ARGUS

Com10 AZ329/AZ329A
High Voltage Interface Unit

020-639-B4

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Power

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Argus Technologies Ltd.

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Com10 AZ329/AZ329A
High Voltage Interface Unit

020-639-B4

The following documents and drawings are included in this manual to provide the necessary information required for installation, operation and fault diagnosis of the unit:

- **Warranty Policy:** 048-507-11
- **Important Safety Instructions and Installation:** 020-639-C2
- **Factory Service Information:** 048-527-11

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Printed in Canada.

WARRANTY AND REPAIR INFORMATION

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(2) invoice is unpaid, or
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Warning

REFER TO SPECIFIC SAFETY WARNINGS THROUGHOUT THIS DOCUMENT BEFORE PERFORMING OPERATIONS.

THE AZ329/AZ329A IS DESIGNED TO ISOLATE THE MCM FROM HAZARDOUS SYSTEM VOLTAGES AND THEREFORE HAS HAZARDOUS POTENTIALS CONNECTED TO IT.

ANY WORK CARRIED OUT ON THE AZ329/AZ329A OR ITS WIRING MUST ONLY BE PERFORMED BY QUALIFIED PERSONNEL.

UNAUTHORIZED DISASSEMBLY OF THE UNIT VOIDS THE WARRANTY.

About this document

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Revision: C
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Revision History

Revision	Date	Action
1	2003/06/01	
2	2005/04/12	Formerly AM329
B	2005/07/19	Archive
C	2005/07/20	Update cover page, header, footer for Argus Technologies Ltd. reissue

Typographical Conventions

This manual includes specification, installation, commissioning and maintenance sections.

Warning Icon

WARNINGS CALL ATTENTION TO INSTRUCTIONS THAT MUST BE FOLLOWED PRECISELY TO AVOID INJURY, AND ARE HIGHLIGHTED BY THE WARNING ICON.

Caution Icon

Cautions highlight danger to equipment, but not personnel. A caution icon accompanies cautions.

Technical Details Icon

The operation section includes information about operation of all standard and optional functions. More detailed technical information that may be useful for troubleshooting is also included and is designated by a technical details icon.

Terms and Abbreviations

MCM	Monitoring and Control Module
SELV	Safety Extra Low Voltage; defined as less than 60.0Vdc by EN60950
AZ328	Com10 Series MCM
AZ329/AZ329A	Adapter unit to couple AZ328 into DC systems of 90 to 150V.

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1 Preface

The AZ329/AZ329A is designed to allow an AZ328 MCM to operate in a DC system of 90 to 150V.

To achieve this, the AZ329/AZ329A is installed in between the MCM and the rest of the system. It provides a suitable voltage to power the MCM, scales the system voltages down to a level suitable for the MCM and protects all other inputs and outputs (except for the current shunts and temperature probe) from faults that may cause the MCM to be connected to a potential of greater than SELV limits.

In order that correct protection of the MCM be achieved with respect to the isolation of AZ328 potentials from the rest of the system potentials, it is essential that the rules and regulations of AS3000 (or equivalent local standard regarding Wiring Rules for Electrical Installations) and EN60950 be observed. To that end, the relevant definitions are that the AZ328 and all of the wiring to it are classed as “earthed SELV.” All high voltage DC system wiring, i.e. 120Vdc, is classed as “unearthed hazardous secondary voltage.” There are other requirements pertinent to specific terminations, such as the Comms ports. For these requirements refer to the specific section below.

1.1 Summary of differences between AZ329 and AZ329A

The AZ329A does not support Alarm outputs as described in 4.3.4 and in 4.4.4.

The AZ329 has an onboard power supply that will generate 55V to power the AZ328 MCM and it will supply auxiliary power to the AZ329. In the case of the AZ329A, an external power supply is required to supply power to the AZ329A as well as the AZ328 MCM.

