ARITECH

2000 Series Sensors

Installation Guide

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CONTENTS

1.   INTRODUCTION

1.1.   Scope

This document is a guide for the installation of the Aritech 2000 Series range of Analogue Addressable Fire Monitors and Aritech 2000 Series Monitoring Controllers and Input / Output Units.

Other manuals available are:

- FP2000/1200/1100 Series Reference Guide

- FP2000 Series Network Configuration Guide

- FP2000/1200/1100 Series End User Instruction Manual

1.2.   2000 Series product overview

Table 1: Aritech 2000 Series products

Product	Product Code	Base
Temperature Monitors:		
Single LED without remote LED driver	DT2053	DB2001(U)
Single LED, 7-segment display, remote LED driver	DT2073	DB2002(U)
Two LED with remote output	DT2063	DB2002(U)
Optical Smoke Monitors:		
Single LED without remote LED driver	DP2051	DB2001(U)
Single LED, 7-segment display, remote LED driver	DP2071	DB2002(U)
Two LED with remote output	DP2061	DB2002(U)
Manual Call Points:		
Manual Call Point	DM2000	—
Manual Call Point: IP66	DM2010	—
Manual Call Point: yellow for gas release	DM2020	—
Isolator:		
Isolator	IU2016	DB2003
Fire Monitoring Controllers:		
Single Input Module	IU2050	—
Zone Monitoring Unit	IU2051	—
Indicating Circuit Controller	IU2080	—
Input / Output Units:		
4 Inputs / 4 Outputs	IO2034	—
2 Inputs / 2 Outputs	IO2032	—
2 Inputs / 1 Output	IO2031	—
4 Inputs	IO2014	—
Optional Housing for I/O units (123 mm (W) x 173mm (L) x 50 mm (H))	IOBOX	—

2. INSTALLATION

2.1. General

The FP2000/1200/1100 Series Analogue Addressable Fire Panels can address up to 128 Aritech devices on a two-wire ring circuit (loop) using digital communication.

The following paragraphs describe the connection and addressing of Aritech devices in a fire protection system.

2.2. Automatic fire sensors

2.2.1. Where to place automatic fire sensors

Siting and spacing detectors:

Please consult local regulations and follow Fire Brigade requirements.

The following apply for flat, horizontal ceilings:

	Smoke detectors	Heat detectors
Maximum area coverage	100 m^2	50 m^2
Maximum horizontal distance between any point in the area and the nearest detector	6 m	5 m
Maximum ceiling height (general limits)	12 m	6 m

Note that these values change if:

- The device is in small corridors.

- There are obstructions.

- The device is in the apex of a pitched roof.

Suitable locations for smoke and heat detectors:

General rule: OPTICAL: Smouldering fire

               HEAT: Full combustion fire

Location	Optical	Heat	Remarks
Corridor / Walkway	#		Air current may exist
Elevator Shaft / Duct	#		Air current is present
General Office / Day Room	#		
Hotel Foyer	#		
Dining Room	#		
Theatre Stages / Audience Hall	#		
Warehouse	#		Not if diesel fork lifts are used
School	#		
Clinic / Nursery Room	#		
Laboratory	#		
Studio / Recording Room	#		Possibility of flaming fire
Factory	#		
Church / Chapel	#		
Cargo Handling Area	#		Presence of air current & dust
Spirit Fuel Store	#		Fast, clean burning fire
Library Room	#		
Central Heating Room		#	
Dryer Room		#	
Kitchen		#	Avoid locations over ovens
Smoky Atmosphere		#	
Closed Parking Area		#	(1): delayed or double knock

2.2.2. Mounting bases and wiring diagrams

All connectors on the base are numbered and have the following function:

1:          (+) remote LED

2:          (-) remote LED

5:          (+) line in and out

6:          (-) line in and out

Earth: to continue ground shield

There are four different mounting bases available for the 2000 Series Sensors:

DB2001:   sensor base without remote LED connectors (Ø 10 cm)

DB2001U: sensor base without remote LED connectors (Ø 15 cm)

DB2002:   sensor base with remote LED connectors (Ø 10 cm)

DB2002U: sensor base with remote LED connectors (Ø 15 cm)

When installing sensors with remote LED drivers (for example DT2073, DP2071), the DB2002 or DB2002U should be used.

Please refer to Figure 1 for Class A, and Figure 2 for Class B (no return) wiring.

It is not necessary to observe polarity on terminals 5 and 6, as the fire monitors are not polarity sensitive. However, when the remote LED driver is being used polarity must be observed!

To install a detector head, insert the head and rotate it clockwise until it is properly aligned and "sets" into the base (Figure 3). Then rotate it an additional 15º to lock it in place.

Each 2000 Series Universal Mounting Base is equipped with a moulded locking mechanism to prevent unauthorised removal of the sensor head (Figure 4). If you want detectors to be locked into the base, remove tab before inserting into the base. To remove the sensor head, insert a small screwdriver into the slot on the side of the base and press in while simultaneously turning the sensor head counter clockwise (Figure 5).

The different Aritech mounting bases are designed so that the fire sensors will not operate in the Isolator Mounting Base DB2003 and vice versa. The 2000 Series range of fire sensors will also not fit the base of another Aritech range of sensors.

A ground shield is strongly recommended, but not essential. The shield must be connected to the earth ground at one point only, preferably via an earth stud in the fire control panel.

Figure 1: Class-A wiring
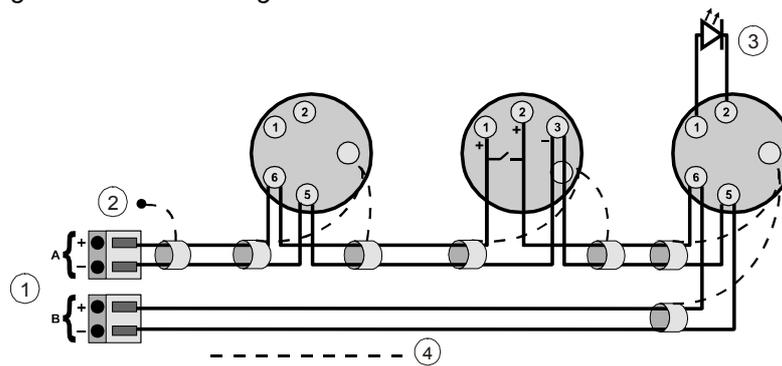
1. Fire control panel
2. Earth stud
3. Remote indicator
4. Shield: Strongly recommended

