ABB MEASUREMENT & ANALYTICS | OPERATING INSTRUCTION | OI/GAH-EN REV. D

GAH series

ATEX-compliant gas analyzer systems for hydrogen-cooled alternators

GAH series ATEX-compliant gas analyzer system

Measurement made easy

Introduction

The GAH100 and GAH200 are designed to provide reliable and accurate hydrogen purity and purge gas measurement to ensure the safe and efficient operation of hydrogen cooled turbo-generators.

For more information

Other publications for the GAH100 and GAH200 analyzer systems are available for free download from www.abb.com/measurement (see links and reference numbers below) or by scanning this code:

	Search for or click on:
Data sheet GAH series analyzer systems	DS/GAH
Configuration instruction GAH series analyzer systems	COI/GAH

Contents

1 Health & Safety

Document symbols

Symbols that appear in this document are explained below:

⚠ DANGER

The signal word '**DANGER**' indicates an imminent danger. Failure to observe this information will result in death or severe injury.

⚠ WARNING

The signal word '**WARNING**' indicates an imminent danger. Failure to observe this information may result in death or severe injury.

⚠ CAUTION

The signal word '**CAUTION**' indicates an imminent danger. Failure to observe this information may result in minor or moderate injury.

NOTICE

The signal word '**NOTICE**' indicates potential material damage.

Note
'**Note**' indicates useful or important information about the product

Safety precautions

Be sure to read, understand and follow the instructions contained within this manual before and during use of the equipment. Failure to do so could result in bodily harm or damage to the equipment.

⚠ WARNING

Installation, operation, maintenance and servicing must be performed:

- by suitably trained personnel only
- in accordance with the information provided in this manual
- in accordance with relevant local regulations

Potential safety hazards

Weight

⚠ WARNING

- The analyzer weighs 7.6 kg (17 lb) and must be mounted in accordance with the information in this Instruction.
- Suitable lifting equipment must be available when installing/removing the analyzer from the mounting.

Electrical

⚠ WARNING

To ensure safe use when operating this equipment, the following points must be observed:

- up to 240 V AC may be present. Ensure the supply is isolated before removing the terminal cover
- normal safety precautions must be taken to avoid the possibility of an accident occurring when operating in conditions of high pressure and/or temperature

Safety advice concerning the use of the equipment described in this manual or any relevant Material Safety Data Sheets (where applicable) can be obtained from the Company, together with servicing and spares information.

...1 Health & Safety

Safety standards

This product has been designed to satisfy the requirements of IEC61010-1:2010 3rd edition 'Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use' and complies with US NEC 500, NIST and OSHA.

Product symbols

Symbols that appear on this product are shown below:


Protective earth (ground) terminal.


Functional earth (ground) terminal.

Alternating current supply only.


This symbol, when noted on a product, indicates a potential hazard that could cause serious personal injury and/or death.
The user must reference this instruction manual for operation and/or safety information.


This symbol, when noted on a product, indicates a potential hazard (flammable gas) which could cause serious personal injury and/or death.
The user must reference this instruction manual for operation and/or safety information.


This symbol, when noted on a product, indicates a potential hazard (explosive gas) which could cause serious personal injury and/or death.
The user must reference this instruction manual for operation and/or safety information.


This symbol, when noted on a product enclosure or barrier, indicates that a risk of electrical shock and/or electrocution exists and indicates that only individuals qualified to work with hazardous voltages should open the enclosure or remove the barrier.


Recycle separately from general waste under the WEEE directive.

Product recycling and disposal (Europe only)


Electrical equipment marked with this symbol may not be disposed of in European public disposal systems after 12 August 2005. To conform to European local and national regulations (EU Directive 2002/96/EC), European electrical equipment users must now return old or end-of-life equipment to the manufacturer for disposal at no charge to the user. ABB is committed to ensuring that the risk of any environmental damage or pollution caused by any of its products is minimized as far as possible.

Note. For return for recycling, contact the equipment manufacturer or supplier for instructions on how to return end-of-life equipment for proper disposal.

End-of-life battery disposal

The transmitter contains a small lithium battery (located on the processor/display board) that must be removed and disposed of responsibly in accordance with local environmental regulations.

Restriction of Hazardous Substances (RoHS)

The European Union RoHS Directive and subsequent regulations introduced in member states and other countries limits the use of six hazardous substances used in the manufacturing of electrical and electronic equipment. Currently, monitoring and control instruments do not fall within the scope of the RoHS Directive, however ABB has taken the decision to adopt the recommendations in the Directive as the target for all future product design and component purchasing.

Installation

Note. CO_2 is referred to throughout this manual as the purge gas. However, other gases such as argon or nitrogen may be used instead.

⚠ CAUTION

This operating instruction applies only to those systems that have been designed and constructed to the standards specified in the schedules of the certificates listed. The separate units to which these certificates apply are clearly identifiable by model numbers and the data on the identification and certification labels fixed to them. Other combinations of similar equipment built to any earlier specifications are not covered.

This is particularly important where new replacement units are to be incorporated into existing installations covered by any earlier certification standards.

It is essential that units are installed strictly in accordance with the appropriate standards for electrical equipment for use in flammable atmospheres. Any deviation from the specified installation conditions, or any unauthorized repairs or adjustments can invalidate the safety assurances given by the certification of the unit.

The ultimate responsibility for any particular installation lies with the installing user/contractor.

This manual gives the installation, operating and maintenance information for the Company's range of Models GAH100 and GAH200 intrinsically safe gas analyzer systems, normally used with hydrogen cooled electrical power generators.

A complete GAH100 or GAH200 analyzer system uses a combination of three different units. Each unit is certified independently for use as part of an intrinsically safe system.

2 Overview

Each katharometer assembly incorporates a wheatstone bridge comprising fine, glass-coated platinum filaments. One pair of parallel arms is sealed in the reference gas and the other pair exposed to the sample gas.

When the intrinsically safe stabilized current from the 4234 type power supply unit is passed through this bridge, the temperature of the platinum filaments rises to a point of thermal equilibrium. Under conditions that are arranged to give minimum radiation and convection heat transfer, the equilibrium temperature depends on the thermal conductivity of the gas surrounding the filament. Thus any difference between the thermal conductivity of reference and sample gases causes an imbalance in the bridge; this imbalance (as a millivolt signal) is indicated by the display unit.

Zener diodes are connected across the input connections from the power supply unit to the katharometer in order to limit the maximum voltage that could be developed across the filament bridge under external fault conditions. Under fault conditions the current is limited to a safe value by the power supply unit.

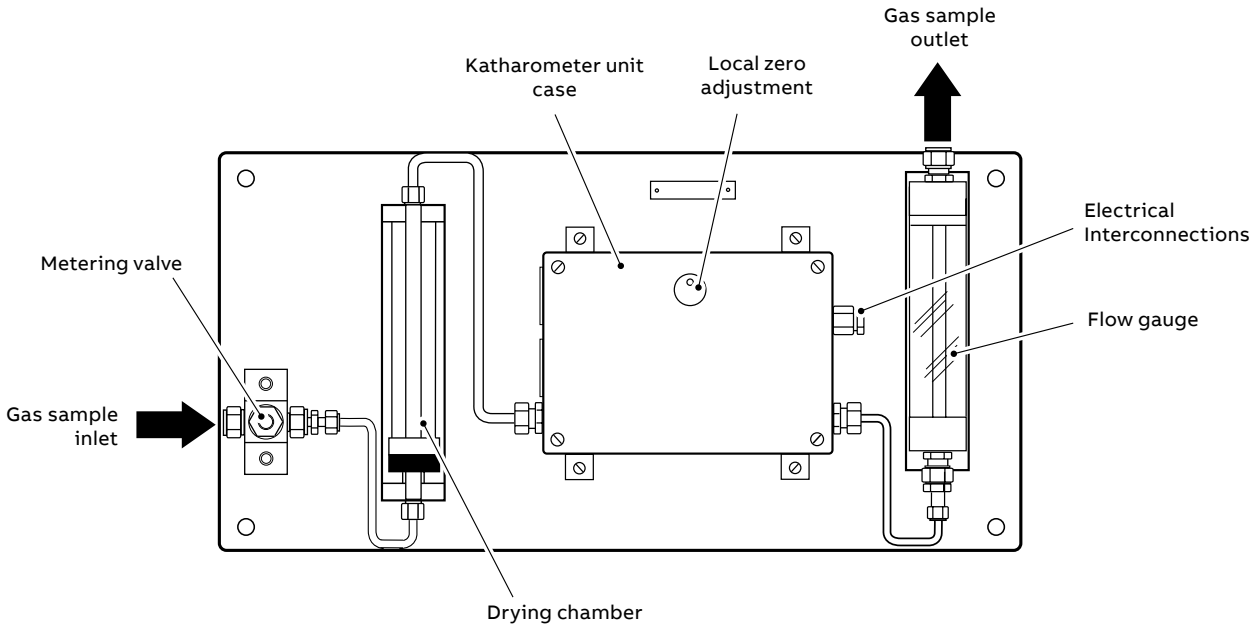


Figure 1 6548 type gas analysis panel

Each panel comprises a metering valve, a drying chamber, a thermally lagged katharometer (Model 6548 type) and a flowmeter. These items are mounted on a flat panel suitable for fixing to a vertical surface close to the sample point. The katharometers are calibrated for the hydrogen purity measurement as well as hydrogen in carbon dioxide and air in carbon dioxide.

To operate a katharometer unit in the hazardous area, one Model 4234 type PSU is required for each katharometer. The power supply is available in SIL rated and non-SIL rated. Non-SIL rated should only be used for legacy thermally controlled analyzer panels. All other analyzer panels should use SIL rated 4234 type power supplies.

The stabilized current output is current and voltage limited to restrict the energy supply into the hazardous area.

The PSU is housed in a metal case fitted with lugs for wall/ panel mounting. Cable gland entries are provided at opposite ends of the case for supply voltage input and stabilized current output cables to the hazardous area.

The circuit is protected by cartridge fuses. The fuses (F2 and F3) **must** have a high breaking capacity (HBC) rating of 1500 A to comply with the terms of the certification.

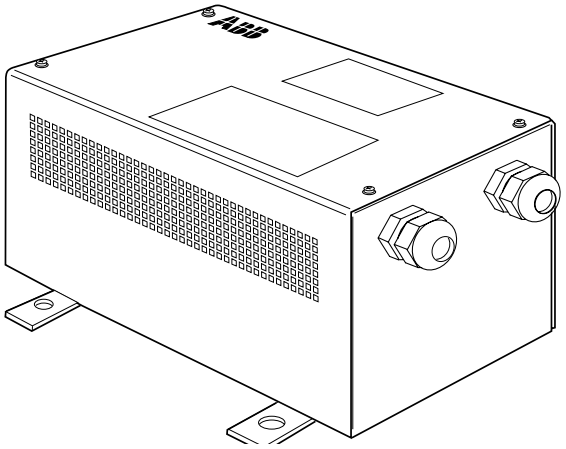


Figure 2 Model 4234 type power supply unit

The 6553 type display unit must be mounted in a safe area and is suitable for panel mounting.

The 6553 type display unit houses one or two CM30 process controllers, each equipped with a range selector switch and protected access for zero adjustment – see Figure 3.

The 6553 type display unit contains encapsulated Zener diode safety barrier devices to limit the electrical energy that can be supplied from the instrument circuits into the hazardous area. These devices are located below the CM30 process controller(s), on a rail that **MUST** be earthed to a high integrity earth point. A metal screening arrangement segregates the connections made to equipment in the hazardous area. The unit is protected on the mains input side by two fuses, one for each circuit, accessible from the front of the panel.

The 6553 type display unit has retransmission outputs for connection to indicator/controllers, providing that they are installed in the safe area and the installation conforms to the requirements given in **Electrical installation** on page 13.