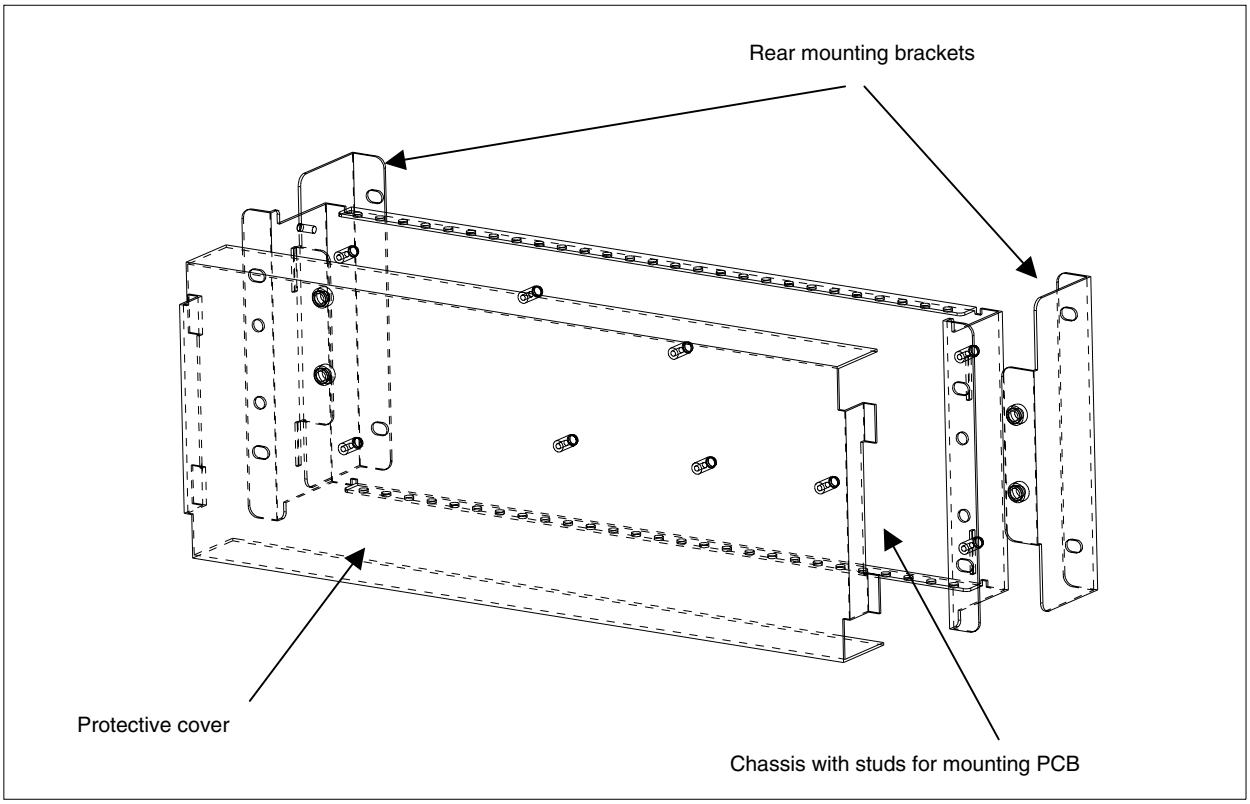

Figure 1–AZ329/AZ329A assembly drawing

2 Specification

2.1 Electrical Specification

Power Input:	90.0 – 150.0Vdc (For the AZ329A, an external power supply of 55V is also required to be connected to the PWR connections on X11.)
Power Output:	55Vdc ±5%, 0 – 350mA (The AZ329A has no output.)
Voltage Inputs (Vi):	80.0 – 150.0Vdc, >200kΩ
Voltage Outputs:	Vi/3 ±0.2%, <15mAdc
Voltage CMRR:	>53dB, 0 – 150.0Vdc
Alarm Inputs:	Suitable for AZ328 MCM
Alarm Outputs:	AZ329 only: Form C, 2A@ 30Vdc, 400mA @ 150Vdc (resistive)
Earth Leakage Detector Range:	<3mA, ≥10mA (depending on bus voltage, refer to Section 5.5.)
Earth Leakage Detector Accuracy:	±10%
Earth Leakage Detector Hysteresis:	±360μA
COMMS ports:	Suitable for AZ328 MCM and Com10 series rectifiers

2.2 Mechanical Specification

Width:	Standard IEC 19” rack system
Height:	4 RU
Depth:	56mm
Weight:	2.0 kg

The above information is valid at the time of publication. Consult factory for up-to-date ordering information.
Specifications are subject to change without notice.

3 Technical Description

3.1 System Wiring

The AZ329/AZ329A is intended to isolate the MCM from wiring associated with the high voltage parts of the system, as shown in the following figure:

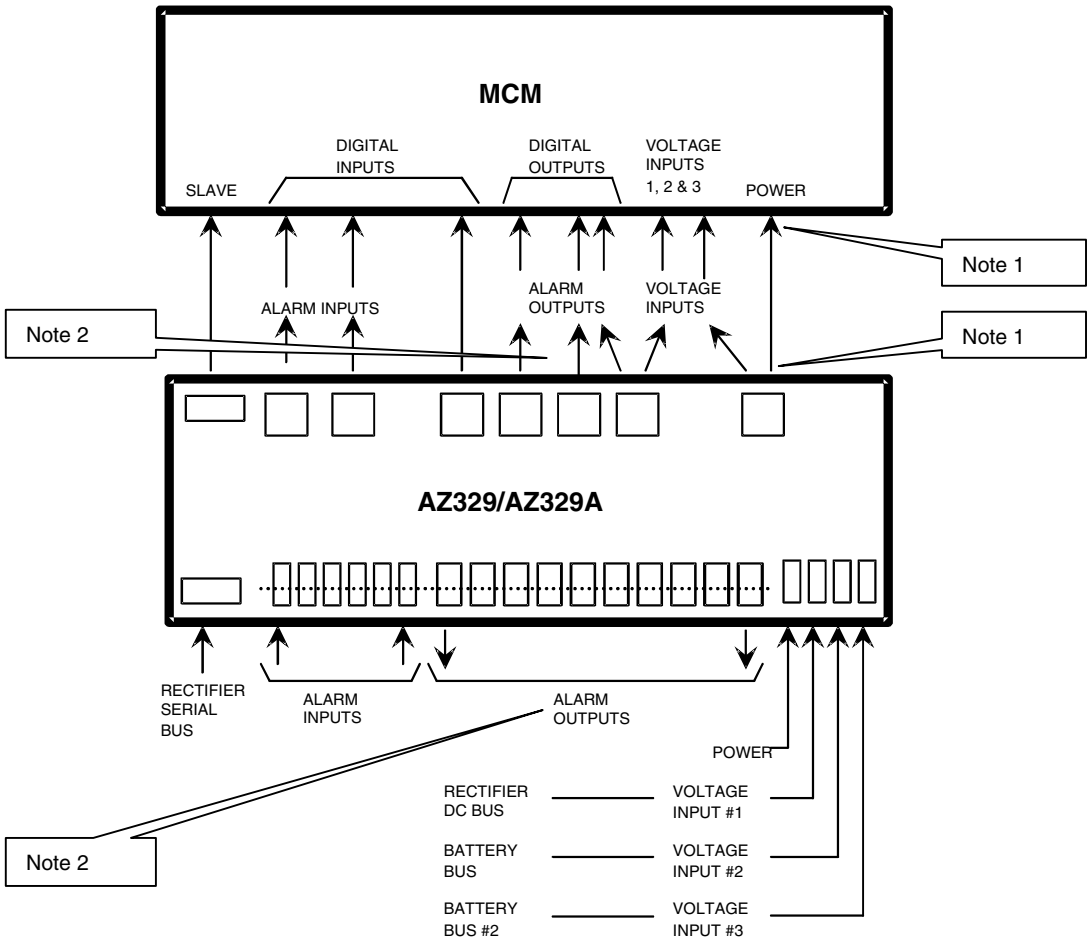

Figure 2–AZ329/AZ329A to MCM system wiring

Note 1: AZ329A requires an external 55Vdc power supply to be connected to these points.
Note 2: AZ329A does not support Alarm outputs.