Figure 2: Class B wiring
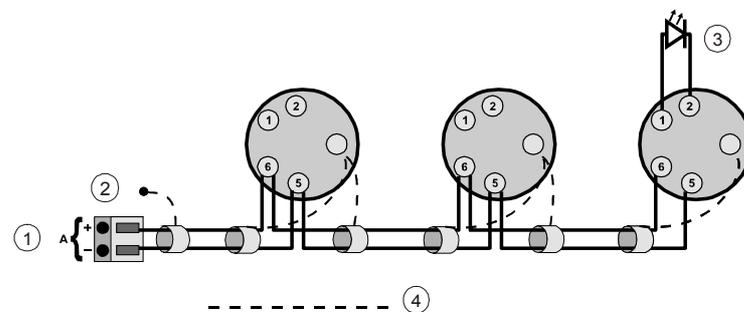
1. Fire control panel
2. Earth stud
3. Remote indicator
4. Shield: Strongly recommended

| *Figure 3* | *Figure 4* | *Figure 5* |

To lock break out
this tab with pliers
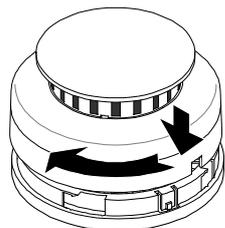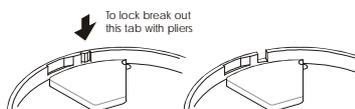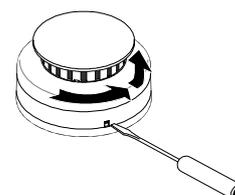
2.2.3. Addressing

To install a detector address (see Figure 3), use a screwdriver to adjust the two rotary switches on the back of the sensor. Set the left rotary switch (0 through 12) for the 10's and 100's digit and the right rotary switch for the 0 through 9 digit.

Figure 3: Address setting for 2000 Series fire sensors
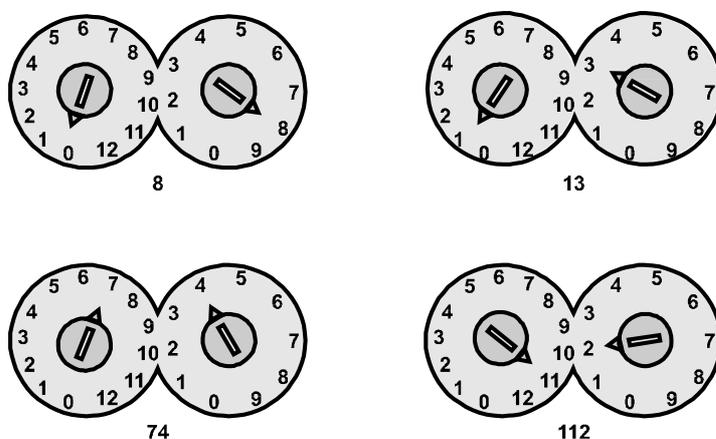
2.2.4. Technical data

	2000 Optical	2000 Heat
Operating voltage	17 – 28 VDC	
Current consumption: quiescent @ 24 V & 24 °C	< 200 µA or 1.6 mA (wake)	< 120 µA (sleep) or 1.6 mA (wake)
quiescent @ 24 V & 70 °C	< 350 µA (sleep) or 1.6 mA (wake)	
nominal	400 µA	
Alarm @ 24 V	LED = 2 mA ± 0.25 mA and /or 7-segment = 3.5 mA ± 0.25 mA (Red)	
Remote indicator	4 mA ± 0.5 mA	
Alarm indicator	2 mA ± 0.5 mA	
Remote indicator	3.5 mA ± 0.5 mA	
Relative humidity	0 - 95% no condensation	
IP - rating	IP43	
Operating temperature	-20 to +70 ºC (no icing)	
Storage temperature	-30 to +85 ºC	
Dimensions	H = 5 cm Ø =10 cm	

2.2.5. 7-Segment indication

The 207x models have a 7-segment display. The information displayed depends on the panel the sensors are connected to.

When installing the 2000 Series Sensors with the Aritech FP2000/1200/1100 fire panel, the following indications are available:

Figure 4: Indications on 7-segment display

Clean Me (Maintenance alarm)	Off (Soak test)
Alarm	Off (Sensor disabled)
Detector Fault	In Test (Waiting for alarm)
Pre-Warning	In Test (Has left alarm condition)
Error: eg. Double address, Wrong type, …	Polling (Blinking mode only)
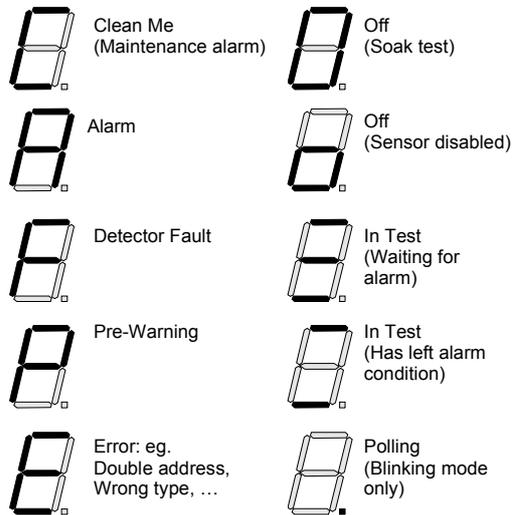
Notes: (Combined with FP2000/1200/1100)

- At the fire panel this information can be programmed to be always available (On) or only when the sensor is being polled (Blinking).

- When the complete zone is disabled, nothing will appear on the 7-segment display of the disabled devices.

- The maximum number of 7-segment displays active at the same moment can be programmed at the panel (in 'On' mode).

- The test conditions mentioned above are tests initiated at the panel and not from the sensor itself (see section 2.2.6).

2.2.6. Diagnostics and sensitivity test modes

Diagnostic and sensitivity test modes are available on the 2000 Series detectors. The 2000 Series smoke detectors provide obscuration or temperature information to the fire panel. Obscuration or temperature is determined by the number of counts received at the fire panel when a 2000 Series detector is polled.

The DP2071 and DT2073 models have a 7-segment display that allows sensitivity, diagnostic and address data to be displayed at the detector head. Holding a magnet near the integral reed switch (Figure 5) will initiate the diagnostic routine at the fire panel.

Figure 5: Initiating the diagnostic routine
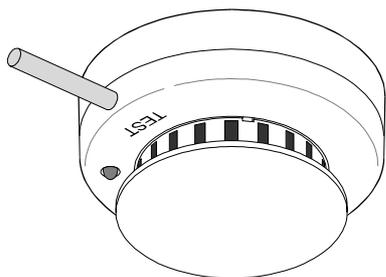
The following sequence will be displayed on the sensor:

First, the address of the sensor will be displayed (e.g. 35), followed by the real-time value (e.g. 56), which is displayed twice.

