MODEL 361/362
PUMP, FILTER &
DISTRIBUTION OVEN

OPERATING MANUAL

Part Number 361/363000
Issue 1

SIGNAL INSTRUMENTS

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DOCUMENT HISTORY

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Contents

1. Specification

Mains Supply

230Vac ±15%, 50/60Hz, 6.3A, **OR**

115Vac ±15%, 50/60Hz, 10A

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

Fuses

230Vac: 6.3A HBC (qty 2)

115Vac: 10A HBC (qty 2)

Oven and Pump Head Temperature

190 ℃

Front-panel adjustable temperature controllers

Inlets

Quantity 1 (361) & 2 (362)

1/4" compression fitting on rear panel

0.7 micron particulate filter, removable from front panel

Hot Outlets

Quantity 3

$^1/_4$" compression fittings on rear-panel

Front-panel individual flow control per outlet

Cold Outlet

Quantity 1

$^1/_4$" compression fitting on rear-panel

External flow control required

Pressure Control

Rear-panel adjustable back pressure regulator, 0 - 25 psig

$^1/_4$" compression fitting on rear-panel for hot dump

Front-panel pressure gauge

Gas Wetted Parts

316 Stainless Steel. PTFE.

Temperature Monitor

Type K thermocouple for monitoring purposes, output connector on rear-panel.

Environmental

40℃ max ambient temperature

Dimensions

6U height rack-mount, 500mm depth

2. Introduction

The Model 361 filters in-coming hot sample gas pressurises it via a heated pump and distributes it to three outlets. The inlet pressure is controlled by a back-pressure regulator which ensures constant flow, via individual needle valves, to each of the outlets. A cold outlet is provided which would normally be routed to a cooler/dryer.

The Model 362 has two selectable inlets and filters for the in-coming hot sample gas lines which are pressurises via a heated pump and distributes it to three outlets. The inlet pressure is controlled by a back-pressure regulator which ensures constant flow, via individual needle valves, to each of the outlets. A cold outlet is provided which would normally be routed to a cooler/dryer.

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, a $^{9}/_{16}$" A/F spanner for ¼" fittings and $^{11}/_{16}$" A/F spanner for $^{3}/_{8}$" 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 distribution oven 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 distribution oven for ventilation.

3.3 Mains Power Connection

Check your local mains voltage. It must fall inside the ±15% limits of the nominal voltage setting of the unit. ***Check the 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.

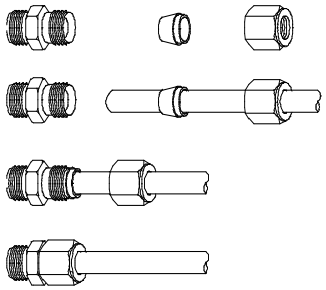
Connect the BROWN wire to the LIVE (L) pin of the mains plug.

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 INLET bulkhead fitting.

Connect hot outlets OUTLET 1, OUTLET 2, OUTLET 3 to individual analysers, as required.

Connect DUMP to a safe exhaust area. There must be no flow restriction here.

Connect OUTLET 4 to cooler/dryer. This outlet must have its own flow control or be capped if not required, to maintain the pressure regulation.

4. Operation

4.1 Initial Setting Up

Adjust the set-point on the temperature controllers to 190dC

Within 15mins the oven should reach temperature. At this time the control indicators should flash with a regular on/off cycle of approximately 10 seconds.

Switch on pump by shorting the yellow and Green wires at the remote control connection. BEWARE 24v is present at this point; the current drawn is approx 1Amp.

Apply sample gas. With all outlets shut off (except DUMP) adjust the rear-panel regulator, using a suitable Allen key, to achieve a moderate pressure indication on the gauge. This setting will be arbitrary at this stage since it depends on the pump performance and desired outlet flows.

Adjust outlet flows using the front-panel needle valves and the special tool. If at any stage, the pressure falls, this indicates loss of regulation and the control pressure should be reduced by adjusting the rear-panel regulator.

Re-adjust outlet flows, again checking for pressure drop. The pressure and the flows will require iterative adjustment to achieve satisfactory performance.

When correctly set up, the regulator should always be dumping a little gas at maximum outlet flow. The regulator will then compensate for reduced flow (when an analyser is calibrating, for example) by increasing its dump rate to maintain the control pressure.