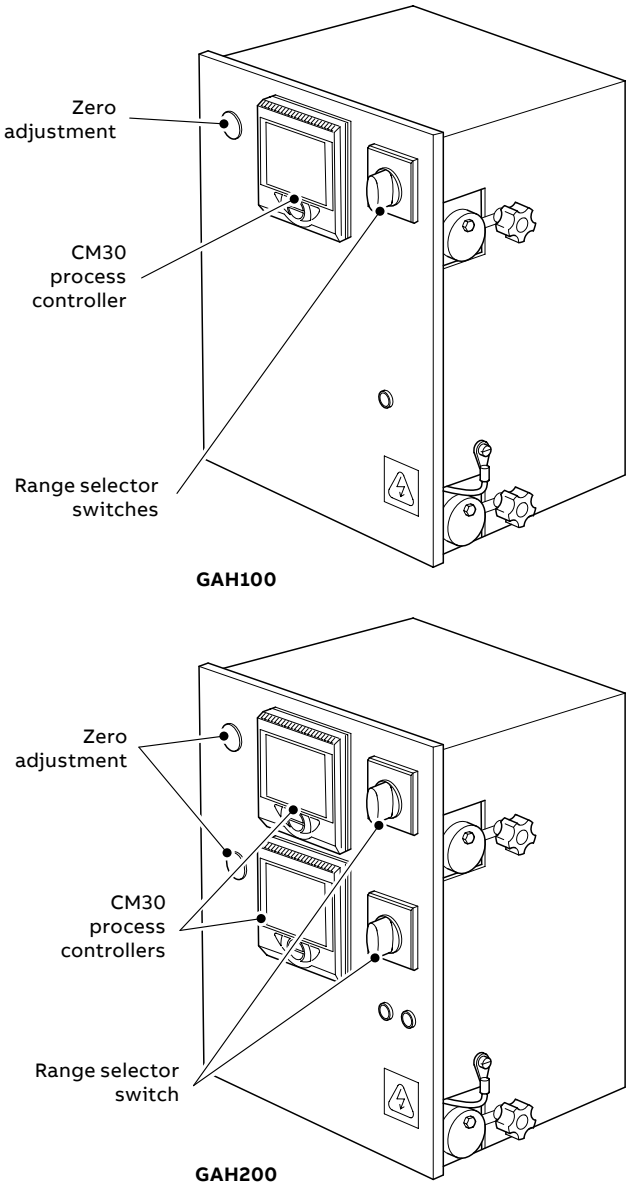


Figure 3 Model 6553 type display units

3 Mechanical installation

General installation requirements

Note. Select a location away from strong electrical and magnetic fields. If this is not possible, particularly in applications where mobile communications equipment is expected to be used, screened cables within flexible, earthed metal conduit must be used.

Certification

Copies of certificates available on request or from: www.abb.com. (see **Certificates** on page 35).

Weights

Note. All weights are approximate and are provided to assist safe manual handling.

	Unpacked weight kg (lb)
6553 type display unit:	7.8 (17.19)
6548 type gas analysis panel:	10.6 (23.36)
4234 type power supply unit:	2.2 (4.85)

Unpacking

NOTICE

- Visually inspect equipment for damage before installing. Do not install damaged or faulty equipment.
- Retain the protective packing materials to allow for re-shipping in the unlikely event of a return.

Identification

It is essential that installers and users clearly identify the various units of the monitoring system as follows:

Model 6553 type display unit

Several versions of the 6553 type display unit are available and are defined by the code number explained in the data sheet (DS/GAH).

Identification and certification labels are fixed to the outside of the display unit case as shown in Figure 4. Use the ordering code table in the data sheet (DS/GAH) to interpret the identification label code and obtain a precise description of the 6553 type display unit.

Note. The location of the identification label on the CM30 process controller is also shown in Figure 4.

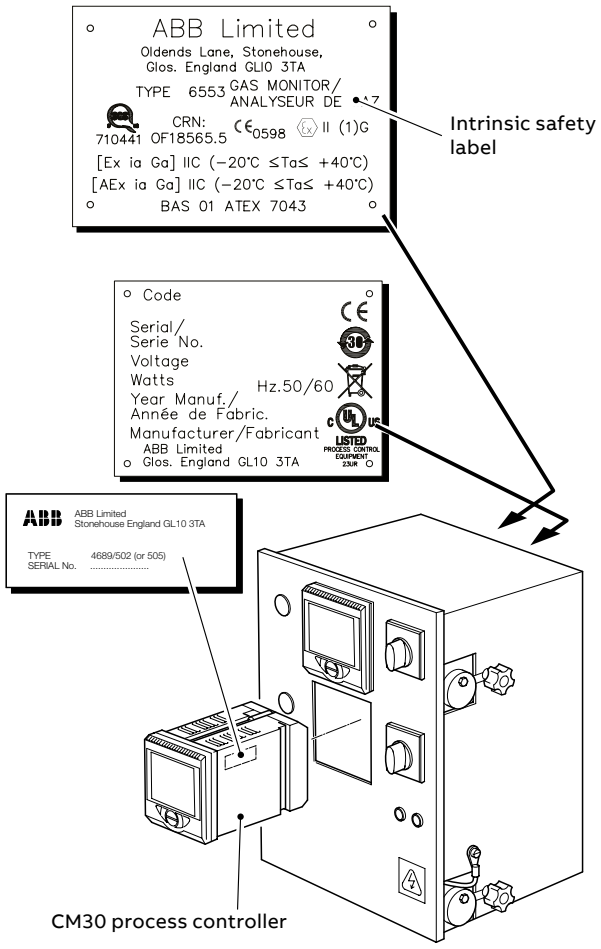


Figure 4 Typical identification labels and locations – model 6553 type display unit

Model 6548 type

Katharometer analyzer panel – Figure 5. Refer also to IM/6517-6518 for further details. The panel is identified by the reference number label as shown in Figure 5. The identification and certification labels of the individual katharometer units are fixed to the katharometer case.

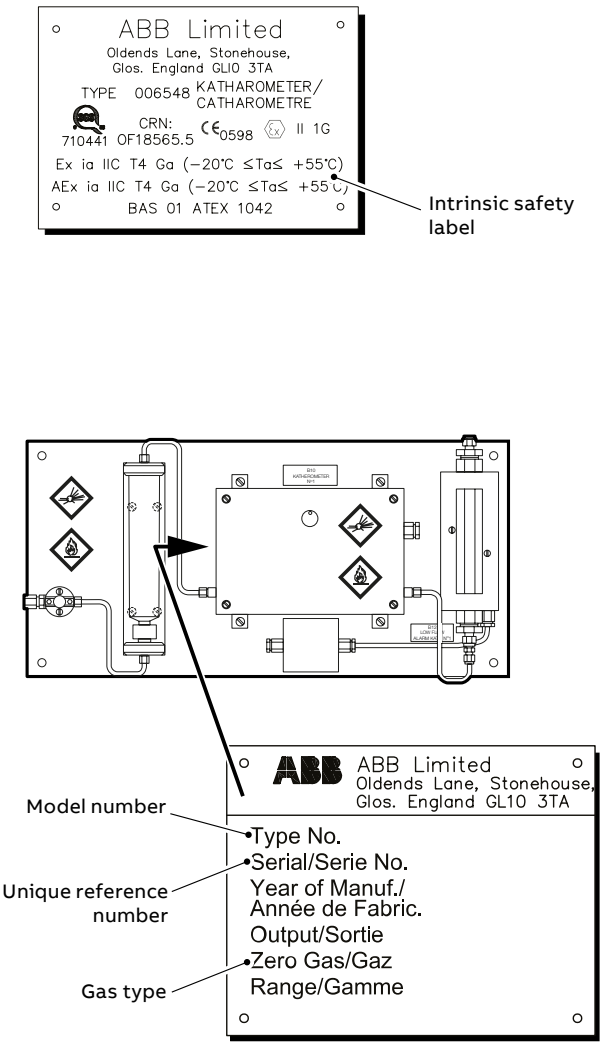


Figure 5 Typical identification labels with locations – model 6548 type katharometer analyzer panels

Model 4234 type power supply unit

Refer also to IM/4234500 for further details. The identification and certification labels are fixed to the outside of the unit case, as shown in Figure 6 and Figure 7.

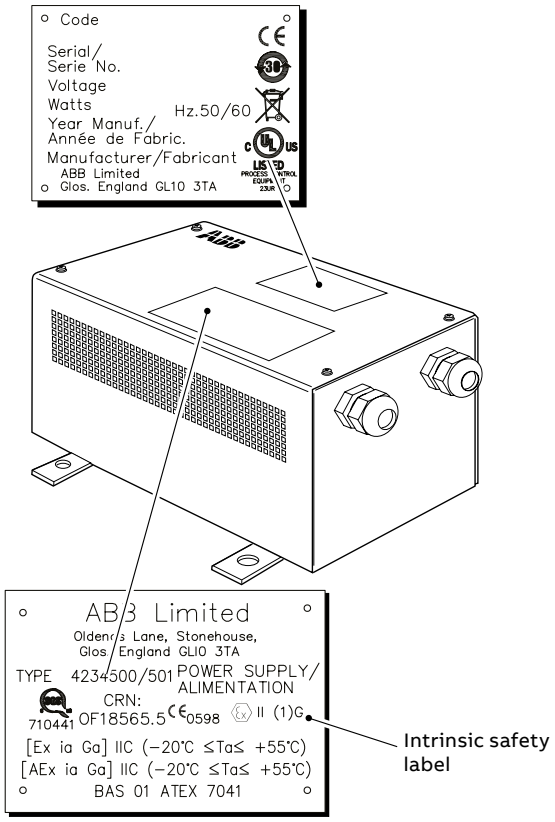


Figure 6 Typical identification labels and locations – model 4234 type power supply unit

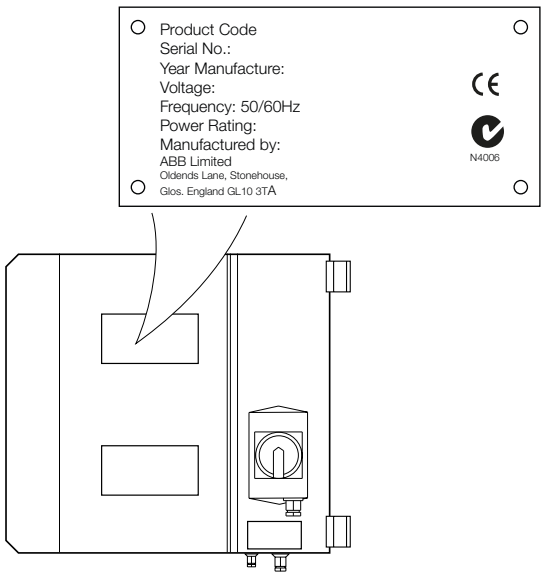


Figure 7 Typical identification labels and locations – cubical option incorporating 6553 type display unit and 4234 type power supply unit

...3 Mechanical installation

Locating and mounting system items

Models 6553 type display unit

⚠ WARNING

The display unit **must** be located in the safe area of the application plant in a sheltered interior environment.

The display unit is designed for panel mounting in a position to suit reading of the displays and with access to the rear for electrical wiring interconnections. The panel preparation requirements and installation dimensions are shown in Figure 8. The display unit is secured to the panel by four adjustable cam brackets – two each side of the unit chassis.

Dimensions in mm (in)

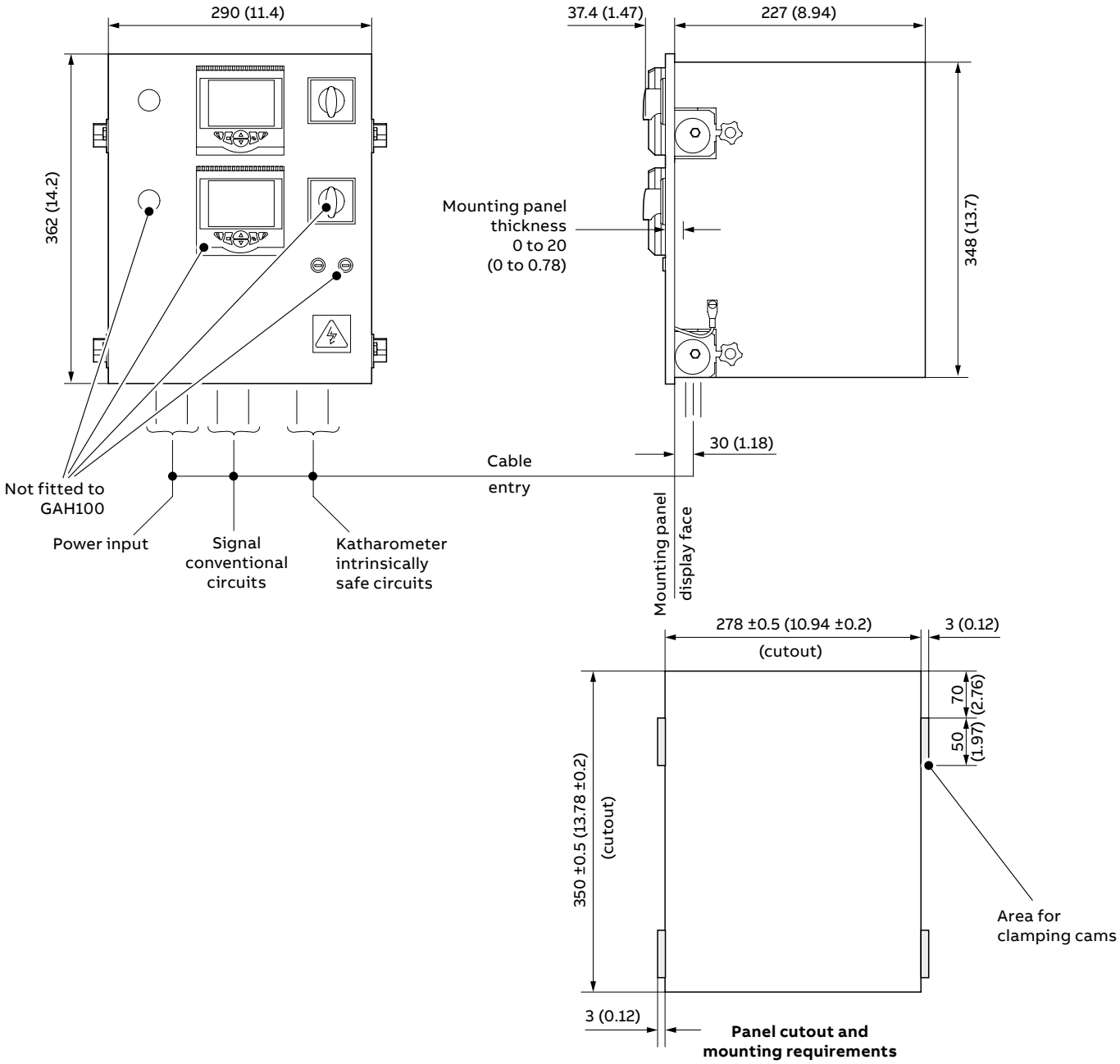


Figure 8 Installation dimensions – model 6553 type display unit

Katharometer analyzer panel

Refer also to IM/6517-6518 for further details.

