MODEL 410
AMMONIA CONVERTER
OPERATING MANUAL

Part Number 197014
Issue 2

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Contents

1. Specification

Converter

Range:	0 - 1000ppm NH_3 in air
Flow rate:	1l/m max
Efficiency:	80% min NH_3 to NO conversion
Catalyst:	platinum on alumina
Temperature	750°C

Oven

Temperature:	200°C
Filter:	borosilicate, 99.5% removal of 0.1 micron, quick-release from rear

Built-in calibration solenoid valve

Gas Connections

Sample inlet:	$^1/_4$" compression fitting
Sample outlet:	$^1/_4$" compression fitting
Calibration inlet:	$^1/_4$" stub tube

Gas Wetted Parts

316 stainless steel, PTFE

Mains Supply

220/240Vac, 50/60Hz, 750VA, **OR**

110/120Vac, 50/60Hz, 750VA

Pre-set at factory and stamped on rear-panel serial number plate

Fuses

230Vac: 3.15AT HBC

115Vac: 6.3AT HBC

Remote Control Inputs

'SAMPLE/CAL' switch contact to ground

'NH_3 IN/OUT' switch contact to ground

Environmental

40°C max ambient temperature

Dimensions

3U height 19" rack-mount, 420mm depth

Weight

12kg

2. Introduction

The Model 410 converter is capable of converting ammonia (NH_3) to nitric oxide (NO) by a process of both catalytic and thermal oxidation. This enables measurements of NH_3 to be made with a nitric oxide analyser. Furthermore, low levels of NH_3 are difficult to measure, whereas a typical chemiluminescent nitric oxide analyser is extremely sensitive.

The reaction is: $4NH_3 + 5O_2 \Leftrightarrow 4NO + 6H_2O$

Note that oxygen is required for the reaction which means, in practise, that the sample gas for analysis must contain air.

The Model 410 is built into a 19" rack unit containing both the converter and a heated sample system which prevents ammonia being dissolved by water condensation.

3. Installation

CAUTION

THIS INSTRUMENT MUST NOT BE USED WITHOUT A SAFETY EARTH CONNECTION

The connection ports will become hot

TAKE PRECAUTIONS AGAINST BURNS

3.1 Introduction

Installation requires the use of a tool set compatible with electrical and pneumatic skills. A suitable set of tools for a minimum installation consists of and electricians flat bladed screwdriver for the mains connections, a sharp knife for cutting PTFE tubing, and a $^{9}/_{16}$" A/F spanner for ¼" fittings. Plumbing in stainless steel will require the use of pipe cutters and benders. We, or our local agents, can offer an installation service if you do not have the necessary skills.

3.2 Location

Observe the environmental limitations listed in the specification section.

The Model 410 is designed to be mounted in a 19" rack or bench mounted. In a 19" rack, ensure that a 1U gap is left above and below the unit for ventilation.

3.3 Mains Power Connection

Check the unit's serial number plate for the voltage rating.

The mains lead supplied with the oven is colour coded and must be connected according to the following instructions.

Connect the BROWN wire to the LIVE (L) pin of the mains plug.

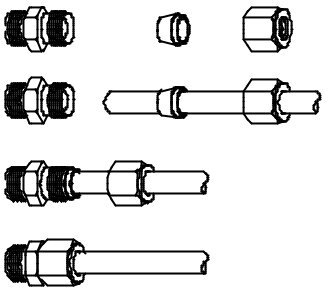
Connect the BLUE wire to the NEUTRAL (N) pin of the mains plug.

Connect the GREEN/YELLOW wire to the EARTH (E) pin of the mains plug.

If the local mains supply does not provide an earth connection, you must supply an independent earth connection. Consult a qualified electrician.

