

4234 500 & 4234 501 Intrinsically Safe Power Supply Unit



The Company

We are an established world force in the design and manufacture of measurement products for industrial process control, flow measurement, gas and liquid analysis and environmental applications.

As a part of ABB, a world leader in process automation technology, we offer customers application expertise, service and support worldwide.

We are committed to teamwork, high quality manufacturing, advanced technology and unrivalled service and support.

The quality, accuracy and performance of the Company's products result from over 100 years experience, combined with a continuous program of innovative design and development to incorporate the latest technology.

EN ISO 9001:2008



Cert. No. Q 05907

EN 29001 (ISO 9001)



Lenno, Italy – Cert. No. 9/90A

Stonehouse, U.K.



Electrical Safety

This equipment complies with the requirements of CEI/IEC 61010-1:2010 'Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use'. If the equipment is used in a manner NOT specified by the Company, the protection provided by the equipment may be impaired.

Symbols

One or more of the following symbols may appear on the equipment labelling:

	Warning – Refer to the manual for instructions
	Caution – Risk of electric shock
	Protective earth (ground) terminal
	Earth (ground) terminal

	Direct current supply only
	Alternating current supply only
	Both direct and alternating current supply
	The equipment is protected through double insulation

Information in this manual is intended only to assist our customers in the efficient operation of our equipment. Use of this manual for any other purpose is specifically prohibited and its contents are not to be reproduced in full or part without prior approval of the Technical Publications Department.

Health and Safety

To ensure that our products are safe and without risk to health, the following points must be noted:

1. The relevant sections of these instructions must be read carefully before proceeding.
2. Warning labels on containers and packages must be observed.
3. Installation, operation, maintenance and servicing must only be carried out by suitably trained personnel and in accordance with the information given.
4. Normal safety precautions must be taken to avoid the possibility of an accident occurring when operating in conditions of high pressure and/or temperature.
5. Chemicals must be stored away from heat, protected from temperature extremes and powders kept dry. Normal safe handling procedures must be used.
6. When disposing of chemicals ensure that no two chemicals are mixed.

Safety advice concerning the use of the equipment described in this manual or any relevant hazard data sheets (where applicable) may be obtained from the Company address on the back cover, together with servicing and spares information.

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1 INTRODUCTION

1.1 General

This instruction manual describes the installation and operation of the 4234 Series Power Supply Unit (PSU), designed to provide a stabilised (optional 350, 250 or 180 mA) DC supply for operation of a single katharometer unit installed in a hazardous area. This PSU is certified as intrinsically Safe ATEX II (1)G [Ex ia Ga] IIC (–20°C ≤Ta≤ +55°C) certificate number BAS 01 ATEX 7041 and must be installed in the safe area.

Additionally, this PSU can be installed as a replacement for 004234 000/01/02 PSUs in systems that are covered by BASEEFA Certificate N^{os} Ex 77138 and Ex 76181, under variations for those certificates.

1.2 Description – Fig. 1.1

The PSU is available in two separate versions defined in **Section 2**.

The unit is housed in a metal case fitted with mounting lugs. Cable gland entries are provided at opposite ends of the case for supply voltage input and intrinsically safe output cables respectively.

A printed circuit board (PCB) assembly (see **Fig. 1.1**) contains the circuit components. The supply voltage input is connected to terminal block (TB1) located on the PCB, adjacent to the fuses F2 and F3. The intrinsically safe constant current output terminal block (TB2) is located on the gland assembly at the opposite end of the assembly. The PCB is mounted on a steel chassis and secured by six screws. The cover is perforated to allow ventilation for cooling.

Note. The PSU has NO serviceable parts.

Two identical fuses (L & N) are mounted within the unit on the mains input. A third fuse is connected in the DC line circuit of the transformer. The L & N fuses are a high breaking capacity type and must only be replaced with identical types. See **Section 2** for rating.

Warning. Hazardous Voltages.
There are no serviceable parts in this unit.
Return to the manufacturer if faulty or seek the services of a qualified engineer.

Switch off the mains supply and disconnect it before removing the cover for any reason.

