



**A4004V46CAI
A4004V4CAI**

**A400 ELITE – ALIGNMENT MONITOR
OPERATION MANUAL**



INSTALLATION INSTRUCTIONS

MODELS: A4004V46CAIA4004V4CAI

Hardware Version: 4.1

Software Version: V1.xx

www.go4b.com

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1. Notice to Customer



Dear 4B Customer:

Congratulations on your purchase. 4B appreciates your business and is pleased you have chosen our products to meet your needs.

Please read in its entirety and understand the literature accompanying the product before you place the product into service. Please read the safety precautions carefully before operating the product. With each product you purchase from 4B, there are some basic but important safety considerations you must follow to be sure your purchase is permitted to perform its design function and operate properly and safely, giving you many years of reliable service. Please read and understand the Customer Safety Responsibilities listed below. Failure to follow this safety directive and the Operation Manuals and other material furnished or referenced, may result in serious injury or death.

SAFETY NOTICE TO OUR CUSTOMERS

- A. In order to maximize efficiency and safety, selecting the right equipment for each operation is vital. The proper installation of the equipment, and regular maintenance and inspection is equally important in continuing the proper operation and safety of the product. The proper installation and maintenance of all our products is the responsibility of the user unless you have asked 4B to perform these tasks.
- B. All installation and wiring must be in accordance with Local and National Electrical Codes and other standards applicable to your industry. (Please see the article “Hazard Monitoring Equipment Selection, Installation and Maintenance” at www.go4b.com.) The installation of the wiring should be undertaken by an experienced and qualified professional electrician. Failure to correctly wire any product and/or machinery can result in the product or machine failing to operate as intended, and can defeat its design function.
- C. Periodic inspection by a qualified person will help assure your 4B product is performing properly. 4B recommends a documented inspection at least annually and more frequently under high use conditions.
- D. Please see the last page of this manual for all warranty information regarding this product.

CUSTOMER SAFETY RESPONSIBILITIES

1. READ ALL LITERATURE PROVIDED WITH YOUR PRODUCT

Please read all user, instruction and safety manuals to ensure that you understand your product operation and are able to safely and effectively use this product.

2. YOU BEST UNDERSTAND YOUR NEEDS

Every customer and operation is unique, and only you best know the specific needs and capabilities of your operation. Please call the 24-hour hotline at 309-698-5611 for assistance with any questions about the performance of products purchased from 4B. 4B is happy to discuss product performance with you at any time.

3. SELECT A QUALIFIED AND COMPETENT INSTALLER

Correct installation of the product is important for safety and performance. If you have not asked 4B to perform the installation of the unit on your behalf, it is critical for the safety of your operation and those who may perform work on your operation that you

select a qualified and competent electrical installer to undertake the installation. The product must be installed properly to perform its designed functions. The installer should be qualified, trained, and competent to perform the installation in accordance with Local and National Electrical Codes, all relevant OSHA Regulations, as well as any of your own standards and preventive maintenance requirements, and other product installation information supplied with the product. You should be prepared to provide the installer with all necessary installation information to assist in the installation.

4. ESTABLISH AND FOLLOW A REGULAR MAINTENANCE AND INSPECTION SCHEDULE FOR YOUR 4B PRODUCTS

You should develop a proper maintenance and inspection program to confirm that your system is in good working order at all times. You will be in the best position to determine the appropriate frequency for inspection. Many different factors known to the user will assist you in deciding the frequency of inspection. These factors may include but are not limited to weather conditions; construction work at the facility; hours of operation; animal or insect infestation; and the real-world experience of knowing how your employees perform their jobs. The personnel or person you select to install, operate, maintain, inspect or perform any work whatsoever, should be trained and qualified to perform these important functions. Complete and accurate records of the maintenance and inspection process should be created and retained by you at all times.

5. RETAIN AND REFER TO THE OPERATION MANUAL FOR 4B'S SUGGESTED MAINTENANCE AND INSPECTION RECOMMENDATIONS

As all operations are different, please understand that your specific operation may require additional adjustments in the maintenance and inspection process essential to permit the monitoring device to perform its intended function. Retain the Operation Manual and other important maintenance and service documents provided by 4B and have them readily available for people servicing your 4B equipment. Should you have any questions, please call the 4B location who supplied the product or the 24-hour hotline number in the USA -309-698-5611.

6. SERVICE REQUEST AND ONLINE PRODUCT REGISTRATION

If you have questions or comments about the operation of your unit or require the unit to be serviced please contact the 4B location who supplied the product or send your request via fax (309-698-5615), email (4b-usa@go4b.com), or call us via our 24-hour hotline number in the USA - 309-698-5611. Please have available product part numbers, serial numbers, and approximate date of installation. In order to assist you, after the product has been placed into service, complete the Online Product Registration section which is accessed via our website www.go4b.com

SITE NAME:
SITE LOCATION:
CONTACT NAME:
CONTACT NUMBER:
PART NUMBER:
SERIAL NUMBER:
DATE OF INSTALL:

2. Warnings and Conditions of Use



DANGER: EXPOSED BUCKETS AND MOVING PARTS WILL CAUSE SERIOUS INJURY OR DEATH. THE OPERATOR MUST ALWAYS LOCKOUT POWER BEFORE REMOVING COVER OF THE INSPECTION DOOR OF THE ELEVATOR OR PERFORMING ANY INSTALLATION OR MAINTENANCE WORK.

DANGER: ALL ELECTRICAL POWER TO THE SYSTEM AND WIRING MUST BE ISOLATED PRIOR TO STARTING ANY INSTALLATION OR MAINTENANCE WORK. WORKING ON OPEN LIVE CIRCUITS IN ATEX ZONES IS PROHIBITED AND CAN LEAD TO AN EXPLOSION.

THE EQUIPMENT SHALL BE SUITABLY EARTH BONDED VIA THE PCB MOUNTED TERMINAL INSIDE THE EQUIPMENT ENCLOSURE.

WARNING: THE EQUIPMENT IS A POTENTIAL STATIC HAZARD, CLEAN ONLY WITH A DAMP CLOTH.

DO NOT ALLOW DUST LAYERS TO BUILD UP ON THE EQUIPMENT

3. Introduction

The A400 ELITE is a microprocessor controlled unit which is able to accept signals of alignment from one or two bucket elevators and is able to cause alarm and shutdown of the elevator and or feeders, when hazardous conditions are detected. The control unit is housed in a self contained wall-mounting enclosure, and the alignment sensors are separate items for mounting on the elevators. The A400 ELITE will operate from 100 to 240 VAC $\pm 10\%$ (A4004V46CAI) or from 24 VDC (A4004V4CAI) depending upon the model chosen.

The alignment sensors operate in pairs to detect the correct alignment of elevator buckets. The control unit can accept signals from the pairs of sensors which may be on one or on two separate elevators. When both pairs of sensors are mounted on one elevator, they are intended to monitor the bottom and the top of the elevator. When both pairs of sensors are mounted on two different elevators, they are each intended to monitor the elevators independently.

4. System Approvals and Compliance

For V4 Model

CE 1180 Ex tb IIIC T125° Db IP66 T_{AMB} -20°C to +50°C IECEx BAS05.0026X

CE 1180 Ex II 2D Ex tb IIIC T125° Db IP66 T_{AMB} -20°C to +50°C Baseefa04ATEX0131X

CSA - Class II Div. 1, Groups E, F & G

(A4004V4CAI - When Powered with a Class 2 Power Supply)

For V46 Model:

CE 1180 Ex tc IIIC T125° Dc IP66 T_{AMB} -20°C to +45°C IECEx BAS11.0018X

CE 1180 Ex II 3D Ex tc IIIC T125° Dc IP66 T_{AMB} -20°C to +45°C Baseefa11ATEX 0033X

CSA - Class II Div. 2, Groups F & G (A4004V46CAI)

Approval Power in Watts

ATEX category 2D: 12 Watts

ATEX category 3D: 25 Watts

CSA (F5004V4CAI-MGW): 12 Watts

CSA (F5004V46CAI-MGW): 12 Watts

Approval Safety Information

To Open the Lid:

1. Disconnect power (isolate ALL circuits)
2. Untighten the lid securing screws
3. Carefully open the lid ensuring that the gasket is not damaged and remains in place

To Close the Lid:

1. Check that the gasket is correctly fitted into the box groove and is undamaged.
2. Tighten the lid screws.
3. Check that the lid and box are correctly mated.

5. Specifications

The Control Unit

A plastic enclosure houses the electronics and terminal connectors. The unit contains a printed circuit board to accommodate power supply circuitry, output relays, microprocessor and terminals. A short ribbon cable is connected to the lid of the enclosure where the indicator lamps are mounted. Adjustments are provided on the printed circuit board for setting up. A 'touch button' is mounted in the lid to allow the unit to be tested during operation.

5.1 Packaging

Overall Packaging Dimensions

Dimensions	270mm x 230mm x 200mm (L x W x H)
Weight	1.4kg

Table 1 - System Packaging Dimensions

5.2 Airborne Noise

This system is electronic with no major moving parts. The airborne noise of the system is below 70dB(A). When a siren is connected to the alarm relay, it is up to the end user to make sure that the noise levels of the selected siren comply with the Machinery Directive.