Figure 6: Sequences displayed on 7-segment display

The following occurs in an alarm condition:

2.2.7.   Testing, Maintenance and cleaning

All 2000 Series smoke detectors are shipped with a plastic dust cover for use in areas where construction is in progress. Smoke detectors will not work with the dust cover in place. Remove the dust cover when installation is completed, prior to testing.

All smoke detectors should be tested in place at least annually or according to local regulations, to ensure smoke entry into the sensing chamber and alarm response. If canned smoke (test aerosol) is used, carefully follow the manufacturer's directions to avoid damage to the detector.

Test Heat Sensors by using a hot air gun (Figure 10A).

Aim at heat sensor from 15 to 25 cm away. Be careful not to melt the plastic.

The sensing-chamber of the 2000 Series photoelectric detector unsnaps for easy field cleaning and service (Figure 10B).

Whenever the diagnostics indicates that cleaning is necessary, remove the photoelectric detector cap, snap off and throw away the optical block chamber (Figure 10C).

Then blow off the optical block base and snap a new optical block chamber back in place, replace the cap and verify sensitivity.

Figure 10: Testing, maintenance and cleaning

A

B

C

D
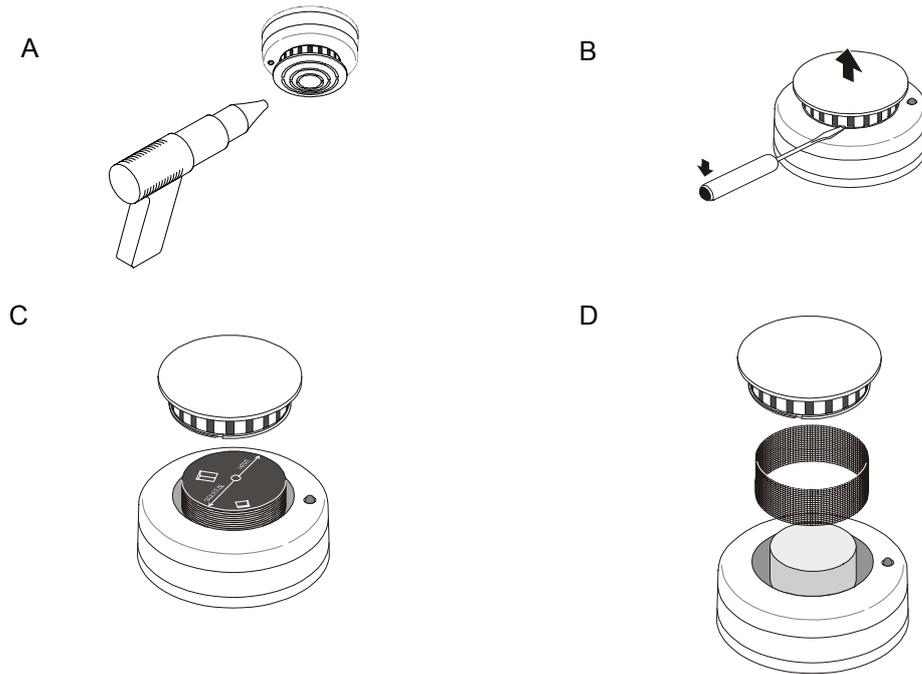
2.3. Manual Call Point (MCP) DM2000 ⎯ DM2010 ⎯ DM2020

INSTALLATION

Figure 7: Wiring diagram for DM20X0 ADDRESSING

④

②

COM 1

COM 2

③

①
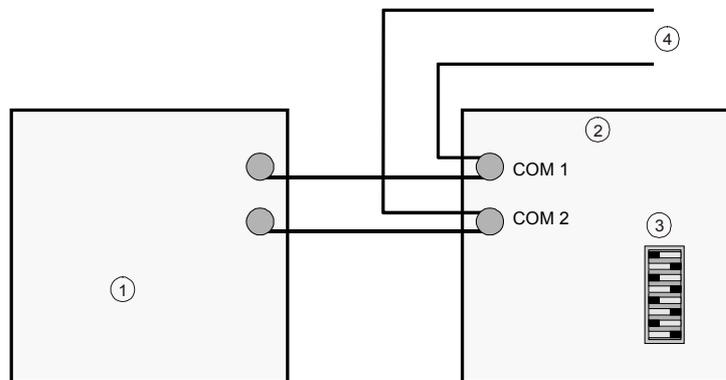
1. Listed compatible analogue addressable
fire alarm control

2. Break glass

3. Address

4. Loop out

Addressing is by means of a DIL-switch on the rear side of the MCP: ON = 0; OFF = 1

Address	Switch 12345678	Address	Switch 12345678	Address	Switch 12345678	Address	Switch 12345678
1	00000001	33	00110011	65	01100101	97	10010111
2	00000010	34	00110100	66	01100110	98	10011000
3	00000011	35	00110101	67	01100111	99	10011001
4	00000100	36	00110110	68	01101000	100	10100000
5	00000101	37	00110111	69	01101001	101	10100001
6	00000110	38	00111000	70	01110000	102	10100010
7	00000111	39	00111001	71	01110001	103	10100011
8	00001000	40	01000000	72	01110010	104	10100100
9	00001001	41	01000001	73	01110011	105	10100101
10	00010000	42	01000010	74	01110100	106	10100110
11	00010001	43	01000011	75	01110101	107	10100111
12	00010010	44	01000100	76	01110110	108	10101000
13	00010011	45	01000101	77	01110111	109	10101001
14	00010100	46	01000110	78	01111000	110	10110000
15	00010101	47	01000111	79	01111001	111	10110001
16	00010110	48	01001000	80	10000000	112	10110010
17	00010111	49	01001001	81	10000001	113	10110011
18	00011000	50	01010000	82	10000010	114	10110100
19	00011001	51	01010001	83	10000011	115	10110101
20	00100000	52	01010010	84	10000100	116	10110110
21	00100001	53	01010011	85	10000101	117	10110111
22	00100010	54	01010100	86	10000110	118	10111000
23	00100011	55	01010101	87	10000111	119	10111001
24	00100100	56	01010110	88	10001000	120	11000000
25	00100101	57	01010111	89	10001001	121	11000001
26	00100110	58	01011000	90	10010000	122	11000010
27	00100111	59	01011001	91	10010001	123	11000011
28	00101000	60	01100000	92	10010010	124	11000100
29	00101001	61	01100001	93	10010011	125	11000101
30	00110000	62	01100010	94	10010100	126	11000110
31	00110001	63	01100011	95	10010101	127	11000111
32	00110010	64	01100100	96	10010110	128	11001000

2.4. Isolator IU2016

GENERAL

An isolator is a "device" which prevents a loop going down completely when a short circuit in that loop occurs. When isolators are used, only the devices between two isolators will go down.

