The Company

We are an established world force in the design and manufacture of instrumentation 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.

The UKAS Calibration Laboratory No. 0255 is just one of the ten flow calibration plants operated by the Company and is indicative of our dedication to quality and accuracy.

Electrical Safety

This instrument complies with the requirements of CEI/IEC 61010-1:2001-2 "Safety requirements for electrical equipment for measurement, control, and laboratory use". If the instrument is used in a manner NOT specified by the Company, the protection provided by the instrument may be impaired.

Symbols

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

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>⚠️</td>
<td>Warning – Refer to the manual for instructions</td>
</tr>
<tr>
<td>⚠️</td>
<td>Caution – Risk of electric shock</td>
</tr>
<tr>
<td>⚡</td>
<td>Protective earth (ground) terminal</td>
</tr>
<tr>
<td>⚡</td>
<td>Earth (ground) terminal</td>
</tr>
<tr>
<td>⚪️</td>
<td>Direct current supply only</td>
</tr>
<tr>
<td>⚪️</td>
<td>Alternating current supply only</td>
</tr>
<tr>
<td>⚪️</td>
<td>Both direct and alternating current supply</td>
</tr>
<tr>
<td>⚪️</td>
<td>The equipment is protected through double insulation</td>
</tr>
</tbody>
</table>

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.
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 CENELEC [EEx ia] IIC Tamb. –20 to 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 No 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.
Please return to the manufacturer if faulty, or seek the services of a qualified engineer.
Ensure that the mains supply is switched off and disconnected before removing the cover for any reason.
4234-500 and 4234-501

Mains 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
13W

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

Load
One katharometer (12.5 max.)
plus interconnecting cable (1.5 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 10 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
12.5 (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.

Power consumption
30VA

IS certification
CENELC [EEx ia] IIC T amb. −20 to 55°C
BASEEFA Certificate No. BAS01 ATEX7041
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.
4.1 Interconnection Diagrams and Cable Requirements

Figs 4.1, 4.2 and 4.3 show the interconnections for intrinsically safe gas analysis systems.

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.

Cables manufactured to DEF STAN 61-12 Part 5 should comply, but care should be taken over the number or cores included in the cable. As can be seen, there is a significant difference between the 2-core and 6-core cables. The diameter over the screen in the 6-core cable is greater than that of a 2-core, and this diameter affects both the inductance and capacitance values.

The values of a typical DEF STAN 61-12 Part 5 cable from:
Permanoid Ltd
Hulm Hall Lane
Manchester, M40 8HH
England

<table>
<thead>
<tr>
<th>2-core</th>
<th>6-core</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inductance (µH/metre)</td>
<td>0.325</td>
</tr>
<tr>
<td>Capacitance (pF/metre)</td>
<td>190</td>
</tr>
<tr>
<td>L/R (µH/ )</td>
<td>8.6</td>
</tr>
<tr>
<td>Test voltage</td>
<td>2 kV AC for one minute</td>
</tr>
<tr>
<td>Rated voltage</td>
<td>440V RMS</td>
</tr>
</tbody>
</table>

It should be further noted that the resistance of this interconnecting cable should be kept to a minimum and must not exceed 1.5 . 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. 4.1 PSU in Association with the 6553 System

### Electrical Installation

#### Safe Area

**Gas Monitor Type 6553**

- **CERTIFIED [EEx ia] IIC**
- **Tamb**: –20°C to +40°C
- **CERT No**: BAS 01 ATEX 7043

#### Hazardous Area

**Katharometer Type 0065XX**

- **CERTIFIED [EEx ia] IIC T4**
- **Tamb**: –20°C to +55°C
- **CERTIFICATE No**: BAS 01 ATEX 1042

### 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:

<table>
<thead>
<tr>
<th>Group</th>
<th>Capacitance in µF</th>
<th>Inductance or L/R ratio in mH</th>
<th>L/R ratio in µH/Ohm</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIC</td>
<td>7.5</td>
<td>0.02</td>
<td>20</td>
</tr>
<tr>
<td>IIB</td>
<td>999</td>
<td>0.06</td>
<td>60</td>
</tr>
</tbody>
</table>

### Note 2b

The capacitance and either the inductance or the inductance to resistance (L/R) ratio of the cables connected between:

- (a) terminals 17 & 18 of the gas monitor Type 6653 and terminals 9 & 10 of a katharometer Type 0065XX,
- (b) terminals 19 & 20 of the gas monitor and terminals 9 & 10 of a katharometer Type 0065XX,
- (c) terminal 4 & 5 of barrier B1 of gas monitor Type 6653 and terminals 2 & 3 of a katharometer Type 0065XX, must not exceed the following values:

<table>
<thead>
<tr>
<th>Group</th>
<th>Capacitance in µF</th>
<th>Inductance or L/R ratio in mH</th>
<th>L/R ratio in µH/Ohm</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIC</td>
<td>38</td>
<td>0.20</td>
<td>40</td>
</tr>
<tr>
<td>IIB</td>
<td>999</td>
<td>0.60</td>
<td>120</td>
</tr>
<tr>
<td>IIA</td>
<td>999</td>
<td>1.60</td>
<td>320</td>
</tr>
</tbody>
</table>

### Note 2c

The capacitance and either the inductance or the inductance to resistance (L/R) ratio of the cables connected between 4 & 5 of barrier B2 plus terminal 4 of barrier B3 of gas monitor Type 6653 and terminals 2, 3 & 6 of a katharometer Type 0065XX, must not exceed the following values:

<table>
<thead>
<tr>
<th>Group</th>
<th>Capacitance in µF</th>
<th>Inductance or L/R ratio in mH</th>
<th>L/R ratio in µH/Ohm</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIC</td>
<td>38</td>
<td>0.20</td>
<td>40</td>
</tr>
<tr>
<td>IIB</td>
<td>999</td>
<td>0.60</td>
<td>120</td>
</tr>
<tr>
<td>IIA</td>
<td>999</td>
<td>1.60</td>
<td>320</td>
</tr>
</tbody>
</table>

### 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 EN50039(1980) 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 EN60079-14:1997).