5.3 A400 Specifications

Specifications

Supply Voltage:	V46 – 100-240V ac +/- 10% 50/60Hz or 24V dc +/- 10% V4 – 24V dc +/- 10%
Power Dissipation:	10VA/10 WATTS
Alarm Relay Contacts:	2 x 1 Pole normally open 8A@ 250VAC Non Inductive
Stop Relay Contacts:	2 x 1 Pole normally open 8A@ 250VAC Non Inductive
Sensor Supply:	Current 200 ma available per sensor Note :A4004V4CAI - because of the manner in which the A400 works, the DC supply to the A400 will become the supply to the sensors. E.g. If the A400 is powered at 24 VDC then the sensors will be powered at 24 VDC. In order to use 12 VDC sensors, contact the factory.
Power Terminals:	2.5mm ² 16 AWG max
Sensor Terminals:	2.5mm ² 16 AWG max
Protection:	V46 – ATEX Cat3D , IECEx Zone22 , CSA Cl II Div2 V4 – ATEX Cat2D , IECEx Zone21 , CSA Cl II Div1 (when used with Cl2 PSU)
Height:	9 3/4", 248mm
Width:	7 9/32", 185mm
Depth:	5 1/4", 133mm
Fixing Centres:	8 13/16" high x 4" wide, 224mm high x 102mm wide
Cable Entry:	2 Holes 11/8" DIA, 28mm, 3/4" CONDUIT
Weight:	3lbs, 1.3Kg

Table 2 – A400 Monitor Specifications

5.3.1. Fuses

Fuse Reference	Fuse Value	Fuse Type	4B Part Number
F6 (V46 ONLY)	2A	T5,Time Delay	FUSE-ELITE-2
F5	200mA	T5,Time Delay	FUSE-ELITE-200
F4	V46=2A V4=200mA	T5,Time Delay	FUSE-ELITE-2 FUSE-ELITE-200
F3	V46=2A V4=200mA	T5,Time Delay	FUSE-ELITE-2 FUSE-ELITE-200
F2	V46=2A V4=200mA	T5,Time Delay	FUSE-ELITE-2 FUSE-ELITE-200
F1	V46=2A V4=200mA	T5,Time Delay	FUSE-ELITE-2 FUSE-ELITE-200

Table 3 – Fuse Ratings

6. Mechanical Installation

DANGER: EXPOSED BUCKETS AND MOVING PARTS WILL CAUSE SERIOUS INJURY OR DEATH. THE OPERATOR MUST ALWAYS LOCKOUT POWER BEFORE REMOVING COVER OF THE INSPECTION DOOR OF THE ELEVATOR OR PERFORMING ANY INSTALLATION OR MAINTENANCE WORK.

Warning: Always lock-out and tag-out the machine prior to installation and set-up.

Wiring: All Wiring Must Be In Accordance With Local and National Electrical Codes and Should Be Undertaken By an Experienced and Professional, Qualified Electrician.

The Control Unit

The Control Unit box should be installed in a suitable control or starter switch room and mounted at an eye level position so that the warning lights can be readily seen. The box should have sufficient space to open the lid for wiring and adjustment. An audible alarm, sounder or visual indicator lamp can be installed in or outside of the control room.



ATTENTION

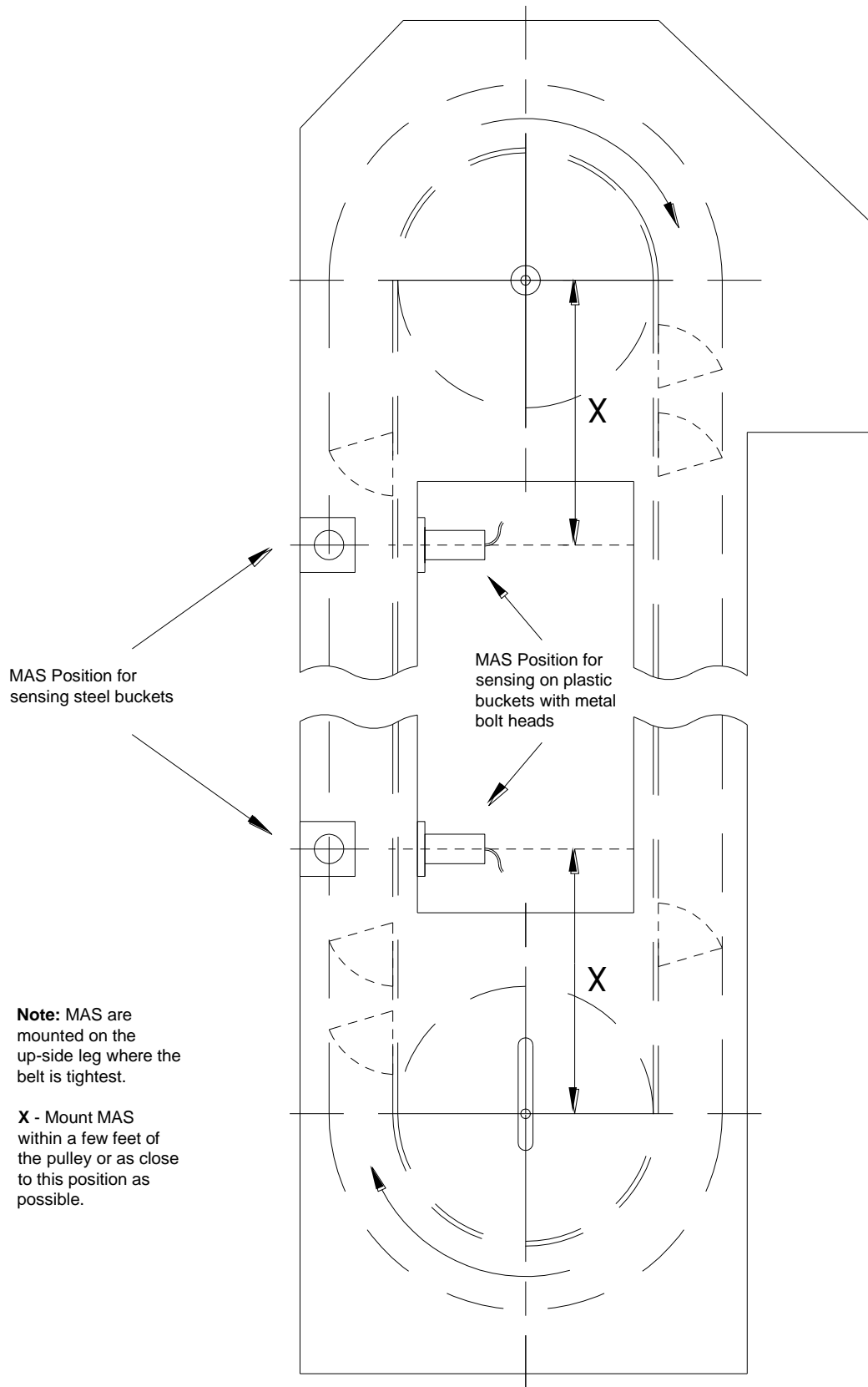
The Control Unit is susceptible to static voltage. Connection of a clean ground to terminal 31 is essential for optimum performance. Prior to this connection, static handling precautions should be taken.

Enclosure Installation

- a. The IP66 rating of the enclosure must be maintained when used in Zone 20 and 21 dust environment. You must use the correct cable, glands and sealing arrangement and in accordance with the installation codes detailed in BS EN 60079 and EN 50281
- b. Where other certified components are used as part of the assembly or installation procedure, the user must take in to account any limitations which might be listed on the relevant certificates.
- c. The box is supplied with 2 x 27.5mm (1 1/8") pre drilled holes in the bottom face. All unused entry apertures must be sealed using component certified stopping plugs Hawke International type 375 or 387. The end user must install component or apparatus certified stopping plugs and cable glands in strict accordance with the manufacturer's instructions. In order to connect conduit to the control unit enclosure, use a Myers™ hub or other equivalent fitting that is rated and suitable for the environment. **Further holes must not be added to the enclosure as this will invalidate any warranty and the product certification.**
- d. All wiring must be carried out in accordance with relevant codes of practice and / or instructions (BS EN 60079-14, EN50281).
- e. The voltage and current and maximum power dissipation shown on the box label must not be exceeded.
- f. The wiring installation must extend to within 1 mm of the metal face of the terminal.
- g. All leads must be insulated for the appropriate voltage.
- h. Not more than 1 single or multiple strand cable is to be connected to any terminal unless multiple conductors have previously been joined in a suitable manner (e.g. boot lace ferrule) such that they present a single connection point to the terminal.
- i. A parallel shaft screwdriver of the correct size should always be used when tightening terminals.