> **⚠ WARNING**
>
> The panel is located in the hazardous area (Zone 0, 1 or 2) of the application plant in a sheltered interior environment.

Avoid locations that could subject the katharometer unit to direct sunlight. When two katharometer panels are used locate them in positions that have the same ambient temperature.

The katharometer unit is fixed to the panel that has fixing holes at each corner for mounting on a suitable vertical surface close to the sample tapping point. The installation dimensions for the panel are shown in Figure 9.

Dimensions in mm (in)

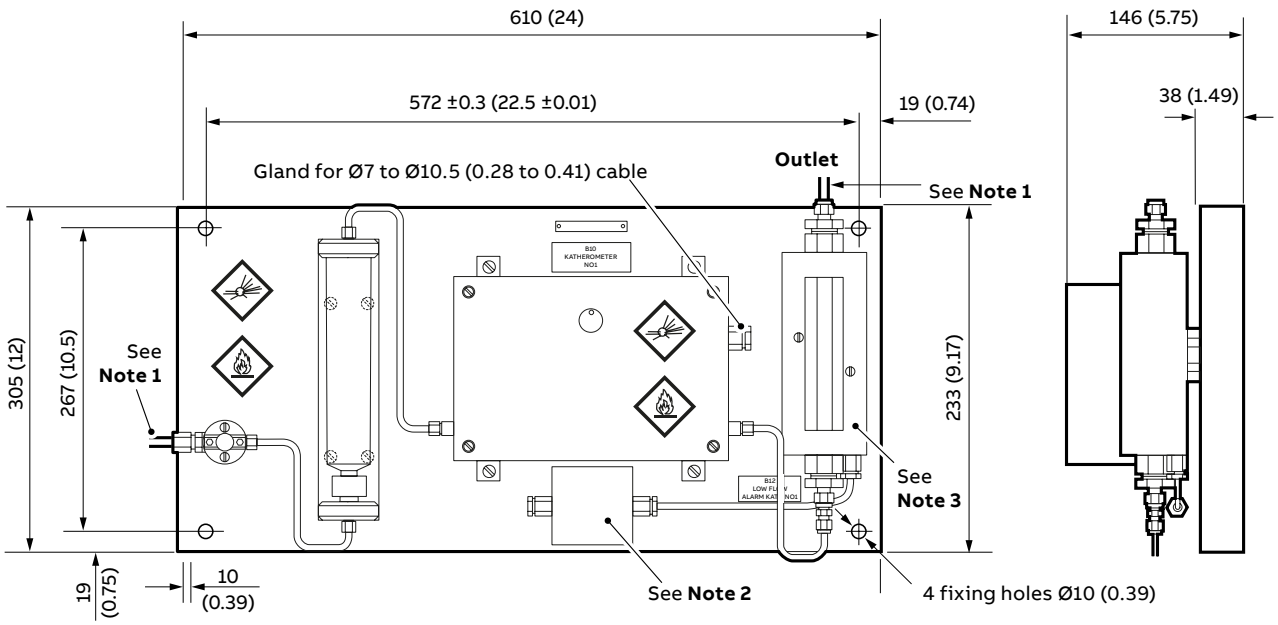


Figure 9 Installation dimension – model 6548 type katharometer analyzer panel

Notes.

1 Coupling for Ø6 (0.24) tube.

2 Terminal box fitted only to systems equipped with optional low flow alarm.

3 A different type of flow gauge is fitted to systems not equipped with the optional low flow alarm – see Figure 1 on page 6.

...3 Mechanical installation

...Locating and mounting system items

Model 4234 type power supply unit
Refer also to IM/4234500 for further details.

⚠ WARNING

The unit **must** be located in the **safe** area of the application plant in a sheltered interior environment.

The power supply unit has four fixing lugs for mounting on a suitable vertical surface. The installation dimensions are shown in Figure 10.

Dimensions in mm (in)

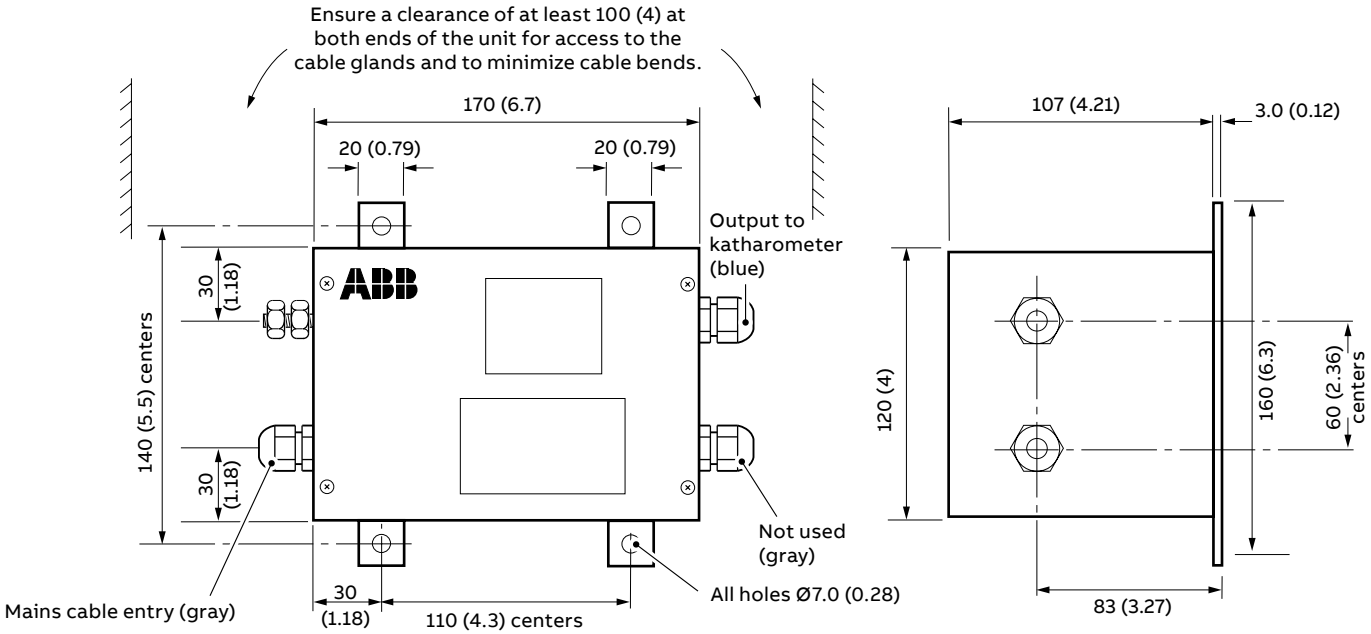


Figure 10 Installation dimensions – model 4234 type power supply unit

Sample gas interconnections

⚠ WARNING

A hazardous mixture of hydrogen in air could develop in the event of leakage from the sample gas system. Mount katharometer analyzer panels in a ventilated area.

The sample pressure must not exceed 10 bar (gauge).

The incoming sample gas temperature must not exceed 55 °C (131 °F). Ideally, allow the sample gas temperature to reach ambient temperature before entry to the Katharometer unit.

If there is a risk of significant particle contamination, incorporate a suitable 1 µm filter unit in the system before the sample gas enters the analyzer system.

Compression couplings are supplied at the sample inlet and outlet to the katharometer panel. These couplings are suitable for connecting 6 mm (0.24 in) outside diameter metal tube. It is recommended that stainless steel tube is used.

Test the complete tubing system for leaks in accordance with the requirements of the responsible authority.

4 Electrical installation

⚠ DANGER

- Equipment in this system operates on AC mains supply voltage electricity. Suitable safety precautions must be taken to avoid the possibility of electric shock.
- 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.

⚠ WARNING

- Although certain instruments are fitted with internal fuse protection, a suitably rated external protection device, either a 3 A fuse or miniature circuit breaker (MCB), must also be fitted by the installer.
- The proper electrical connections and wiring standards must be achieved to establish the intrinsic safety of the system, as certified.
- AC input, intrinsically safe DC output and nonintrinsically safe wiring must all be routed separately.

Electrical interconnections

Figure 11 on page 14 shows the interconnecting wiring requirements for the GAH series gas analyzer systems; these requirements must be strictly observed. Details of cable requirements, that must be strictly adhered to, are also given – see **Cable requirements** on page 22.

After completing the wiring, check that the continuity earthing (grounding) and isolation of all circuits is to the required local electrical standards for intrinsically safe circuits.

The separate units of the Analyzer system must be interconnected as detailed in **Model 6553 type display unit** on page 16, **Model 6548 type katharometer analyzer panel** on page 20 and **Model 4234 type power supply unit (PSU)** on page 21.

…4 Electrical installation

…Electrical interconnections

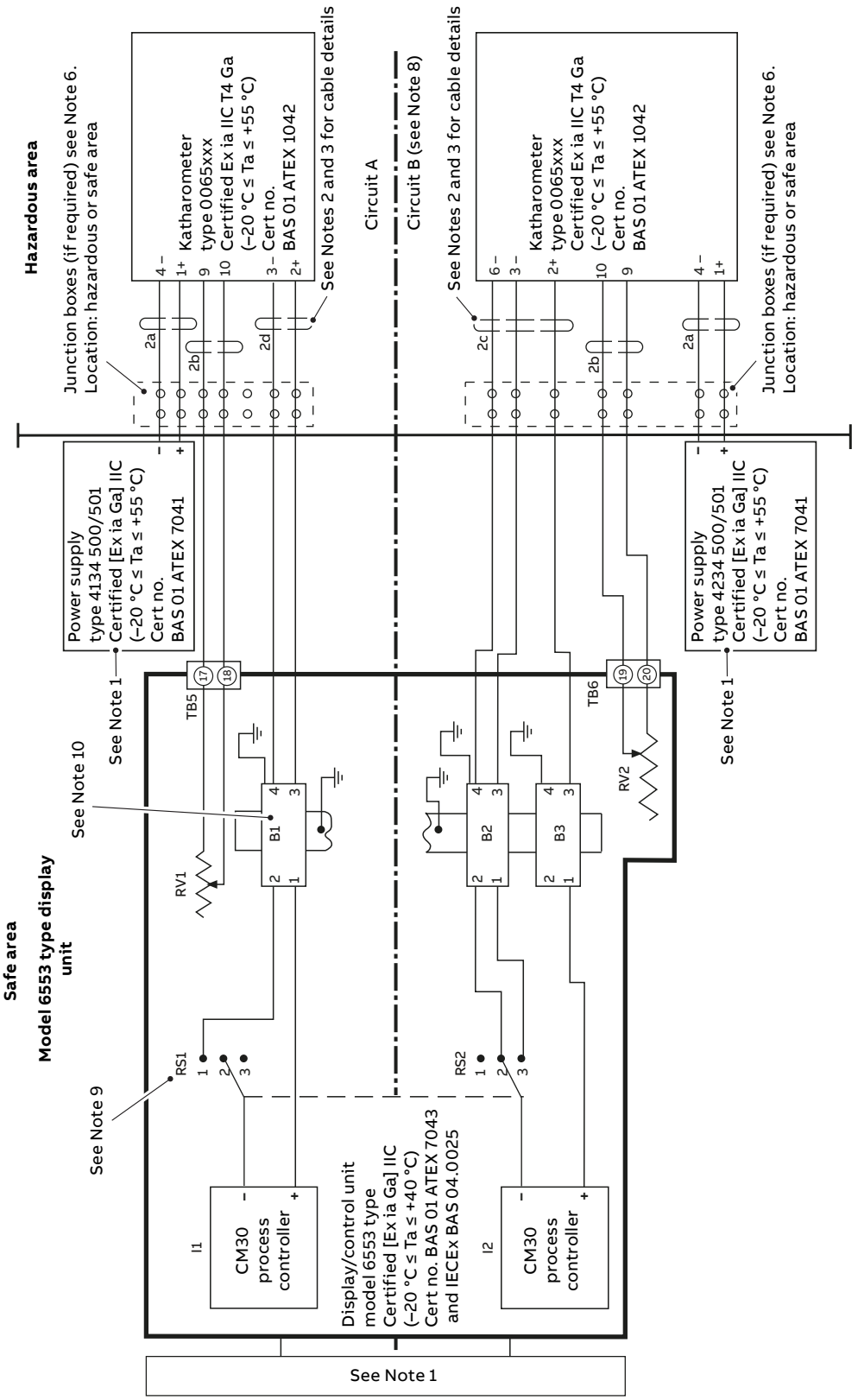


Figure 11 GAH series gas analyzer systems – interconnecting wiring requirements

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 V r.m.s or 250 V 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 4234 type 500/501 and terminals 1 and 4 of a katharometer type 0065XX must not exceed the following values:

Group	Capacitance	Inductance or L/R ratio	
	in µF	in mH	in µH/Ω
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 cables connected between (a) terminals 17 and18 of the gas monitor type 6653 and terminals 9 and 10 of a katharometer type 0065XX, (b) terminals 19 and 20 of the display/control unit and terminals 9 and 10 of a katharometer type 0065XX, (c) terminal 4 and 5 of barrier B1 of gas monitor type 6653 and terminals 2 and 3 of a katharometer type 0065XX, must not exceed the following values:

Group	Capacitance	Inductance or L/R ratio	
	in µF	in mH	in µH/Ω
IIC	38	0.40	75
IIB	999	1.20	225
IIA	999	3.20	600

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

Group	Capacitance	Inductance or L/R ratio	
	in µF	in mH	in µH/Ω
IIC	40	0.05	52
IIB	999	0.16	210
IIA	999	0.43	421

Note 2d The capacitance and either the inductance or the inductance to resistance (L/R) ratio of the cables connected between terminals 3 and 4 of barrier B1 of gas monitor type 6553 type and terminals 2 and 3 of katharometer type 0065XX, must not exceed the following values:

Group	Capacitance	Inductance or L/R ratio	
	in µF	in mH	in µH/Ω
IIC	40	0.37	79
IIB	999	1.37	88
IIA	999	3.28	632

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 must 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, for example, '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).

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.

Note 10 Zener barriers (B1, B2 and B3) MTL 7755ac BAS 01 ATEX 7217 and IECEx BAS 04.0025.

...4 Electrical installation

Model 6553 type display unit

⚠ DANGER

- Do not make connections to the hazardous area terminals (terminal blocks TB5 and TB6) other than those specified in Figure 13. The appropriate cable requirements must be strictly adhered to.
- The earthing of B1 and B2 via TB-IS Earth must be in accordance with EN 60079-14. The cable must be insulated and the conductor must be 4 mm^2 cross sectional area minimum.

Remove the outer case from the back of the unit to gain access to the terminal blocks.

Make electrical connections through the bottom of the unit into the terminal blocks immediately above them – see Figure 12.

The alarm and signal outputs on terminal blocks TB3 and TB4 may be connected as required. The availability of signal outputs vary with the particular 6553 type system – see Figure 13 for details.

Make the wiring connections in accordance with the information given in Figure 13 and **Electrical interconnections** on page 13.

⚠ DANGER

The integrity of the fail-safe operation of the Zener diode safety barrier devices depends on an intrinsically safe earth connection which must not have a resistance greater than 0.1 Ω to the application plant earth (ground).

Make the mains and case earth (ground) connection at stud (TS1) – see Figure 12.

On completion of wiring and checks, replace the outer case and secure the clamping brackets to the mounting panel.

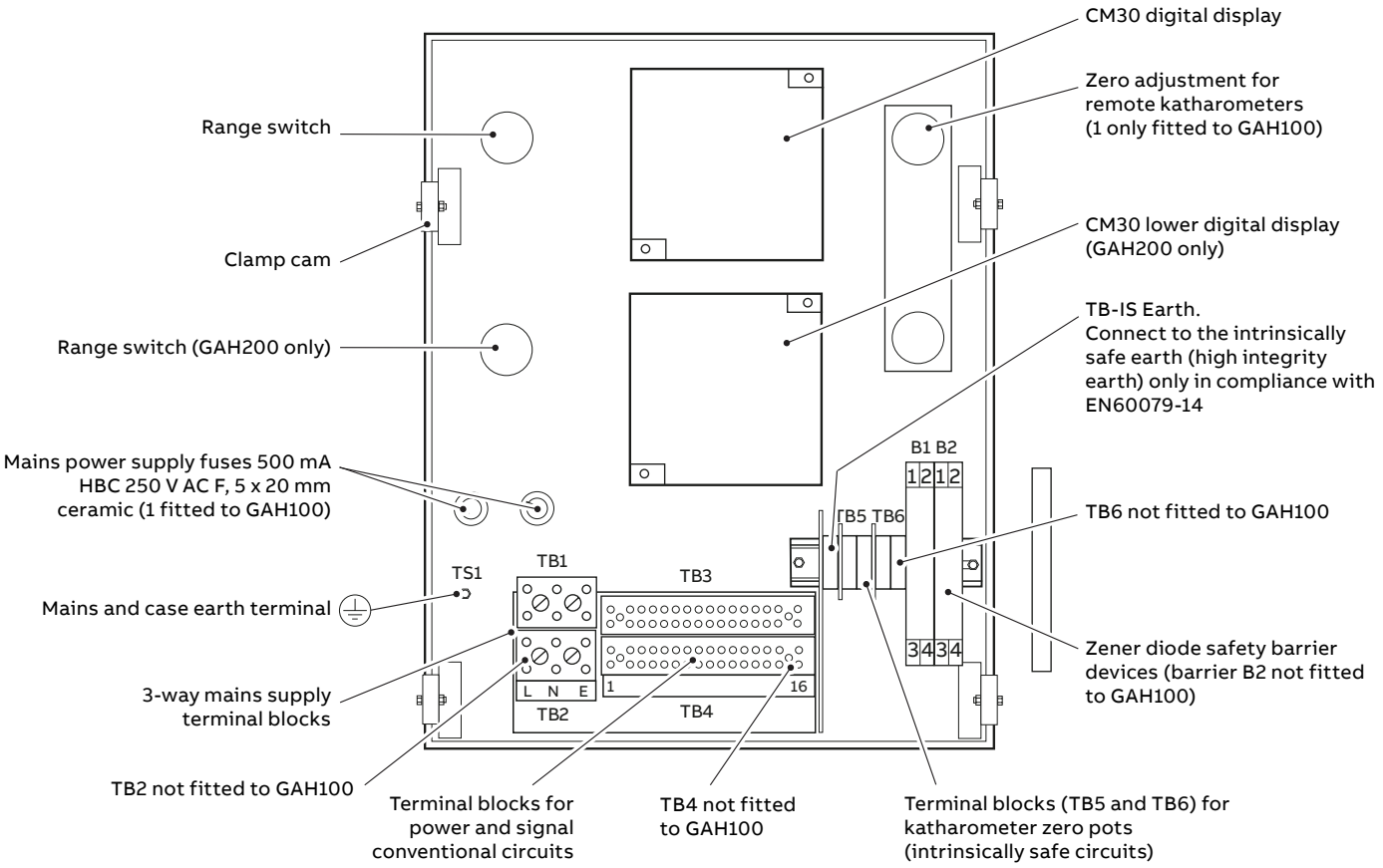
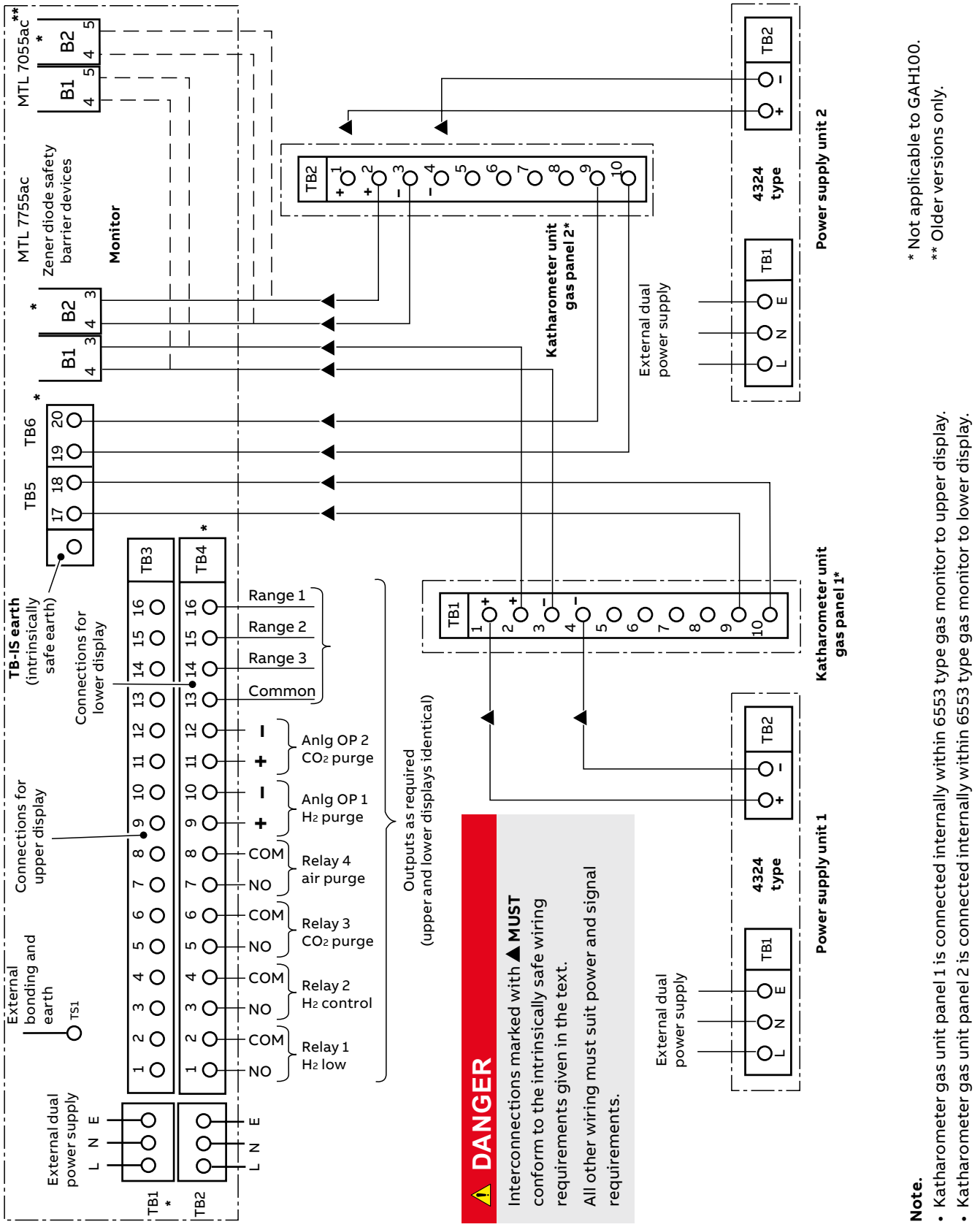


Figure 12 Location of components inside case (rear view) – model 6553 type display unit