3.2 AZ329/AZ329A Terminations

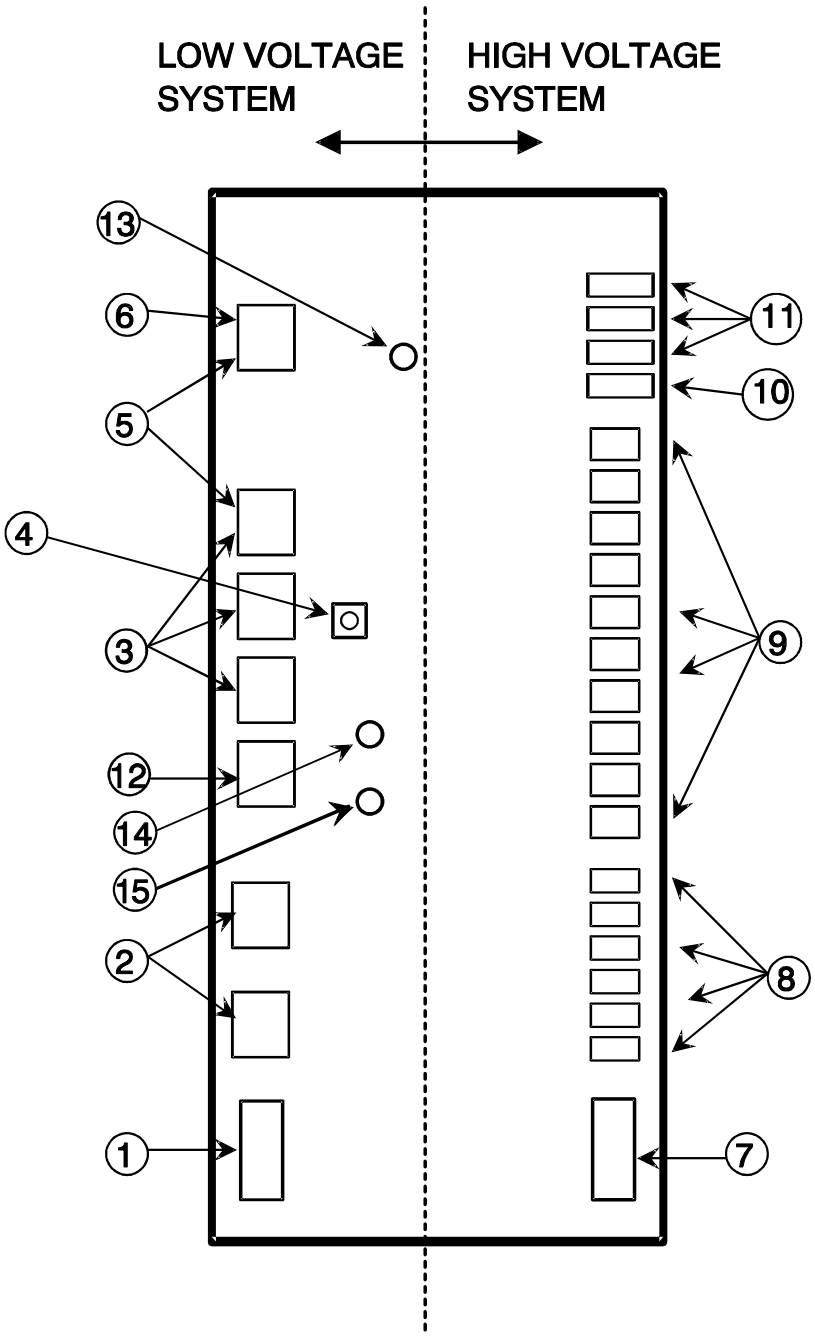

Figure 3–AZ329/AZ329A terminations

Balloon #	Description	Installation	Commissioning	Maintenance
1	Serial port connection to MCM 'Rect/Slave' port	4.3.6	-	-
2	Digital inputs to MCM	4.3.5	5.6	6.3
3	AZ329 only: Alarm outputs from MCM	4.3.4	5.7	6.2
4	Earth leakage detector sensitivity adjustment	-	5.5.2	-
5	Voltage outputs to MCM	4.3.3	5.4	-
6	AZ329: Power supply to MCM AZ329A: External 55VDC power supply to be connected here.	4.3.2	5.3	-
7	Connection to rectifier serial data bus	4.4.5	-	-
8	Digital inputs from high voltage system	4.4.3	5.6	6.3
9	AZ329 only: Alarm outputs to high voltage system	4.4.4	5.7	6.2
10	Power supply to AZ329/AZ329A from high voltage system	4.4.1	5.3	-
11	Voltage inputs from high voltage system	4.4.2	5.4	-
12	Earth leakage detector outputs to MCM alarm inputs	4.3.7	5.5	6.4
13	Power indicator	-	5.3	6.1
14	Negative Earth leakage detector indicator	-	5.5.1	6.4
15	Positive Earth Leakage detector indicator	-	5.5.1	6.4

Table A–AZ329/AZ329A terminations

4 Installation

4.1 Wiring Layout

The AZ329/AZ329A has all connectors on the two long sides of the PCB. To enable correct and suitable isolation of the high voltage and low voltage connections, all of the high voltage DC system connections are made on one side of the PCB while all the low voltage MCM connections are made on the opposite side of the PCB.

To differentiate between the two sides, the MCM connections have labels that end with “LV” to denote Low Voltage and likewise the System side terminations labels end with “HV” for High Voltage.

Ensure that the wiring card is filled in with the appropriate details as the wiring is completed.

All wiring to the AZ329/AZ329A and MCM must be properly isolated from mains wiring with a minimum of double or reinforced insulation.

The MCM wiring must be isolated from the DC System wiring as well the mains wiring. For exact details of the isolation required between the MCM and the DC System consult the appropriate regulatory standard.

4.2 Earthing Points

Both, the AZ328 and the AZ329/AZ329A each have an earthing terminal and these must be connected to a protective earthing terminal in a manner consistent with the requirements of EN60950 and AS3000 (or equivalent local standard regarding Wiring Rules for Electrical Installations).

The gauge of the wire required will be a function of the distance between the AZ328 or AZ329/AZ329A and the earthing point of the equipment rack. In any event the earthing wire must be a green/yellow wire of not less than 2.5mm^2.

4.3 MCM Connections

4.3.1 General

This manual only covers the MCM connections that are wired to the AZ329/AZ329A. For all other MCM wiring and the location of specific terminations on the MCM consult the MCM manual.

4.3.2 Power

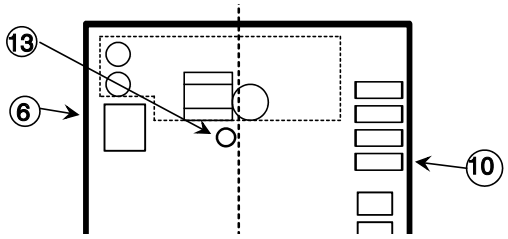

Figure 4–Power supply connections

4.3.2.1 AZ329

The AZ329 generates a DC output suitable for powering the MCM. This output is available on X11 and is labelled “PWR.” This output should be wired directly to the power supply input of the MCM.

4.3.2.2 AZ329A

The AZ329A does NOT generate its own DC output to power the AZ328 MCM. An external 55VDC power supply must be connected to X11 and to the PWR input on the AZ328 MCM. The high voltage supply must also be connected to the PWR connection on X9. This is used for the detection of earth faults.