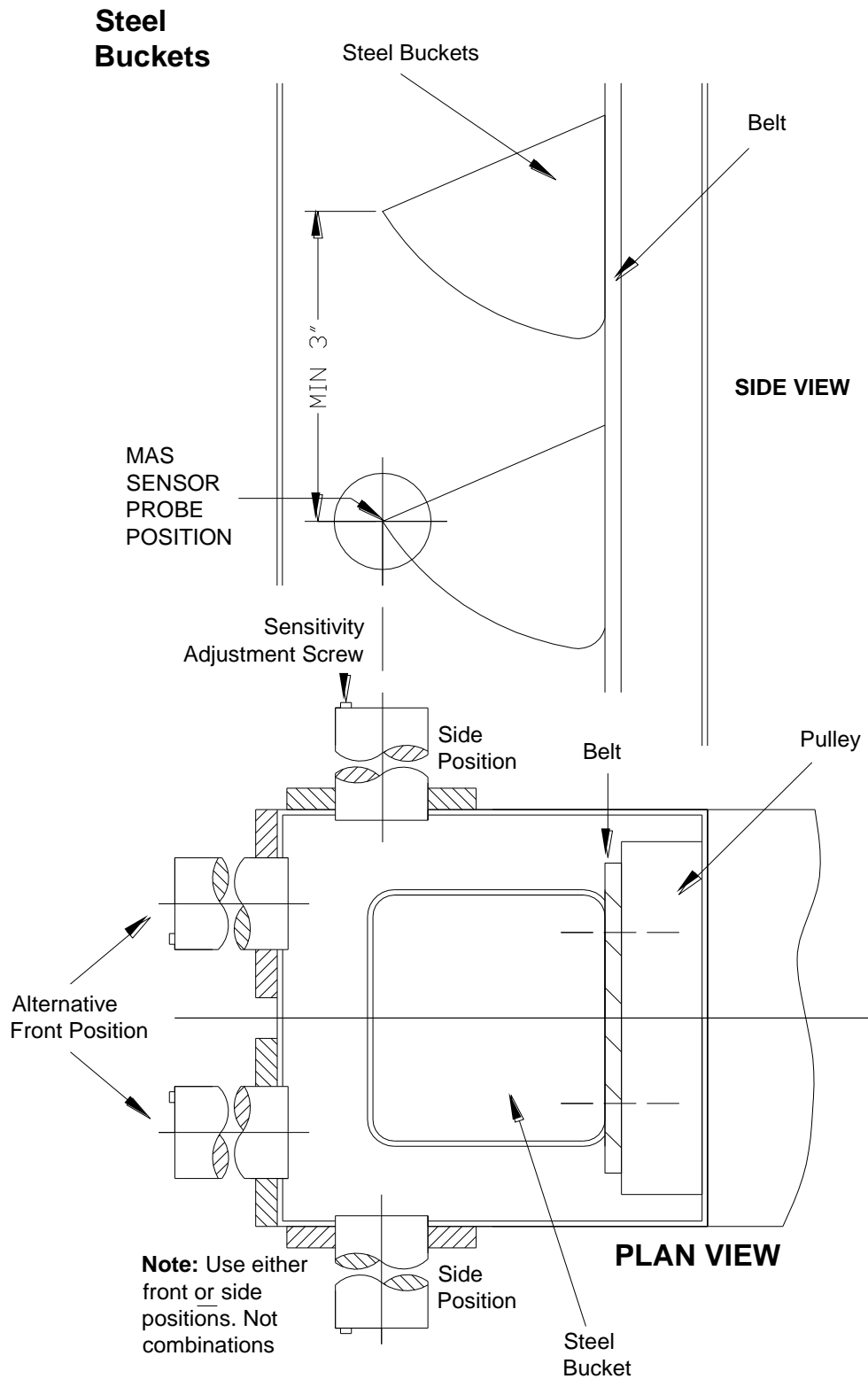
The Alignment Sensors

- Two alignment sensors are required to be mounted on each elevator.
- Install the 2 sensors in the ‘up’ leg trunking or tight belt side, immediately above the boot, as shown in Figure 1 or in a similar position immediately below the head.
- For side mounting for steel buckets, a sensor should be installed at each side of the trunking, either in line with the centre of wide spaced buckets at a distance of no more than 50mm (2”) from the buckets, or with the outer edge of the sensor in line with the tips of the bottomless or very closely spaced steel buckets at a distance of no more than 38mm (1½”) from the steel buckets, and by adjusting the probe, obtain the best setting for the minimum sensitivity requirement of the sensor. Set the sensor so that it does not have to work at maximum sensitivity, as shown in Figure 2 and Figure 3. Always ensure that in the worst case of elevator misalignment, the sensors will not be damaged within the elevator.
- For rear mounting for plastic buckets with steel bolt heads, a sensor should be installed on either side of the rear of the trunking, each about 12.7mm (½”) to the outside of the end bucket bolt head, as on Figure 4. Each sensor should be flush or protrude slightly through the trunking and be a maximum of 25.4mm (1”) from the bucket bolt head as shown in Figure 5.



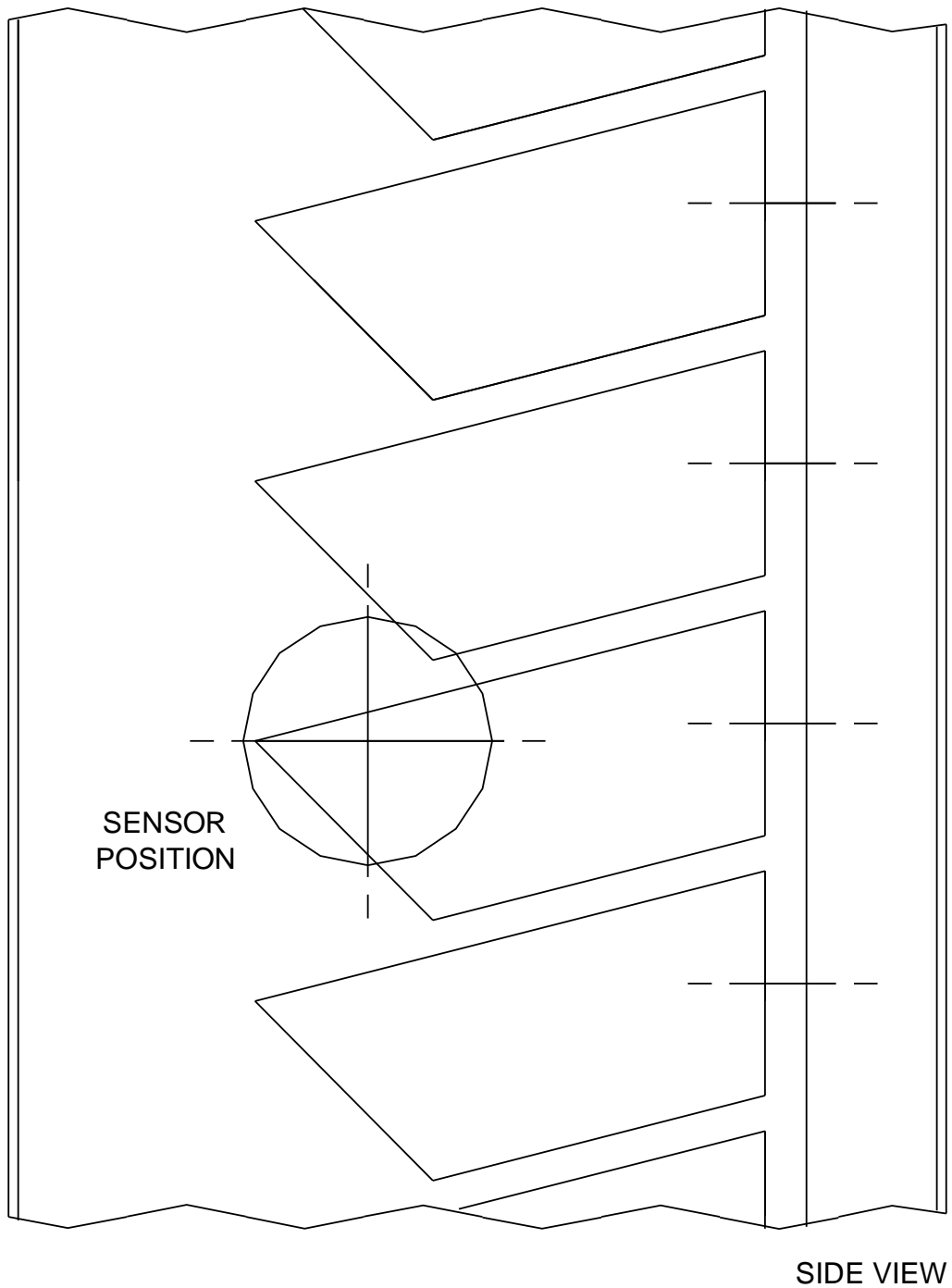
**TYPICAL PROBE SENSING POSITIONS
ON UP LEG OF ELEVATOR**

Figure 1



MAS SENSOR POSITIONS FOR BELT ALIGNMENT AND BELT SLIP SENSING WITH ELAVATOR STEEL BUCKETS

Figure 2

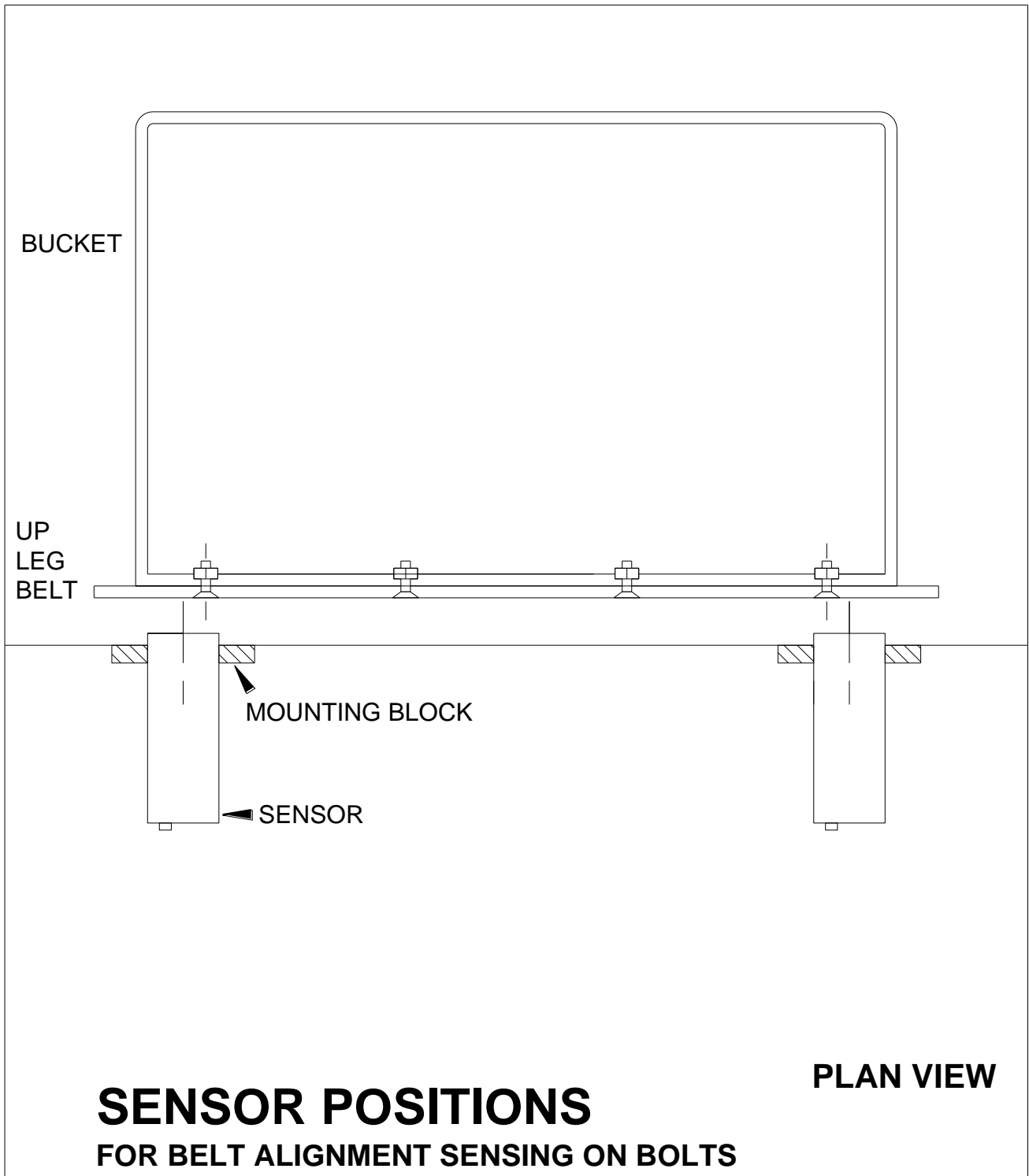


SENSOR POSITIONS

SIDE VIEW OF ELEVATOR LEG TRUNKING SHOWING BEST POSITION FOR THE INSTALLATION OF THE SENSOR WITH G.B. BOTTOMLESS OR STARCO LOW PROFILE OR VERY CLOSE CENTRED BUCKETS TO GIVE THE MAXIMUM DIFFERENTIAL BETWEEN THE BUCKETS.

