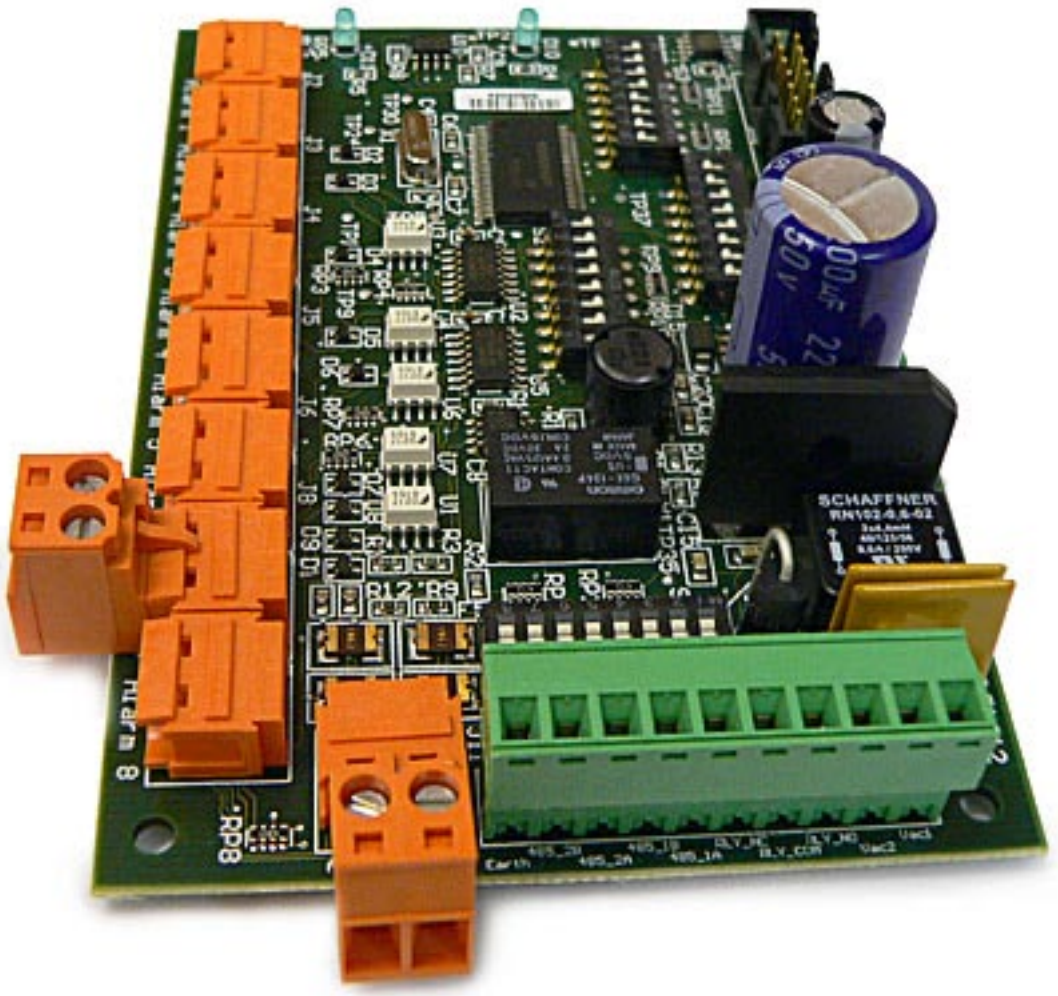
Sparkle Alarm Card

Feature and Operations Manual



- Simple installation
- Alarm inputs individually programmable for NC or NO
- RS-485 control
- 8 opto-isolated alarm inputs
- 18 to 28 V ac/dc supply
- Up to 8 cascadable cards, max 64 alarms

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Precision Camera Control Systems

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2: Introduction

2.1 Conventional System

PTZ CCTV domes usually have dedicated alarm inputs to monitor alarm contacts, such as passive infrared sensors (PIR's). A dome can be programmed to respond to specific alarms by moving to cover the area of interest. The number of alarms the dome can monitor is typically limited to eight by the dome input connectors, and wiring each pair of contacts to the dome can require long and inconvenient cable runs, as well as cable duplication. Figure 1 shows a typical installation.

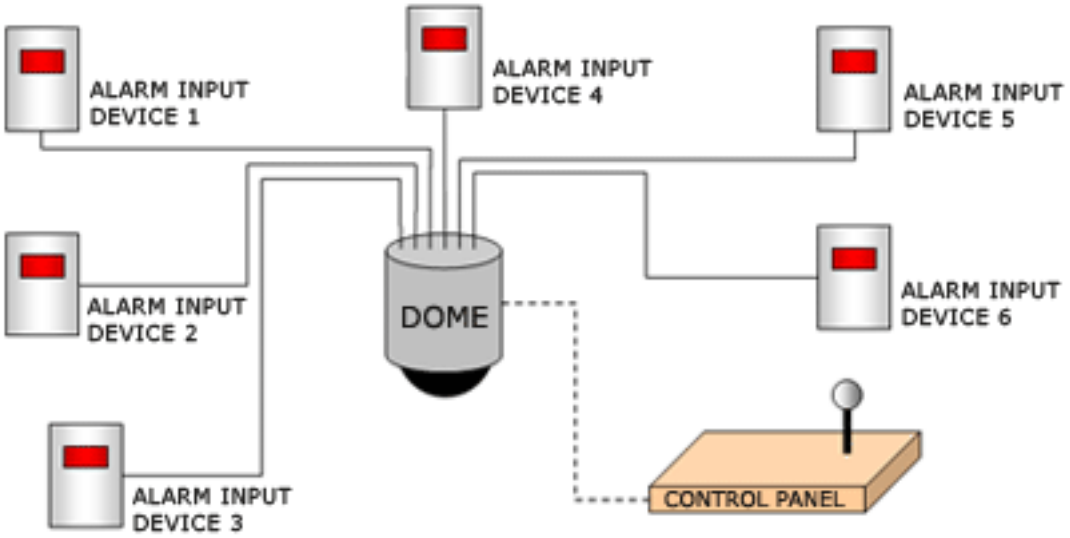


Figure 1. Standard alarm input configuration for a PTZ dome

2.2 Sparkle Alarm Card System

The Sparkle alarm card allows simple installation wiring, more alarms in a system, and far greater operational flexibility. Each alarm card has two RS-485 serial ports, one Master and one slave, with 8 opto-isolated alarm contact monitor inputs, as illustrated in Figure 2. This allows them to be cascaded so that any alarm event ripples through connected cards immediately, without any polling delay.