Output Current (mA)	Links
350	C to X
250	D to X
180	E to X

NO connections should be made to points A or B

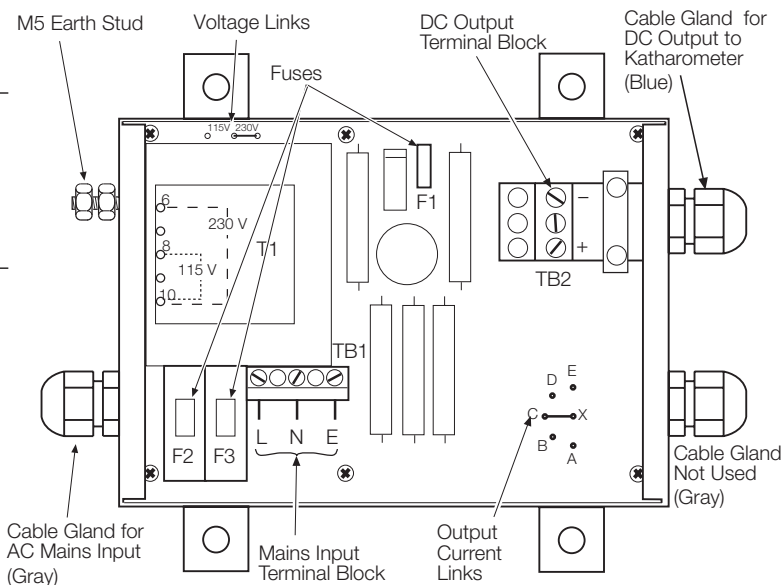


Fig. 1.1 Location of Internal Component

2 SPECIFICATION

4234-500 and 4234-501

Power supply

Series 4234-501	115V AC 50/60Hz
Series 4234-500	230V AC 50/60Hz

Supply limits

Voltage variation	±15%
Frequency range	46 to 64Hz

Power consumption

30 W Max.

Fuse ratings

L & N (F2 and F3)	250mA (T) (20 x 5mm) 250VA, 1500A h.b.c. cartridge type
DC line (F1)	400mA (F) (250V AC)

Load

One katharometer (12.5Ω max.)
plus interconnecting cable (1.5Ω max.)

Output

Output

180, 250 or 350mA DC (constant current)

Output regulation

Within ±0.8% for:

- a) Load variation ±15%
- b) Supply variation ±6%
- c) Ambient temperature ±10°C (50°F)

Ripple

Less than 17.5V across 10Ω load peak to peak

Output stability

Within ±0.7% of initial setting over a period of one month with load resistance, supply voltage and ambient temperature at nominal stated values

Maximum load

12.5Ω (one Katharometer)

Environmental

Protection

IP30 (NEMA 1)

Ambient temperature range

–20 to 55°C (–4 to 131°F)

Mounting centres

140mm x 110mm (5.5 x 4.3 in.)

Overall dimensions

170mm high x 160mm width x 110mm depth
(6.7 in. high x 6.3 in. width x 4.3 in. depth)

Weight

2.12kg (0.96 lb) approx.

IS certification

[Ex ia Ga] IIC (–20°C ≤Ta≤ +55°C)