Figure 3

UP LEG TRUNKING IMMEDIATELY ABOVE BOOT

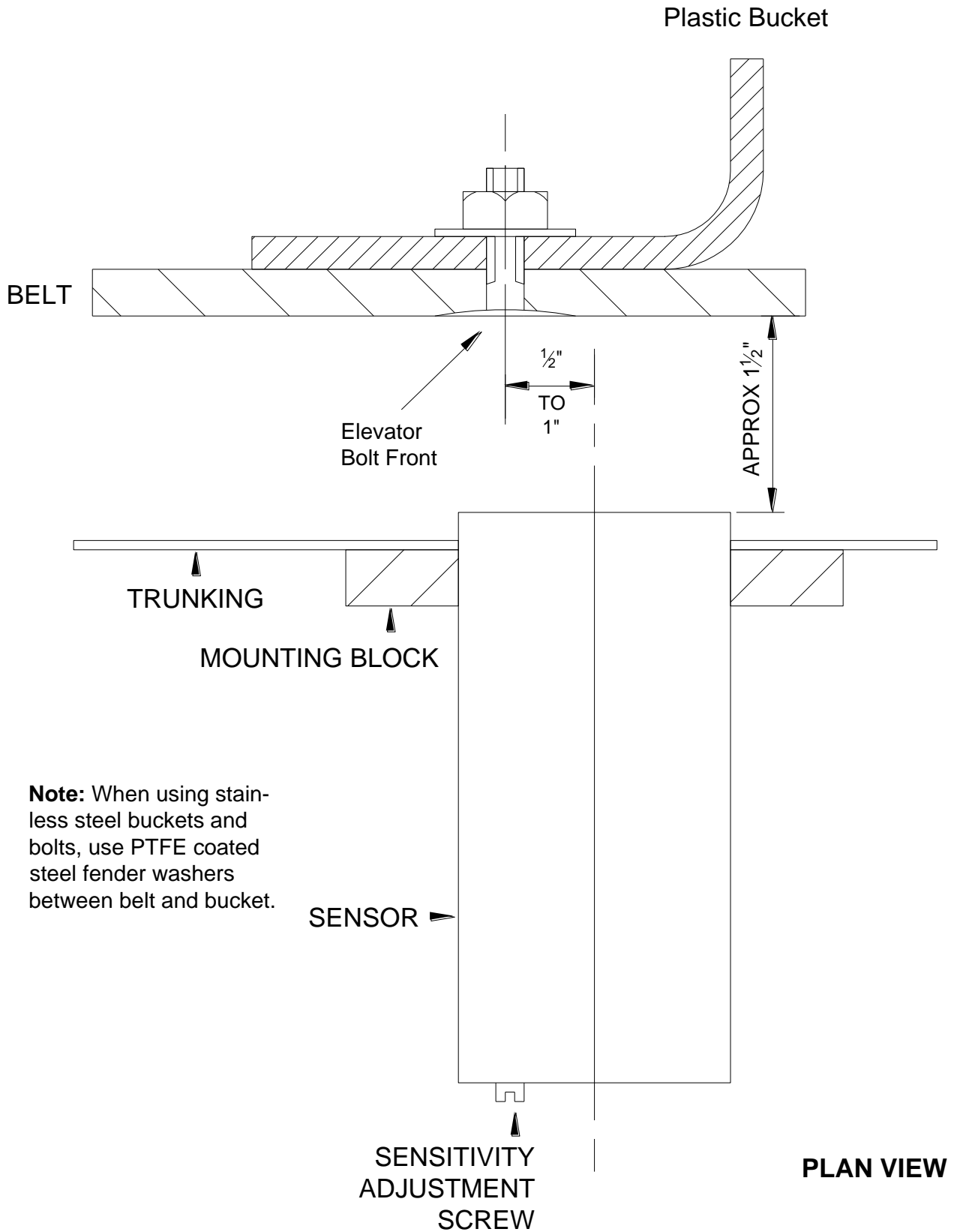


SENSOR POSITIONS

FOR BELT ALIGNMENT SENSING ON BOLTS

PLAN VIEW

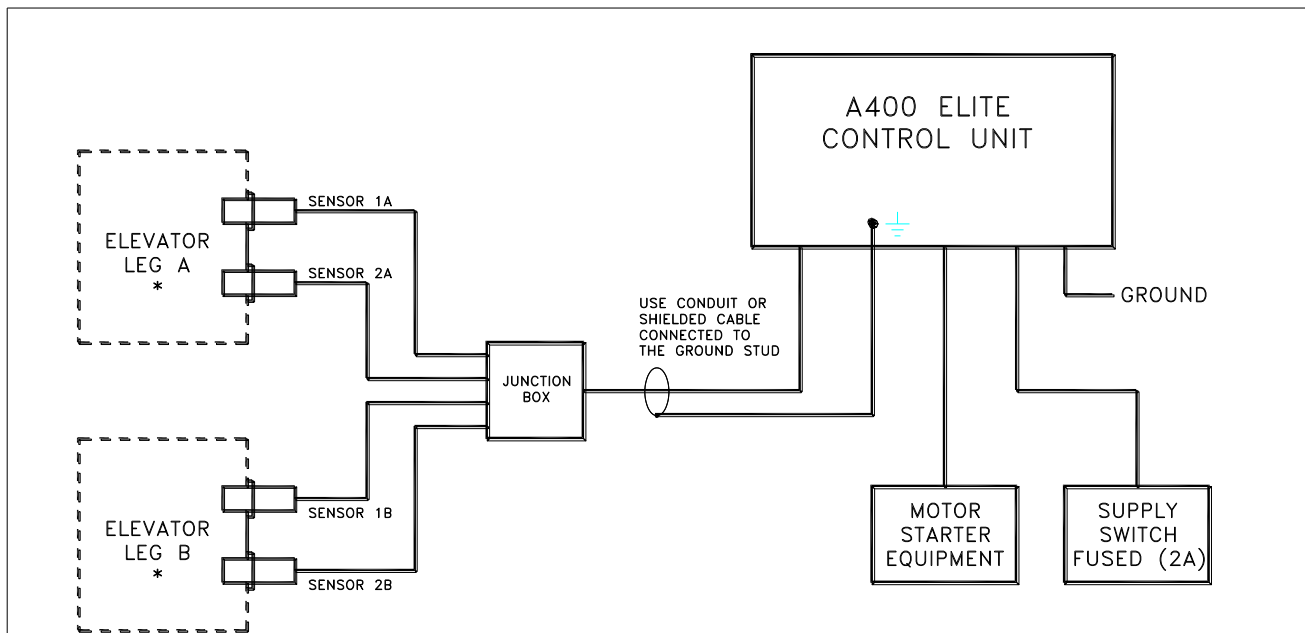
Figure 4



Note: When using stainless steel buckets and bolts, use PTFE coated steel fender washers between belt and bucket.

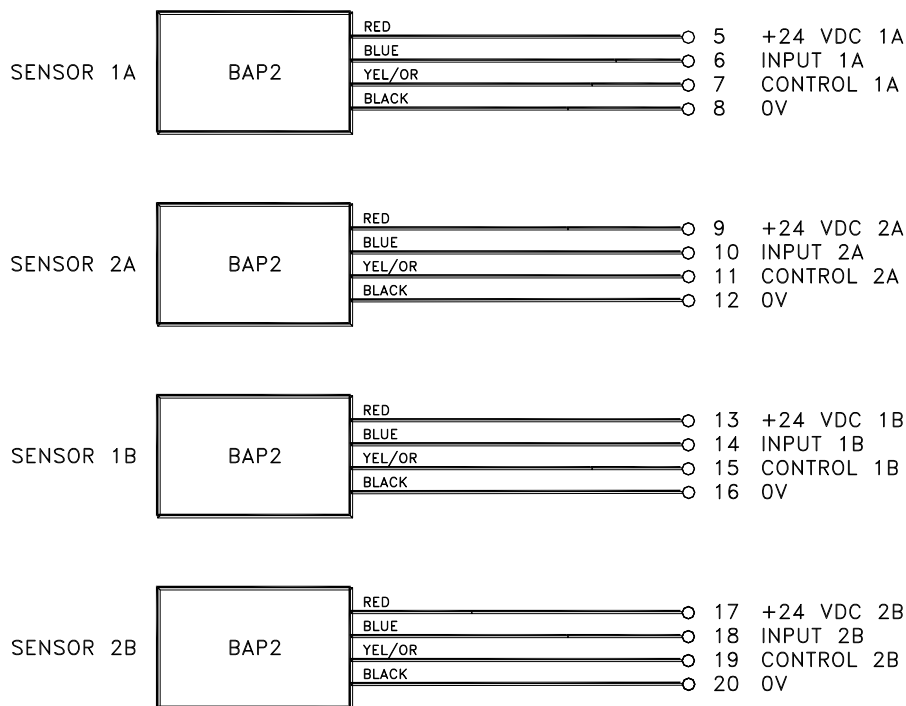
FOR BELT ALIGNMENT SENSING ON BOLTS

Figure 5



* OR UPPER AND LOWER POSITIONS ON ONE ELEVATOR LEG

NOTE: THE WHITE WIRE CAN BE IGNORED BUT MUST BE MADE SAFE THE GREEN WIRE IS GONNECTED TO THE CASE OF THE BAP SENSOR AND MUST BE CONNECTED TO EARTH.