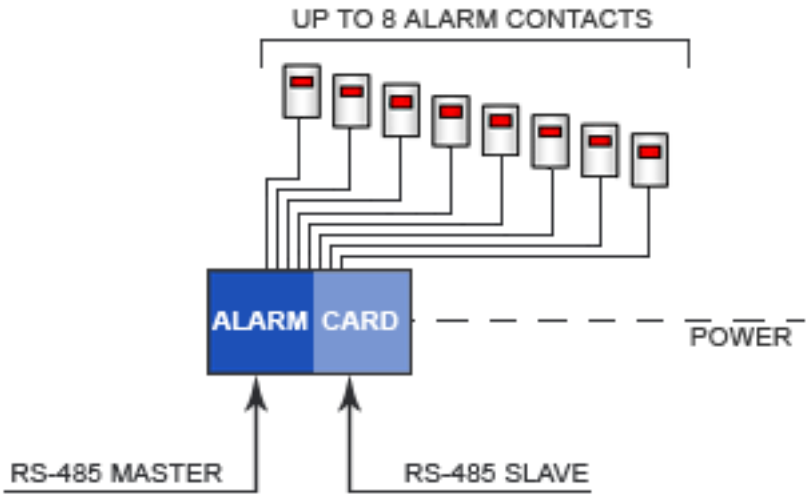


Figure 2. Sparkle alarm card connectivity

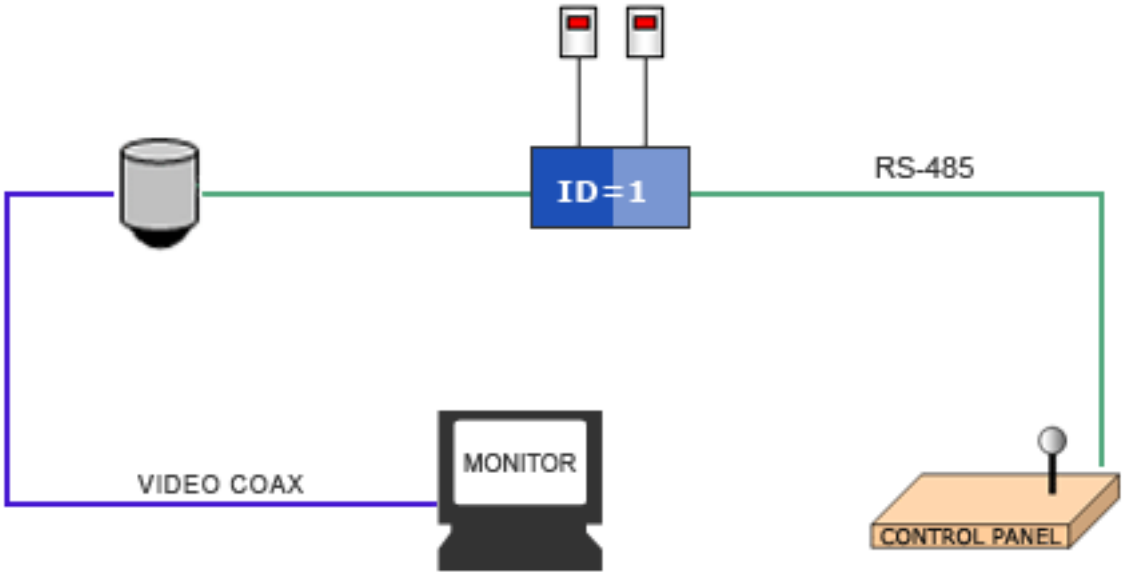


Figure 3. Simple RS-485 control system with one Sparkle dome and 1 alarm card monitoring two alarm devices

In a system where Sparkle domes are controlled through their video coax cable, each dome receives alarm data through its RS-485 port; and in a system where all domes are controlled by RS-485 the command loop passes through the alarm cards and while domes are controlled normally the alarm events are broadcast to all domes on the loop. Each dome can be programmed with appropriate actions to each different alarm through the unique alarm response structure in the Sparkle dome. The Sparkle alarm card allows alarm contact pairs to be positioned and monitored near the alarms themselves with a single RS-485 serial cable forwarding alarm status to the dome.

Up to eight Sparkle alarm cards can be daisy chained on the RS-485 serial loop. Not all inputs need to be used on a card, which allows cards to be connected to one or two alarms where geographically convenient to save installation wiring with a maximum capacity of 64 alarm contacts for each dome (see Figure 4).

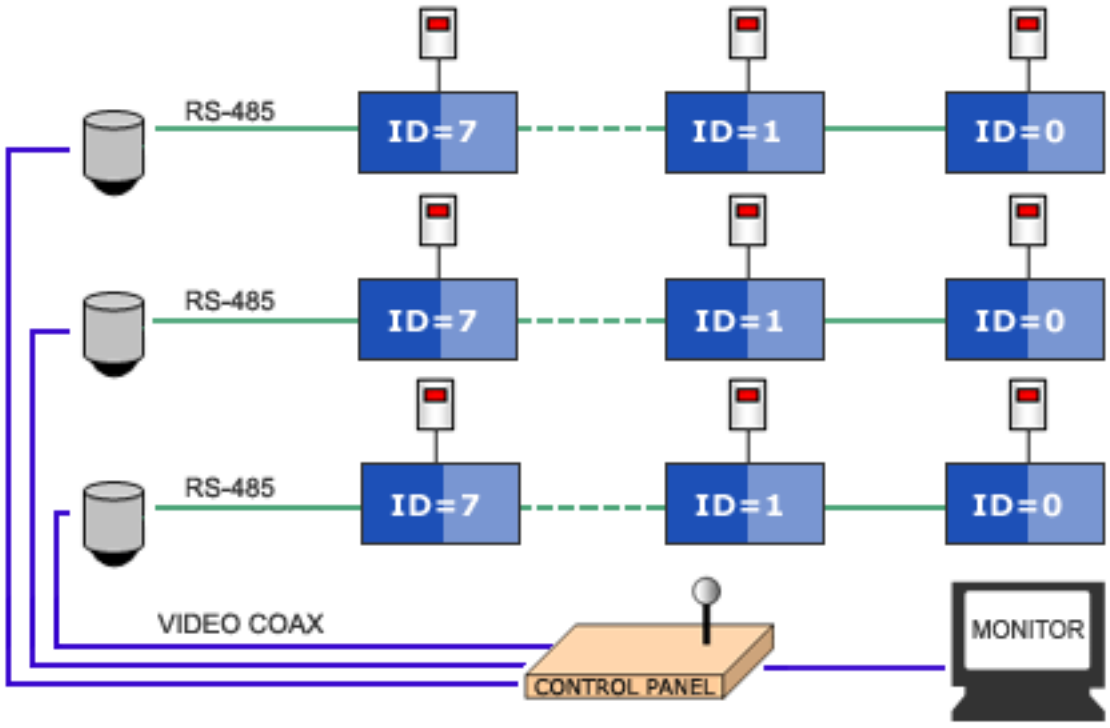


Figure 4. Sparkle alarm cards and Sparkle domes in UTC control system; each individual dome can respond to a maximum of 64 alarms.