The IU2016 can be placed in the loop and is completely transparent for the protocol (in normal condition). No address setting is required.

High-end fire panels, like FP2000/1200/1100, have built-in isolators per loop. This means that no isolators have to be placed at the beginning and end of the loop.

INDICATORS

The yellow LED will start blinking when the isolator goes active i.e. when one side is isolated. The short-circuit will always be located between two active isolators or between one active isolator and the panel.

INSTALLATION

The Isolator is fitted into the Isolator Mounting Base DB2003.

There are four single terminals, namely:

(+) IN	Line in
(+) OUT	Line out
(-)	Common negative
Single terminal:	This terminal is intended as a through connection point for cable shields or for an earth connection.

Isolators are - unlike the other 2000 Series devices - polarity sensitive. The connection must be as follows:

Figure 8: Class A loop with isolator IU2016
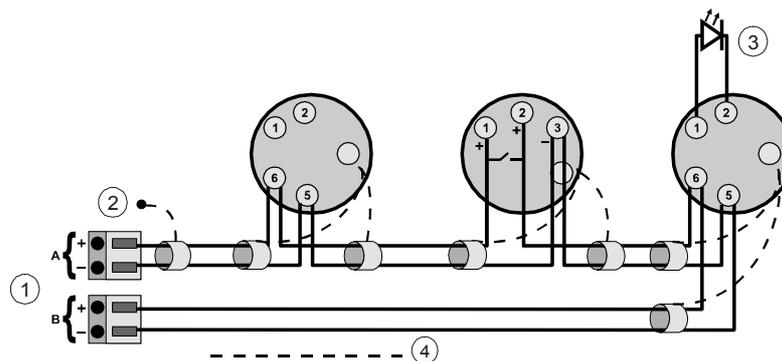
1. Fire control panel   3. Remote indicator

2. Earth stud   4. SHIELD: Strongly recommended

✎ *According to the EN54-directive, isolators should be placed at least every 32 devices. The use of isolators per zone is recommended.* **Please consult local regulations and follow Fire Brigade requirements.**

TECHNICAL DATA:

Operating voltage	17 - 38 V
Non - isolated current	<205 µA
Isolated current	<420 µA
Line resistance non-isolated	< 1 Ohm
Line resistance isolated	> 33 kOhm
Switching times non-isolated to isolated	< 5 ms
Switching time isolated to non-isolated	< 3.1 s once fault is removed
Operating temperature	-20 to + 70 ºC (non condensing)
Storage temperature	-30 to + 85 ºC
Relative humidity	0 - 95 %

2.5. Fire monitoring controllers

2.5.1.   Single Input Module IU2050

GENERAL DESCRIPTION

The Aritech Analogue Addressable Single Input Module is designed to monitor normally open or normally closed contacts. It can typically be connected to conventional Manual Call Points, Pull Stations, or Door Monitors and will report actuation within 1 second, depending on the programming of the fire panel. The addressabilitv of the IU2050 allows the identification of the exact location of the switch activation.

The IU2050 is connected to theFP2000/1200/1100 via a two wire communication loop that provides power and control data. The single input module utilises an advanced digital data communications protocol that ensures the integrity of the data communications with extensive error correction algorithms.

ADDRESS SETTING

Please refer to paragraph 2.2.3.

TECHNICAL DATA

Operating voltage:	17-28 V at the communication loop terminals
Modulating voltage:	4-9 V
Standby current:	< 250 µA
End-of-Line resistor value:	150 kΩ, 1/4 W, 5%
Operating temperatures	-4 ºF to 158 ºF (-20 ºC to 70 ºC)
Operating humidity	0-95%, Non-condensing

INSTALLATION

Figure 9: Wiring diagram for SIM
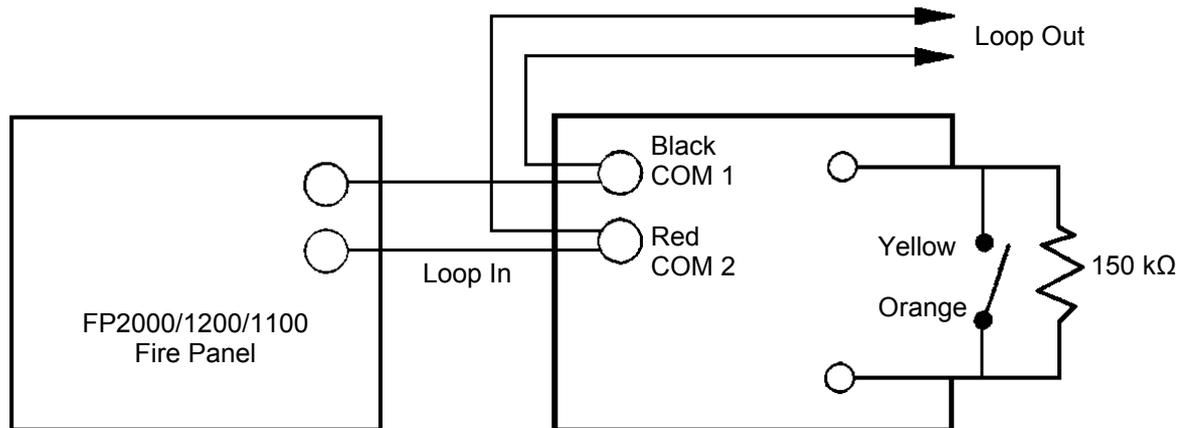
✎ *Wiring shown above (N.O. Switch) will detect open/fault on the circuit, depending on the programming of the panel. The panel may also be programmed such that the SIM will, instead, detect a short circuit (via a N.C. switch).*

2.5.2.   Zone Monitoring Unit IU2051

GENERAL DESCRIPTION

The IU2051 can be used to connect conventional detectors, fire beams, etc. on the analogue loop. It is important to note that the total current load of the conventional loop must not exceed 3.5 mA. This is typically 30 detectors.

The PCB has to be put in a housing, according to environmental conditions.

INDICATORS

Yellow LED: Indicates an open circuit or short on the two-wire conventional loop.

Ind +/- connectors: An extra LED can be connected to indicate a Fire Alarm condition on the conventional loop.

ADDRESS SETTING

Please refer to paragraph 2.2.3.