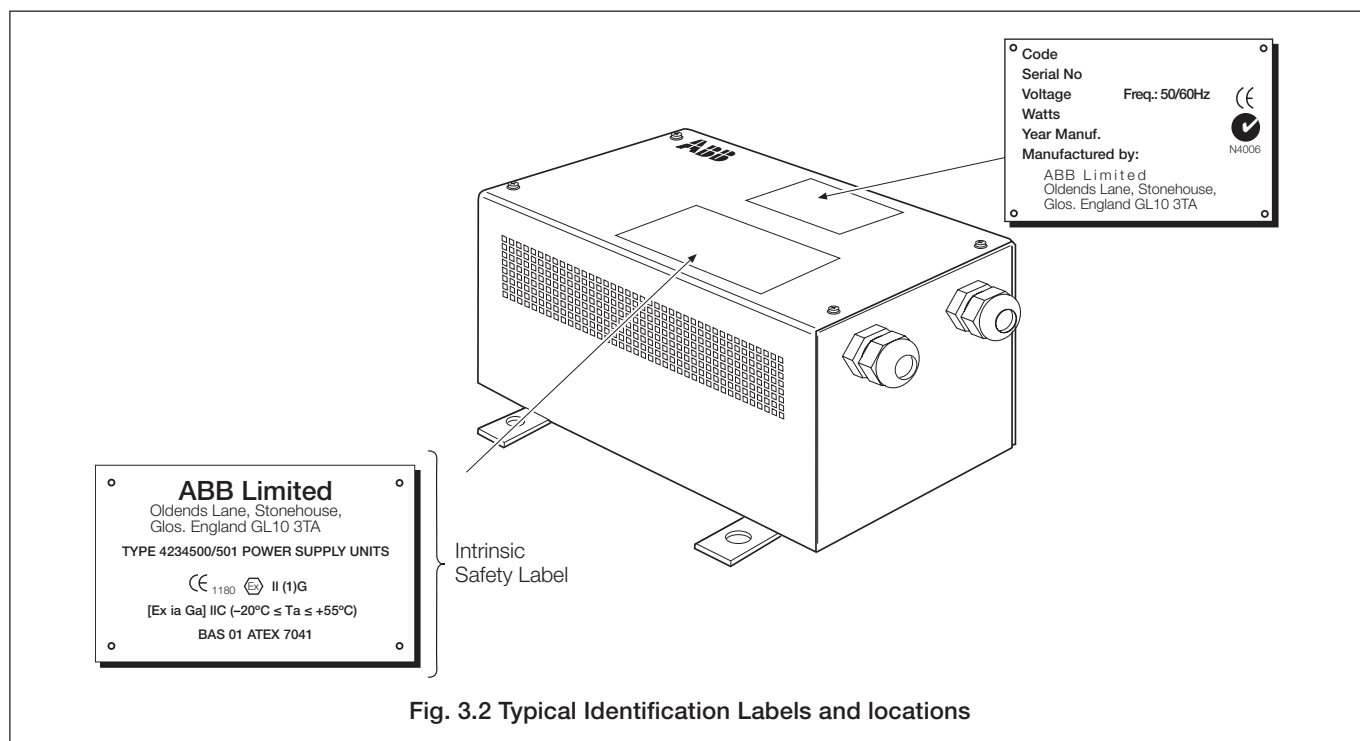
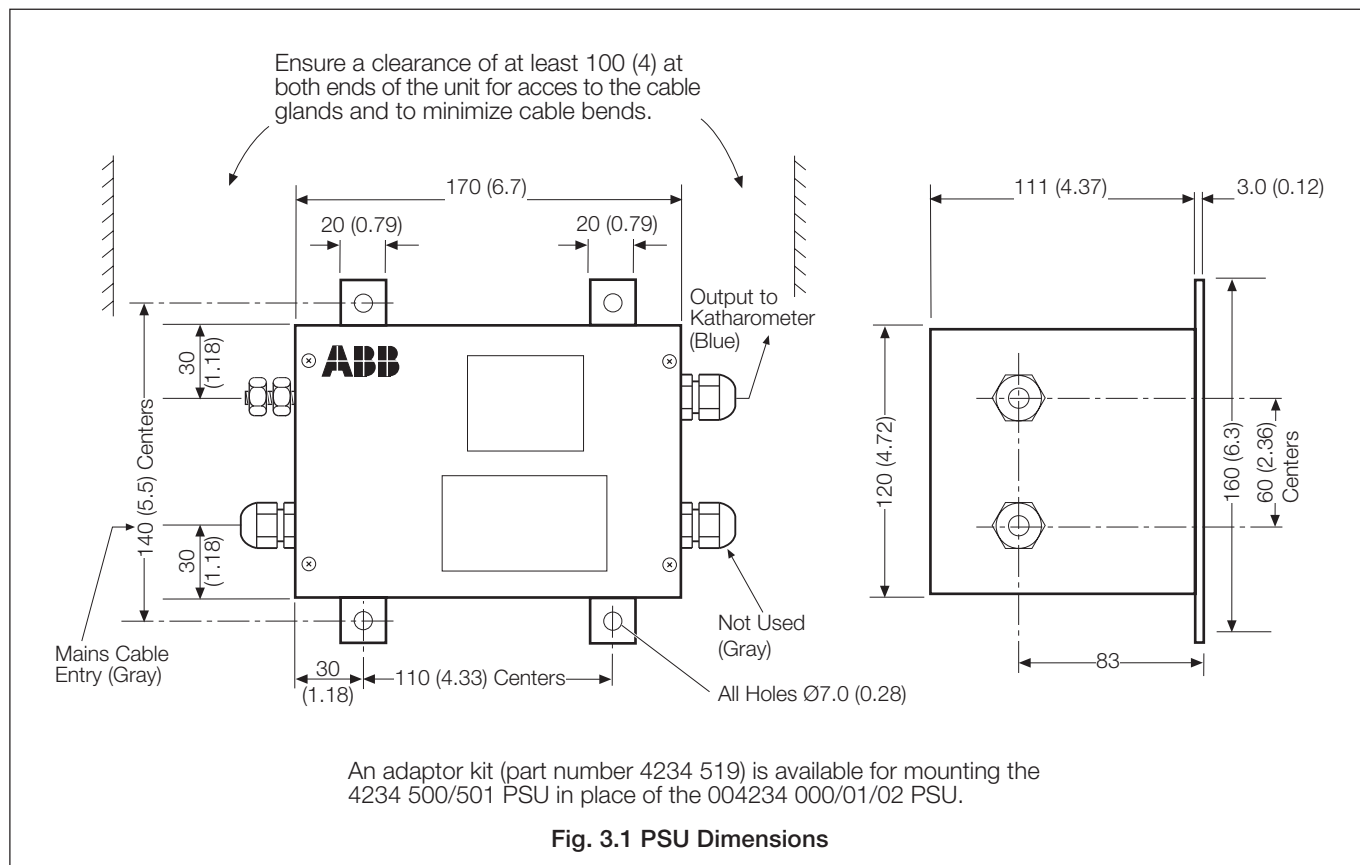
BASEEFA Certificate No. BAS01 ATEX7041

DS/4234-EN Rev. E

3 MECHANICAL INSTALLATION

The PSU must be mounted in a clean, dry, well ventilated position (on a wall or panel) in the safe area by means of the four fixing lugs. **Fig. 3.1** gives dimensions and fixing details for the unit.

Before commencing installation, check that the unit supplied is suitable for the supply voltage available – see **Section 2** and the data plate on the unit cover, **Fig. 3.2**.



4 ELECTRICAL INSTALLATION

4.1 Interconnection Diagrams and Cable Requirements

Warning.

- The mains supply to the equipment must be able to isolate the equipment independently. For example, use a switched spur or a mains isolator correctly rated according to the regulations of the country in which the equipment is being used.
- The means of isolation must be located as close to the equipment as possible and must not be obstructed.
- The switch or isolator must be clearly marked.

Note. Ensure all connections are made in accordance with local and/or national regulations.

Figs 4.1, 4.2 and 4.3 show the interconnections for intrinsically safe gas analysis systems. Use wiring rated to 75 °C (167 °F) minimum only. **It is important to ensure** that the connections between system components conform to the requirements of EN60079-14.

The interconnecting cable between the PSU and the katharometer is subject to a stringent limitation imposed by the intrinsic safety requirements. **Figs 4.1, 4.2 and 4.3** outline the requirements for the overall system.

The inductance/resistance ratio of the cable used to carry the stabilised DC constant current (mA) supply into the hazardous area must not exceed the maximum for the relevant atmosphere classification as specified in **Figs 4.1, 4.2 and 4.3**.