This approach also makes it easy, if less than eight Sparkle alarm cards are installed, to add additional alarms at convenient points subsequent to the initial installation with very little extra wiring.

When several Sparkle alarm cards are installed on the same serial RS-485 loop (see Figure 5) they each need to be identified by a specific address, and the addresses (running from 0 to a maximum of 7) must be set for each alarm card. Section 5.2 describes how to set the address of a card on installation.

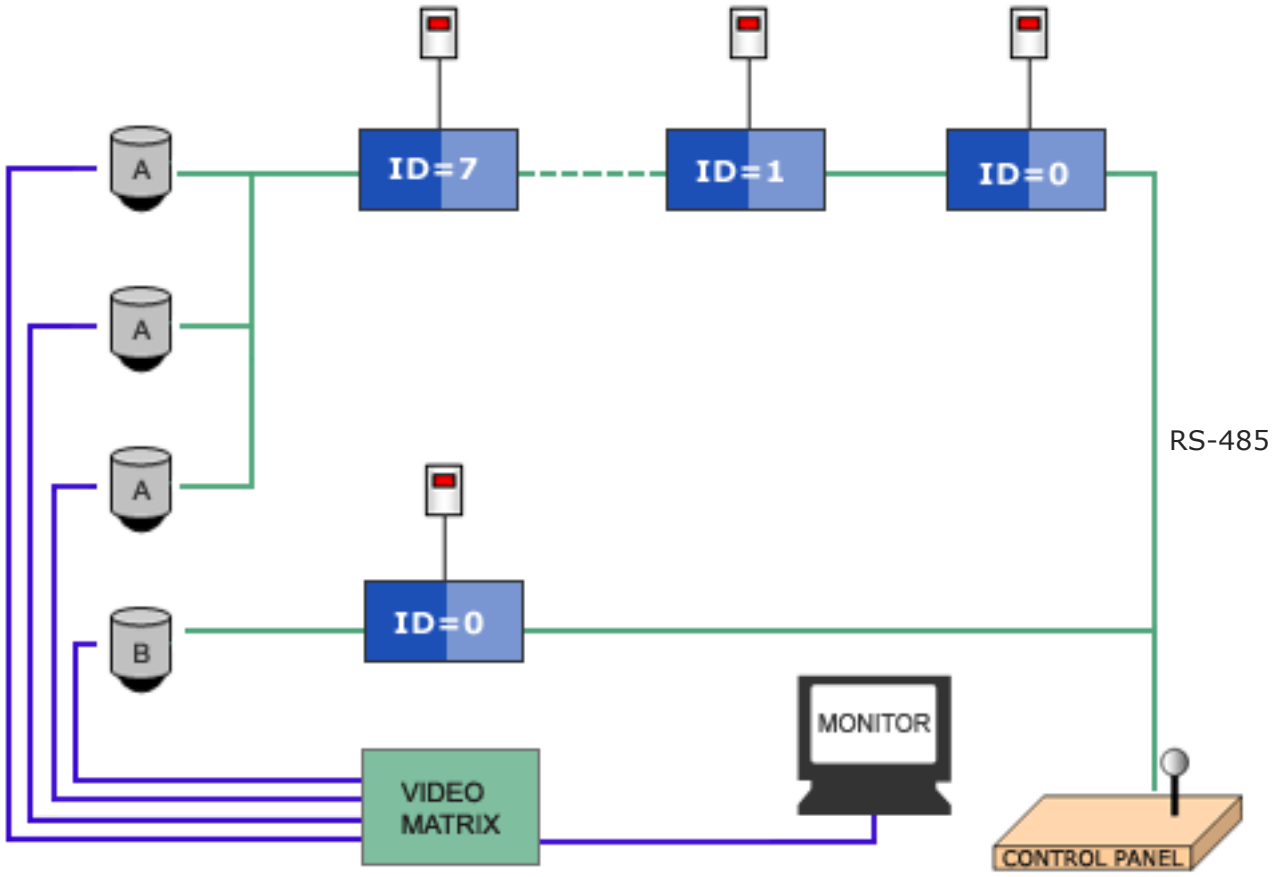


Figure 5. RS-485 control system with several Sparkle domes and Sparkle alarm cards. Domes "A" jointly respond to up to 64 alarms, while dome "B" can seperately respond to a maximum of 64 different alarm events.

3: Operating Instructions

Step 1: Set the RS-485 protocol of the alarm card.

The alarm card must be set to the same RS-485 protocol that the domes and control panel are using. If the domes are under coax control then the alarm card should be set to Overview protocol. The relevant protocol switch settings are described in section 5.1.

Step 2: Set the alarm card ID.

The alarm card ID is a number between 0 and 7 that determines where in a daisy chain of alarm cards the alarm card sits. An alarm card is said to be in a daisy chain if it is directly connected to one other alarm card (for example alarm cards 1, 2 and 8 in Figure 6 are daisy chained but alarm cards 9 and M are not). However, no two daisy chained alarm cards can share the same ID, this limits the number of alarm cards that can be daisy chained to a maximum of 8. The advantage of daisy chaining alarm cards is that it increases the number of alarms that can action a set of domes.

With a single stand alone alarm card, such as alarm card 9 in Figure 6, the maximum number of alarm input devices that can be connected to the set of attached domes is 8. With 8 daisy chained alarm cards, the number of alarm input devices that can be connected to the set of attached domes is 64. The alarm card ID switch settings are described in section 5.2.