### 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 EN50020:1994.

### Note 7

Circuit A or Circuit B may be omitted.

### Note 8

Circuit B may be identical to Circuit A.

### Note 9

This item may or may not be fitted.
**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:

<table>
<thead>
<tr>
<th>Group</th>
<th>Capacitance in µF</th>
<th>Inductance or L/R ratio in mH/Ohm</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIC</td>
<td>7.5</td>
<td>0.02</td>
</tr>
<tr>
<td>IIB</td>
<td>99</td>
<td>0.06</td>
</tr>
<tr>
<td>IA</td>
<td>999</td>
<td>0.16</td>
</tr>
</tbody>
</table>

**Note 2b** The capacitance and either the inductance or the inductance to resistance (L/R) ratio of the cable connected between 4 & 5 of an MTL 7055ac zener diode safety barrier and terminals 2 & 3 of a katharometer Type 0065XX, must not exceed the following values:

<table>
<thead>
<tr>
<th>Group</th>
<th>Capacitance in µF</th>
<th>Inductance or L/R ratio in mH/Ohm</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIC</td>
<td>35</td>
<td>0.40</td>
</tr>
<tr>
<td>IIB</td>
<td>999</td>
<td>1.20</td>
</tr>
<tr>
<td>IA</td>
<td>999</td>
<td>3.20</td>
</tr>
</tbody>
</table>

**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 EN50039(1980) subject to the following:

a. Each circuit shall be individually screened within a type 'A' multicore cable.

b. 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 EN60079-14:1997).

**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 EN50020:1994.
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:

<table>
<thead>
<tr>
<th>Group</th>
<th>Capacitance in μF</th>
<th>Inductance or L/R ratio in mH</th>
<th>L/R ratio in μH/Ohm</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIIC</td>
<td>7.5</td>
<td>0.02</td>
<td>20</td>
</tr>
<tr>
<td>IIB</td>
<td>999</td>
<td>0.06</td>
<td>60</td>
</tr>
<tr>
<td>IA</td>
<td>999</td>
<td>0.16</td>
<td>160</td>
</tr>
</tbody>
</table>

Note 2b The capacitance and either the inductance or the inductance to resistance (L/R) ratio of the cable connected between 4 & 5 of an MTL 7055ac zener diode safety barrier plus terminals 4 of a second MTL 7055ac zener diode safety barrier plus terminals 2 & 6 of a katharometer Type 0065XX, must not exceed the following values:

<table>
<thead>
<tr>
<th>Group</th>
<th>Capacitance in μF</th>
<th>Inductance or L/R ratio in mH</th>
<th>L/R ratio in μH/Ohm</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIIC</td>
<td>38</td>
<td>0.20</td>
<td>40</td>
</tr>
<tr>
<td>IIB</td>
<td>999</td>
<td>0.60</td>
<td>120</td>
</tr>
<tr>
<td>IA</td>
<td>999</td>
<td>1.60</td>
<td>320</td>
</tr>
</tbody>
</table>

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 EN50039(1980) subject to the following:

a. Each circuit shall be individually screened within a type ‘A’ multicore cable.

b. 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: EN60079-14:1997). 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.

Note 5 The system must be marked with 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 EN50020:1994.

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

---

**Fig. 4.5 Connecting to AC Supply**

**Fig. 4.6 Connecting the DC Output**
5.1 Safety and Certification
Model 4234500 and 4234501 PSUs have been certified intrinsically safe to the requirements of:

ATEX Directive 9/94/EC
Code [Ex ia] II C (–20°C T a +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.

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 Replacing Fuses – Fig. 5.1

1. Switch off and disconnect the mains supply
2. Remove the four screws and lift off the cover.
3. Replace fuse(s)
4. Replace cover, connect to mains power source and switch on.

Caution. Use only ABB fuses part numbers:
F1 ............ 0231555 (F) (400mA cartridge)
F2 & F3 .... 0231577 (T) (250mA 1500A HBC cartridge)

Fig. 5.1 Changing Fuses
PRODUCTS & CUSTOMER SUPPORT

Products

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, Strip Chart and Paperless Recorders
- Paperless Recorders
- Process Indicators

Flexible Automation
- Industrial Robots and Robot Systems

Flow Measurement
- Electromagnetic Flowmeters
- Mass Flow Meters
- Turbine Flowmeters
- 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 hydrizine 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.

United Kingdom
ABB Limited
Tel: +44 (0)1453 826661
Fax: +44 (0)1453 829671

United States of America
ABB Inc.
Tel: +1 775 850 4800
Fax: +1 775 850 4808

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:

1. A listing evidencing process operation and alarm logs at time of failure.
2. Copies of all storage, installation, operating and maintenance records relating to the alleged faulty unit.
ABB has Sales & Customer Support expertise in over 100 countries worldwide

www.abb.com

The Company’s policy is one of continuous product improvement and the right is reserved to modify the information contained herein without notice.

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