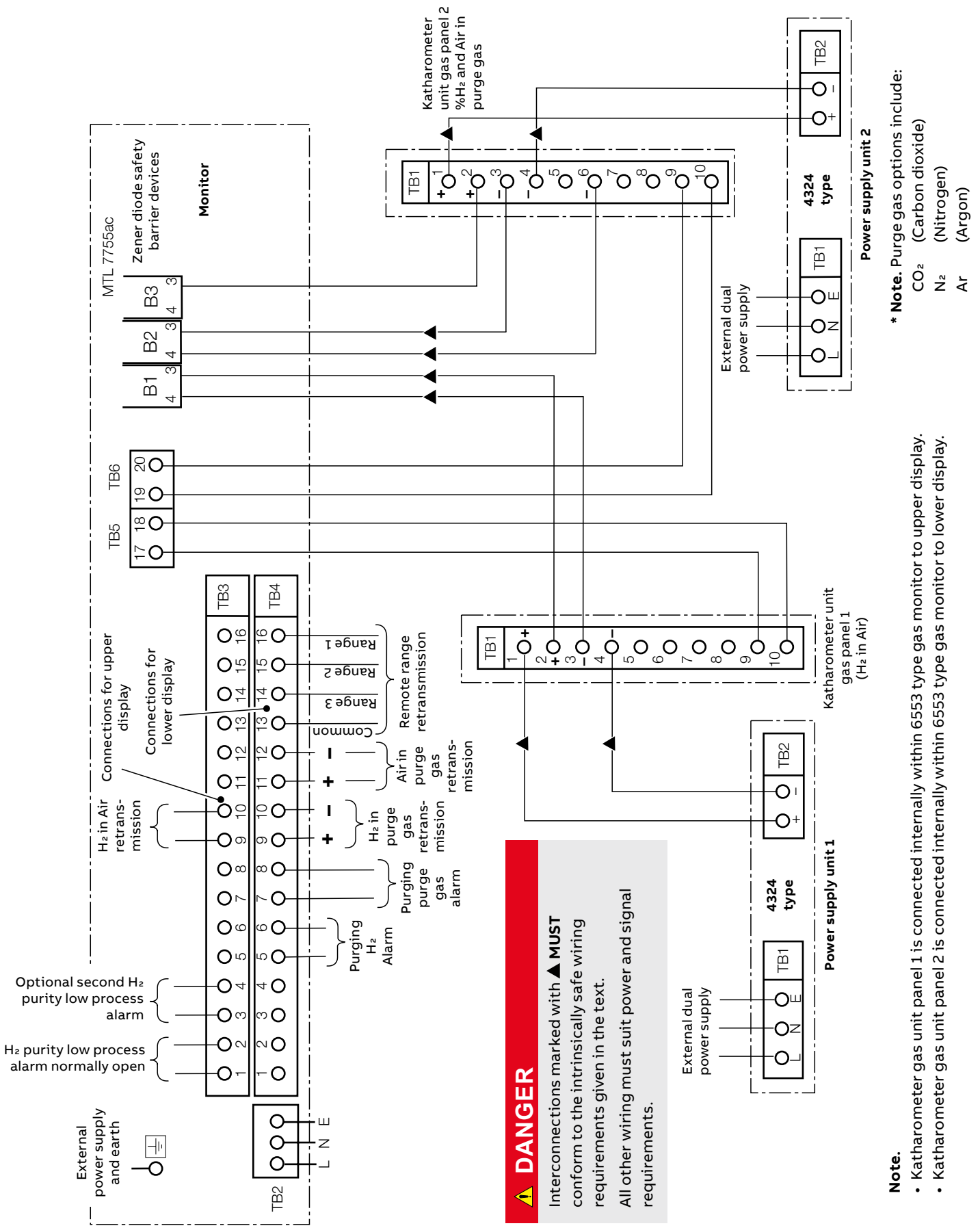


* Not applicable to GAH100.
** Older versions only.

Note.

- Katharometer gas unit panel 1 is connected internally within 6553 type gas monitor to upper display.
- Katharometer gas unit panel 2 is connected internally within 6553 type gas monitor to lower display.

Figure 13 Interconnection wiring diagram – GAH100 and GAH200 wiring diagram for single and dual 3-range systems (H2 purity and purge monitoring)



Note.

- Katharometer gas unit panel 1 is connected internally within 6553 type gas monitor to upper display.
- Katharometer gas unit panel 2 is connected internally within 6553 type gas monitor to lower display.

*** Note.** Purge gas options include:

CO_2 (Carbon dioxide)
N_2 (Nitrogen)
Ar (Argon)

Figure 14 Interconnection wiring diagram – GAH200 Wiring Diagram for AK101 equivalent systems, Hydrogen Purity on system 1 and Dual Purge on system 2

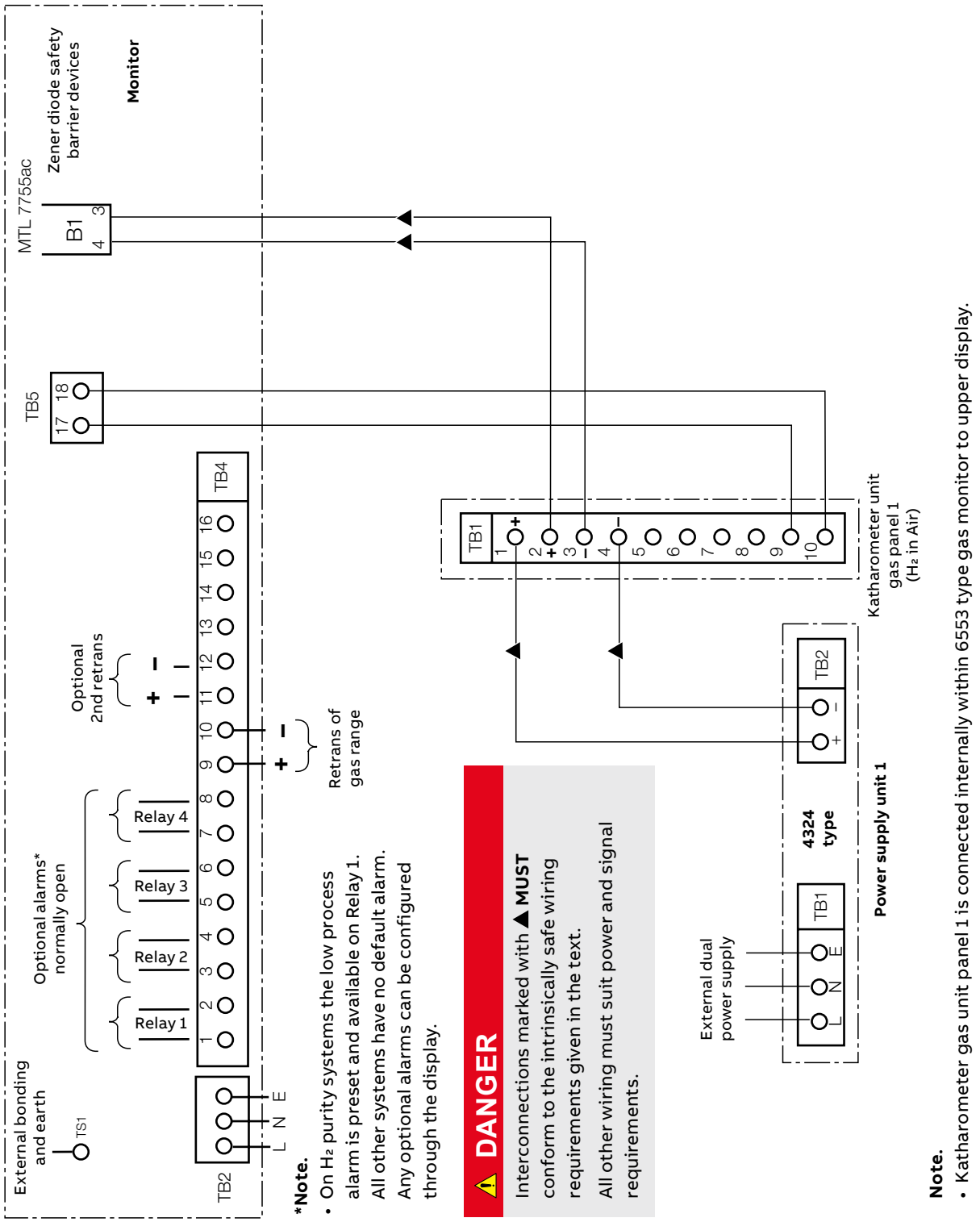


Figure 15 Interconnection wiring diagram – GAH100 wiring diagram for single range systems (eg H2 purity)

...4 Electrical installation

Model 6548 type katharometer analyzer panel
Refer also to IM/6517-6518 for further details.

To gain access to the connection terminal block TB1:

1 Remove four screws in the cover of the katharometer unit.

2 Remove cover.

Make the electrical connections to the display unit in accordance with the information given in Figure 13 and Figure 16 and **Intrinsically safe requirements** on page 22.

The electrical connections are made at the terminal block (TB1) via the cable gland or any replacement gland to suit the intrinsically safe wiring requirements. When the appropriate interconnections have been made, if remote zero is to be used, remove the 510 W dummy remote zero resistor from across terminals 9 and 10 and set the zero adjustment potentiometer on the katharometer to the approximate mid-point.

Replace the cover when wiring is complete.

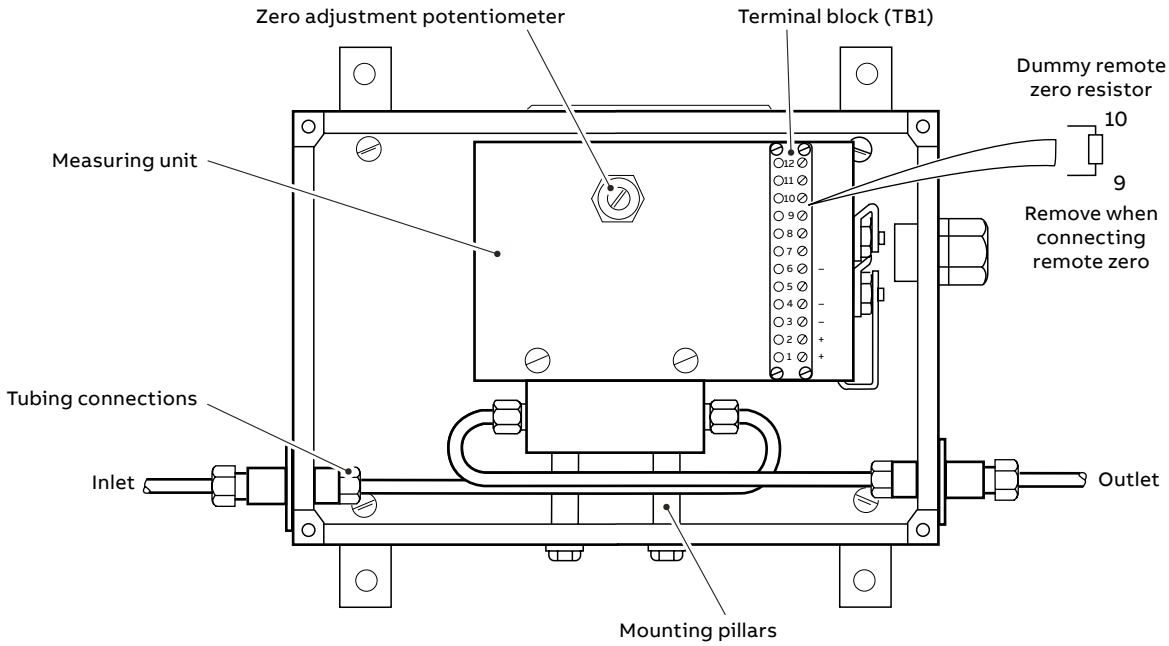


Figure 16 Location of components inside case – model 6548 type katharometer unit

Model 4234 type power supply unit (PSU)

Refer also to IM/4234500 for further details.

⚠ DANGER

Hazardous voltages

- **DO NOT** connect a mains supply to the PSU with the output terminals on open circuit.
- There are no serviceable parts in the PSU. Return the PSU to the manufacturer if faulty or seek the services of a qualified engineer.
- Isolate the PSU from the mains supply before removing the cover.

NOTICE

Ensure that the PSU is correct for the mains supply voltage available. A 115 V PSU cannot be adapted for use with a 230 V supply or vice versa. Ensure the voltage link is set to correct supply voltage – see Figure 17.

Isolate the PSU from the mains supply and remove the cover to gain access to the terminal blocks.

Identify terminal block (TB1) adjacent to transformer T1 and ensure the correct transformer tapping is used for the incoming mains supply – for example:

link from tapping 6 to 10 for 230 V.
or
link from tapping 8 to 10 for 115 V.

Make electrical connections in accordance with the information given in Figure 11 and Figure 13 and in **Cable requirements on page 22**.

The electrical connections are made at terminal blocks TB1 and TB2 through the appropriate cable gland or any replacement gland to suit intrinsically safe wiring requirements. Secure the incoming cable using the cable clips adjacent to the terminal blocks.

Replace the cover when wiring is complete.

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

DO NOT make any connections to points A or B

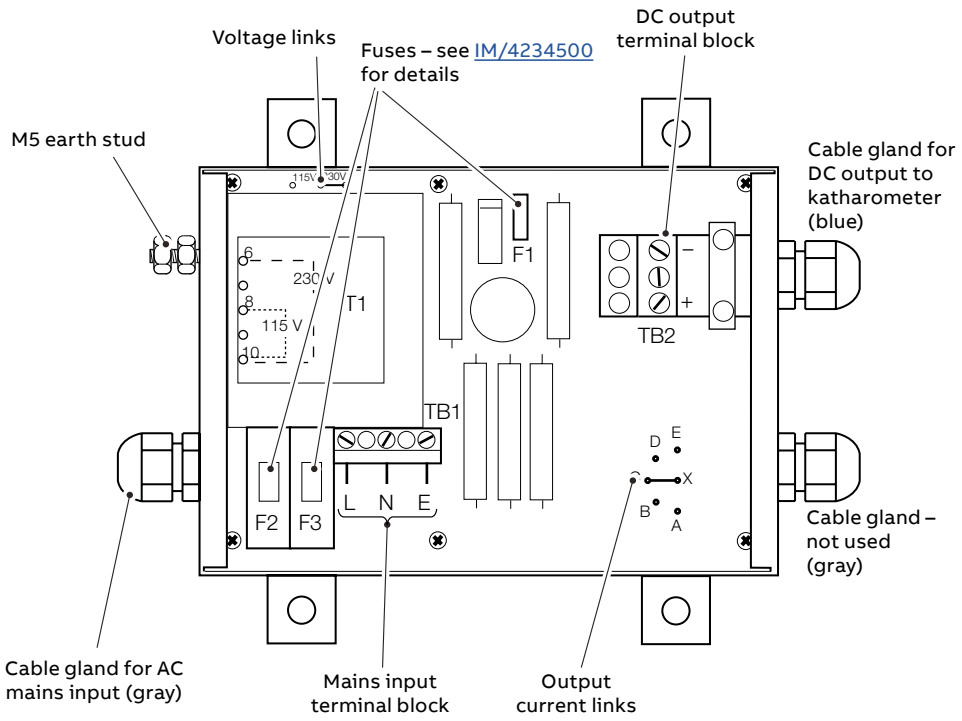


Figure 17 Location of components inside case – model 4234 type power supply unit

...4 Electrical installation

Intrinsically safe requirements

These requirements relate to the interconnecting wiring made to and from model 6548 type katharometer analyzer panels in the hazardous area and those for remote ancillary items connected to the system.