4.3.3 Voltage Outputs

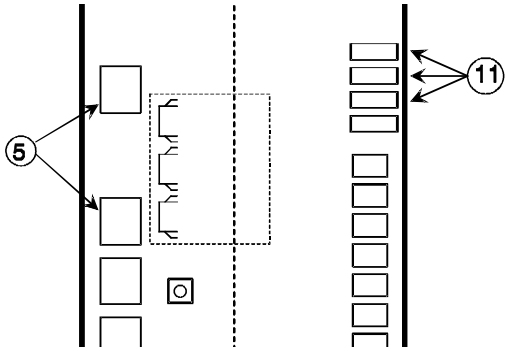

Figure 5–Voltage outputs

There are three voltage output circuits offered on the AZ329/AZ329A. The outputs are labelled VI1LV, VI2LV and VI3LV. VI1LV and VI2LV are presented on connector X5 and VI3LV is presented on X11.

If a voltage input is not used it may safely be left unconnected on both the MCM and the AZ329/AZ329A.

NOTE: *These inputs are polarity dependant; the polarity is marked on the PCB.*

4.3.4 Alarm Outputs (AZ329 only)

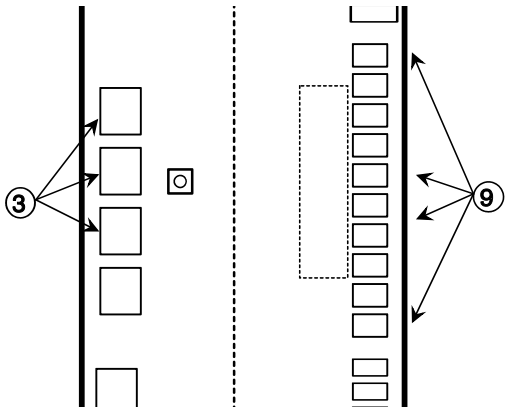

Figure 6–Alarm outputs

A maximum of ten alarm outputs can be wired through the AZ329. Which of the 18 alarm outputs of the MCM is used must be decided before wiring can take place.

Each of the alarm output connections involves two wires that connect directly to the ‘common’ and either of the ‘NC’ or ‘NO’ alarm output terminations of the MCM. It is recommended that the ‘NC’ output be used as this provides fail safe operation for outputs which have normally energised relays in the MCM (such as the MCM fail alarm).

The alarm outputs from the MCM terminate on connectors X2, X3, X4 and X5 on the AZ329/AZ329A and are labelled “DO1LV”, “DO2LV” and so on up to “DO10LV.” These terminations are not polarity dependant.

4.3.5 Alarm Inputs

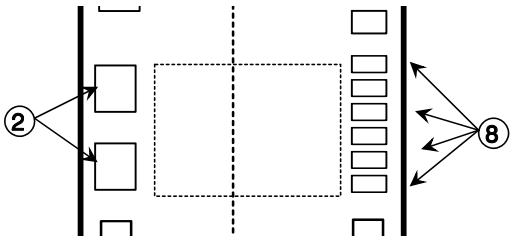

Figure 7–Alarm inputs

Up to six alarm inputs may be wired through the AZ329/AZ329A. Which of the 9 alarm inputs of the MCM is used must be decided before wiring can take place.

Each of these inputs involves only two wires from MCM to AZ329/AZ329A. These circuits are not polarity dependant.

The alarm inputs from the MCM terminate on connectors X7 and X8 on the AZ329/AZ329A and are labelled “DI1LV”, “DI2LV” through to “DI6LV.”

In some cases it may be possible to connect alarm inputs directly into the system. To do this safely, first ensure that the system connection offers the appropriate degree of protective isolation. For the exact requirements refer to the relevant regulatory standards. If in doubt, wire the input via the AZ329/AZ329A.

4.3.6 Rectifier Communications Port

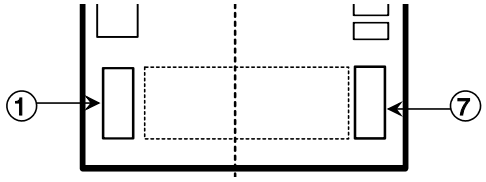

Figure 8–Rectifier communications port

The ‘Rect/Slave’ communications port of the MCM terminates on connector X37 labelled ‘Comms MCM’ on the AZ329/AZ329A.

4.3.7 Earth Leakage Detector

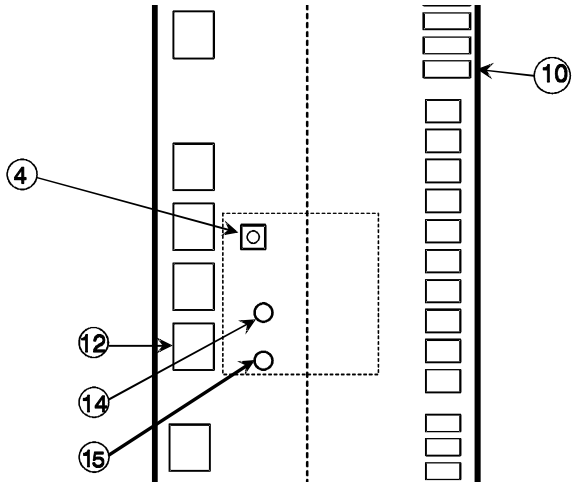

Figure 9–Earth leakage detector

There are two outputs from this circuit. One of these circuits indicates an earth leakage fault on the positive side of the system DC bus and the other indicates the same on the negative bus.