BLOCK DIAGRAM AND SENSOR WIRING

Figure 6

ONE ELEVATOR - AC SUPPLY WITH FOUR SENSORS (1A, 2A, 1B, 2B)

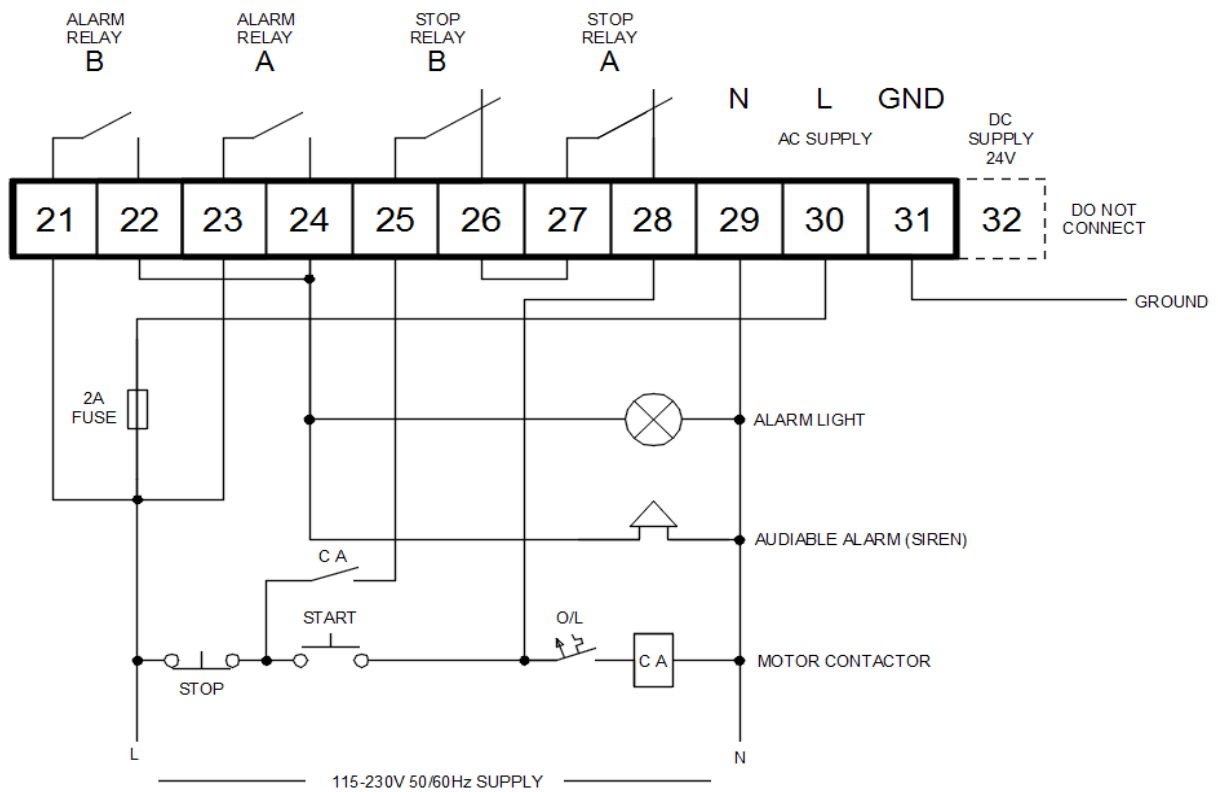


Figure 7

ONE ELEVATOR - AC SUPPLY WITH TWO SENSORS (1A AND 2A) ELEVATOR A

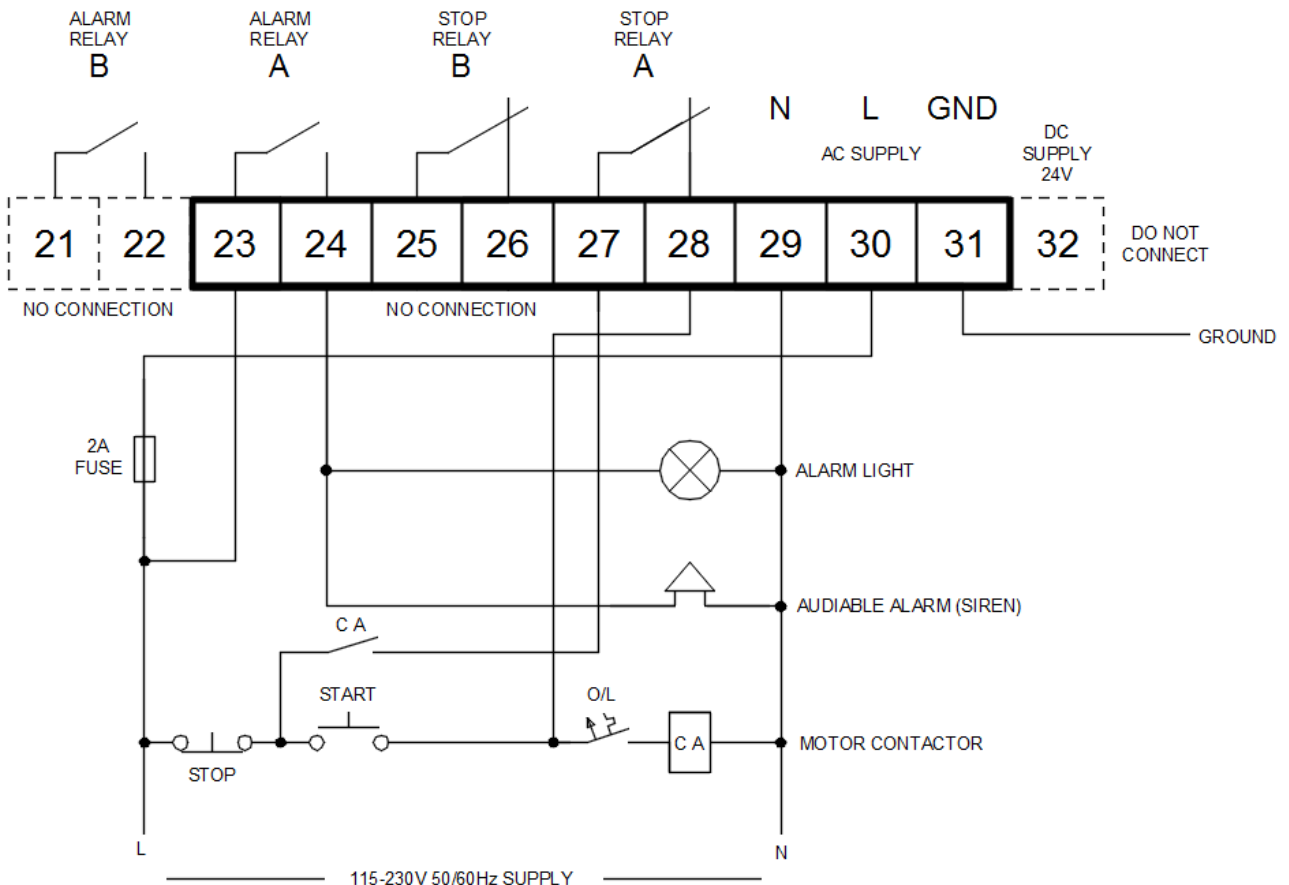


Figure 8

ONE ELEVATOR - AC SUPPLY WITH TWO SENSORS (1B AND 2B) ELEVATOR B

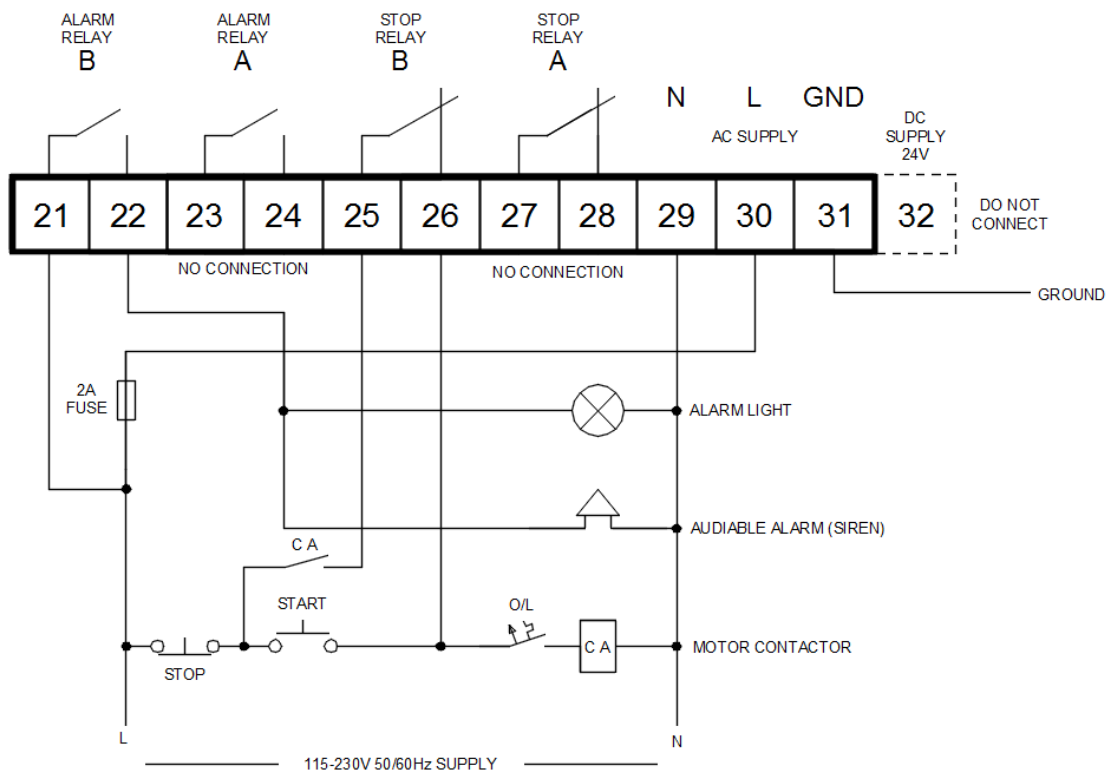


Figure 9

TWO ELEVATORS - AC SUPPLY WITH TWO SENSORS PER ELEVATOR (SENSOR 1A AND 2A FOR ELEVATOR A, SENSOR 1B AND 2B FOR ELEVATOR B)