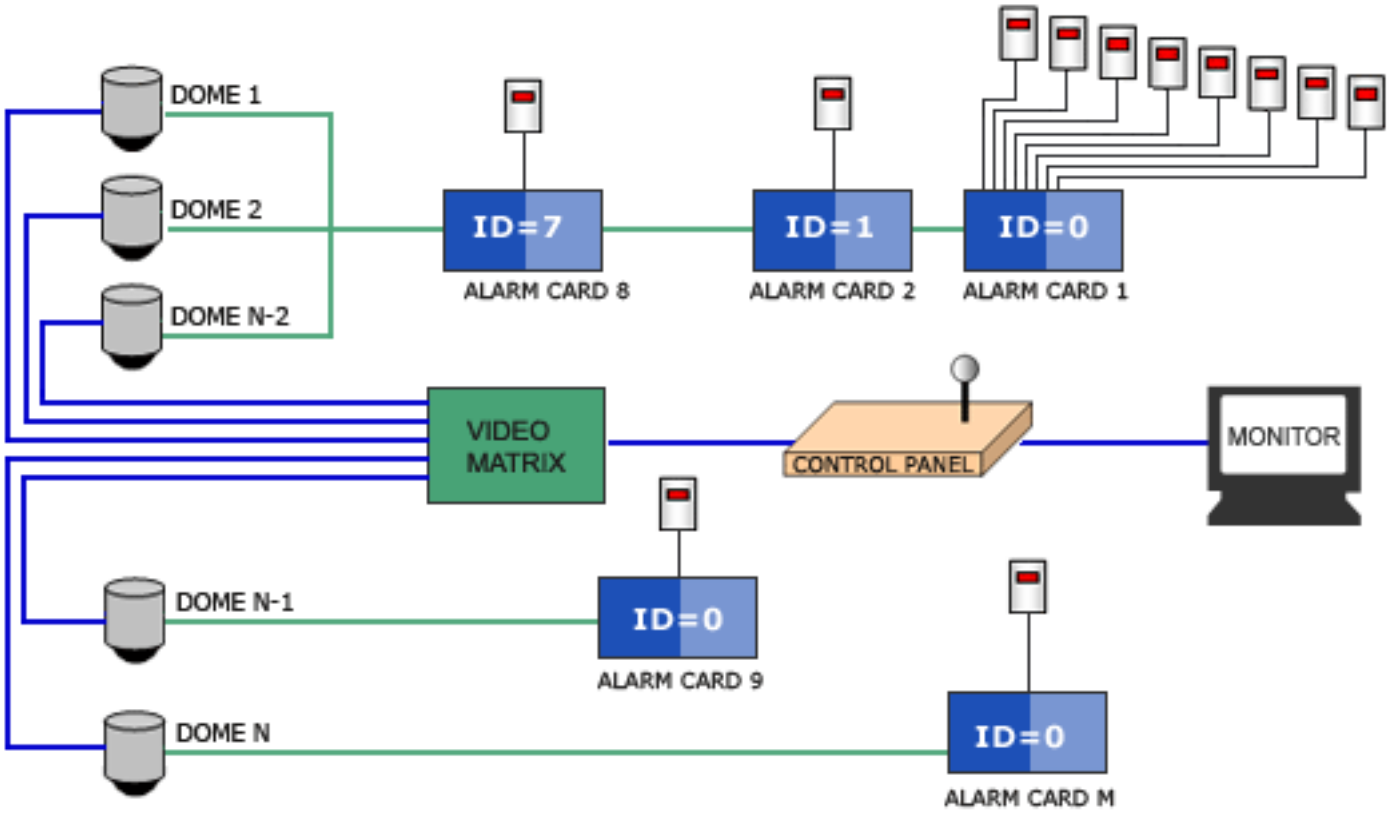


Figure 6. Example of alarm configuration when controlling domes via coax

Step 3: Set the RS-485 network termination.

Each alarm card has two RS-485 connections: a master connection and a slave connection (see Figure 2). The RS-485 slave connection is used to connect the alarm card to a control panel or an upstream daisy chained alarm card. The RS-485 slave connection is depicted on the right hand side of the alarm cards by a light blue. In Figure 5, alarm card with ID3 has its slave connection attached to a control panel and alarm card with ID2 has its slave connection attached to the alarm card 3 master connection. The RS-485 master connection is used to connect the alarm card to a set of domes or a downstream daisy chained alarm card. The RS-485 master connection is depicted on the left hand side of the alarm cards by a dark blue. Each of the two RS-485 connections can be terminated individually with a 100nF capacitor in series with a 120 ohm resistor connected across the differential RS-485 lines. Section 5.2 describes how to set termination

Step 4: Set the alarm input to normally open or normally closed (NO/NC) state.

Each alarm input on the alarm card can be configured to be NO or NC. If an input is set as NO then closing of the alarm input device contacts enables the alarm and opening the contacts disables the alarm. Conversely, if an input is set as NC then opening of the alarm input device contacts enables the alarm and closing of the contacts disables the alarm. The NO/NC alarm input settings are described in section 5.3.

Step 5: Ensure the alarm card is in RUN mode.

The RUN mode switch settings are described in section 5.4.

Step 6: Alarm enable

If the alarm enable (illustrated in section 7) contacts are shorted together, the card will report alarm actions. If the alarm enable contacts are left open (by removing the alarm enable plug), the card will not report alarms but will pass messages in a cascaded chain. The alarm enable plug needs a wire connection between the two screw terminals.

Step 7: Connect alarm input devices.

Connect alarm input devices to the alarm card alarm inputs ensuring that the NO/NC switch settings are correct for each input. Up to 8 input devices can be connected to the alarm card. The alarm input connectors are described in section 7.2.

Step 8: Connect master and slave RS-485.

Using twisted pair cable attach the domes (or downstream daisy chained alarm card) to the alarm card's master RS-485 connection (see alarm cards 2 and 8 in Figure 7). If there is no upstream daisy chained alarm card and the domes are controlled via RS-485 then connect the control panel to the alarm card's slave RS-485 connection (see alarm cards 1, 9 and M in Figure 7).