Cable requirements

The interconnecting cables between the various components of the gas analysis system are subject to stringent limitations because of the requirements of the intrinsic safety certification. These are listed below and detailed in Figure 11 on page 14.

Components installed in safe areas must use cable suitably rated according to the regulations of the country in which the equipment is being used.

All cables entering the hazardous area must be kept separate from cables in the safe area. Cables entering the hazardous area must not be routed with other cables and terminations must have an earthed screen to separate them from connections for other circuits. The detailed requirements are as follows:

- **Connections between model 6548 type atharometer analyzer panels and the 4234 type PSU**
  - All cables from the katharometer in the hazardous area must have an inductance/resistance ratio not exceeding 22 µH/ W (for Group IIC gases). Refer also to Figure 11 on page 14, Note 2a. In addition, the maximum loop resistance of the interconnecting cable is limited to 1.5 Ω; this may place a limitation on the length of the total cable run. These wires are indicated by a ▲ in Figure 13 on page 17.
  - Twist single sheathed conducting cables together to reduce their mutual inductance and route them separately from cabling for non-intrinsically safe circuits in the safe area.
- **Connections between model 6548 type katharometer analyzer panels and model 6553 type display unit**
  - Katharometer to display unit cables, carrying the output signals through Zener barrier units inside the display unit, are subject to a maximum inductance/resistance ratio of 79 µH/Ω (for group IIC gases). Refer also to Figure 11 on page 14, Note 2d. These wires are indicated by a ▲ in Figure 13 on page 17.
- **Connections between model 6548 type katharometer analyzer panels and model 6553 type display unit**
  - Katharometer 9 and 10 to 6553 type display unit terminals TB5 and TB6 cables are subject to a maximum inductance/resistance ratio of 75 µH/Ω. Refer also to Figure 11 on page 14 Note 2b. These wires are indicated by a ▲ in Figure 13 on page 17.

Interconnection cables

The choice of wiring cable is restricted by the limitations imposed by the certification parameters. Care must be taken to ensure that the specification of the cable required for interconnection lengths is such that the certification parameter limits are not exceeded – see Figure 11 on page 14, Notes 2a, b, c and d and Notes 3 and 4.

Installing remote ancillary items

Indicators/controllers or other electrical equipment connected to TB1 of the model 6553 type display unit must not be supplied from, nor contain, a voltage source greater than 250 V DC or 250 V RMS with respect to earth.

Full intrinsically safe requirements

If systems are to be modified or used with other gases, the full ATEX requirements must be complied with as follows:

- The total capacitance and inductance or inductance to resistance ratio (L/R) of the cables connecting the katharometer unit to the hazardous area terminals of the display unit (TB2) and power supply unit terminals (TB1) must not exceed the values in Figure 11 on page 14.
- Junction boxes used in the hazardous or safe areas must conform to ATEX Directive 9/94/EC, specifically clauses 6.1 and 6.3.1 of EN60079–0 (2012) and EN60079–11 (2012).

When the GAH series gas analyzer systems have been correctly installed in accordance with the requirements for intrinsic safety in this Section, refer to **Setting up** on page 23 for system set up.

5 Setting up

Note. CO_2 is referred to throughout this manual as the purge gas. However, other gases such as argon or nitrogen may be used instead.

Katharometer analyzer panel – filling the drying chamber

Referring to Figure 1 on page 6:

1 Remove the drying chamber on the katharometer analyzer panel by unscrewing the large knurled nut at the base of the chamber. Pull the chamber down and out of the sealing groove to remove it from the panel.

   Note. The desiccant used in the drying chamber is granular anhydrous calcium sulphate and absorbs moisture from the atmosphere. The drying chamber has a capacity of approximately 140 ml and requires approximately 100 g of desiccant to fill it. Filling and resealing must be performed as quickly as possible.

2 Open a container of fresh desiccant and fill the drying chamber.

3 Replace the drying chamber in its sealing groove and reposition the chamber to enable it to be secured and sealed by hand tightening the knurled nut.

4 Perform an approved leak testing procedure before passing sample gas through the system.

Setting sample flow

When all tubing interconnections have been made and external parts of the sample system checked for leaks, perform the following procedure:

1 Supply calibration quality CO_2 or argon through the gas analyzer system at the normal working pressure of the application plant. Do not exceed the maximum pressure of 125 mm H_2O min. to 10 bar (gauge) max.

   Note. In some instances, testing for leaks with CO_2 or argon may not be considered an adequate check of gas-tight integrity in respect of the more penetrating hydrogen gas. Consideration should be given to the use of a gas that has penetrating properties similar to hydrogen (for example, helium).

2 Slowly open the metering valve to give a nominal flowrate of gas of 100 to 150 ml min^{-1}. Do not exceed the maximum flowrate of 250 ml/min.

3 Set the flowrate and shut off the calibration gas external to the analyzer system.

4 Repeat this procedure for each katharometer analyzer panel, as required.

...5 Setting up

Electrical checks

Perform the electrical checks described in **Power supply unit output** and **Zener diode safety barrier devices**.

Power supply unit output

⚠ DANGER

This unit is part of the certified intrinsically safe system. Appropriate safety precautions must be taken to prevent any incendive electrical discharges in the hazardous area when performing this task.

Testing the output may only be performed with the hazardous area cable disconnected.

1 Isolate the PSU from the power supply.

2 Remove the cover from the PSU.

3 Disconnect the output wires to the hazardous area at terminals TB2+ and TB2–.

⚠ DANGER

Ensure that proper electrical safety precautions are taken at all times when undertaking this procedure.

4 Restore the PSU's power supply and check that the output measures 350 mA into a 14 Ω load.

5 On completion of tests, Isolate the PSU from the power supply and reconnect the output wires to the hazardous area at terminals TB2+ and TB2–.

Zener diode safety barrier devices

Zener diode safety barrier devices are fitted to the katharometer system as detailed in Table 5.1 and are checked at the time of manufacture. To ensure absolute safety, check that the barriers are correctly earthed by performing an appropriate test before using the katharometer system.

⚠ DANGER

- The Zener diode safety barrier devices are certified intrinsically safe and form part of the certified intrinsically safe system. Appropriate safety precautions **MUST** be taken to prevent any incendive electrical discharges in the hazardous area when testing the barriers.
- If the tests identify a faulty barrier, it **MUST** be replaced by a new unit **OF THE SAME TYPE** – see Table 1. The barriers are sealed units and repairs **ARE NOT** permitted.

Table 1 Zener diode safety barriers

Barrier type	Location	Conforms to ATEX Directive 9/94/EC certificate number
MTL7755ac	6553 type display unit	BAS 01 ATEX 7217 and IECEx BAS 04.0025
MTL7767+	Low flow alarm (if fitted)	BAS 01 ATEX 7202

Checking intrinsically safe earth

Check that the resistance between the earth terminal connecting the Zener barriers in the 6553 type display unit and the application plant system high integrity earth does not exceed 0.1 Ω.

6 Displays, overview

CM30 operator page, icons and keys

The CM30 display and icons are shown in Figure 18 and the CM30 front panel keys are shown in Figure 19.

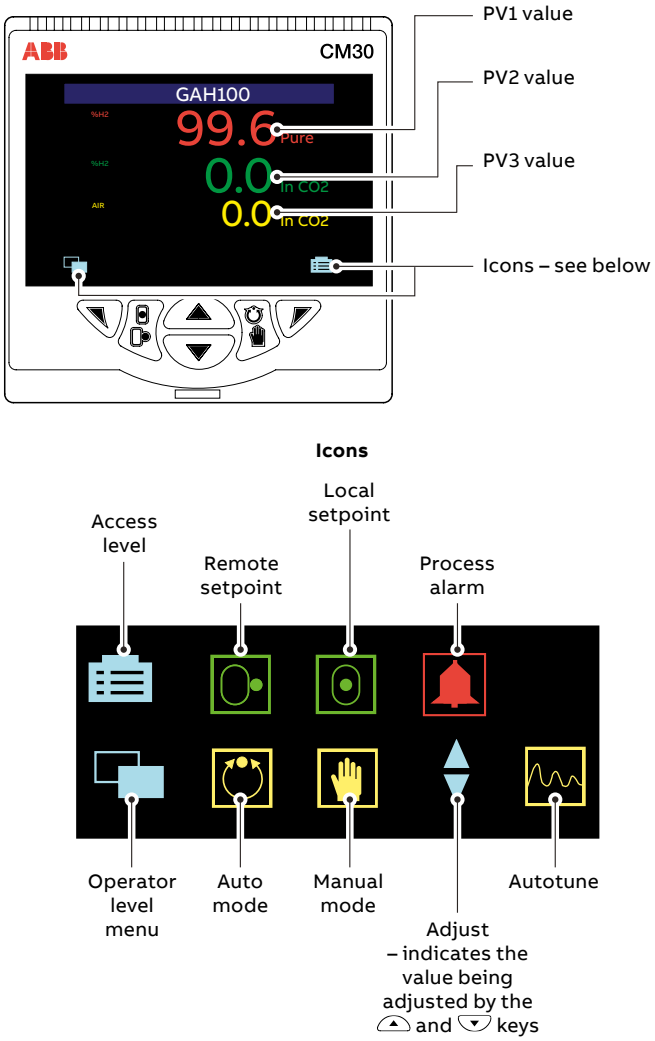


Figure 18 CM30 displays and icons

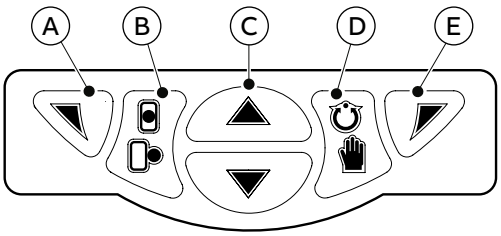


Figure 19 CM30 front panel keys

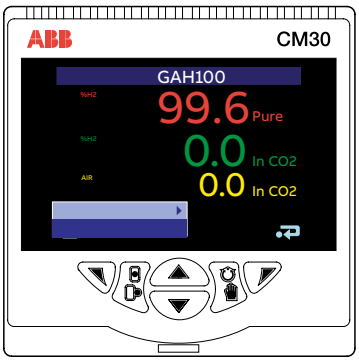
Table 2 CM30 front panel key functions

(A)	Navigation (left)/**Operator Level** access key
(B)	Local/Remote setpoint mode selection key
(C)	Up/Down keys – navigate up/down menus and increase/decrease displayed values
(D)	Auto/Manual control mode selection key
(E)	Navigation key (right)/programmable **Soft Key**

Note. When a **Soft Key** option is assigned to key (E), the **Advanced Level** must be accessed using the **Operator Level** access key (A).

...6 Displays, overview

Operator level menus



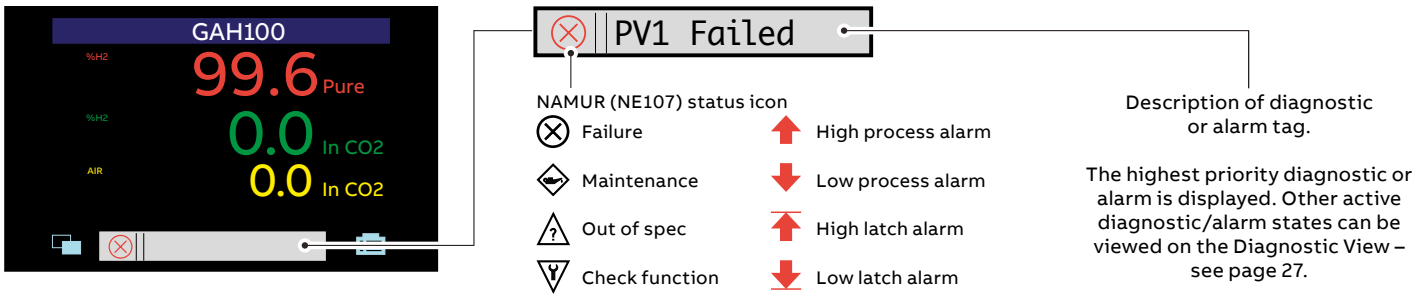
Operator level menus are used to adjust setpoint(s) and output(s), select setpoints, select the view and to enter **Basic** and **Advanced** modes (via the Access level) – see page 27.
To access **Operator Level** menus:

1 From the **Operator Page**, press the key to view the available menus.

2 Use the and keys to scroll through the menus and menu options.

3 Press the key to expand menu levels and to select menu options, or press the key to return to the previous menu.

Diagnostic status bar



Diagnostic view

The **Diagnostic View** can be selected from the **Operator/View Select** menu. All currently active diagnostic alarm states are displayed in the **Diagnostic View**.