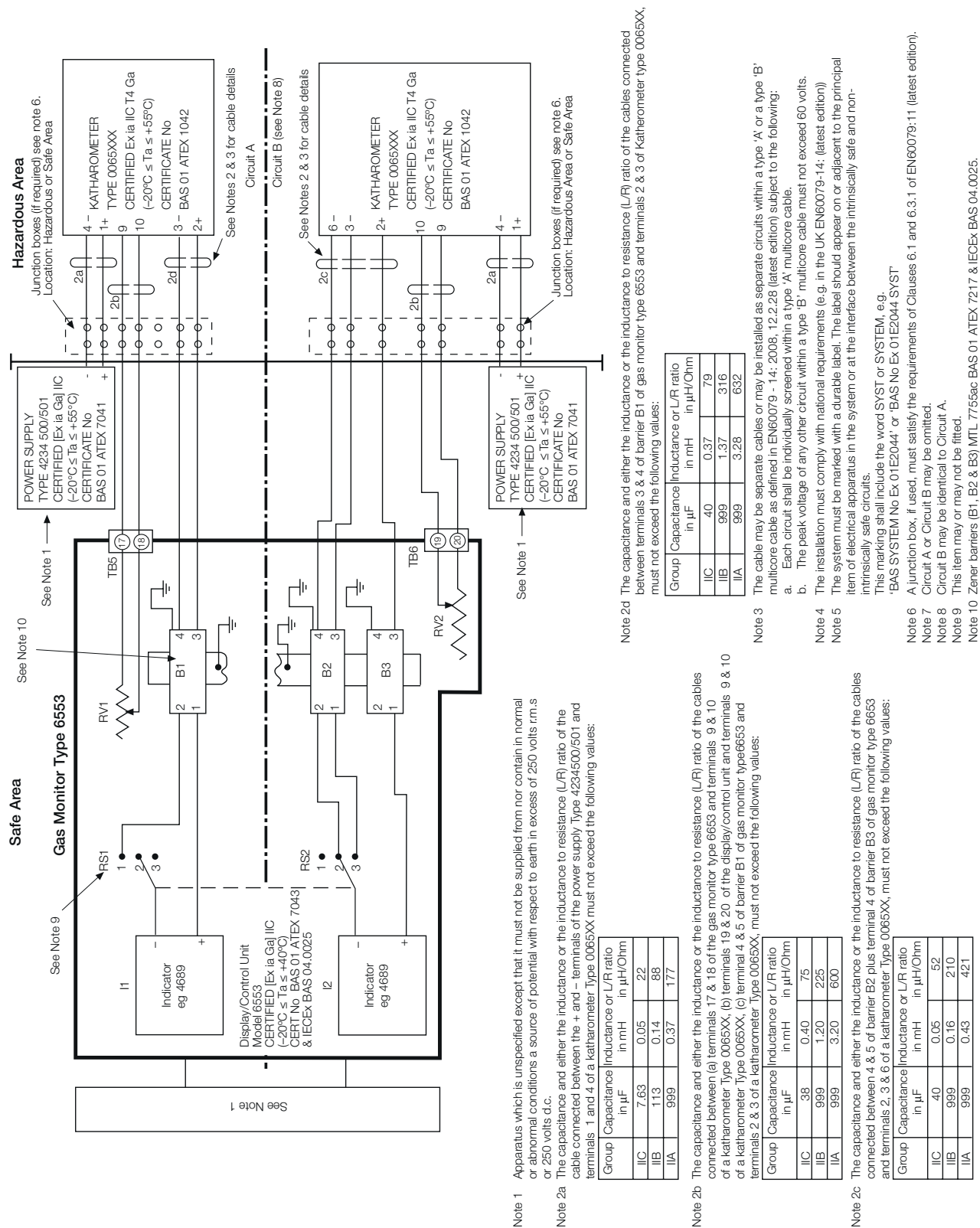
The choice of wiring cable is restricted due to the limitations imposed by the certification parameters – see **Notes 2a, b and c** in **Figs 4.1, 4.2 and 4.3**.

It should be further noted that the resistance of this interconnecting cable should be kept to a minimum and must not exceed 1.5 Ω . This limits the maximum cable length between a katharometer and its associated power supply unit.

Single sheathed conducting cables must be tightly twisted together to reduce their mutual inductance and laid separately from cables carrying 'safe area' connections.

The only requirement in respect of intrinsic safety for the cable used to connect the AC supply voltage to the PSU is that it should NOT be routed with the intrinsically safe constant current (mA) stabilised supply output cable.

It should be noted that the cable glands will accept a cable between 5 to 9mm in diameter.