3.4 Gas Connection

All pipe fittings have the same assembly method. Cut the tubing to length ensuring that the ends are cut square. Slide the nut and ferrule over the tube. Insert the tube into the end of the fitting and hold it firmly against the internal shoulder. Slide the nut and ferrule to the fitting and tighten the nut until it is finger tight. Tighten the nut a further 1¼ turns with a suitable spanner. When connections are remade, it is only necessary to tighten the nut slightly with the spanner after making it finger tight.



Connect the incoming hot sample to the SAMPLE inlet compression fitting. Some form of restriction may be required to limit the flow rate. Note that the sample gas for analysis must contain air.

Connect the ANALYSER sample outlet to the analyser sample inlet. Depending on the length, a heated line may be advisable to prevent temperature drop and the possibility of water condensation.

Connect NH_3 calibration gas (balance must be AIR) to the CAL inlet stub pipe. The flow should be adjusted to be similar to the sample.

4. Operation

4.1 Initial Setting Up

The nitric oxide analyser should be pre-calibrated with a known standard of NO.

Switch unit on. The POWER and FURNACE indicators should light.

Within 1 hour the unit should reach temperature. At this time the FURNACE indicator should flash with a regular on/off cycle.

Select 'CAL' and 'NH_3 IN' on the front panel. The nitric oxide analyser should read more than 80% of the NH_3 calibration gas.

'SAMPLE' can now be selected and the reading corrected for the efficiency.

4.2 Usage

Allow 1 hour warm-up time.

To prevent condensation, do not introduce hot sample gas until the oven is at temperature.

On power-down, purge out sample gas, to prevent condensation.

5. Maintenance

The filter is the only item requiring periodic inspection and replacement.

To ensure satisfactory performance, the filter element should be replaced with Signal part number FILT/010.

5.1 Replacement of Filter Element

It is not advisable to do this with the oven hot due to the danger of burns.

- Switch off sample pump and ensure oven is de-pressurised
- Unscrew the rear-panel knob and withdraw housing from oven
- Check for cleanliness and clean if necessary
- Slide the old element off the holder within the oven and replace with a new one
- Re-engage the housing, screwing clockwise to secure

6. Warranty

For a period of 12 months from the date on which an instrument is delivered to the Purchaser, Signal Group Ltd. (the 'Company') will exchange or repair at the Company's option any part or parts requiring replacement or repair by reason of defective workmanship or material. This warranty applies to all new instrumentation manufactured by and purchased from Signal Group Ltd. subject to these conditions of sale:

- The Company's obligations are conditional upon the goods being properly packed and despatched by the Purchaser to the Company's Works with transportation, insurance and other charges prepaid by the Purchaser. There is no charge to the Purchaser for the cost of the materials or labour time expended by the Company in discharge of its warranties. If a site visit is requested a charge will be made to cover the travelling and at the Company's discretion, subsistence expenses.

- The Company shall not be responsible for any defect which, in the opinion of the Company, was attributable to:

    - Wear and tear. Certain components are, by their nature, consumables, and are excluded from warranty. Such items include catalyst material, lamps, filters etc.

    - Any form whatsoever of improper use or maladjustment or damage caused by the Purchaser, his employees or anyone other than the Company's personnel.

    - Abnormal corrosive or abrasive conditions.

    - Lack of regular servicing and maintenance of the instrument by Signal Group Ltd. or an authorised representative. Regular servicing is required according to the relevant maintenance schedule or every six months after delivery to validate warranty, and will be chargeable at current rates.

    - Non-compliance with any instructions issued by the Company concerning the use and fitting of the instrument.

    - Damage arising from installation or use of the goods in unsuitable environmental conditions.

    - Faulty or irregular supply of electricity, air, water, gas or other site services.

    - Modifications by unauthorised personnel.

- The Company shall not be responsible for any expense which the Purchaser may incur in removing, replacing or fitting any part.

- Every other form of liability, including consequential loss, damage or cost, howsoever caused, is hereby expressly excluded except where such loss or damage arises from negligence of the Company or its servants.

- This warranty is given in addition to your statutory rights.