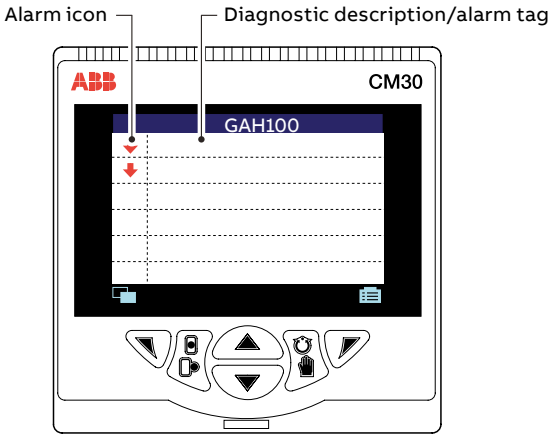


Figure 20 CM30 diagnostic view

Security options

Passwords can be set to enable secure end-user access at 2 levels: **Basic** and **Advanced**. A **Service** level is also listed; this is password-protected at the factory and reserved for factory use only.

Passwords are set, changed or restored to their default settings at the **Device Setup**/**Security Setup** parameter.

Note. When the CM30 is powered-up for the first time the **Basic** and **Advanced** level levels can be accessed without password protection. Protected access to these levels must be allocated on-site as required.

Access level

Table 3 Access levels

Level	Access
Logout	Displayed after **Basic** or **Advanced** level are accessed. Logs the user out of **Basic** or **Advanced** level. If passwords are set, a password must be entered to access these levels again after selecting **Logout**.
Read only	Enables all parameter settings to be viewed as read-only parameters.
Basic	Enables access to the **Basic** level and adjustment of PID parameters, autotuning configuration and adjustment of alarm trip points.
Advanced	Enables configuration access to all parameters.
Service	Reserved for use by authorized service personnel.

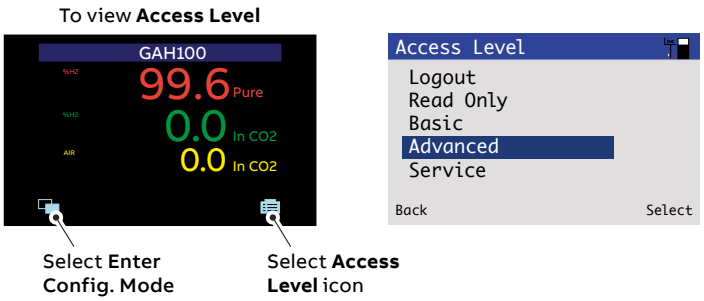
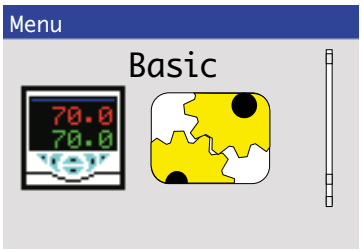


Figure 21 Access level

Note. A 5-minute time-out period enables a user to return to the **Operator** page and re-access the previous menu (displayed at exit) without re-entering the password. If 5-minute time-out period is exceeded, or if **Logout** is selected, a password must be entered to access protected levels.

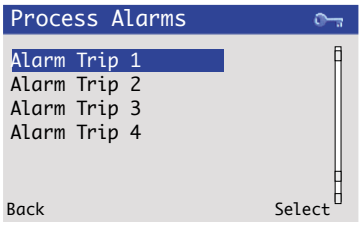
7 Basic level



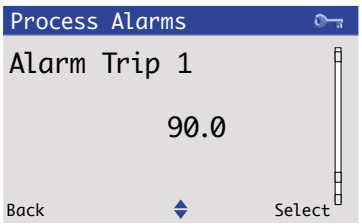
The **Basic** menu provides access to the tunable control settings and setpoint values.

Process Alarms

Alarm Trip 1(4) The alarm trip point value required.



Use the ▲ and ▼ keys to select the alarm to adjust and press the ◥ key.



Use the ▲ and ▼ keys to increase/decrease the alarm trip point value and press the ◥ key when the value required is displayed.

8 Start-up

⚠ DANGER

When the analyzer is connected to the power supply, terminals may be live and the opening of covers or removal of parts (except those to which access may be gained by hand) is likely to expose live parts.

Note. CO_2 is referred to throughout this manual as the purge gas. However, other gases such as argon or nitrogen may be used instead.

In normal operation, the range selector switch is set to position 1 and the H_2 purity range is displayed.

When all the required wiring connections and electrical checks have been made correctly, switch on the power supply to the analyzer as follows:

1 Switch on the supply to the PSU.

2 Switch on the supply to the 6553 type display unit.

Alarms

Alarm action description

An alarm relay is energized during normal non-alarm relay states and is de-energized upon recognition of an alarm condition, thereby providing 'fail-safe' alarms. For example, if alarm 2's trip point is set to 95.0 %, when the display indicates greater than 95.0 % (plus hysteresis), alarm relay 2 is energized. When the display indicates less than 95.0 % (minus hysteresis), alarm relay 2 is de-energized. This operating mode ensures that an alarm condition is signaled in the event of a mains power failure.

Hydrogen alarm trip point

It is recommended that the hydrogen alarm trip points are based on a reducing percentage of hydrogen as it is displaced by air entering the application plant. This can be achieved by setting alarm 1 and alarm 2 to give ample warning of the development of a potentially explosive mixture. Factory settings are Alarm 1 = 93.0 % and Alarm 2 = 95.0 %.

Gas calibration

Introduction

Before putting the system on-line, it is recommended that a calibration check for the 'zero' reading is made using calibration standard sample gas.

The 'zero gas' is marked permanently on the data plate of the katharometer unit. This gas, when passed through the katharometer, gives a zero millivolt output. To provide a fail-safe condition, the zero gas is 85 % hydrogen in nitrogen mixture. This ensures that, if the power supply to the katharometer fails, an alarm condition occurs.

Full scale output from the katharometer is obtained by a 100 % hydrogen gas sample and no adjustment of the katharometer output is normally required. The maximum signal for the full scale reading is sealed during manufacture and must not be altered by users.

With the katharometer adjusted correctly using the 'zero gas' hydrogen in nitrogen mixture, carbon dioxide (or argon) and air mixtures are displayed correctly when the selector switch is in the appropriate position.

...8 Start-up

Range calibration

Note.
- Test for leaks in accordance with the requirements of the responsible authority for site safety after making any hydrogen connections.
- The procedure detailed below is not normally necessary as the ranges are set at the factory.

1 **Select range 1**
Pass an 85 % H_2/15 % N_2 gas mixture through the katharometer and allow the reading to stabilize. Adjust the katharometer zero potentiometer or remote zero (if fitted) to give a reading of 85 % H_2 in air.

2 Pass 100 % H_2 through the katharometer and allow the reading to stabilize. If necessary adjust the katharometer span potentiometer (R7) to give a reading of 100 % H_2.

3 **Select range 3**
Pass 100 % CO_2 or argon through the katharometer and allow the reading to stabilize. Adjust the katharometer span potentiometer (R7) to give a reading of 0 % air in CO_2/argon.

4 Pass 100 % air through the katharometer and allow the reading to stabilize. Adjust katharometer span potentiometer (R7) to give a reading of 100 % air in CO_2 or argon (only if the reading is greater than 100 %).

5 **Select range 1**
Pass 100 % H_2 through the katharometer and allow the reading to stabilize. Adjust the katharometer zero potentiometer or remote zero (if fitted) to give a reading of 100 % H_2 in air.

6 Repeat steps 3 to 5 and adjust as necessary.

9 Operation

Note. CO_2 is referred to throughout this manual as the purge gas. However, other gases such as argon or nitrogen may be used instead.

Normal

During normal operation, the GAH series analyzer systems are used to indicate the purity of hydrogen used as a coolant. The display shows the percentage of hydrogen in air, that should be safely in excess of the explosive limit at the hydrogen rich end.

There are no routine adjustments required to the analyzer system after completion of start-up procedures and putting on-line in monitoring mode. The system requires only the performing of safety routines and minor adjustments to the metering valve to maintain the required flowrate.
A summary of the functions and status of the system for the different range selector switch positions is shown in Table 9.1.

Purging of hydrogen coolant gas

Initially, inert purge gas (CO_2) is introduced into the system. When the hydrogen concentration is safely below the explosive limit, air is introduced into the system to completely displace the purge gas and remaining hydrogen.

The GAH series analyzer systems provide all the necessary indications and output signals to enable this operation to be performed safely.

⚠ CAUTION

Observe the safety procedures that apply to the operation of gas cooling and sample systems.

To purge the system of hydrogen coolant:

1. Set the range selector switch on the display unit to position 2.
2. Commence the purging operation.
3. When the changeover to introduce air into the application plant is made, set the range selector switch to position 3.

Filling with hydrogen coolant gas

This procedure is a reversal of the purging procedure.

Initially, inert purge gas (CO_2) is introduced into the application plant until the air content is safely below the explosive limit for air in hydrogen. When this limit is reached, hydrogen is gradually introduced into the system to displace the purge gas and air.

⚠ CAUTION

Observe the safety procedures that apply to the operation of gas cooling and sample systems.

Note. For optimum accuracy, it is recommended that the filling operation is started within 24 hours of performing the calibration procedure.

1. Set the range selector switch on the display unit to position 3.
2. When the changeover to introduce hydrogen into the application plant is made, set the range selector switch to position 2.
3. When the display indicates that hydrogen filling is complete, set the range selector switch to position 1. The analyzer system is now ready for monitoring H_2 concentration.

Table 4 Functions and status of display units for different range selector switch positions

Range selector switch position	Upper display line		Upper display line		Alarm 1 + 2 set point and retransmission
	Actual display	Function	Actual display	Function	
(1)	xxx.x	Variable value	%H2 IN AIR	Hydrogen purity	As required
(2)	xxx.x	Variable value	%H2 IN CO2 or Ar	Purge gas	Inhibit
(3)	xxx.x	Variable value	%AIR IN CO2 or Ar	Purge gas	Inhibit

10 Maintenance

The katharometer unit and its associated equipment are designed for stable and accurate operation over long periods.

This section covers the requirements for fault finding, diagnostic tests and maintenance tasks.

⚠ DANGER

- Each component in this analyzer system forms an integral part of a certified intrinsically safe system. Appropriate safety precautions must be taken to prevent any incendive electrical discharges in the hazardous area when performing any of the tasks in this Section.
- Equipment in this system operates at AC mains supply voltages. Suitable precautions must be taken to avoid the possibility of electric shock.
- The maximum pressure and temperature limits specified for particular parts of the system must not be exceeded.

Note. After service, repair or modification, the suitably qualified personnel involved must certify that the equipment is in a safe state.

General maintenance

Pressure

The operation of the katharometer units is not affected significantly by changes in pressure providing that they are within the pressure limits – see **Sample pressure** on page 37.

Flow

The katharometer zero balance and sensitivity are independent of the sample flowrate, as the sample gas sensing system depends on molecular diffusion. However, the speed of response is affected by the flowrate. This means that the flow resistance of the drying chamber is a compromise between obtaining speed of response and avoiding a rapid degradation of the desiccant.

Leaks

There is an inherent safety requirement that there are no leaks into or out of the sample system. Any leaks could also affect the correct operation of the katharometer unit.

Vibration

The katharometer unit tolerates reasonable levels of mechanically induced vibration. Pulsations due to unsteady sample flow can affect the katharometer filaments and cause errors due to excessive cooling.

Contamination

Contamination in the sample system can arise from oil or suspended particles, or from erosion of material from the sample system upstream of the katharometer unit.

Ambient temperature

The calibration of the katharometer is not affected significantly by variations of the ambient temperature. Temperature changes can affect the sensitivity and reduce accuracy on sensitive ranges.

Bridge current

The working current supplied from the PSU to the katharometer bridge is 350 mA . This value must remain stable during normal operation as the katharometer output signal is proportional to the cube of the bridge current.

Diagnostic tests

Checking the PSU output

Perform the test procedure in **Power supply unit output** on page 24.

Checking Zener diode safety barrier device integrity

Perform the test procedure in **Zener diode safety barrier devices** on page 24.