TECHNICAL DATA

Operating voltage:	20-28 V at the communication loop terminals
Total standby current:	< 7.5 mA, 4.5 mA typical (no conventional detectors connected) at the communication loop terminals
Maximum alarm current:	< 60 mA at communication loop
Maximum number of conventional detectors:	30. (Do not exceed 3.5 mA + EOL load current)
Maximum capacitance:	1 μF
Maximum line length:	not to exceed 2 km or not greater than 100 Ohms
End-of-Line resistor value:	10 kOhm ± 5%, 1/4 W
Supply voltage conventional loop:	17 - 25 VDC

Zone impedance @ 24V:

	Short circuit:	< 120 Ohms
	Fire:	120 - 1 kOhm
	Quiescent:	1 kOhm - 26 kOhm
	Open circuit:	> 26 kOhm

Extra remote output:	current limited at 4.5 mA
Operating and storage temperatures	see Sensors (section 2.2.4)
Mounting holes:	4 mm diameter
Physical dimensions and mounting holes:	dimensions in mm
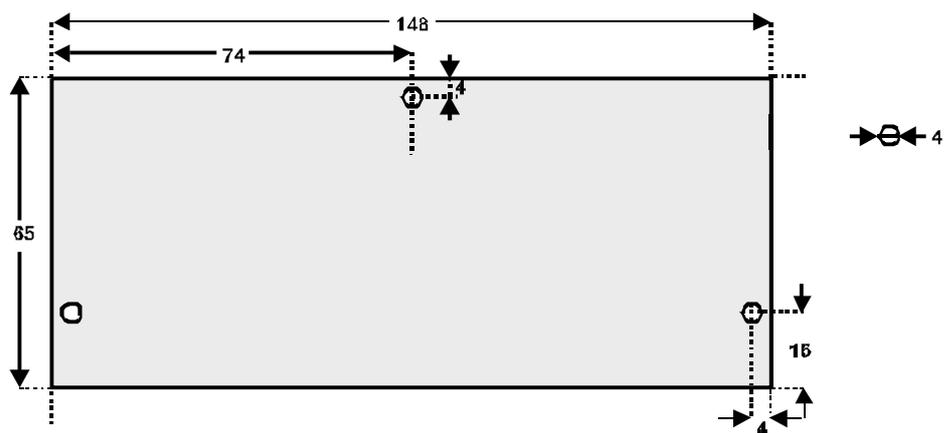
INSTALLATION

Figure 10: Wiring diagram for zone monitoring unit
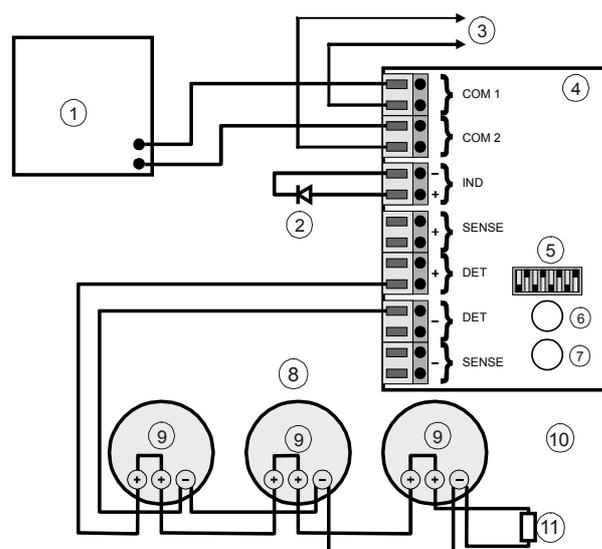
1. Listed Compatible Analogue Addressable Fire Alarm Control
2. LED (Current limited to 4.5 ma.)
3. Loop out
4. Two-wire zone monitor IU2051
5. Address
6. MSB
7. LSB
8. Class "B" hook-up
9. Two-wire smoke detector
10. Note: Two-wire smoke detector loop voltage is > 17.0 V in this configuration
11. 10 K EOL resistor
12. Class "A" hook-up
13. Note: Two-wire smoke detector loop voltage is 16.0 V in this configuration
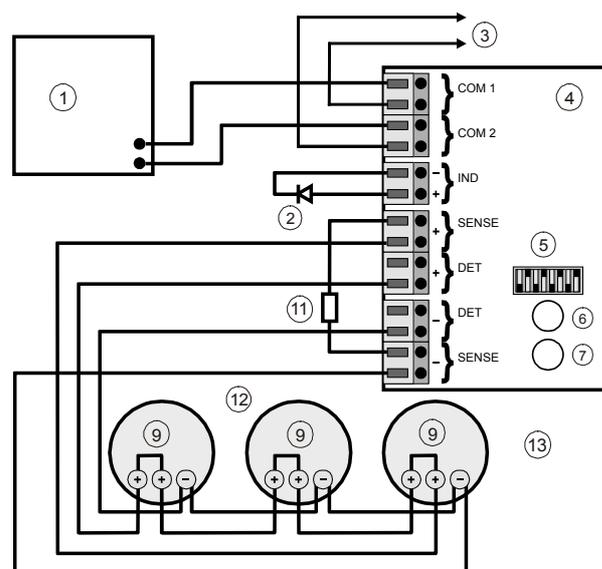
✍️ *Where (non-addressable) intrinsically safe detectors are to be used, the Zener barrier must be placed in the safe area adjacent to the hazardous area.*

2.5.3. Indicating Circuit Controller IU2080

General description:

The IU2080 provides an interface between the two wire multiplexed ring circuit and local supply loop sounders and strobes with their associated user supplied external power supply. The local supply loop circuit can be selected for a 12V or 24V application. The selection is done by the S2 switch located on the board. If the switch is closed, the loop is set to the 12V application and if the switch is open the loop is set to the 24V application. The external power supply provides the power to drive the sounders and strobes. A

number of devices totalling up to 3A may be connected to the sounder spur (750 mA in applications requiring AFNOR approvals).

The ICC monitors the local power supply for a low voltage condition and the external fault relay contacts (via fault +-ve) for an open condition. An end of line resistor is used to ensure that the local supply loop is intact. The ICC monitors for loop shorts as well as for loop open circuits via this resistor. Moreover, the ICC can provide a means for EOL monitoring via a Z-style connection back to the ICC itself.

The PCB has to be put in a housing, according to environmental conditions.

Indicators:

The IU2080 contains a red LED that will light when the relay is in a position to cause the sounders and sirens to be energised. The green LED indicates that the external power supply voltage is present and greater than approximately 8 volts.

Addressing:

The address of the ICC is set by a dip switch on the ICC circuit board. The decimal address of the ICC must be converted to a binary number to set the dip switch. Please refer to section 2.3 (MCP) for the complete table.