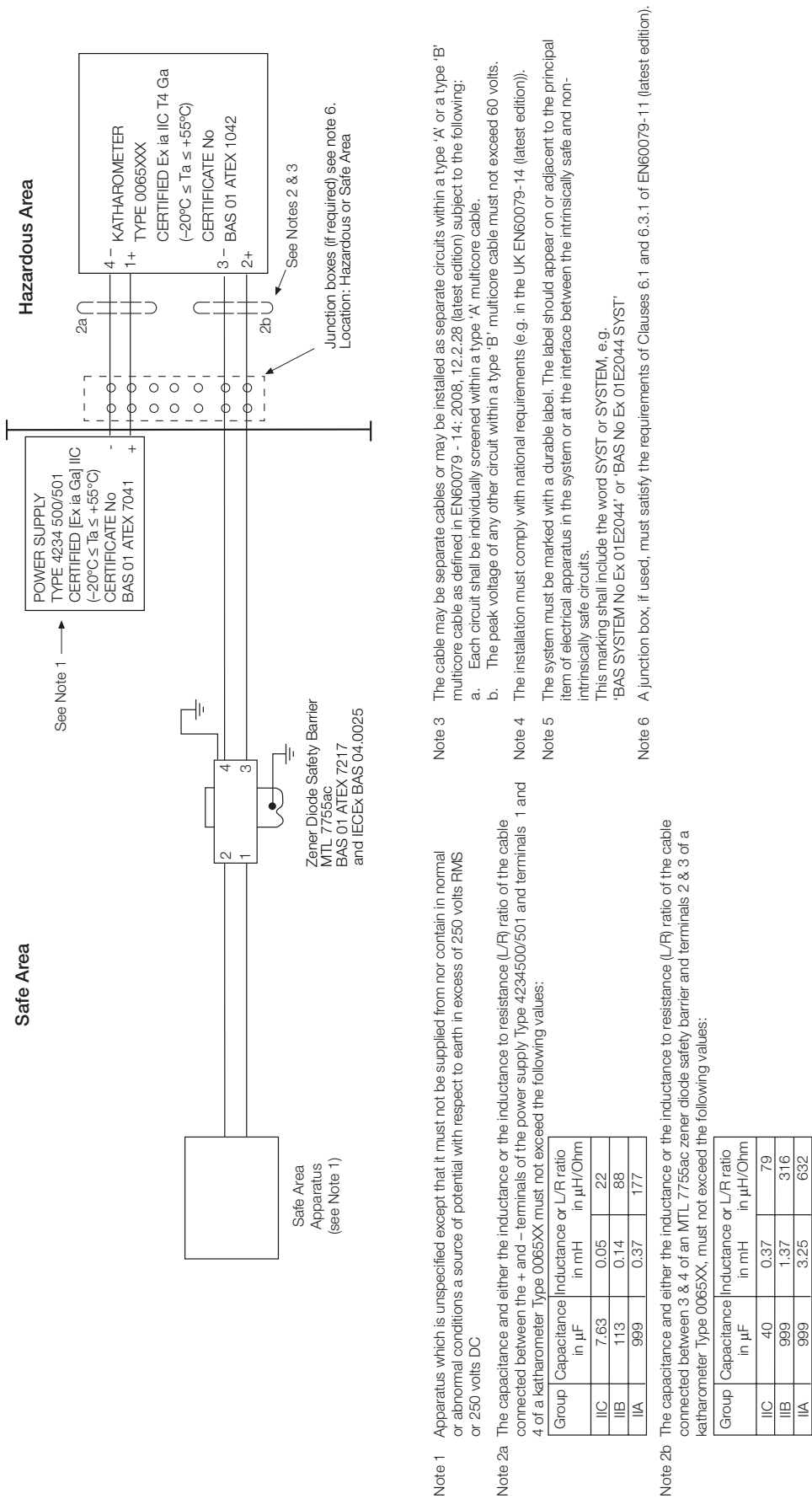
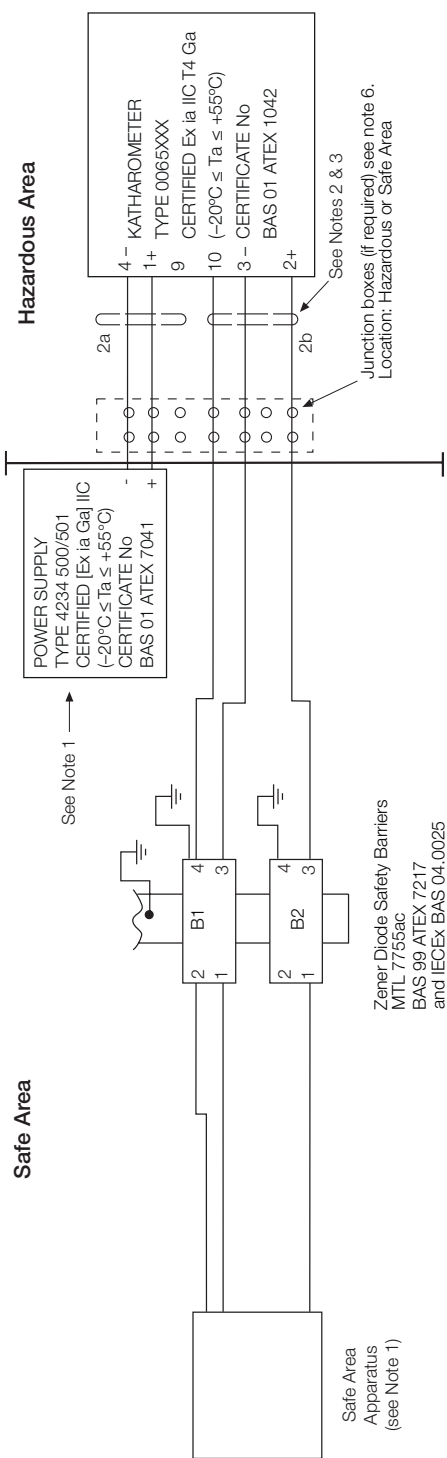