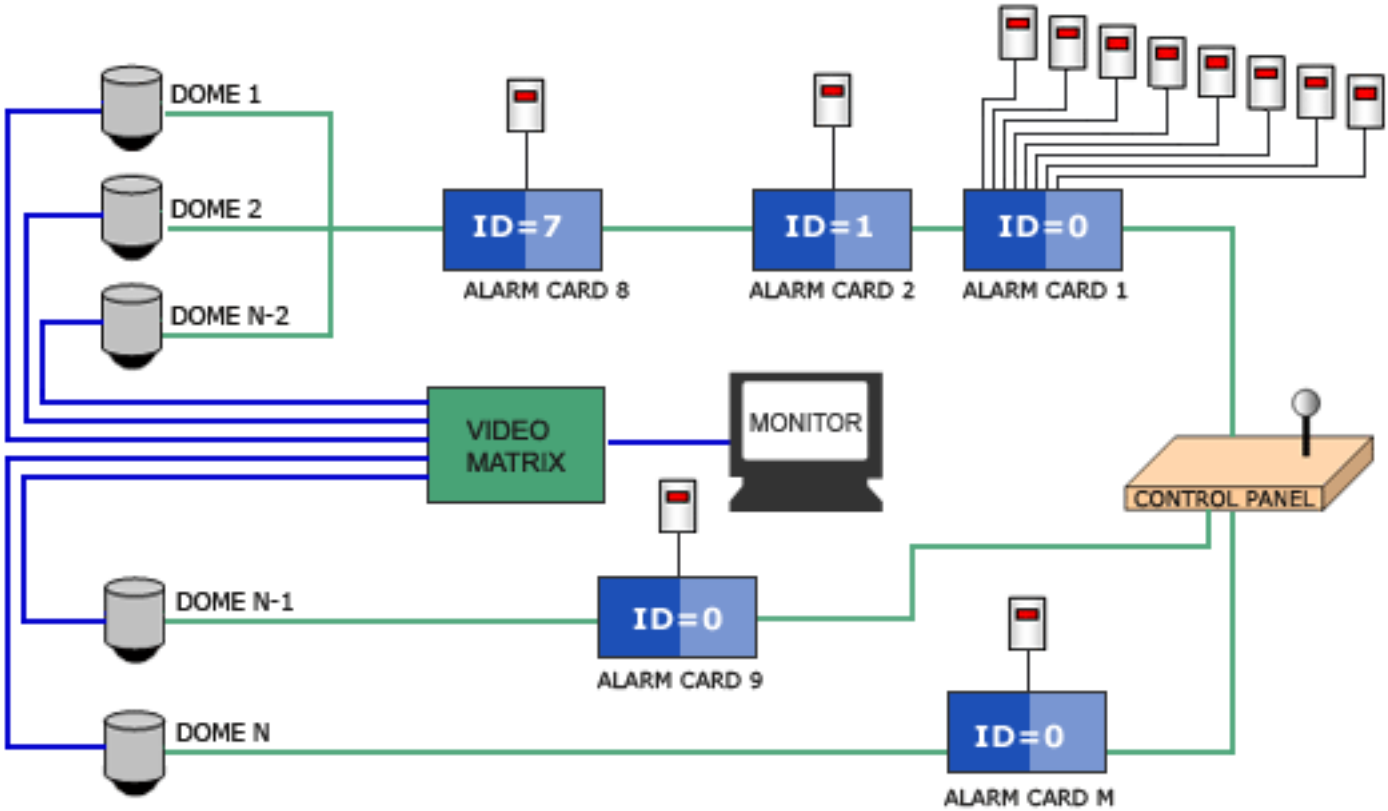


Figure 7. Example alarm configuration when controlling domes via RS-485

Note: All messages from the control panel to the domes will be passed transparently through the alarm card chain and all replies from the domes will be passed transparently back to the control panel through the alarm card chain. If there is no upstream daisy chained alarm card and the domes are under coax control then make no connection to the alarm card's slave RS-485 connection (see alarm card with ID3 in Figure 4). Make sure the RS-485 connections maintain their correct sense - their details are described in section 7.1.

Step 9: Connect power to the alarm card.

Connect an 18-28 V ac/dc supply to the alarm card's power connection. For connection details see section 6.1.

Step 10: Configure the attached domes to respond to appropriate alarm numbers accordingly.

When an alarm is enabled by an alarm input device attached to the alarm card, an RS-485 alarm enable broadcast message is generated by the alarm card. When the alarm is disabled by the alarm input device the alarm card generates an RS-485 alarm disable broadcast message. All domes on the RS-485 network at the end of the alarm card daisy chain receive the broadcast alarm messages. However, each dome must be configured to respond to the alarm message appropriately. The default dome behaviour is to ignore the alarm messages. Dome responses, such as going to a preset position or starting a tour of preset positions, can be programmed for each alarm number between 1 and 64 throughout the dome menu structure. The appropriate alarm number in the dome menu for a given alarm input device is calculated using the following formula:

```
Dome alarm number = Alarm card input number + (8 x Alarm card ID)
```

For example an alarm input device connected to input 5 on an alarm card with ID = 3 would give:

```
Dome alarm number     = 5 + (8 x 3)
                      = 29
```

4: Switch Settings

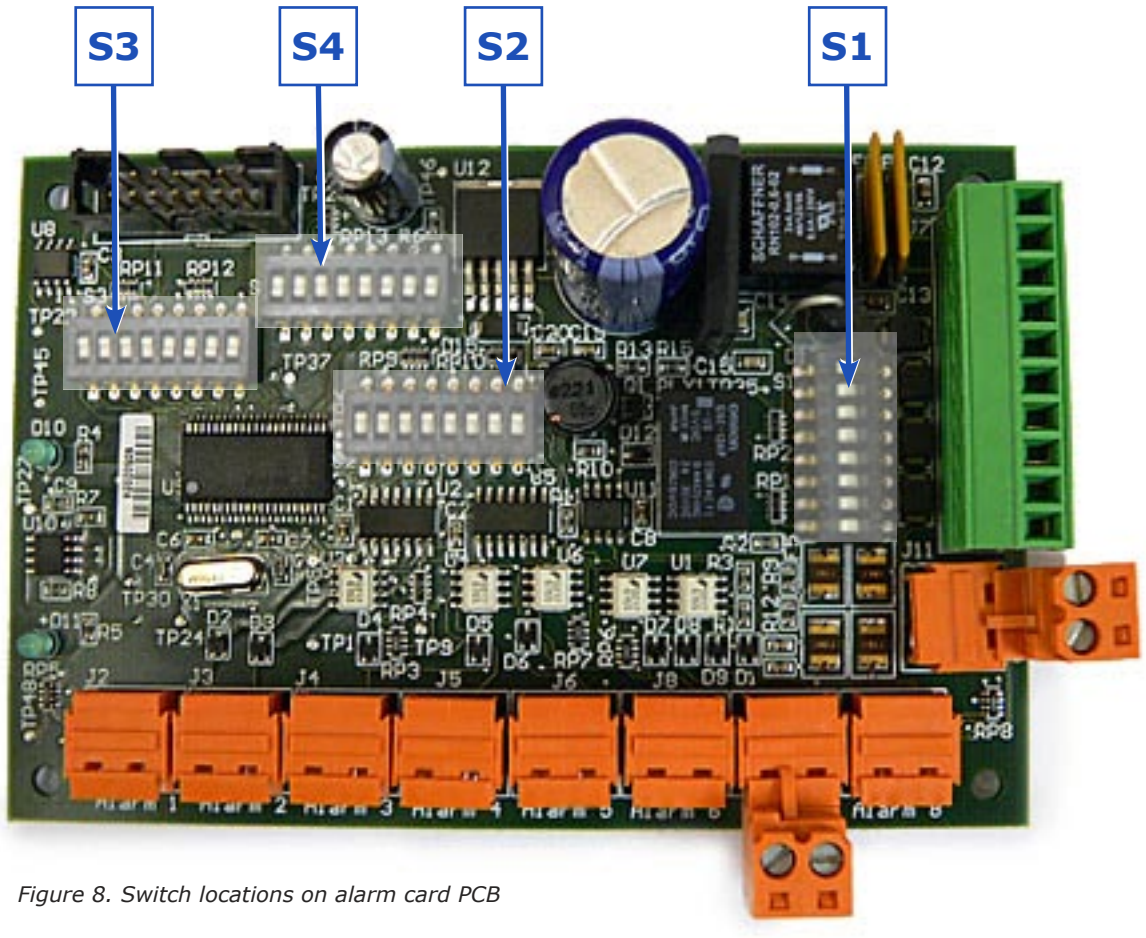


Figure 8. Switch locations on alarm card PCB

4.1 Switch bank S3

This switch is used to select the RS-485 protocol that the alarm card is using. The alarm card uses the same protocol to receive messages from the control panel (if operating in RS-485 dome control mode) and to send messages to the dome. All devices on RS-485 networks connected to the alarm card must use the protocol selected by S3. Only bits 1-4 are used (see Figure 9).