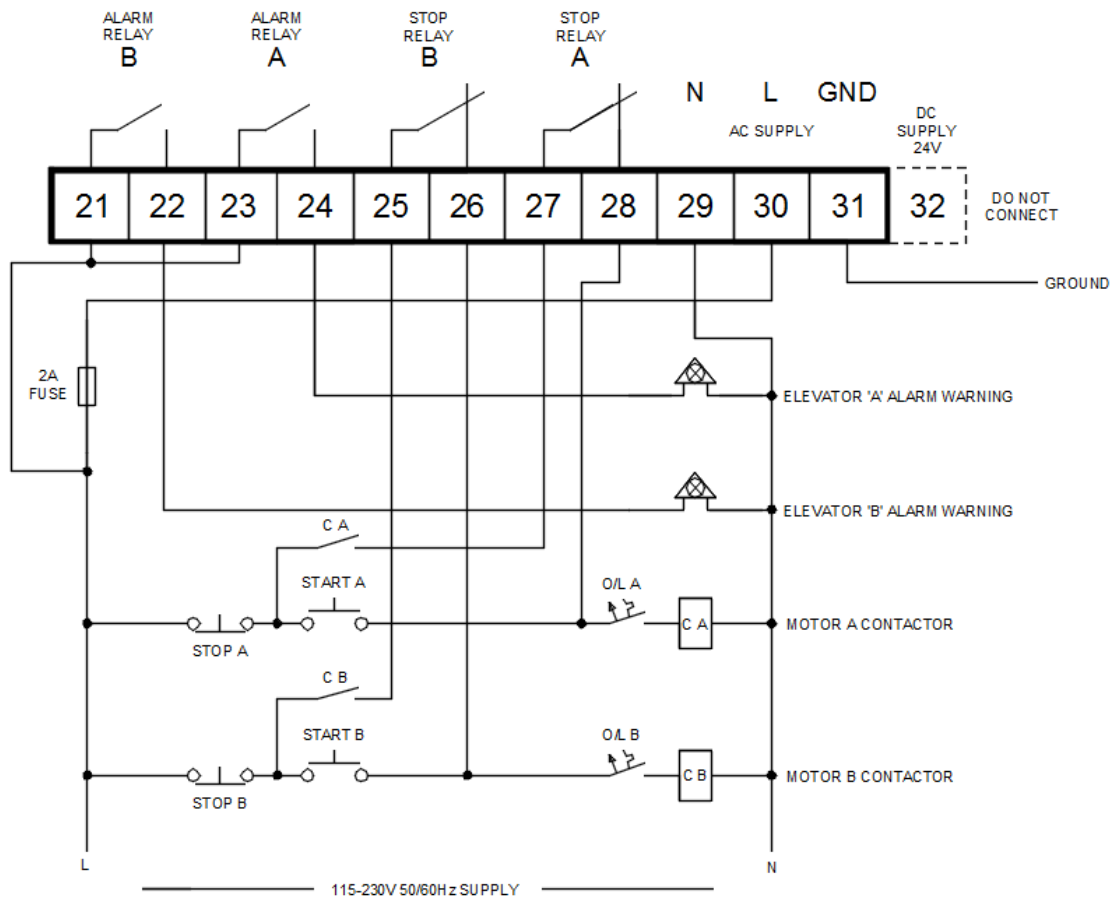


Figure 10

ONE ELEVATOR - DC SUPPLY WITH FOUR SENSORS (1A, 2A, 1B, 2B)

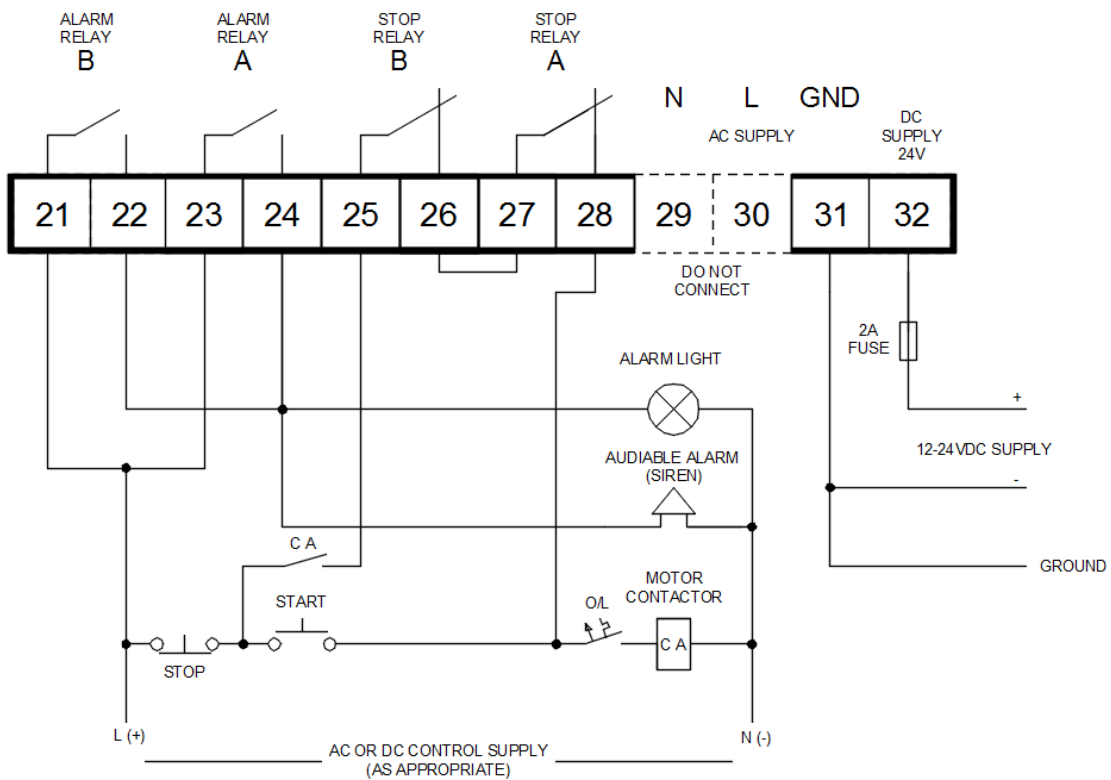


Figure 11

TWO ELEVATORS - DC SUPPLY WITH TWO SENSORS PER ELEVATOR (SENSOR 1A AND 2A FOR ELEVATOR A, SENSOR 1B AND 2B FOR ELEVATOR B)

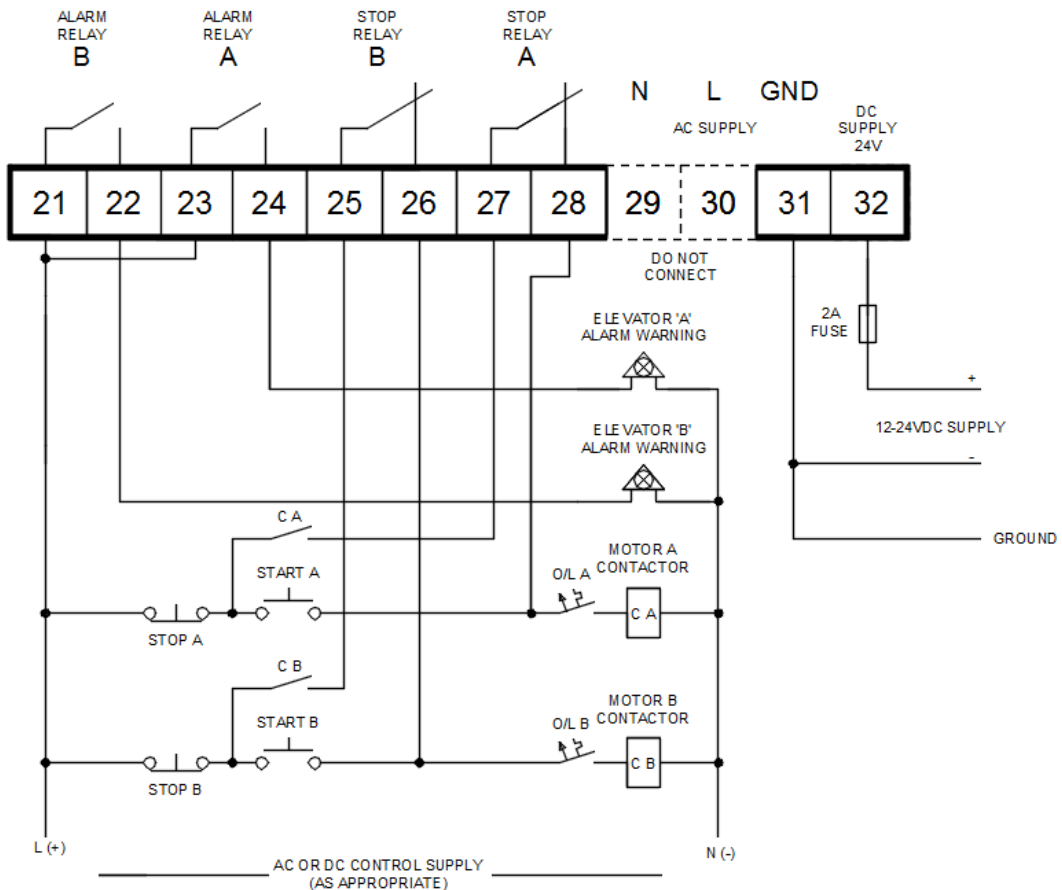
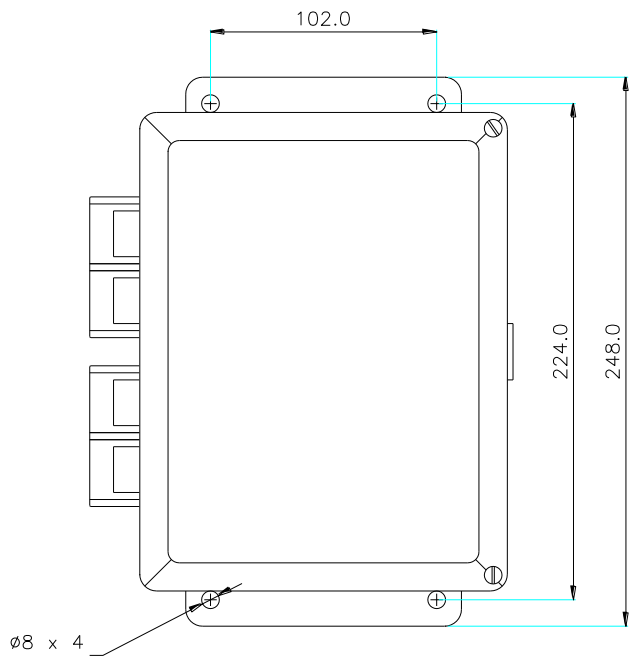


Figure 12

6.3.1. A400 Dimensions



NOTE:
ALL DIMENSIONS IN MM

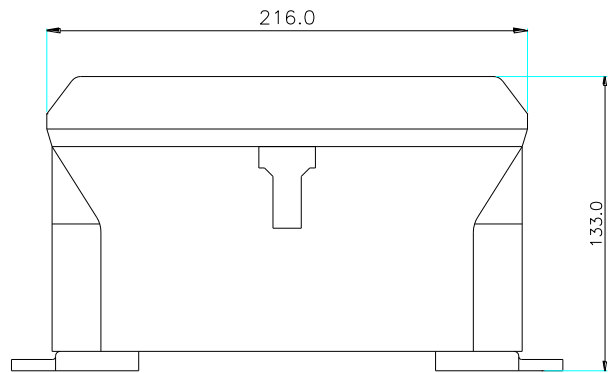
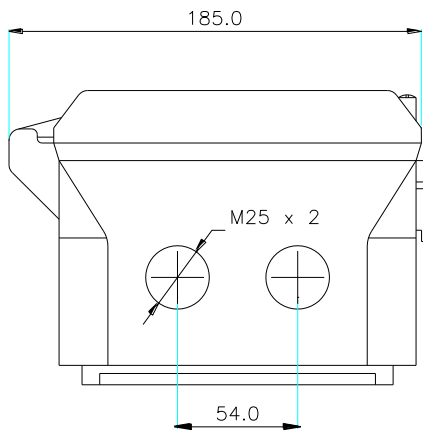


Figure 13 – A400 Mechanical Dimensions

7. Electrical Installation and Wiring

DANGER: ALL ELECTRICAL POWER TO THE SYSTEM AND WIRING MUST BE ISOLATED PRIOR TO STARTING ANY INSTALLATION OR MAINTENANCE WORK. WORKING ON OPEN LIVE CIRCUITS IN ATEX ZONES IS PROHIBITED AND CAN LEAD TO AN EXPLOSION.