Technical data:

Operating voltage	17 – 28 V (at the communication loop terminals)
Total standby current	< 350 µA (< 200 µA typical)
Maximum loop alarm current	< 3.5 mA
End of line resistor value	10 kOhm 1/4W, 5%
Bell loop impedance at 24 V:	
Short circuit	< 3.3 kOhm
Quiescent	3.3 kOhm - 13.0 kOhm
Open circuit	> 13.0 kOhm
Local power supply, low voltage detection:	
12 V supply	<10.2 V
24 V supply <20.4 V	
Local supply current (standby)	<11.0 mA @ 24 VDC
Local supply current (alarm)	<72.0 mA @ 24 VDC plus bell loop load current
Supervisory voltage	approx. 2.2 VDC (inverted)
Bell loop voltage in alarm	12 or 24 VDC
Fuse rating	3 A
Physical dimensions	See paragraph 2.5.1, Zone Monitoring Unit
Mounting holes	See paragraph 2.5.1, Zone Monitoring Unit
Operating & storage temperature	See paragraph 2.2.4

Installation:

Figure 11: Location of jumpers and connectors on the PCB
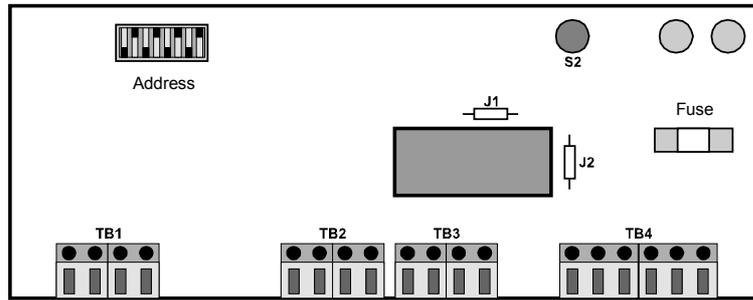
Figure 12: Style Y operation without power supply trouble relay
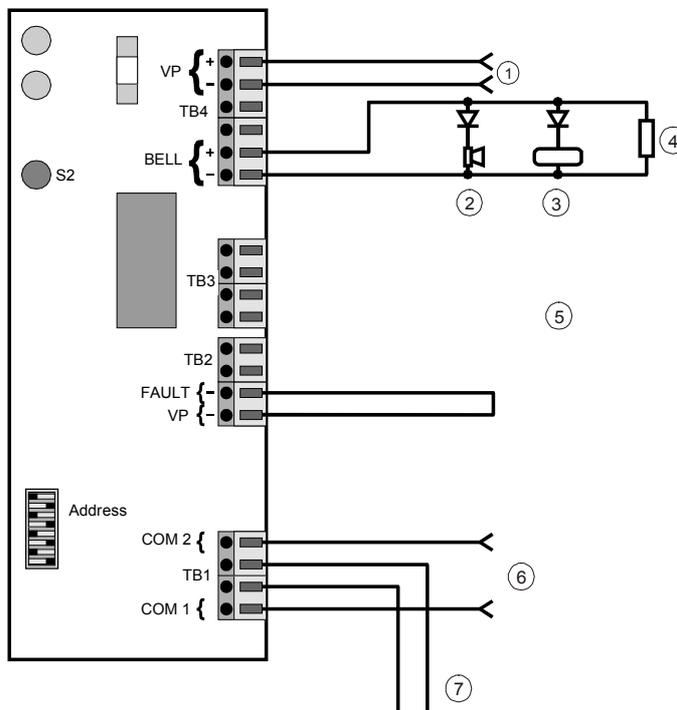
1. External power supply/charger 24 V or 12 V

2. Sounder

3. Strobe

4. EOL resistor: 10 K, ¼ W, 5%

5. Note: If a 12 VDC application, close S2 which is located on the PCB

6. Connected to the communication line

7. Loop out

Figure 13: Fault signal indication with open collector driver
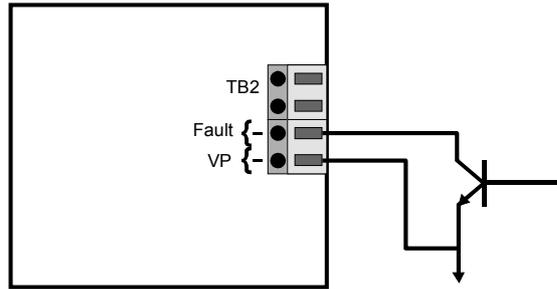
Note: Connect the fault signal terminal as shown if the open collector transistor is used. The transistor must be in the "ON" condition under normal operation. If the transistor opens, a fault signal to the panel is indicated.

This connection is valid in all operational models.

Figure 14: Style Y operation with power supply trouble relay
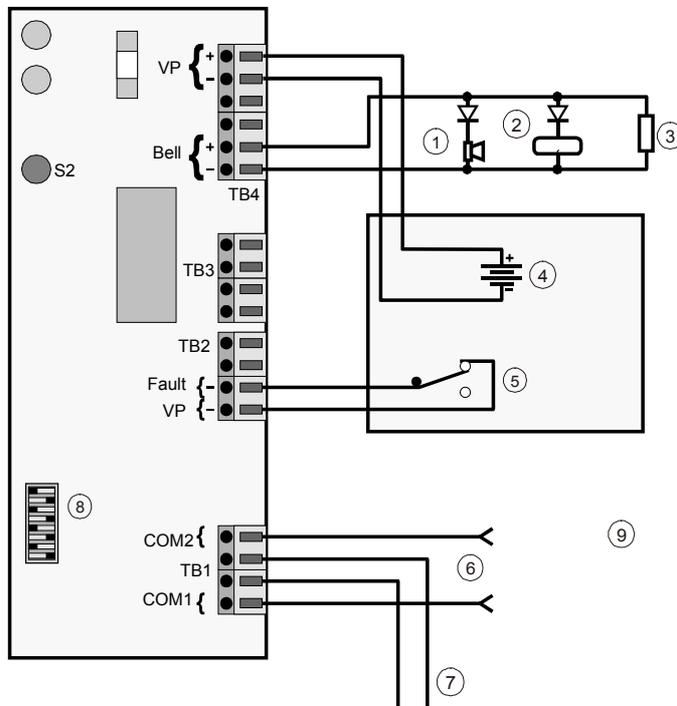
1. Sounder
2. Strobe
3. EOL resistor 10 K, ¼ W, 5%
4. External power supply charger 24 VDC or 12 VDC
5. Trouble relay contacts
6. Connect to communication line
7. Loop out
8. Address
9. Note: If a 12 VDC application, close S2 which is located on the PCB