4.2 Usage

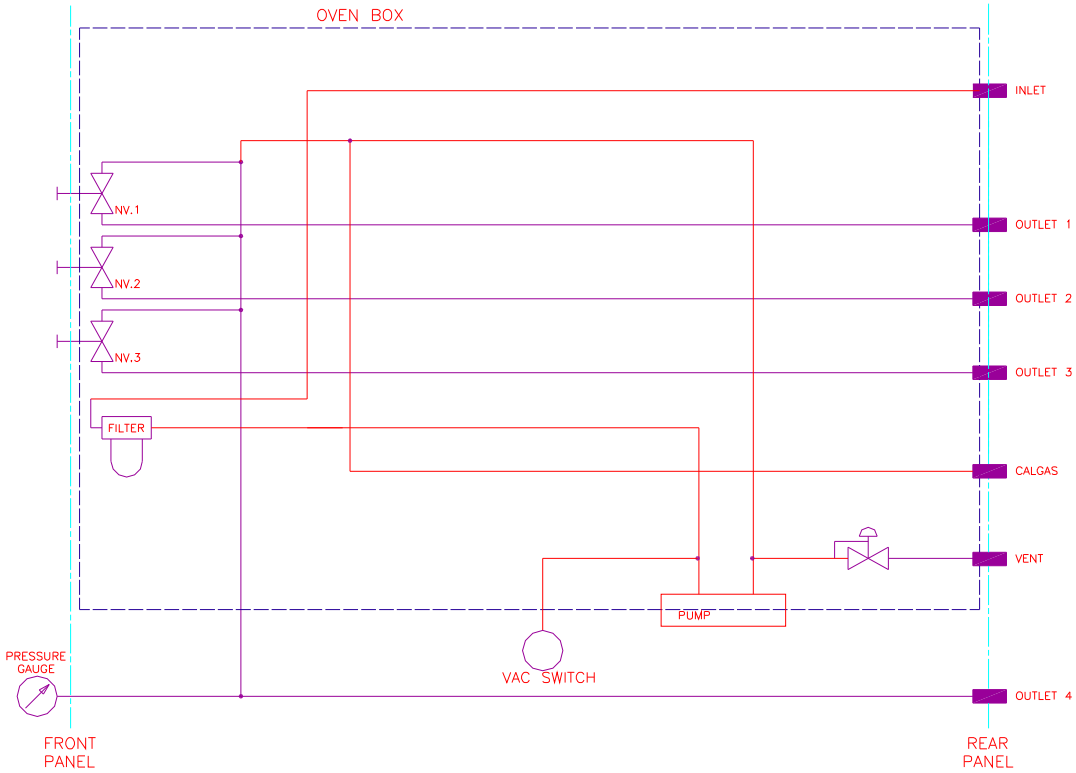
Allow 1 hour warm-up time.

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

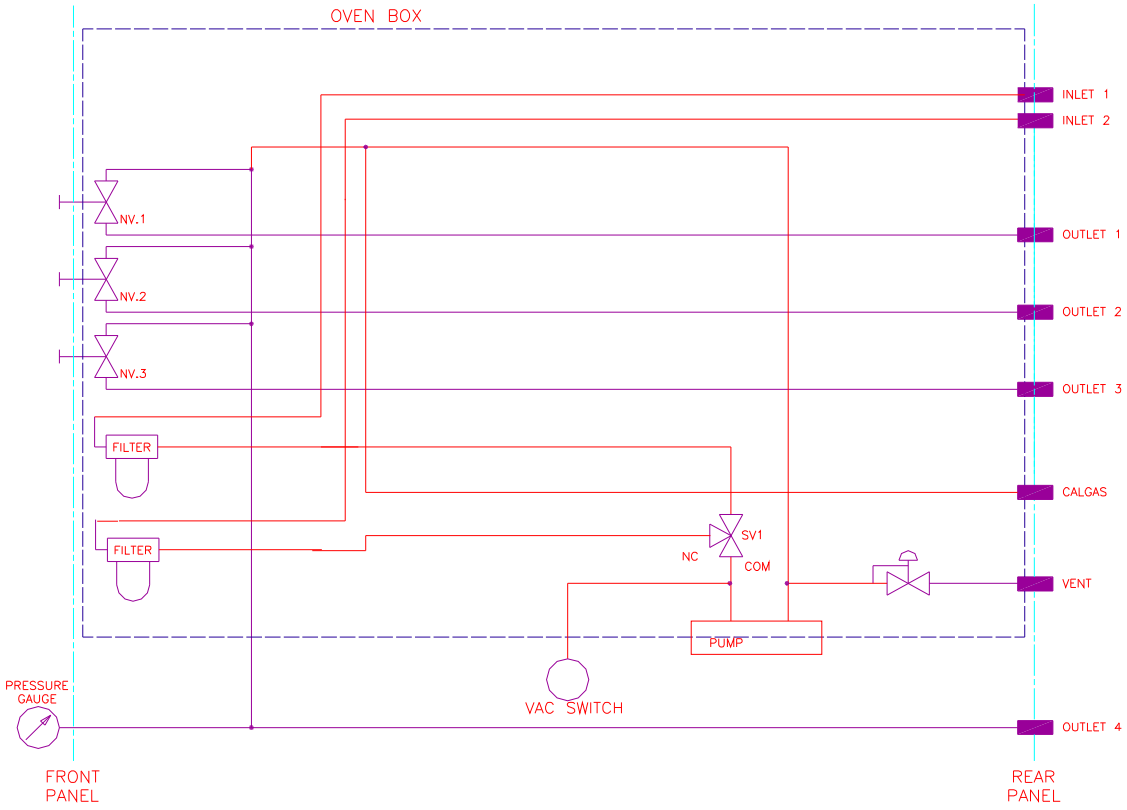
On power-down, purge out sample gas, to prevent condensation. A vacuum switch is fitted inside the unit; this will detect a blocked filter by opening the n/c contact between the red and blue wires on the remote cable.