Warnings

- Analogue signals must be shielded if cables are longer than 10m
- Digital signals can be shielded
- Keep sensor wiring separate from high voltage cables
- Never run sensor cables in the same conduit as 3-phase motor cables
- Never weld near or around the supplied system components
- Track belts and commission plant prior to installing TouchSwitches

All Wiring Must Be In Accordance With Local and National Electrical Codes and Should Be Undertaken By an Experienced and Professional, Qualified Electrician. In order to comply with the ATEX regulations, the installation design and process must also comply with the latest IEC 60079 range of standards.

7.3.1. Testing and Commissioning

7.3.2. Electrical Wiring

Refer to Figure 6, Figure 7, Figure 8, Figure 9, Figure 10, Figure 11 & Figure 12

Terminal (Shield) is used to provide a continuous shield connection for the communications cable and is not grounded in the A400

Terminal 1 and 2 (A+ and B-) are used for the RS485 serial communications bus (HotBus). Care should be taken to ensure that the connections are observed. Incorrect connection can result in loss of communications between nodes.

WARNING: under no circumstances must the power supply connection be allowed to come into contact with these terminals; to do so would result in the failure of the communications interface.

Terminals 3 and 4 (+ and 0V) are used to provide a 24 DC supply to the HotBus network node when required. This supply can be disabled by switch SW2 and is protected by F5.

Terminal 5 is used to provide +24 VDC power to sensor 1A and is protected by F1

Terminal 6 is used as input signal for channel 1A

Terminal 7 is 0 to +12 VDC control signal for sensor 1A (when required)

Terminal 8 is 0 VDC for sensor 1A

Terminal 9 is used to provide +24 VDC power to sensor 2A and is protected by F2

Terminal 10 is used as input signal for channel 2A

Terminal 11 is 0 to +12 VDC control signal for sensor 2A (when required)

Terminal 12 is 0 VDC for sensor 2A

Terminal 13 is used to provide +24 VDC power to sensor 1B and is protected by F3
Terminal 14 is used as input signal for channel 1B
Terminal 15 is 0 to +12 VDC control signal for sensor 1B (when required)
Terminal 16 is 0 VDC for sensor 1B

Terminal 17 is used to provide +24 VDC power to sensor 2B and is protected by F4
Terminal 18 is used as input signal for channel 2B
Terminal 19 is 0 to +12 VDC control signal for sensor 2B (when required)
Terminal 20 is 0 VDC for sensor 2B

Terminals 21 and 22 are volt free Alarm contacts for Alarm relay B rated 250 VAC @ 8 Amp non inductive.
Terminals 23 and 24 are volt free Alarm contacts for Alarm relay A rated 250 VAC @ 8 Amp non inductive.

Terminals 25 and 26 are volt free Stop contacts for Stop relay B rated 250 VAC @ 8 Amp non inductive.
Terminals 27 and 28 are volt free Stop contacts for Stop relay A rated 250 VAC @ 8 Amp non inductive.

Terminals 29 and 30 are for the AC power supply. This is only fitted when the A400 is to be used in a Zone 22 application. The AC supply can be between 100 and 250 Volts 50/60 HZ.

Terminal 31 is used for a ground (earth) terminal when using a mains power supply or a 0 VDC terminal when using a separate DC power supply.

Terminal 32 is used when powering the A400 from a separate 24 VDC power supply.

Fuses:

It is very important to observe the fuse ratings used on the A400 elite. The following fuse ratings **MUST** apply. Fuses 1 to 4 are located on the underside of the plug in circuit board to provide mechanical protection.

F1 to F5 must have a **maximum** rating of 200ma when used in a CAT 2D (Zone 21) installation.
F1 to F4 has a recommended maximum rating of 2A when used in a CAT 3D (Zone 22) installation.
F5 has a recommended maximum rating of 200mA when used in a CAT 3D (Zone 22) installation.

F1 to F4 are used to limit the current available to each of the 4 sensors.
F5 is used to limit the current available to the internal electronics and terminals 3 and 4.

F6 is used to protect the AC power supply and should have a 2 Amp rating. This fuse is only required when used in Zone 22 installations.

In order to maintain the product certification, these fuses **MUST** be replaced with equivalent fuses at the same rating. Failure to do so will invalidate the certification and any warranties which may exist.

8. Operation Description

Front Panel LED Function	LED Colour
POWER	GREEN
SENSOR 1A	GREEN
SENSOR 2A	GREEN
MISALIGNMENT A	AMBER
SENSOR 1B	GREEN
SENSOR 2B	GREEN
MISALIGNMENT B	AMBER
ALARM	RED
STOP A	RED
STOP B	RED

Table 4 - Fascia LED Description

DIP Switch SW1 Number	DIP Switch Function
1	Alarm Delay Low/High Sensor Inputs A
2	Alarm Delay Low/High Sensor Inputs B
3	Stop Delay Low/High Sensor Inputs A
4	Stop Delay Low/High Sensor Inputs B
5	Misalignment Tolerance A Low/High
6	Misalignment Tolerance B Low/High
7	Not Used
8	Not Used

Table 5 - SW1 DIP switch description

Internal Potentiometer Ref.	Sensor Channel Ref.
VR1	Alignment Sensor Sensitivity Control 1A
VR2	Alignment Sensor Sensitivity Control 2A
VR3	Alignment Sensor Sensitivity Control 1B
VR4	Alignment Sensor Sensitivity Control 2B

Table 6 - Sensor Sensitivity Control

Adjustment of Switches

Ensure that the electrical supply to the control unit is OFF.

Open the lid of the control unit and locate 8 small slide switches, near the left hand row of terminals. Initially all 8 switches should be in the left position.

SWITCH 1 (Top) sets the delay between detecting a misalignment condition for sensors 1A and 2A, and energising ALARM RELAY 'A'. Left = 5secs, Right = 30secs

SWITCH 2 sets the delay between detecting a misalignment condition for sensors 1B and 2B, and energising ALARM RELAY 'B'. Left = 5secs, Right = 30secs

SWITCH 3 sets the delay between energising ALARM RELAY 'A' and de-energising STOP RELAY 'A'. Left = 20secs, Right = 60secs.

SWITCH 4 sets the delay between energising ALARM RELAY 'B' and de-energising STOP RELAY 'B'. Left = 20secs, Right = 60secs.

SWITCH 5 sets the allowable misalignment tolerance for each of the two sensors 1A and 2A. Set to the right (HIGH) position only if nuisance alarms are generated because of bucket/belt problems

SWITCH 6 sets the allowable misalignment tolerance for each of the two sensors 1B and 2B. Set to the right (HIGH) position only if nuisance alarms are generated because of bucket/belt problems

SWITCH 7 & 8 are not used.

The TEST function

Normal Test

The A400 ELITE is equipped with a self test function, initiated by the test button on the lid of the control unit. When the button is pressed the Alarm lamp flashes and then the following automatic test is initiated as the button is released.

1. All lamps illuminate – the ALARM lamp continues to flash
2. After 5 seconds all lamps return to their normal conditions

This test can be performed when the elevator is running or stopped and tests the correct function of the microprocessor and of all lamps.

Extended Test

If the Normal Test is initiated as in 4.3.1 and if the test button is pressed again, while the ALARM lamp is flashing, the extended test operates as follows:

1. All lamps illuminate – the ALARM lamp continues to flash
2. Pressing the test sensor again
3. The ALARM and STOP A lamps flash for a further 5 seconds (8 seconds total time)
4. The ALARM RELAY and STOP RELAYS are inverted and the ALARM, STOP A and STOP B lamps flash
5. After 3 seconds all lamps and relays return to their normal conditions

If this test is performed when the elevator is not running, the Alarm will sound but the STOP RELAYS will have no effect on the elevator. If this test is performed when the elevator is running, the Alarm will sound and the STOP RELAYS will stop the elevator! This test should be performed on a regular basis to check the safety of the installation.

The touch button has been designed to ignore the first 0.5 seconds of touch; this is to reduce the possibility of accidental activation. Once activated as indicated by the led adjacent to the touch pad, removing the finger deactivates the button, if you leave your finger in place, the touch button will only remain active for approximately 2 seconds before automatically de-activating again. The touch button continuously recalibrates in order to eliminate the effects of static, dust or moisture build up on the surface.

Starting and Accelerating

The A400 ELITE automatically detects that the elevator is running by testing the signals from the Alignment Sensors. If two pulses are received from either of the 'A' sensors within the allowed start up time (preset to approx 10seconds), the elevator is considered to be running and the STOP 'A' relay will energise to maintain the motor starter circuit. Similarly the 'B' sensors will energise the STOP 'B' relay.

Normal Running

As long as the relevant sensors both receive the correct number of pulses, the elevator is considered to be running normally and the relevant STOP relay will remain energised and the STOP indicator lamps will remain off.

Normal Stopping

When the elevator is stopped by means of the motor starter, when the pulses cease from both sensors, and after a further 10seconds the relevant STOP relay will de-energise, ready for the next starting operation. If the elevator is re-started within this 10 second delay, as the STOP relay is still energised, starting is still enabled.

Misalignment Alarm

If the ratio of the pulses from a pair of alignment sensors falls to a value which is less than that set by SWITCH 5 or SWITCH 6 as appropriate, the elevator is in misalignment and the MISALIGNMENT A or MISALIGNMENT B lamp will be energised. If the lamp remains energised for a time which is longer than that set on SWITCH 1 or 2, the ALARM RELAY 'A' or 'B' will energise. If the misalignment condition subsequently corrects itself, the MISALIGNMENT 'A' or 'B' lamp and ALARM RELAY 'A' or 'B' will de-energise.

Misalignment Stop (Shutdown)

If the alarm relay remains energised for a time which is longer than that set on SWITCH 3 or 4, the relevant STOP RELAY will de-energise and the relevant STOP lamp will energise. When the elevator has stopped and the pulses have ceased on the sensors, the relevant STOP lamp and MISALIGNMENT lamp will flash to indicate the reason for the stop condition.