Fig. 4.2 PSU in Association with a Katharometer and Other Safe Area Apparatus with One Zener Diode Barrier



Note 1 Apparatus which is unspecified except that it must not be supplied from nor contain in normal or abnormal conditions a source of potential with respect to earth in excess of 250 volts RMS or 250 volts DC

Note 2a The capacitance and either the inductance or the inductance to resistance (L/R) ratio of the cable connected between the + and - terminals of the power supply Type 4234500/501 and terminals 1 and 4 of a Katharometer Type 0065XX must not exceed the following values:

Group	Capacitance in μF	Inductance or L/R ratio in mH	Inductance or L/R ratio in $\mu\text{H}/\Omega\text{m}$
IIC	7.63	0.05	22
IIB	113	0.14	88
IIA	999	0.37	177

Note 2b The capacitance and either the inductance or the inductance to resistance (L/R) ratio of the cable connected between 3 & 4 of an MTL 7755ac zener diode safety barrier plus terminals 3 of a second MTL 7755ac zener diode safety and terminals barrier 2, 3 & 6 of a Katharometer Type 0065XX, must not exceed the following values:

Group	Capacitance in μF	Inductance or L/R ratio in mH	Inductance or L/R ratio in $\mu\text{H}/\Omega\text{m}$
IIC	40	0.05	52
IIB	999	0.16	210
IIA	999	0.43	421

Note 3 The cable may be separate cables or may be installed as separate circuits within a type 'A' or a type 'B' multicore cable as defined in EN60079 - 14: 2008, 12.2.28 (latest edition) subject to the following:

- Each circuit shall be individually screened within a type 'A' multicore cable.
- The peak voltage of any other circuit within a type 'B' multicore cable must not exceed 60 volts.

Note 4 The installation must comply with national requirements (e.g. in the UK EN60079-14; (latest edition)).

Note 5 The system must be marked with a durable label. The label should appear on or adjacent to the principal item of electrical apparatus in the system or at the interface between the intrinsically safe and non-intrinsically safe circuits.

This marking shall include the word SYST or SYSTEM, e.g.

'BAS SYSTEM No Ex 01E2044' or 'BAS No Ex 01E2044 SYST'

Note 6 A junction box, if used, must satisfy the requirements of Clauses 6.1 and 6.3.1 of EN60079-11 (latest edition).

Fig. 4.3 PSU in Association with a Katharometer and Other Safe Area Apparatus with Two Zener Diode Barriers

...4 ELECTRICAL INSTALLATION

4.2 Accessing the PSU Terminals

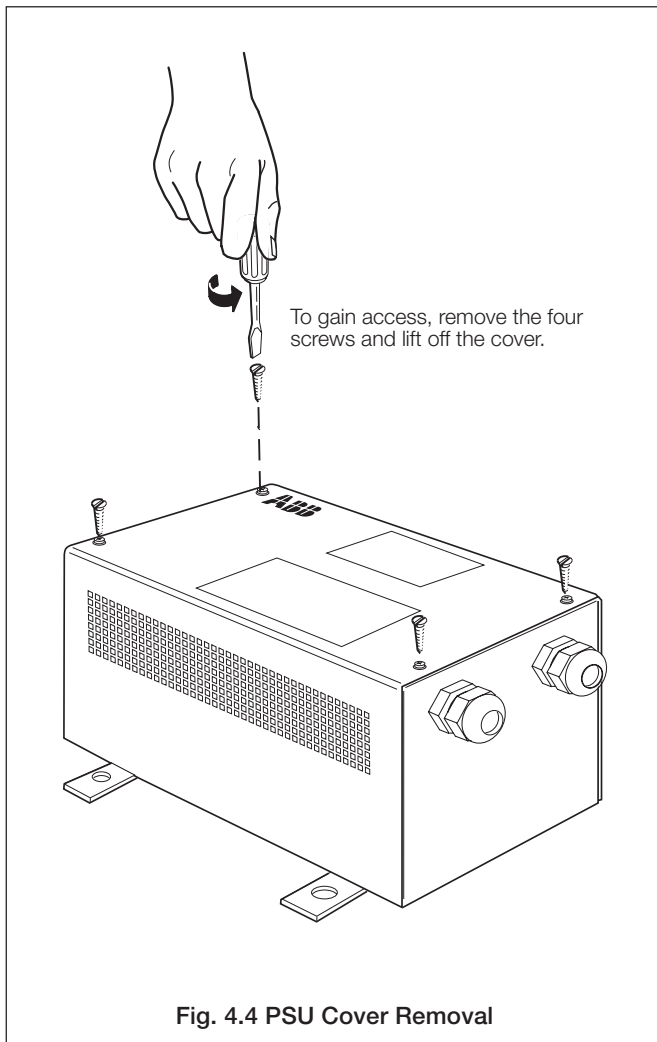
Warning. If the PSU is cubicle mounted or has its cover removed for test purposes, AC mains supply voltage is exposed at certain locations within the assembly when supplies are connected. Thus, there is a risk of electrocution.

All normal precautions must be taken to avoid the risk of accidental electrical shock during installation and maintenance of the equipment. Ensure that the supply cable is disconnected at its source before touching any electrical connections.