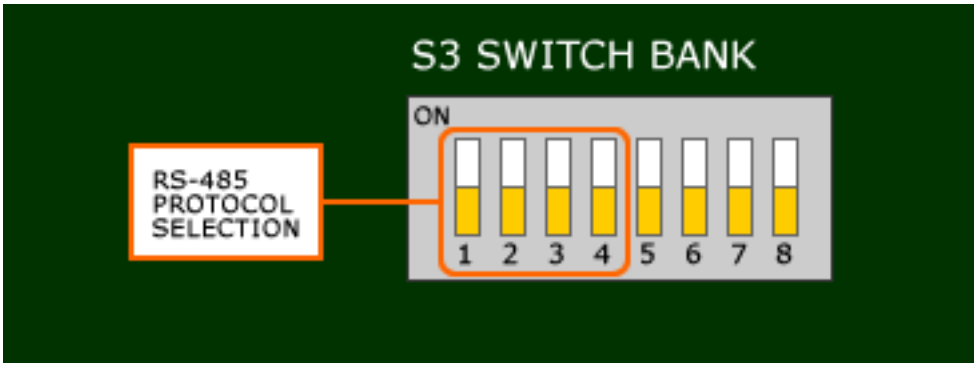


Figure 9. Individual switch usage for switch bank 3

The mapping between the switch settings and the protocol selection is shown in Table 1:

S3_1	S3_2	S3_3	S3_4	PROTOCOL
ON	**ON**	**ON**	**ON**	Overview
OFF	**ON**	**ON**	**ON**	Pelco P 9600
ON	OFF	**ON**	**ON**	Pelco P 4800
OFF	OFF	**ON**	**ON**	Philips 9600
ON	**ON**	OFF	**ON**	Philips 2400
OFF	**ON**	OFF	**ON**	Kalatel
ON	OFF	OFF	**ON**	Sensormatic
OFF	OFF	OFF	**ON**	Ultrak
ON	**ON**	**ON**	OFF	Samsung
OFF	**ON**	**ON**	OFF	VTC
ON	OFF	**ON**	OFF	Pelco D 2400
OFF	OFF	**ON**	OFF	Ikegami
ON	**ON**	OFF	OFF	CBC
OFF	**ON**	OFF	OFF	
ON	OFF	OFF	OFF	
OFF	OFF	OFF	OFF	

Table 1: Mapping from S3 switch settings to RS-485 protocol

4.2 Switch bank S4

This switch is used to select the alarm card ID and the RS-485 termination. The use of the switches in the S4 bank is shown in Figure 10.

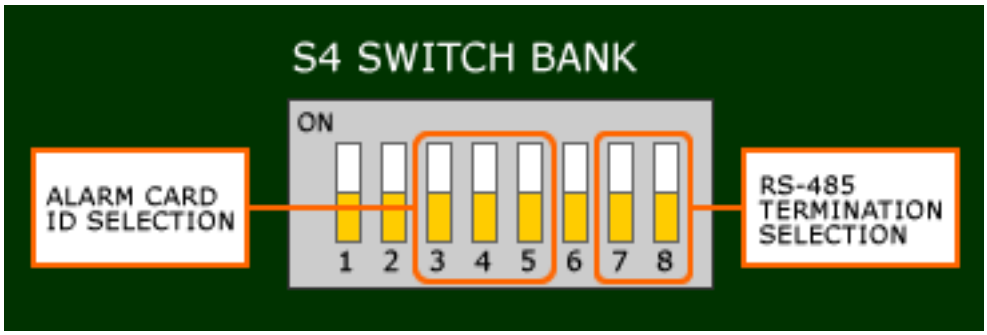


Figure 10. Individual switch usage for switch bank S4

The alarm card ID determines which alarm numbers the card generates. A card with ID=0 will generate alarms 1-8, a card with ID=1 will generate alarms 9-16 and so on. Note: No two alarm cards with the same ID can be placed on the same RS-485 daisy chain.

The mapping between switch settings, alarm card ID and alarm number generation is shown in Table 2:

S4_3	S3_4	S4_5	ALARM CARD ID	ALARM NUMBERS GENERATED BY CARD
ON	**ON**	**ON**	0	1-8
OFF	**ON**	**ON**	1	9-16
ON	OFF	**ON**	2	17-24
OFF	OFF	**ON**	3	25-32
ON	**ON**	OFF	4	33-40
OFF	**ON**	OFF	5	41-48
ON	OFF	OFF	6	49-56
OFF	OFF	OFF	7	57-64

Table 2: Mapping from S4 switch settings to alarm card ID and alarm number generation

The alarm card RS-485 termination switches are used to select termination for the two RS-485 connections that the alarm card has. The termination is a 100nF capacitor in series with a 120 ohm resistor connected across the differential RS-485 lines, like illustrated in Figure 11.

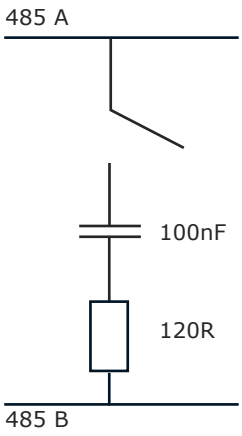


Figure 11. Termination schematic

Table 3 shows the mapping from the switch settings to the termination settings:

S4_7	S4_8	485_1A & 485_2B MASTER CONNECTION	485_1A & 485_2B SLAVE CONNECTION
ON	**ON**	**Terminated**	**Terminated**
OFF	**ON**	Not Terminated	**Terminated**
ON	OFF	**Terminated**	Not Terminated
OFF	OFF	Not Terminated	Not Terminated

Table 3: Mapping from S4 switch settings to RS-485 termination

Note: 485_1A & 485_1B are used for the RS-485 master connection from the alarm card to the dome or downstream alarm card. 485_2A & 485_2B are used for the RS-485 slave connection from the alarm card to the control panel or upstream alarm card.

4.3 Switch bank S1

This switch is used to select whether the external alarm input devices provide a normally open (NO) or normally closed (NC) contact. If a switch in the S1 bank is ON then the corresponding alarm input is normally closed (i.e. opening contact triggers alarm). If a switch is OFF then the corresponding alarm input is normally open (i.e. closing contact triggers alarm). As there are eight alarm inputs, each of the switches in bank S1 are used (see Figure 12), with the switch number corresponding to the alarm contact input number.

