0
110	0	1	1	1	0	1	1	0
111	1	1	1	1	0	1	1	0
112	0	0	0	0	1	1	1	0
113	1	0	0	0	1	1	1	0
114	0	1	0	0	1	1	1	0
115	1	1	0	0	1	1	1	0
116	0	0	1	0	1	1	1	0
117	1	0	1	0	1	1	1	0
118	0	1	1	0	1	1	1	0
119	1	1	1	0	1	1	1	0
120	0	0	0	1	1	1	1	0
121	1	0	0	1	1	1	1	0
122	0	1	0	1	1	1	1	0
123	1	1	0	1	1	1	1	0
124	0	0	1	1	1	1	1	0
125	1	0	1	1	1	1	1	0
126	0	1	1	1	1	1	1	0
127	1	1	1	1	1	1	1	0

Configuration

Figure 5: RDU main board



- (1) DIP switches
- (2) Connector

RDU main board

The address switch on the RDU should be set to the same address as the detector whose display is to be repeated.

Because the RDU only monitors, multiple RDUs can be set up to display the status of one detector.

If no bus master or PC is to be used on the system, then set DIP switch segment 8 ON to get the RDU to poll the detector. If multiple RDUs are used only set one RDU to poll.

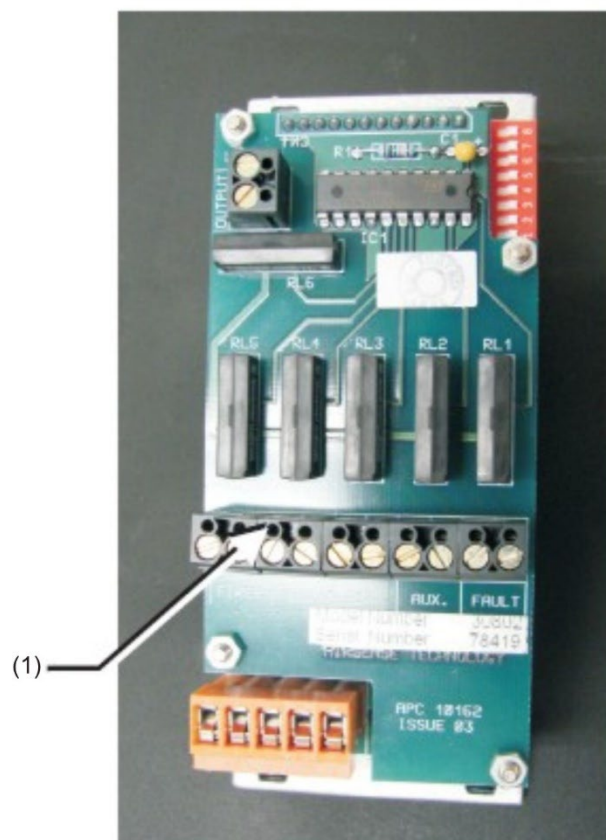
The RDU requires a 24 VDC power supply and is designed to be fitted into a 3u 19 in. rack frame. Eight RDUs will fit across a single 3U high frame.

RDU relay board

The optional relay board provides separate relay outputs for all the alarm levels of the detector driving a particular RDU. Once the relay board is connected to the RDU (which must be powered off first) operation is completely automatic.

Relay contacts are provided for each alarm level plus a normally energised common fault relay.

Figure 6: Relay board fitted on main board



(1) Relay contacts

Using an RDU to show common detector status

Setting an RDU to address 0 will configure it to display the common alarm and fault status for all detectors. No bar graph indication will be shown when the RDU is set to the common address.

If a relay board is fitted to an RDU set to address 0 then the relays will indicate common alarm and fault relays for all detectors.

Note: This signal is sent from the command module and is only available when a hardware command module is being used in the system.

Chapter 4

Troubleshooting

Summary

This chapter provides information to troubleshoot the RDU.

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Troubleshooting the RDU

This chapter provides some possible solutions if a problem should occur with your RDU. If the problem is not addressed in this chapter or, if after performing the suggested actions, the problem persists, contact Technical Support.

Table 4: Troubleshooting guide

Problem	Solution or corrective action
RDU is dead (no lights and fault relay is open).	Input voltage is missing or too low.
RDU shows fault but the detector shows okay.	The RDU is not receiving data. Check cabling and set the RDU to poll the detector if necessary. Check the address switch.