A cal gas input is also provided this bypasses the pump and allows a known gas to be admitted to the downstream of the pump. This must be capped when not in use.

4.3 Flow Schematics

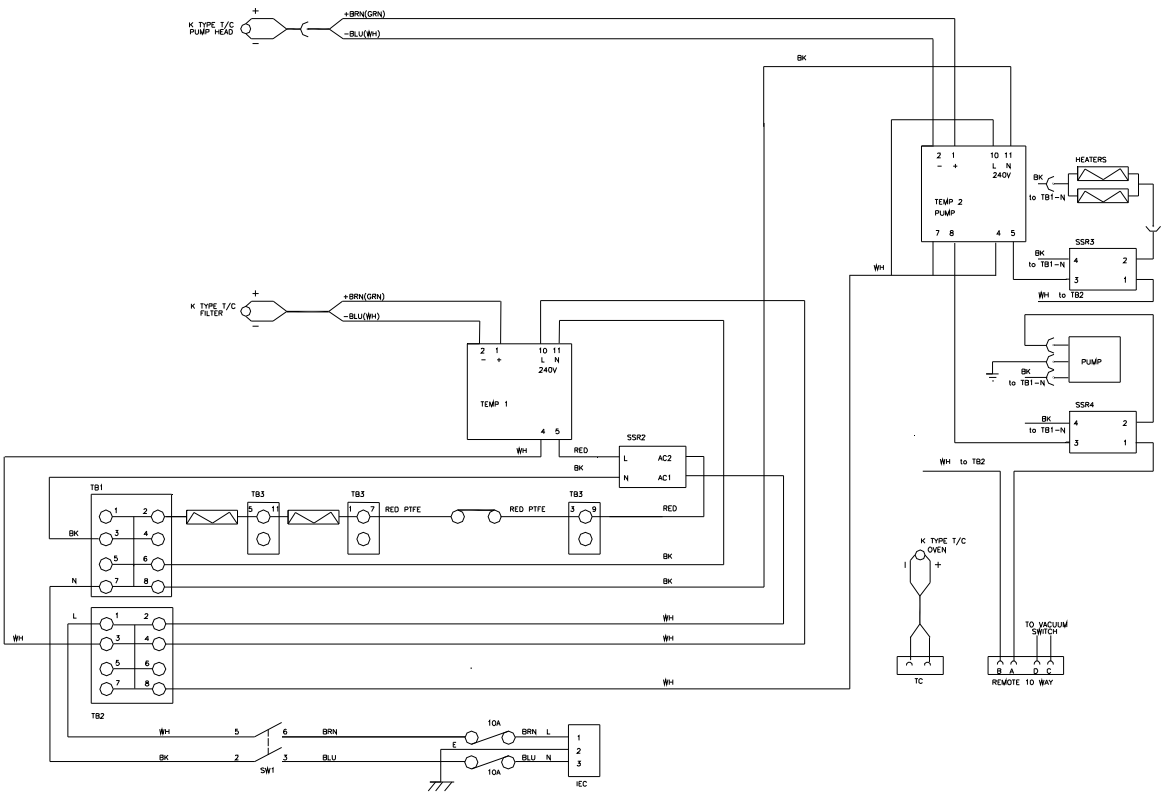


Model 361 Flow Schematic

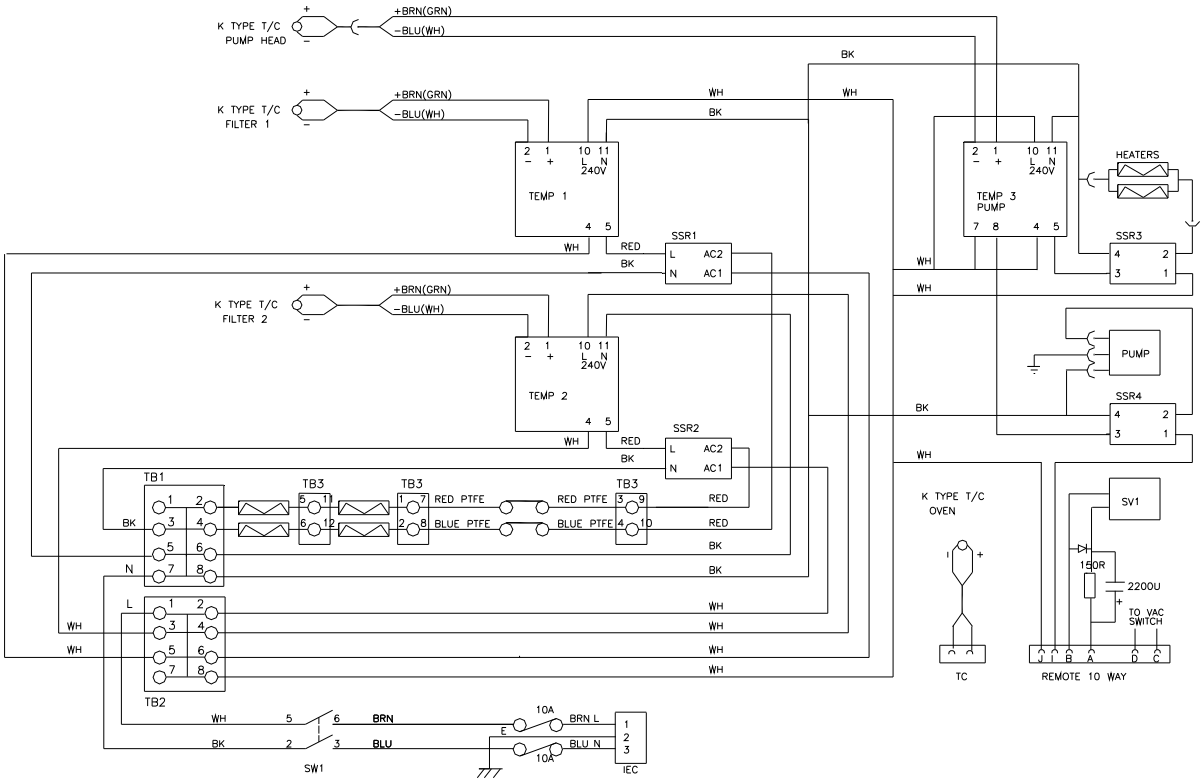


Model 362 Flow Schematic

4.4 Wiring Schematics



Model 361 Wiring Schematic



Model 362 Wiring Schematic

4.5 Remote Control 361

- To remotely control the sample pump use a volt free contact to short Pins A & B on the remote connector (10 - way) located on the rear panel of the unit.

Remote Control 362

- To remotely control the sample pump use a volt free contact to short Pins I & J on the remote connector (10 - way) located on the rear panel of the unit.
- For the Model 362 to switch from Sample Inlet 1 to Inlet 2 apply +24v DC to Pin A and 0v to Pin B to drive the changeover solenoid valve.

5. Maintenance

The filter is the only item requiring periodic inspection and replacement. This specially designed filter system has been proven to last many days on continuous sampling of over-rich engines and cold start diesels. To ensure satisfactory performance, the filter element should be replaced with Signal part number FILT/028.

5.1 Replacement of Filter Element

This procedure can be done with the oven hot but take precautions against burns.

- Switch off inlet pump and ensure oven is de-pressurised