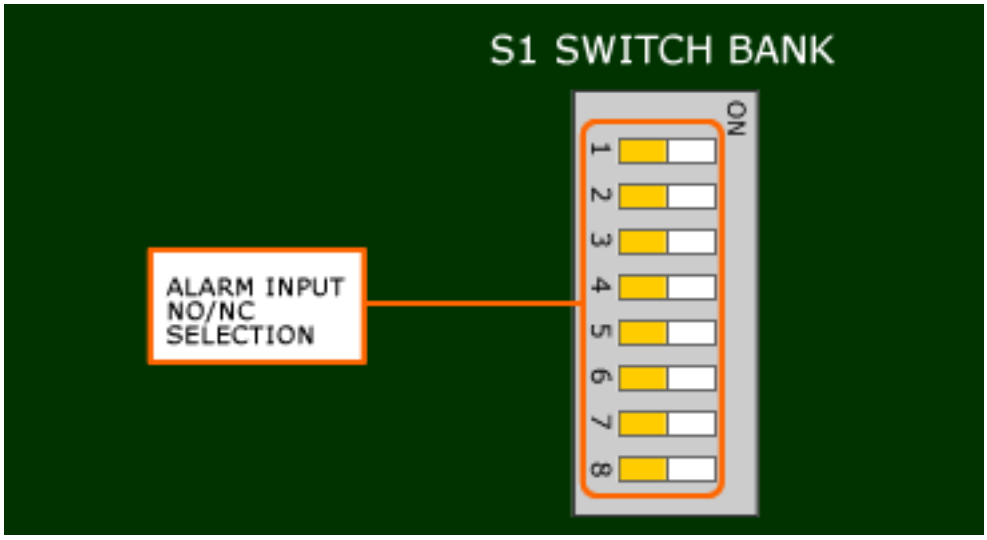


Figure 12. Individual switch usage for switch bank S1

4.4 Switch bank S2

This switch is used to choose between Run mode and Program mode. The alarm card should always be used in Run mode. Program mode is for maintenance only and the alarm card will not function correctly in this mode. To switch into Run mode ensure that all the switches in bank S2 (see Figure 13) are in the ON position.

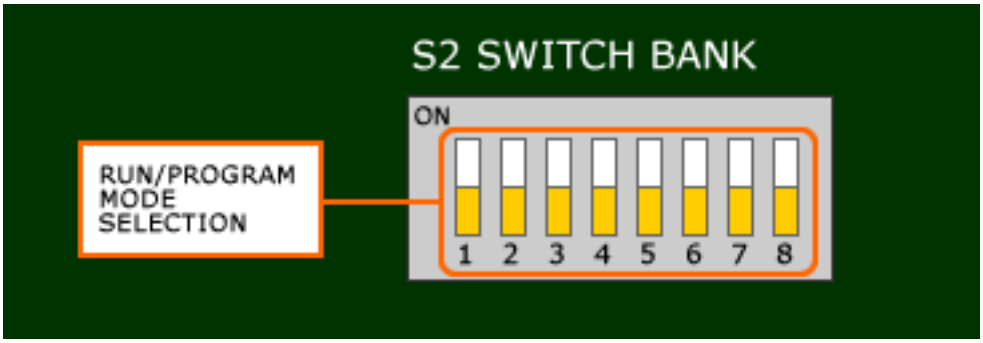


Figure 13. Individual switch usage for switch bank S2

5: Operating Conditions

Supply voltage:	18-28V ac/dc
Temperature range:	-20 t0 +70 deg C
Ambient:	Keep the area around the card free from ice and water

6: Dimensions

The alarm card width and depth dimensions are shown in Figure 14. Provision must be given around two of the sides to allow the external connectors to be attached to the PCB. The maximum depth of the card is 35mm.

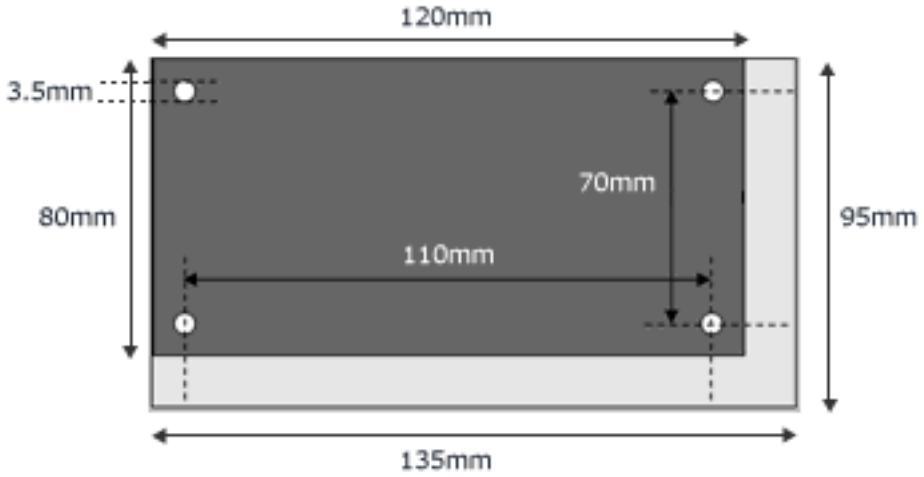


Figure 14. Alarm card dimensions. Dark grey denotes PCB area, light grey denotes connector clearance requirement.

7: Connectors

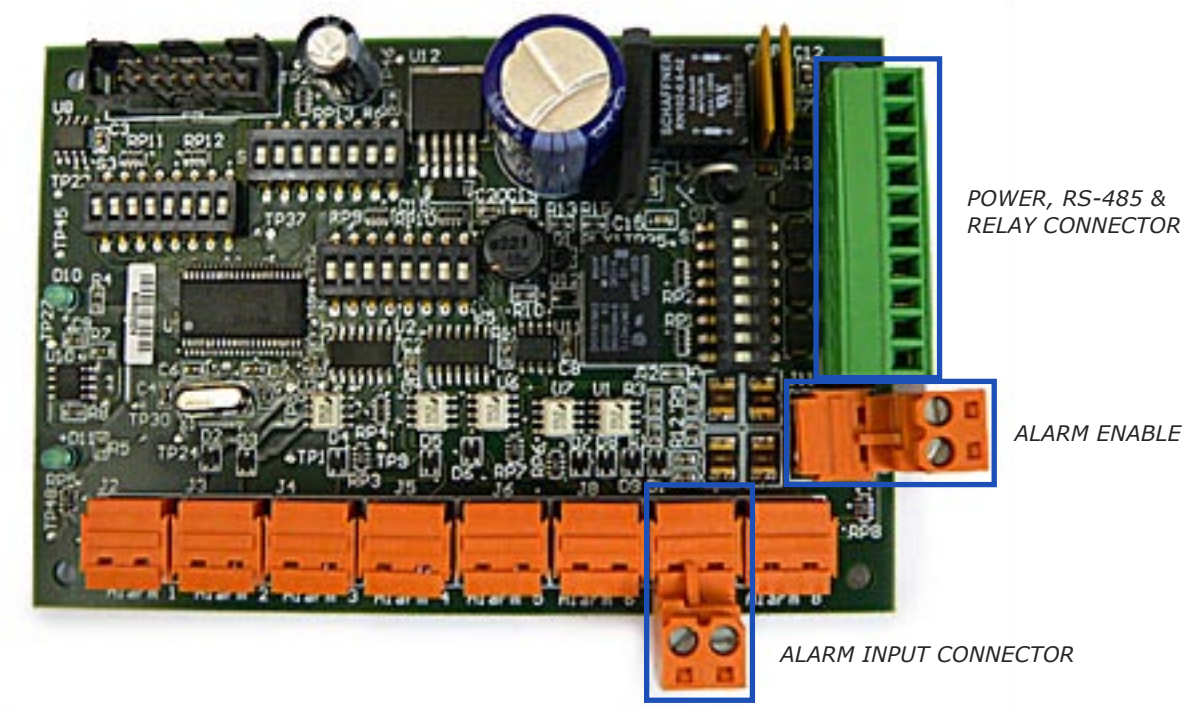
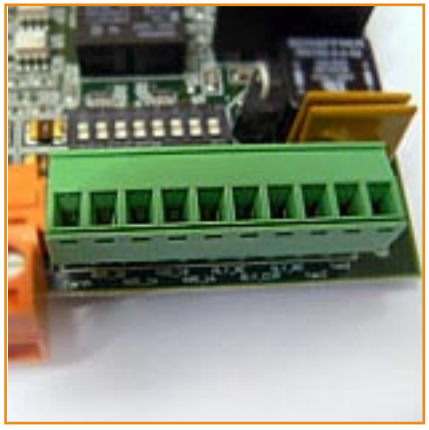