Figure 15: Style Z operation without power supply trouble relay

1. External power supply/charger 24 V or 12 V
2. Sounder
3. Strobe
4. Connect to communication line
5. Loop out
6. Address
7. Note: If a 12 VDC application, close S2 which is located on the PCB
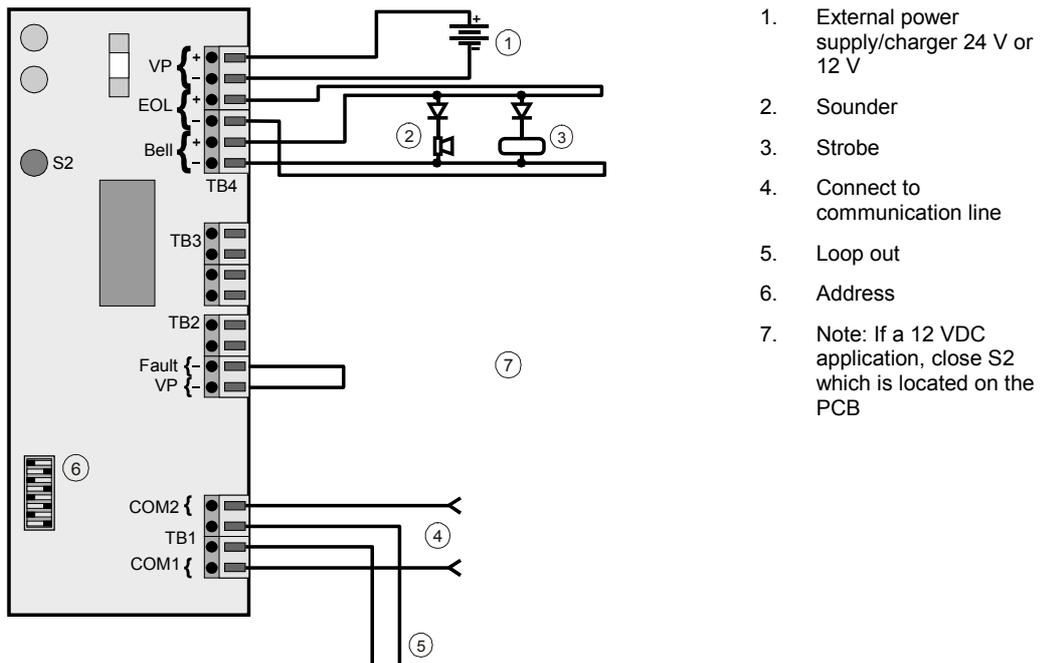
Figure 16: Style Z operation with power supply trouble relay

1. Sounder
2. Strobe
3. External power supply charger 24 VDC or 12 VDC
4. Trouble relay contacts
5. Connect to communication line
6. Loop out
7. Address
8. Note: If a 12 VDC application, close S2 located on the PCB. 10 K EOL is internally connected between PIN 3 and 4 of TB4.

Figure 17: AC Operation

1. External power supply from control panel 24 VDC
2. EOL resistor: 10 K, ¼ W, 5%
3. To audio transformer – secondary side (AC signal 70 Vrms)
4. To audio transformer – secondary side (rectified AC > 2.5 V)
5. Connect to communication line
6. Address
7. Loop out
8. Note: Remove jumpers J1 and J2 located on the PCB

2.6. Input / Output units

General:

The Aritech 2000 Series input-output modules allow for connecting an external signal (input) by a voltage free contact for further processing in the Fire panel. These inputs are supervised and faults can be signalled at the panel. Furthermore, relay contacts (output) can be used for triggering devices, external to the loop.

All 2000 Series IO-modules are loop powered (no additional power supply required).

The PCB has to be put in a housing, according to environmental conditions.

Depending on the amount of supervised inputs and outputs, the following models are available:

IO2034:   4 Inputs / 4 Outputs module

IO2032:   2 Inputs / 2 Outputs module

IO2031:   2 Inputs / 1 Output module

IO2014:   4 Inputs module

Indicators

A yellow LED indicates a fault condition in one of the supervised inputs. The definition of this fault condition (open, short, open or short) must be programmed at the panel. The indication stays until the panel is reset.

Addressing

The address of a Input / Output Unit is set by means of two rotary switches on the unit. Please refer to paragraph 2.2.3 on how to set the address.

Technical data:

Operating voltage	17 –28 V
Total standby current	< 250 µA
Typical standby current	< 200 µA
Maximum line length	not to exceed 100 m
Outputs	2.0 A maximum at 30 VDC
	0.3 A maximum at 125 VAC

Inputs:

Input loop impedance (150K EOL included)	Reported to panel:
Open – 555K	Open (open circuit)
243K – 54K	Passive (contact open)
39K – 11K	Active (contact closed)
5K6 – short	Short (short circuit)