Caution. Ensure that the correct version of the unit has been supplied for the supply voltage available. A 115V unit cannot be used with a 230V supply or vice versa.

Check that the current output meets the katharometer input requirements (see katharometer data label) – see Fig. 4.6. If in doubt contact ABB.

Remove the power supply unit cover to obtain access to the separate labelled terminal blocks – see Fig. 4.4.



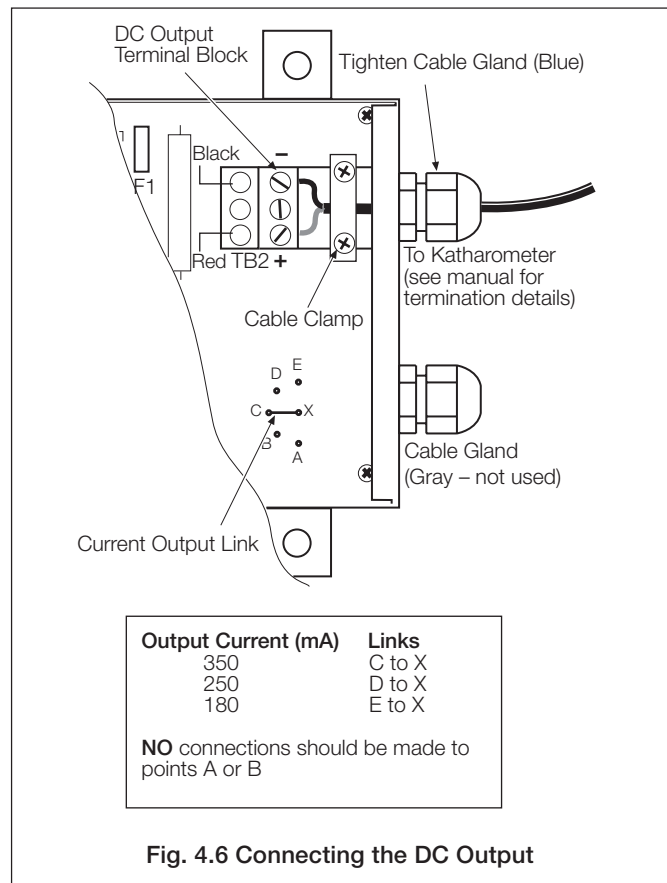
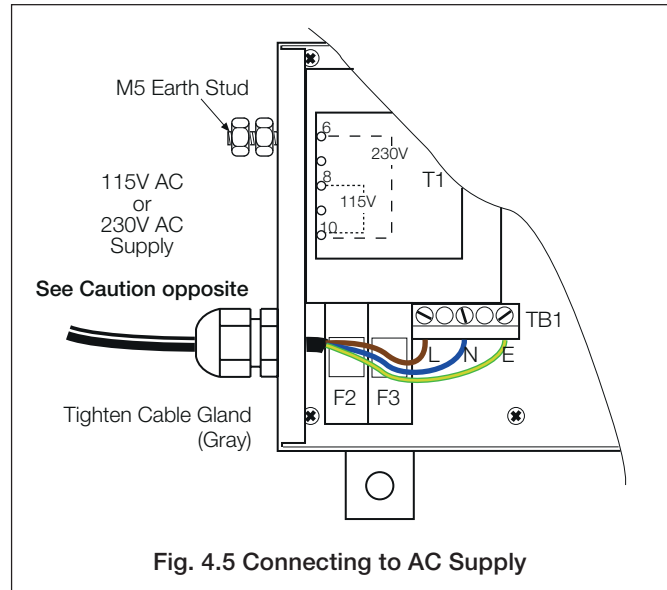
4.3 Electrical Connections

The mains terminal block, TB1, is situated next to the transformer, T1, and fuses, F2 and F3.

Connect the AC mains input cable as in Fig. 4.5.

Note. Earth bonding to be made via M5 Earth Stud.

Connect the DC output cable as in Fig. 4.6.



5 SERVICING

5.1 Safety and Certification

Model 4234500 and 4234501 PSUs have been certified intrinsically safe to the requirements of:

ATEX Directive 9/94/EC
[Ex ia Ga] IIC (-20°C ≤ Ta ≤ +55°C)
Cert. BAS 01 ATEX 7041

and **MUST** be sited in the **safe area**.

Warning. Interference with any unit or its components implies acceptance by that person of responsibility for ensuring that intrinsic safety continues to be maintained.

Unauthorised repair or incorrect assembly may render any unit unfit for use in an intrinsically safe system.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

To ensure that this standard of safety is maintained in operation it is essential that any servicing or similar work on the unit shall be performed only by suitably trained personnel in possession of all necessary information and a knowledge of the relevant standards applicable.