Figure 15. External connector locations on the alarm card PCB

7.1 Power, RS-485 and Relay Connector



Description:	10-way plug
Manufacturer:	IMO
Manufacturer's part number:	21.1550M/10
Farnell stock number:	9632794

Pinout (from top to bottom of connector as shown in Figure 4):

Vac1	Connection 1 for 18-28 V ac/dc power supply
Vac2	Connection 2 for 18-28 V ac/dc power supply
RLY_NO	Normally open contact for relay output (for future use)
RLY_COM	Relay common contact (for future use)

RLY_NC	Normally closed contact for relay output (for future use)
485_1A Master RS-485	A to dome or downstream daisy chained alarm card
485_1B Master RS-485	B to dome or downstream daisy chained alarm card
485_2A Slave RS-485	A from control panel or upstream daisy chained alarm card
485_2B Slave RS-485	B from control panel or upstream daisy chained alarm card
Earth	External earth connection

7.2 Alarm Input/Alarm Enable Connector

Description:	2-way rising clamp type terminal, 5.08mm
Manufacturer:	Weidmuller
Manufacturer's part number:	1526460000
RS stock number:	325-4143

Note: The two inputs should be wired together to enable alarm monitoring.

8. Example of Installation

Figure 16 illustrates an example installation of 3 alarm cards in RS-485 controlled system, together with the switch settings for each alarm card, presented in the Table 4-6 below.

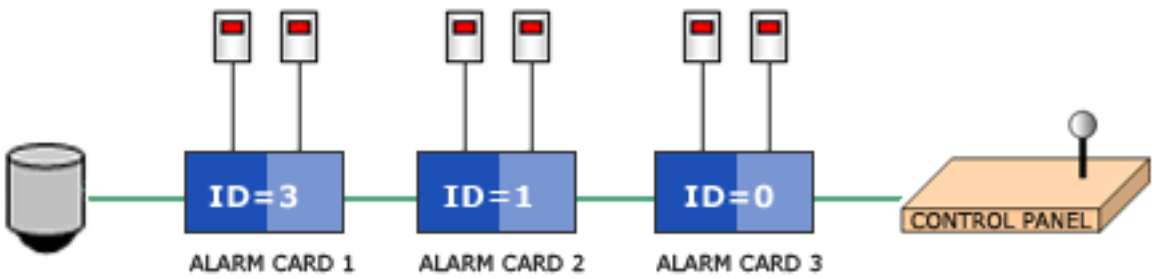


Figure 16.

ALARM CARD 1									
BANK	SWITCH								SETTING
	1	2	3	4	5	6	7	8	
S1	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	All N/O
S2	ON	ON	ON	ON	ON	ON	ON	ON	Run Mode
S3	ON	ON	ON	ON	OFF	OFF	OFF	OFF	Overview protocol
S4	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	ID=3 No termination

POWER + RS-485 CONNECTOR PORT	LABEL	CONNECT TO
1	Vac 1	PSU
2	Vac 2	PSU
3	RLY_NO	None
4	RLY_COM	None
5	RLY_NC	None
6	485_1A	Dome RS-485 A
7	485_1B	Dome RS-485 B
8	485_2A	Alarm Card 2 485_1A (port 6)
9	485_2B	Alarm Card 2 485_1B (port 7)
10	Earth	Earth

Table 4: Alarm Card 1 switch settings and connections

ALARM CARD 2									
BANK	SWITCH								SETTING
	1	2	3	4	5	6	7	8	
S1	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	All N/O
S2	ON	ON	ON	ON	ON	ON	ON	ON	Run Mode
S3	ON	ON	ON	ON	OFF	OFF	OFF	OFF	Overview protocol
S4	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	ID=1 No termination

POWER + RS-485 CONNECTOR PORT	LABEL	CONNECT TO
1	Vac 1	PSU
2	Vac 2	PSU
3	RLY_NO	None
4	RLY_COM	None
5	RLY_NC	None
6	485_1A	Alarm Card 1 485_2A (port 8)
7	485_1B	Alarm Card 1 485_2B (port 9)
8	485_2A	Alarm Card 3 485_1A (port 6)
9	485_2B	Alarm Card 3 485_1B (port 7)
10	Earth	Earth

Table 5: Alarm Card 2 switch settings and connections

ALARM CARD 3									
BANK	SWITCH								SETTING
	1	2	3	4	5	6	7	8	
S1	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	All N/O
S2	ON	ON	ON	ON	ON	ON	ON	ON	Run Mode
S3	ON	ON	ON	ON	OFF	OFF	OFF	OFF	Overview protocol
S4	OFF	OFF	ON	ON	ON	OFF	OFF	OFF	ID=0 No termination

POWER + RS-485 CONNECTOR PORT	LABEL	CONNECT TO
1	Vac 1	PSU
2	Vac 2	PSU
3	RLY_NO	None
4	RLY_COM	None
5	RLY_NC	None
6	485_1A	Alarm Card 2 485_2A (port 8)
7	485_1B	Alarm Card 2 485_2B (port 9)
8	485_2A	Control Panel RS-485 A
9	485_2B	Control Panel RS-485 B
10	Earth	Earth

Table 6: Alarm Card 3 switch settings and connections

9: PSU

Power supply: 18-28 V ac/dc

Current Draw: ~30mA typical (24V dc supply)

Power consumption: ~0.75W typical