Physical dimensions and mounting holes (mm):
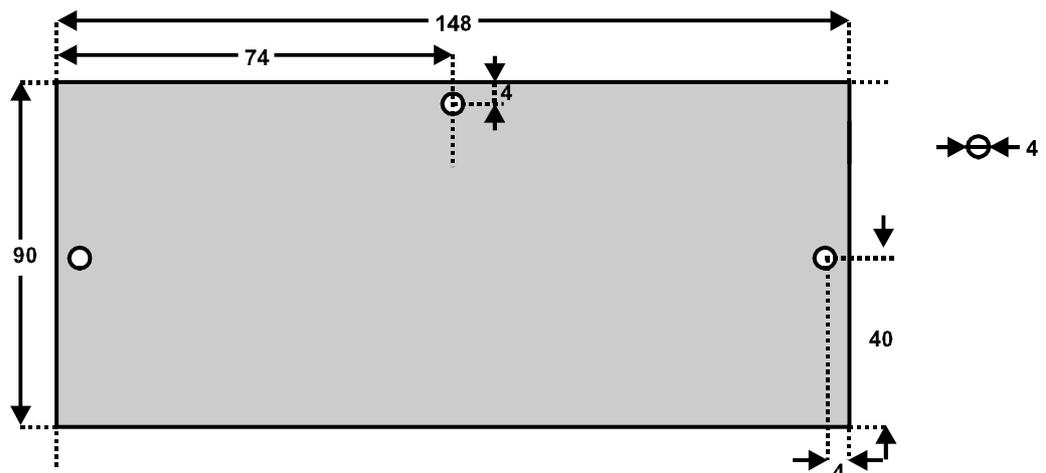
Installation:
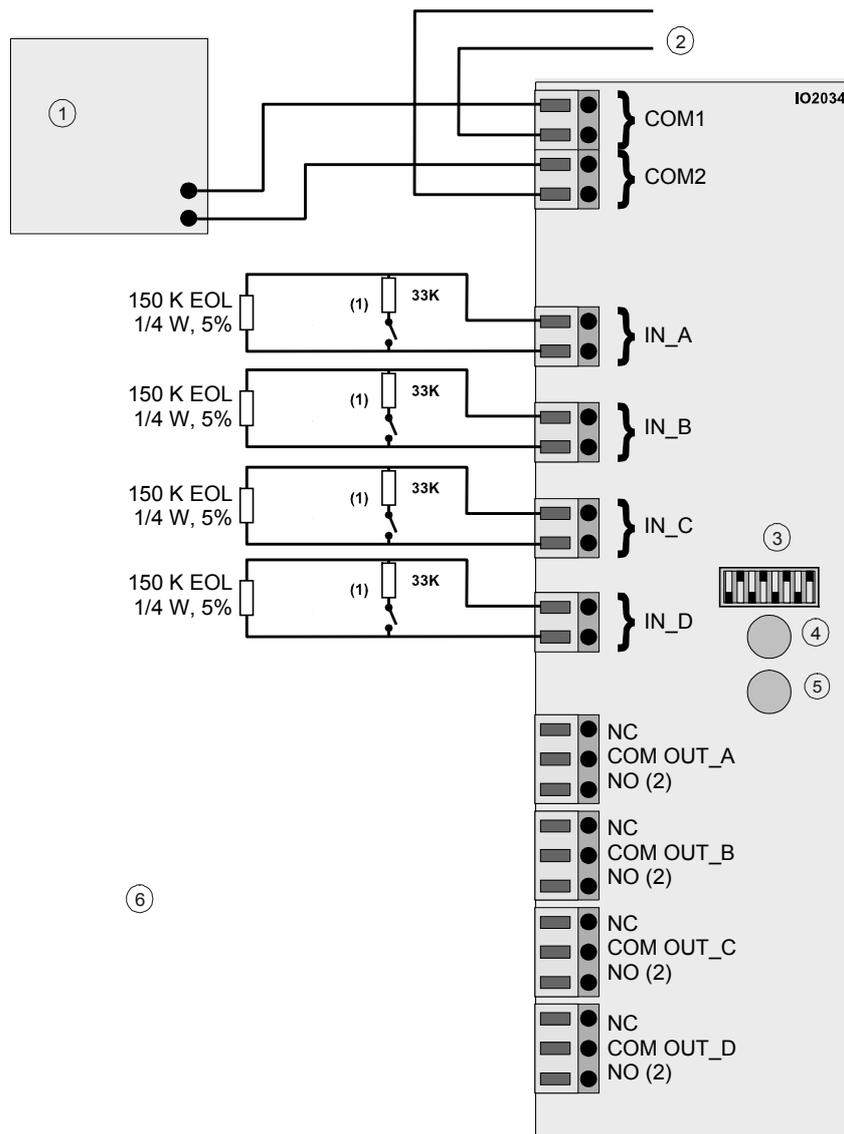
1. Listed compatible analogue addressable fire alarm control
2. Loop out
3. Address
4. MSB
5. LSB
6. (1) Notes:
   - Depending on panel set-up, 33 K resistor is optional
   – Inputs are NO (normally open)
   – Outputs are shown in inactive condition
   – According to the model number, the PCB will have more or less components

3. LOOP LOAD CALCULATIONS

3.1. General

When designing a Series 2000 system it is important to calculate the designed loop configuration to ensure that it operates within the minimum and maximum voltage parameters under worst case voltage and current conditions.

The low voltage limit is normally 20 VDC for systems that include Zone Monitoring Units and for systems without such units it is 17 VDC.

The voltages mentioned only refer to the minimum DC voltage level, the AC voltage level must be maintained at 5 to 9 V above the DC level.

The calculation procedure and expressions shown in the following paragraphs give a rough method of checking whether the DC conditions are satisfied.

The calculations are based on the DC voltage only and the attenuation of the AC voltage signals is theoretically relative to that of the DC voltage. In most cases, the AC voltage will be within specification when the DC voltage is within specification limits, provided that the AC voltage level is well above the minimum DC level (5 V) to begin with.

3.2. Calculation procedure

1. Calculate the total quiescent (standby) current for the loop devices using Table 2.

2. Calculate the worst case condition for additional alarm and LED current using Table 3.

   Notes:

   - The 'worst case' condition should still be considered as a 'realistic' condition, taking into account the physical location of the sensor, remote indicators and so on. In most of the applications, 10 sensors in alarm at the same moment (per loop) are a good indication.

   - In some panels (like FP2000/1200/1100), the maximum number of LED's in alarm per loop at the same time can be programmed.

3. Determine the total loop resistance, using Table 4.

   - The cable values given are "per core", therefore for a two core cable the resistance must be multiplied by two.

   - The 10 Ohm source impedance is related to the FP2000/1200/1100.

4. Multiply the total current and the total resistance and subtract the result from the central control equipment loop voltage. This will give the minimum voltage that a device in the worst possible position on the loop can experience under power fail conditions.

3.2.1. Standby current

LOOP 1

Table 2: Device Quiescent Current

STANDBY CURRENT

Device	Code	Number of Devices	Standby Current (A)	Total Standby Current (A)
OPTICAL	DP2051		0,00025	
	DP2071		0,00025	
HEAT	DT2053		0,00025	
	DT2073		0,00025	
MCP	DM2000		0,00025	
SINGLE INPUT MODULE (SIM)	IU2050		0,00025	
ZONE MONITOR	IU2051		0,0045	
IND. CIRCUIT CONTROL	IU2080		0,00035	
4I / 4O	IO2034		0,00025	
2I / 2O	IO2032		0,00025	
2I / 1O	IO2031		0,00025	
4I	IO2014		0,00025	

3.2.2. Alarm Current

LOOP 1

Table 3: Device Alarm Current

ALARM CURRENT

	Number of Devices	Alarm Current (A)	Total Alarm Current (A)
Define the numbers of sensors that can go into alarm at the same time	10	0.004	0.04

3.2.3. Loop Resistance

LOOP 1

Table 4: Resistance

RESISTANCE

Part	Code	Resistance	Number of devices	Total resistance (ohm)
Panel source	FP2000/1200/1100	10	1	10
Isolators	IU2016	1		
Cable	2L1.0 MICC	0.017		
(Ohm/m/CORE)	2L1.5 MICC	0.011		
	2L2.5 MICC	0.1168		
	FP200 1.0	0.0181		
	FP200 1.5	0.0121		
	FP200 2.5	0.0074		
	WS104	0.05		
	WC104	0.020635		

Calculation for Minimum Device Voltage (V_{min}) Under Worst Case Conditions:

TOTAL CURRENT:	I	(sum of quiescent and alarm current)	
TOTAL RESISTANCE:	R		
LOOP VOLTAGE:	V	(e.g. FP2000/1200/1100 : 29 V)	

V_{min} = V — (I x R)

V_{min} > = 17 V — no Zone Monitoring Units

V_{min} > = 20 V — with Zone Monitoring Units