The outputs terminate on connector X17 and are labelled PEFLV and NEFLV for the positive and negative earth fault alarms respectively.

For fail-safe operation it is recommended that the ‘common’ and ‘normally closed’ contacts be used.

The PEFLV output is connected to the MCM alarm input ‘User Input #1’ and the NEFLV alarm output is connected to MCM alarm input ‘User Input #2.’ These two alarm inputs will require appropriate configuration via the front panel interface of the MCM.

4.4 HV System Connections

4.4.1 Power Input

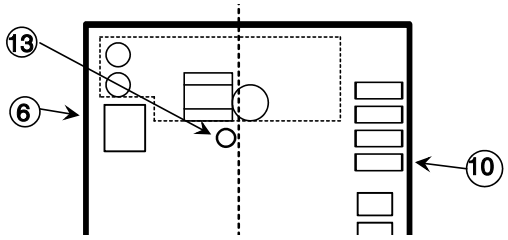

Figure 10–HV power input

The power input to the AZ329/AZ329A must be connected to a part of the DC bus that is not subject to loss of power under any normal operating conditions. The ideal location is the Battery bus. The power input terminates on connector X9 and is labelled 'PWR.'

NOTE: The power input is also where the AZ329/AZ329A looks to detect an earth leakage fault. The power input is polarity dependant. The polarity is marked on the PCB.

4.4.2 Voltage Inputs

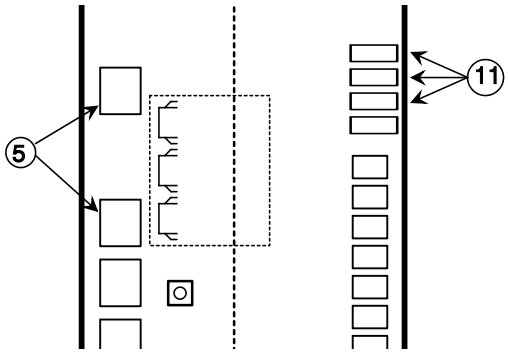

Figure 11–Voltage inputs

There are three voltage inputs. Which ones are used and for what purpose is a decision of the person designing the system but the following rules apply:

1. These are differential inputs that must be connected with the correct polarity. Incorrect polarity will not damage the inputs but voltage readings on the MCM will be incorrect.
2. Unused inputs may be left unconnected.

The three inputs are labelled V1, V2 and V3 and are available on connectors X20, X18 and X19 respectively. These inputs may be wired to any part of the DC bus of the power system.

These inputs are rated for DC voltages up to 150V.

4.4.3 Alarm Inputs (AZ329 only)

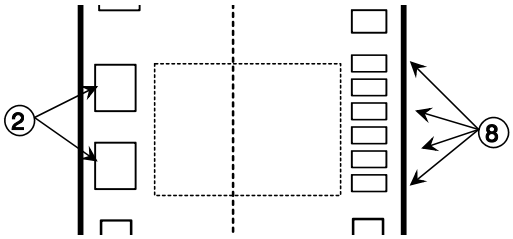

Figure 12–Alarm inputs

The alarm inputs of the AZ329/AZ329A are intended to terminate on uncommitted switch or relay contacts and not carry any voltages introduced externally to the AZ329/AZ329A and MCM.

No special requirements exist for these inputs to be isolated from the DC System other than they must not be connected directly to it.

4.4.4 Alarm Outputs

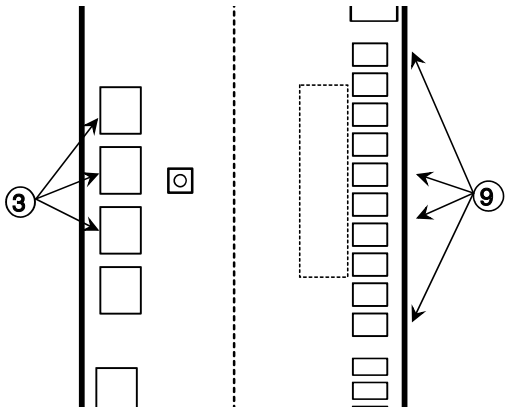

Figure 13–Alarm outputs

These outputs are relay contacts with ‘common’, ‘normally closed’ and ‘normally open’ terminations available.

The contacts are rated to switch up to 400mAdc (resistive load) at 150V.

There are no requirements for isolation between these outputs and the DC System.