Restarting

If the elevator has stopped because of a misalignment condition as in 4.8 the lamps described above will remain flashing indefinitely. When the elevator is re-started, as soon as the normal starting conditions described in 4.4 are met, the flashing lamps will be cancelled.

Two Separate Elevators

If the A and B sensors are fitted to two separate elevators, the above descriptions 4.1 to 4.9 apply separately to each elevator and separate ALARM and STOP relays can be used.

One Elevator with Four Sensors

If the A and B sensors are mounted on the same elevator, (for example A at the top and B at the bottom) the control unit will differentiate between misalignment faults at the two sensor locations. Normally, the two STOP relays would be connected so that both can stop the elevator and either alarm relay will operate the alarm indicator.

The Elevator Alignment Sensors

The sensor is designed to detect moving ferrous material which passes within its sensing range. It will not detect plastics, rubber, stainless steel, aluminium etc, and it will not detect a stationary or slow moving target. It is designed to detect steel elevator buckets, either from the side of the elevator leg or through the elevator belt. It can also detect steel bolts used to attach non-magnetic buckets to the elevator belt, by sensing from the back of the belt. With two sensors correctly mounted, misalignment of the belt/buckets/bolts can be detected.

Contained within the probe body is a powerful magnet and an electronic detector circuit. The body itself is manufactured from metal or tough plastic and all of the components are rigidly potted in epoxy resin. None of the materials used in the sensing end of the sensor are capable of producing a friction spark from accidental collision within the elevator. A multicore cable is permanently attached to the outer end of the sensor. A small LED is moulded into the outer end of the sensor and this is arranged to flash each time that a target is detected. A clamp block or mounting flange is provided to attach the sensor to the elevator panels and to allow easy adjustment of sensing distance.

Adjustment of Alignment Sensors

Note: If the control unit is mounted in a hazardous area, switch the electrical supply **OFF before** opening the lid of the control unit to make the following adjustments. Close the lid **before** switching the electrical supply **ON**. Repeat this each time an adjustment is required inside the control unit.

Ensure that the Alignment Sensors have been correctly mounted as described in para. 2.2. At this point it will be necessary to start the elevator. Note that until the A400 Elite is correctly set up and adjusted, the elevator may not run continuously subject to the method of wiring to the motor starter. With the elevator running and correctly aligned, adjust the Sensitivity Control potentiometers in the control unit as follows. Turn the potentiometer for the relevant alignment sensor fully anti clockwise; at this position, the relevant sensor indicator lamp on the lid of the control unit will probably not be flashing. Increase the potentiometer in a clockwise direction until the indicator lamp flashes steadily then increase a little more for allowable misalignment. Repeat for all other sensors. When all sensor adjustments are complete, test the complete assembly as follows. With the elevator running correctly and aligned correctly, slacken the clamp screw on each alignment sensor in turn, slowly pull out the sensor, measuring how far the sensor is withdrawn until the LED on the sensor (and the lamp on the control unit) no longer flashes steadily. This is the amount of tolerable misalignment. If this amount is too great, reduce the control potentiometer setting by turning slightly anti clockwise. If this amount is too small, increase the control potentiometer setting by turning slightly clockwise. When the adjustment is completed, clamp the sensor back in its original position. Repeat for all sensors.

9. Maintenance Procedure

DANGER: EXPOSED BUCKETS AND MOVING PARTS WILL CAUSE SERIOUS INJURY OR DEATH. THE OPERATOR MUST ALWAYS LOCKOUT POWER BEFORE REMOVING COVER OF THE INSPECTION DOOR OF THE ELEVATOR OR PERFORMING ANY INSTALLATION OR MAINTENANCE WORK.

DANGER: ALL ELECTRICAL POWER TO THE SYSTEM AND WIRING MUST BE ISOLATED PRIOR TO STARTING ANY INSTALLATION OR MAINTENANCE WORK. WORKING ON OPEN LIVE CIRCUITS IN ATEX ZONES IS PROHIBITED AND CAN LEAD TO AN EXPLOSION.



IF THE SYSTEM DOES NOT ALARM AND SHUTDOWN AS REQUIRED, THEN REMOVE THE MACHINE FROM SERVICE UNTIL THE PROBLEM HAS BEEN DIAGNOSED AND CORRECTED.

10. Commissioning

DANGER: EXPOSED BUCKETS AND MOVING PARTS WILL CAUSE SERIOUS INJURY OR DEATH. THE OPERATOR MUST ALWAYS LOCKOUT POWER BEFORE REMOVING COVER OF THE INSPECTION DOOR OF THE ELEVATOR OR PERFORMING ANY INSTALLATION OR MAINTENANCE WORK.

DANGER: ALL ELECTRICAL POWER TO THE SYSTEM AND WIRING MUST BE ISOLATED PRIOR TO STARTING ANY INSTALLATION OR MAINTENANCE WORK. WORKING ON OPEN LIVE CIRCUITS IN ATEX ZONES IS PROHIBITED AND CAN LEAD TO AN EXPLOSION.

For problems after initial start-up

1. Are all the buckets magnetic (steel) or non-magnetic (plastic, rubber or stainless steel)? If magnetic, ie steel, the Alignment Sensor should be directed at the bucket as in Figure 2 and Figure 3. If non-magnetic, the Alignment Sensor should be directed at the steel bolt heads as Figure 4 and Figure 5.
2. Are all the buckets present on the belt (none missing) and equally spaced?
3. Is there excessive interference on the electrical power supply? Power conditioners and surge (spike) suppressor may have to be fitted.
4. Has the wiring for the Sensors been routed away from power cables? See paragraph 2.2.
5. Are the Sensors mounted away from plastic abrasion liners (which could cause static interference), electric motors and other magnetic fields?
6. Is the A400 Elite circuit properly grounded?
7. Is the elevator leg grounded to prevent static build-up?
8. Is the belt running true?
9. Does the belt stay in alignment when material is fed into the elevator leg?
10. Is the elevator leg belt tightened up sufficiently to prevent belt slip and misalignment?

11. Check that there is no tramp metal in the intake, no loose head pulley lagging, and no loose abrasion liners.
12. Have the Sensors been mounted rigidly and free from vibration?
13. Check that the Sensors do not foul the buckets or the bolts.
14. If sensing on the bolt heads, are the Sensors positioned on the outside of the bolt heads as shown in Figure 5?
15. Is the Micro-processor control unit overheating, if so mount in temperature-controlled environment of maximum temperature 104°F (40°C).
16. If the elevator bucket bolts are non magnetic (stainless steel), insert mild steel fender washers under the bolt heads as targets.
17. Check that high powered ‘Walkie Talkie’ radios are not operated immediately near the A400 Elite control unit or Sensors as this will affect the performance.
18. If your bucket elevator has a weighted take up please ensure that there is sufficient weight on it to prevent belt slip.

11. Breakdown Procedure

SYMPTOM	CAUSE	REMEDIAL ACTION
LED on Alignment Sensor does not flash	Sensor too far away from buckets Sensor adjustment incorrect Wiring connection faulty	Move Sensor closer to bucket if possible Turn Sensitivity Control clockwise Check wiring
LED on Alignment Sensor flashes excessively	Sensor too close to buckets Sensor adjustment incorrect Interference in wiring	Move Sensor away from buckets Turn Sensitivity Control anti clockwise Use shielded cable and rigid conduit
Sensor LED on Control unit does not flash	Elevator is not running Sensor not operating Wiring Fault Sensor connected to wrong terminals	See section 1 above Check wiring
Wrong Sensor LED on unit flashes	Sensor connected to wrong input	See Figure 6
Alarm LED on	Belt misaligned	Check belt
Stop LED on	Stop condition occurred Belt misaligned	Check motor starter Check belt
Elevator fails to start	Wiring fault	Check wiring
Elevator starts but fails to keep running	Belt slipping Start signal too short	Check belt Wait for minimum of two pulses before releasing start button

Table 7 - Fault Finding Chart

12. Manufacturer Information

**Don Electronics Ltd
Westfield Industrial Estate
Kirk Lane
Yeadon
Leeds
UK
LS19 7LX**

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13. Revision History

Revision	Date	Modifications
R2	Oct /2009	Added legal and warranty information to the manual
R3	Feb 2010	Updated legal and warranty information. Removed any reference to V46AI and replaced it with V46A.
R4	Oct 2010	Updated DoC and Certs.
R5	March 2011	Added CSA Approvals
R6	May 2011	Added Certification for Category 3D
R7	Nov 2011	Updated Specification
R8	June 2013	Updated Certification
R9	July 2014	Updated conditions of use – page6
R10	31.07.2014	Updated fuse values – page 13
R11	11.09.2014	Reformatted and made minor alterations to instructions (e.g. BAP specification removed)
R12	04.05.2016	Added new drawing to clarify connection details when using 1 or 2 elevators with one or two sensors using AC or DC supply.

Table 8 – Revision History

With subsidiaries in North America, Europe, Asia, Africa and Australia along with a worldwide network of distributors, 4B can provide practical solutions for all your applications no matter the location.



**4B BRAIME ELEVATOR
COMPONENTS**
(4B Group Headquarters)
Hunslet Road
Leeds LS10 1JZ
UK

Tel: +44 (0) 113 246 1800
Fax: +44 (0) 113 243 5021

4B DEUTSCHLAND

9 Route de Corbie
Lamotte Warfusee, F-8080
France (Business Address)

Tel: +49 (0) 700 2242 4091
Fax: +49 (0) 700 2242 3733

4B AFRICA

PO Box 1489
Jukskei Park
2153 Johannesburg
South Africa

Tel: +27 (0) 11 708 6114
Fax: +27 (0) 11 708 1654

4B SETEM SARL

9 Route de Corbie
80800 Lamotte Warfusee
France

Tel: +33 (0) 3 22 42 32 26
Fax: +33 (0) 3 22 42 37 33

4B ASIA PACIFIC

68/19 Moo 5
Tambol Bangmuangmai
Amphur Muang
Samutprakarn, 10270
Thailand

Tel: +66 (0) 2 758-3648
Fax: +66 (0) 2 758-2926

4B COMPONENTS LTD.

625 Erie Ave.
Morton, IL 61550
USA

Tel: 309-698-5611
Fax: 309-698-5615

4B AUSTRALIA

Unit 1-18
Overlord Place, Acacia Ridge
Queensland 4110
Australia

Tel: +61 (0) 7 3711 2565
Fax: +61 (0) 7 3711 2574