Checking the katharometer output

1 Isolate the display unit from the power supply.

2 Remove the outer cover from the katharometer unit.

3 With the katharometer operating:

   a Check that the voltage across terminals TB1 – 1 and TB1 – 4 is not above 4 V with 350 mA passing. If the voltage is above this value it is possible that one or more bridge filaments are broken.

   b Check that the voltage across terminals TB1 – 1 and TB1 – 4 is below 2.8 V with 350 mA passing. If the voltage is below this value and there no zero adjustment is available, it is possible that there is an accumulation of liquid within the katharometer block – see **Removing liquid from katharometer measurement block** on page 33.

4 If the reading in step **3**a is unstable when the katharometer block is tapped gently, it is possible that a filament is damaged but not open circuit.

If any of the above tests indicate that the katharometer is faulty, the complete katharometer unit must be returned for repair or replacement.

The span adjustment of katharometer units are sealed and must not be adjusted unless necessary – see **Range calibration** on page 30.

Routine maintenance

Hydrogen katharometer calibration

Perform a calibration check in accordance with **Gas calibration** on page 29.

Calibration must be performed at intervals of 3 months of on-line use.

Purge gas katharometer calibration

Perform a calibration check in accordance with **Gas calibration** on page 29.

Calibration should be performed before using the katharometer for monitoring a purging procedure.

Changing desiccant in drying chamber

The need to change the desiccant in the drying chamber on the katharometer analyzer panel depends on the condition of the sample gas.

It is recommended that the analyzer system is monitored regularly during the initial phase of operation for indications that the desiccant is exhausted. A suitable maintenance interval for this task can then be established.

As the desiccant degrades, the white grains acquire a yellowish tinge and the granular form becomes more consolidated. If liquid contamination occurs, the desiccant becomes brown and consolidated.

This procedure must be performed on the basis of instrument response or at intervals of 1 year.

⚠ WARNING

Observe the safety procedures that apply to the operation of gas cooling and sample systems.

1 Isolate the sample gas system from the main system. Perform a limited hydrogen purging operation on the sample system in accordance with the instructions of the responsible authority.

2 Fill the drying chamber –see **Katharometer analyzer panel – filling the drying chamber** on page 23.

3 After purging any residual air from the sample system in accordance with the requirements of the responsible authority, allow hydrogen to pass through the katharometer again.

Repair maintenance

Removing liquid from katharometer measurement block

If tests indicate that there is a possible accumulation of liquid in the katharometer filament block, remove the liquid as follows:

1 Electrically isolate the defective katharometer at its PSU.

2 Isolate the gas sample system to the defective katharometer from the main gas cooling system. Purge the sample system of hydrogen in accordance with the requirements of the responsible authority.

NOTICE

During step **3**, **DO NOT** damage or remove the thermal insulation inside the katharometer case.

3 Remove the cover of the katharometer unit and dismantle the internal sample system pipework.

4 Remove the fixing screws securing the mounting pillars to the case – see Figure 16 on page 20.

5 Disconnect the interconnecting wiring at terminal block TB1.

NOTICE

During step 6, **DO NOT**:

- insert any type of probe into the gas system of the katharometer filament block assembly
- use compressed air to blow through the system.

6 Remove the katharometer filament block assembly from the case and tilt at 45 ° to the horizontal to enable any liquid to drain from the measurement block – see Figure 22.

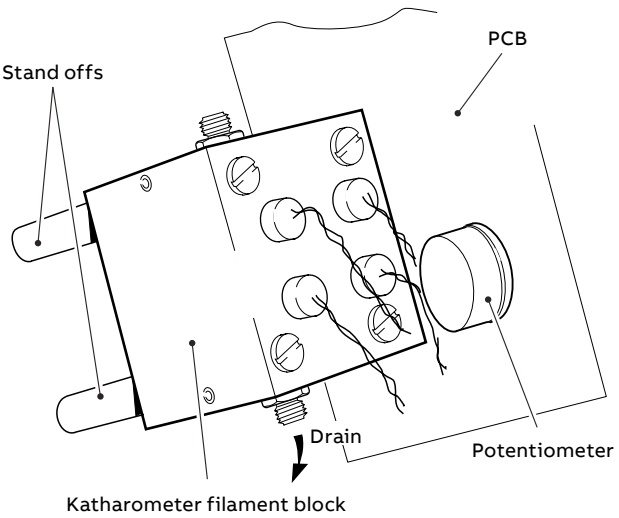


Figure 22 Removing liquid from the katharometer filament block

...10 Maintenance

...Repair maintenance

7 Pour a small quantity of ethanol through the katharometer filament block. Allow as much liquid as possible to drain out. Assist this by gentle shaking. Repeat this procedure several times until all evidence of contamination is removed.

8 Fit the katharometer filament block assembly into its case. Replace the fixing screws and make the electrical interconnections at terminals TB1 – 1 and TB1 – 4.

9 Fit the internal sample gas tubing.

10 Reconnect the sample gas tube interconnection couplings.

11 Replace the desiccant in the drying chamber in accordance with the procedure in **Changing desiccant in drying chamber** on page 33.

12 Perform a leak test in accordance with the requirements of the responsible authority.

13 Power up the katharometer unit by switching on the appropriate PSU.

14 Pass dry air or another suitable dry gas through the katharometer at the normal sample flowrate for 24 hours.

15 Isolate the katharometer unit at its PSU.

16 Make the remaining electrical connections at TB1 of the katharometer unit – see **Location of components inside case – model 6548 type katharometer unit** on page 20.

17 Replace the cover of the katharometer unit.

18 Power up the katharometer unit from its PSU.

19 Perform a calibration procedure – see **Gas calibration** on page 29.

Note. It is possible that the zero reading may drift for several days after the removal of liquid.

Removal/replacement of a CM30 process controller

1 Electrically isolate the 6553 type display unit.

2 Referring to Figure 23:

a Insert bezel release tool (A) (supplied) into front panel slot (B) below the function keys.

b Press bezel release tool (A) fully in and then down (C) until the shoulder on the tool engages with the notch behind the controller front plate.

c Pull bezel release tool (A) to withdraw the inner assembly from case (D).

Note. If the bezel release tool is mislaid, 2 small flat-headed screwdrivers (4 mm [0.15 in]) can be used as alternative tools, one inserted into the front panel slot and the second for leverage in the notch on the underside of the CM30's front plate. The notch is the only area that can be used as a leverage point – do not attempt to lever the front panel from any other area.

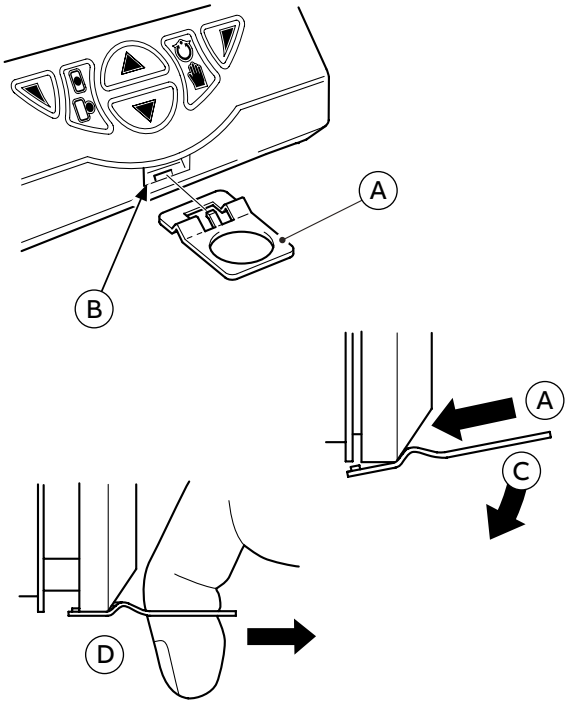


Figure 23 Removing the controller from its case

11 Certificates

CE Declaration of Conformity certificates are available from the Company on request or can be downloaded from: www.abb.com/analytical.

EC Declaration of Conformity – gas monitor 6553 type

EC Declaration of Conformity – power supply units 4234 type 500/501

EC Declaration of Conformity – Katharometers 6539 type and 6548 type

12 Specifications

6553 type gas monitor

Approvals

- CENELEC approved
- [Ex ia Ga] IIC (–20 °C ≤ Ta ≤ +40 °C)
- BASEEFA Certificate No. BAS 01 ATEX 7043
- Ⓔx II (1)G
- EN61010-1:2010 compliant

Ranges

(a) 80 % or 85 to 100 % H_2 in air
(b) 0 to 100 % H_2 in purge gas *
(c) 0 to 100 % air in purge gas *

Range selector switch positions (when fitted)

1 – percentage by volume, hydrogen in air
2 – percentage by volume, hydrogen in purge gas *
3 – percentage by volume, air in purge gas *

Accuracy (display units)

±0.25 % of scale span

Ambient temperature range

0 to 40 °C (32 to 104 °F)

Power supply

110/120 V AC or 200/220/240 V AC, 50/60Hz
(two separate versions)

Fuse rating

F1/F2 500 mA, 250 V AC rated 1500 A @ 250 V AC, HRC, ceramic, fast blow

Power consumption

30 VA approximately

Outline dimensions

290 x 362 x 272 mm (11.4 x 14.25 x 10.9 in)

Weight

12 kg (26.4 lb)

Environment

Sheltered interior, 0 to 90 % RH

Digital I/O

Number

6

Type

- User-programmable as input or output
- Minimum input pulse duration – 125 ms

Input

- Volt-free or 24 V DC
- 1 – signal 15 to 30 V
- 0 – signal 3 to 5 V
- Conforms to IEC61131-2

Output

- Open collector output
- 30 V, 100 mA max. switched
- Conforms to IEC61131-2

Update rate

125 ms

Relays

Number

4

Contact rating

5 A, 240 V

Update rate

125 ms

Set points

Number

4

Adjustment

Programmable

Hysteresis

±1 % fixed

Local annunciation

Red LED

Analog outputs

No. of retransmission signals

2 fully isolated

Output current

0 to 10 mA or 0 to 20 mA programmable

Accuracy

±0.25 % FSD ±0.5 % reading

Resolution

0.1 % at 10 mA, 0.05 % at 20 mA

Maximum load resistance

750 Ω (20 mA max.)

* **Note.** Purge gas options include:
CO_2 (Carbon dioxide)
N_2 (Nitrogen)
Ar (Argon)

4234 type power supply unit

Approvals

- CENELEC approved
- [Ex ia Ga] IIC (–20 °C ≤ Ta ≤ +55 °C)
- BASEEFA Certificate No. BAS 01 ATEX 7041
- Ⓔx II (1)G
- EN61010-1:2010 Compliant

Power supply

- 115 V AC 50/60Hz or
- 230 V AC 50/60Hz

Power consumption

30 W max.

Fuse rating

- T250 mA 250 V AC rated 1500 A HRC ceramic, 250 V AC rated
- 20 x 5 mm

DC output

350 mA stabilized ±0.14 %

Load conditions

1 katharometer 13 Ω max.
Interconnecting cable 2 Ω max.

Ambient temperature range

–20 to 55 °C (–4 to 131 °F)

Supply variations

±15 V (115 V supply) or ±30 V (230 V supply) 46 to 64 Hz

Regulation

Within ±0.5 % for:

- Load variation of ±15 %
- Supply variation of ±15 %
- Ambient temperature variation of ±20 °C (36 °F)
- ±4 Hz frequency variation

Ripple

Less than 0.5 % of set output peak/peak across a 10 Ω load

Stability

Within ±0.7 % of initial setting, over period of 1 month with load resistance, supply voltage and ambient temperature at nominal stated values

Overall dimensions

160 x 170 x 110 mm (6.3 x 6.7 x 4.3 in)

Weight

2.12 kg (4.8 lb) approx.

Environment

Sheltered interior

6548 type katharometer analyzer panel

Approvals

- CENELEC approved
- Ex ia Ga IIC (–20°C ≤ Ta ≤ +55°C)
- BASEEFA Certificate No. BAS 01 ATEX 1042
- Ⓔx II (1)G

Power supply

350 mA DC, from 4234 type power supply unit

Signal output

0 to 10 mV for each range (air in N_2 1.0mV)

Accuracy

- ±2 % of scale span, each range
- ±5 % of scale span, air in N_2

Dead time

Typically 5 s

Response time

Typically 40 s for 90 % step change at katharometer (tubing and drying chamber introduce extra delays)

Ambient temperature

- 55 °C (131 °F) max.
- 0 °C (32 °F) min.

Sample connections

Compression couplings – 6 mm OD tube

Sample pressure

- Minimum 125 mm H_2O
- Maximum 10 bar (gauge)

Sample temperature

0 to 55 °C (32 to 131 °F)

Normal sample flowrate

100 to 150 ml/min.

Maximum gas flowrate

250 ml/min

Minimum gas flowrate

50 ml/min

Outline dimensions

610 x 305 x 152 mm (24 x 12 x 6 in)

Weight

8.6 kg (18.9 lb)

Environment

Sheltered interior

Notes

Notes

ABB Measurement & Analytics

For your local ABB contact, visit:
www.abb.com/contacts

For more product information, visit:
www.abb.com/measurement

3KXA004120R4201

OI/GAH-EN Rev. D 07.2024