- Rotate the handle ¼ turn anti-clockwise and withdraw from housing
- Slide the element off the holder
- Clean if required and check the condition of the O ring seals
- Slide new filter element onto holder
- Insert into housing, taking care to avoid the projecting bayonet studs
- Engage the bayonet studs and rotate ¼ turn clockwise to secure

5.2 Replacement of Pump Diaphragm and Valves

- Turn off power to the Prefilter, isolating the pump supply, and leave to cool down.
- Remove unit outer covers and the oven lid.
- Disconnect the inlet and outlet tubes of the pump noting which goes where and remove the pump.
- Undo the four bolts, one in each corner of the pump head and lift the head assembly clear.
- Undo the bolt in between the inlet and outlet port on the head, lift off the bolt, retaining bracket and two port stubs.
- Remove the Teflon valves, clean and refit new valves.
- Reconstruct the pump head, reversing the procedure above.

- Unscrew the diaphragm retaining plate and remove the existing diaphragm.
- Clean thoroughly and refit new diaphragm.
- Clamp diaphragm in place with the retaining plate and refit the pump head, then replace pump.
- Re-apply power to the Prefilter and check the operation of the pump, it should be capable of producing a free flow rate of around 10 L/min and a dead head vacuum of around 500 mbar.

6.0 Warranty

For a period of 24 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.