4.4.5 Serial Ports

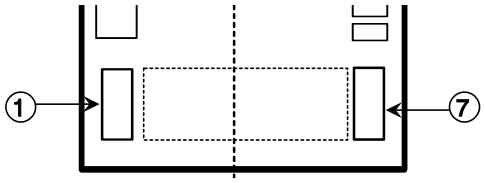

Figure 14–Serial ports

The serial communications ports of the rectifiers terminate on AZ329/AZ329A connector X38 labelled ‘Comms HV.’ Ensure that the serial bus to which the rectifiers connect is suitably isolated from the mains as well as the DC System buses.

5 Commissioning

5.1 DC Bus Tests

Before conducting isolation tests on the DC bus, disconnect the power supply and voltage inputs from the AZ329/AZ329A. This is necessary because the AZ329/AZ329A connects each of the DC buses and voltage inputs to earth via resistors that will cause the isolation test to fail.

5.2 Earth Continuity

Ensure that the protective earth connection of the AZ329/AZ329A meets the requirements of the appropriate standard.

5.3 Applying Power

Before installing rectifiers, use a bench supply to power the DC System buses. The combination of the AZ329/AZ329A and the MCM should draw less than 500mA.

When the AZ329/AZ329A starts, a green LED near the power transformer will glow.

Shortly afterward the MCM should also start.

5.4 Voltage Inputs

Still using the external bench supply, vary the bus voltage from 80.0 to 150.0Vdc and verify that the MCM indicates the correct voltages on the front panel displays.

5.5 Earth Leakage Detection

5.5.1 Functional Tests

Measure the voltage between each of the positive and negative DC buses and earth and verify that earth is approximately half way between the buses.

One at a time, apply a short circuit between the positive and negative buses and earth. Verify that the short circuit applied to the positive bus causes the “positive earth fault” indicator on the AZ329/AZ329A to glow and “User Alarm 1” to be active on the MCM. Verify that the short circuit applied to the negative bus causes the “negative earth fault” indicator on the AZ329/AZ329A to glow and “User Alarm 2” to be active on the MCM.

5.5.2 Sensitivity Adjustment

There are two methods by which the earth leakage detector’s trip point may be set. The first of these methods is as follows:

5.5.2.1 Method 1

Connect a voltmeter between test points X25 and X26 (which are adjacent to the earth leakage detector adjustment potentiometer, R71). Now adjust R71 such that the voltage reading on the meter reaches the desired value. The correlation between voltmeter readings and the nominal trip point is as follows:

Fault Current (mA)	Volt Meter Reading
3	1.23
4	1.64
5	2.05
6	2.46
7	2.87
8	3.28
9	3.69
10	4.1

Table B–Earth leakage detector’s trip point, adjustment method 1

The earth leakage detector has a hysteresis of ±360μA so the actual trip current will be 360μA higher than those quoted in the above table and the release current will be 360μA less than those in the table above.

Note that the accuracy of the earth leakage detector is not especially high. Refer to the electrical specifications in Section 2 for details. It is advised that the trip points be tested externally by applying earth faults of known value. A method for doing this is described below.

5.5.2.2 Method 2

The second method for adjusting the trip point of the earth leakage detector is to deliberately introduce an earth fault at the desired fault current and adjust the sensitivity of the earth leakage detector until the detector trips.

To introduce the earth fault, a resistor needs to be connected between either the positive or negative bus and earth. The resistor value is chosen such that the desired fault current flows through it. The exact value of the fault resistor (denoted by Rfault) is given by the equation below. Note that Ifault is the desired fault current trip point and Vi is the DC bus voltage.

$$\text{Rfault} := \frac{-1}{2} \cdot \frac{(11640\,\text{Ifault} - \text{Vi})}{\text{Ifault}}$$

If the bus voltage can be adjusted to 125Vdc then the resistor values are as per the table below. The table shows the exact resistor value as well as the fault current for nearest value matches in the E24 and E12 series of resistor values:

Exact Match		Nearest E24 Series Value		Nearest E12 Series Value	
Fault Current (mA)	**Test Resistor (Ohms)**	**Test Resistor (Ohms)**	**Fault Current (mA)**	**Test Resistor (Ohms)**	**Fault Current (mA)**
3	15k	15k	3.0	15k	3.0
4	9k8	10k	4.0	10k	4.0
5	6k7	6k8	5.0	6k8	5.0
6	4k6	4k7	5.9	4k7	5.9
7	3k1	3k	7.1	3k3	6.9
8	2k	2k	8.0	1k8	8.2
9	1k1	1k1	9.0	1k	9.2
10	430R	430R	10	390R	10

Table C–Earth leakage detector's trip point, adjustment method 2

The resistors need only be ¼ Watt types but 1% or better tolerance is recommended. When connecting the resistor be sure to connect the earth end first and take great care connecting the bus end of the resistor.

Connect the resistor between earth and the positive bus first. Once the resistor is connected, adjust the earth leakage detector sensitivity potentiometer, R71, to minimum sensitivity (fully clockwise) and note that neither the positive nor negative earth fault indicators are glowing. Now adjust the sensitivity potentiometer slowly clockwise until the positive earth fault indicator glows.