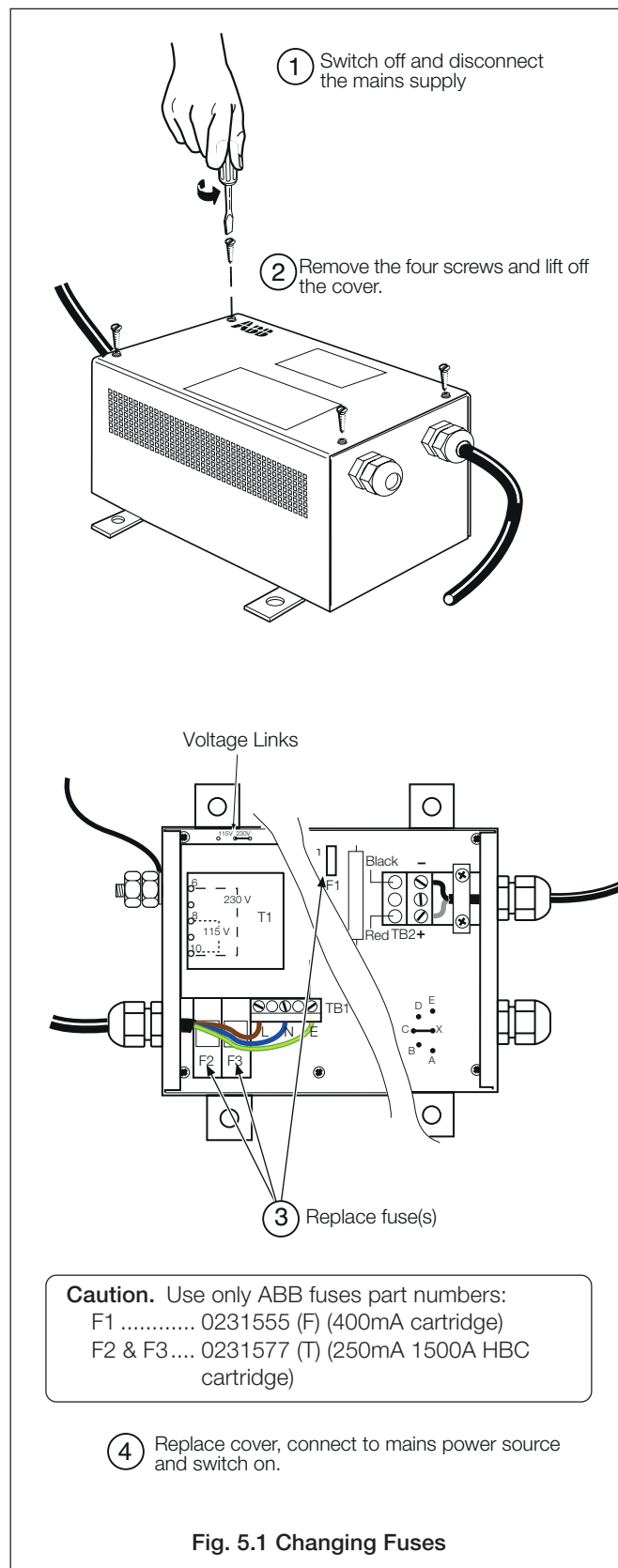
There are no serviceable components in these PSUs other than to replace the fuses. These fuses must be replaced only with those stated in the specification. If a fault occurs the PSU should be returned to the nearest ABB Service Centre, or returned to the factory for repair.

5.2 Cleaning

Warning. Switch off the PSU prior to cleaning.

Use only a dry or damp cloth to clean the exterior of the PSU. Do not use water or any solvents.

5.3 Replacing Fuses – Fig. 5.1



NOTES

Products and customer support

Automation Systems

For the following industries:

- Chemical & Pharmaceutical
- Food & Beverage
- Manufacturing
- Metals and Minerals
- Oil, Gas & Petrochemical
- Pulp and Paper

Drives and Motors

- AC and DC Drives, AC and DC Machines, AC Motors to 1kV
- Drive Systems
- Force Measurement
- Servo Drives

Controllers & Recorders

- Single and Multi-loop Controllers
- Circular Chart and Strip Chart Recorders
- Paperless Recorders
- Process Indicators

Flexible Automation

- Industrial Robots and Robot Systems

Flow Measurement

- Electromagnetic Flowmeters
- Mass Flowmeters
- Turbine Flowmeters
- Wedge Flow Elements

Marine Systems & Turbochargers

- Electrical Systems
- Marine Equipment
- Offshore Retrofit and Refurbishment

Process Analytics

- Process Gas Analysis
- Systems Integration

Transmitters

- Pressure
- Temperature
- Level
- Interface Modules

Valves, Actuators and Positioners

- Control Valves
- Actuators
- Positioners

Water, Gas & Industrial Analytics Instrumentation

- pH, Conductivity and Dissolved Oxygen Transmitters and Sensors
- Ammonia, Nitrate, Phosphate, Silica, Sodium, Chloride, Fluoride, Dissolved Oxygen and Hydrazine Analyzers
- Zirconia Oxygen Analyzers, Katharometers, Hydrogen Purity and Purge-gas Monitors, Thermal Conductivity

Customer support

We provide a comprehensive after sales service via a Worldwide Service Organization. Contact one of the following offices for details on your nearest Service and Repair Centre.

UK

ABB Limited

Tel: +44 (0)1453 826661

Fax: +44 (0)1453 829671

USA

ABB Inc.

Tel: +1 215 674 6000

Fax: +1 215 674 7183

Client Warranty

Prior to installation, the equipment referred to in this manual must be stored in a clean, dry environment, in accordance with the Company's published specification. Periodic checks must be made on the equipment's condition. In the event of a failure under warranty, the following documentation must be provided as substantiation:

- A listing evidencing process operation and alarm logs at time of failure.
- Copies of all storage, installation, operating and maintenance records relating to the alleged faulty unit.

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