Remove the resistor from the positive bus to the negative bus. If the negative bus fault indicator does not light up increase the sensitivity of the earth leakage detector by turning the sensitivity adjustment, R71, clockwise. The adjustment required should be very small and represents the small differences in the two halves of the detector circuit.

5.5.2.3 Verification

Irrespective of which method is used to adjust the sensitivity of the earth leakage detector, the operation of the detector with a simulated bus fault must be verified.

Using a resistor value determined from the tables or equation above introduce the earth fault by connecting the resistor between earth (first connection) and the positive bus. Ensure that the AZ329/AZ329A positive earth fault indicator glows. Remove the resistor (from the positive bus only) and reconnect it to the negative bus. Ensure that the negative earth fault indicator glows.

If Method 1 was used, a very slight adjustment may be required to overcome the hysteresis of the earth leakage detector.

The above test should be repeated with a resistor value that represents a fault current at least 1mA less than the set trip point. Note that for this test no earth fault should be indicated.

Once verification is complete, the resistors used in the test should be packaged with the rest of the system, as they will be required during maintenance procedures. Make a notes of the trip point of the earth leakage detector and the location of the test resistors in Section 7.3 of this document so that they may be found at a later date.

5.6 Alarm Inputs

All alarm inputs must be exercised to ensure correct operation. How these alarms are tested will depend on which alarms are used and how they are configured.

Unused alarm inputs on the AZ329/AZ329A need not be checked.

5.7 Alarm Outputs

As with the alarm inputs, all outputs must be exercised to ensure correct operation. If the alarm output of the MCM is terminated on the AZ329/AZ329A but the high voltage side of the alarm circuit is not yet wired then the high voltage side contacts will need to be tested with a resistance meter or continuity checker.

Unused alarm outputs on the AZ329/AZ329A need not be checked.

6 Maintenance

This section is for the information of qualified service personnel only.

NOTE: *There are no user serviceable parts on the AZ329. All service or repair work must be referred to Com10 or their authorized agent.*

6.1 Visual Inspection

There should be no discoloration or visible damage to any components on the AZ329/AZ329A.

The green power indictor should be glowing.

Check for discoloration of cables particularly close to termination points.

Check for evidence of arcing.

6.2 Alarm Outputs

Exercise all alarm outputs that terminate on the AZ329/AZ329A.

6.3 Alarm Inputs

Exercise all alarm inputs that terminate on the AZ329/AZ329A.

6.4 Earth Fault Detector

Using the resistors from the commissioning procedure or resistors of an appropriate value (if, for example, the bus voltage is different to when the system was commissioned) verify that the earth leakage detector trip point is correct.

The following formula may be used to calculate the resistor values required:

$$\mathrm{Rfault} := \frac{-1}{2} \cdot \frac{(11640\,\mathrm{Ifault} - \mathrm{Vi})}{\mathrm{Ifault}}$$

Note that the maintenance procedure should be similar to the commissioning procedure in that the earth leakage detector is tested for correct operation at the trip point and also that the detector does not trip with a fault current 1mA lower than the trip point.

7 Wiring Termination Tables

7.1 Alarm Outputs

Output #	Alarm	Destination	Checked
DO1			
DO2			
DO3			
DO4			
DO5			
DO6			
DO7			
DO8			
DO9			
DO10			

7.2 Alarm Inputs

Input #	Alarm	Destination	Checked
DI1			
DI2			
DI3			
DI4			
DI5			
DI6			

7.3 Earth Leakage Detector

	Value	Checked
Trip Point		
Test Resistor Location		

FACTORY SERVICE INFORMATION

Technical Support

Technical support staff are available for answering general questions related to installation, operation and maintenance of Argus products. In Canada and the USA, call Argus toll free 7:30 am to 5:00 pm Pacific Standard Time at:

+1-888 GO ARGUS

(+1-888-462-7487)

For emergencies, call +1-888-GO-ARGUS 24 hours a day, seven days a week.
Customers outside Canada and the USA, call +1-604-436-5547 for technical support.

Training

Argus offers various levels of product and technical training. These workshops provide a mix of theory and hands on application for qualified customers. Please consult your sales representative for course schedules, locations and costs, or visit our website at ***www.argusdcpower.com***.

Factory Repair and Servicing

All service, beyond initial adjustments, should be carried out by qualified factory service personnel. For these procedures, please contact Argus Technologies at the locations listed to the right.

Product Returns

Before returning any product for service, please obtain a Return Material Authorization (RMA) number from an Argus factory service representative. The representative will require the model and serial number, as well as a brief description of the problem prior to issuing the RMA number. All material must be pre-authorized before being returned.
See document 048-507-10 "Warranty and Repair Information" for more details.

Moving and Storage

Units must be suitably packed in the original shipping container (or equivalent) prior to re-shipping. The box should be completely enclosed and constructed of wood or double-wall, corrugated cardboard. At least 3" of foam or shock absorbing packing material must surround the unit.

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