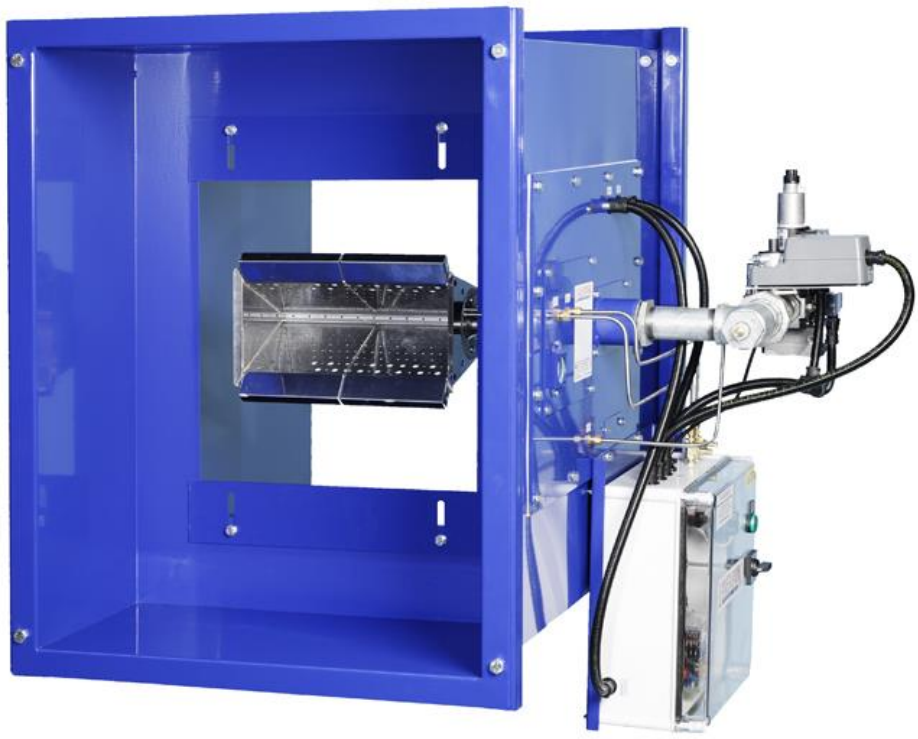
LANEMARK
COMBUSTION ENGINEERING

PROCESS BURNERS

INSTALLATION, COMMISSIONING AND MAINTENANCE MANUAL



The information contained in this manual is advisory and in general terms only and does not constitute a legal liability on Lanemark Combustion Engineering Ltd.

Lanemark Combustion Engineering Ltd reserve the right to supply equipment to their latest specification.

DUCT GAS BURNER SYSTEM J***

CUSTOMER :

END USER :

BURNERS : **DB04(MOD)N NATURAL GAS DUCT BURNER**

PN 72004 JUNE 2000

If this manual was sent out with an actual burner (or several burners built to the same specification) a duplicate Burner Data Plate will be shown on this page. This will give the actual burner :-

Serial Numbers
Gas Type (Natural or Propane)
Electrical and Gas Train Specification
Burner Head Pressure Setting
Fan Motor Supply Voltage Required

SERIAL NO. J***** - 1

MODEL DB04

FUEL TYPE NATURAL

HEAT INPUT 335 **kW**

BURNER HEAD PRESSURE 4.3 **mbar**

MANUFACTURED MM/YYYY

SUPPLY GAS TEMP	15 **ºC**	**SUPPLY AIR TEMP.**	15 **ºC**
MAXIMUM HEAT INPUT	352 **kW**	**MINIMUM HEAT INPUT**	35 **kW**
GROSS CALORFIC VALUE	99.102 **MJ/Nm3**	**NET CALORIFIC VALUE**	91.2 **MJ/Nm3**
MAXIMUM INLET PRESSURE	100 **mbar**	**MINIMUM INLET PRESSURE**	20 **mbar**
GAS VALVE TRAIN TYPE	KROMSCHRODER	**DRAWING NO.**	56752
ELECTRICAL WIRING DIAGRAM NO.	61053		

CONTROL SUPPLY 230 **V** 1 **PH** 50 **Hz** **FLC** 3 **A**

SERIAL NO. J***** - 1

MODEL DB04

FUEL TYPE NATURAL

HEAT INPUT 335 **kW**

BURNER HEAD PRESSURE 11.3 **mbar**

MANUFACTURED MM/YYYY

SERIAL NO. J***** - 1

MODEL DB04

SUPPLY VOLTAGE 230 **V**

MANUFACTURED MM/YYYY

INFORMATION ONLY

If this manual was sent out with an actual burner a copy of the :-

- Declaration Of Incorporation For Partly Completed Machinery.
- Declaration of Conformity To Order.
- Test Certificates.
- Calibration Certificates.
- Certificates for equipment supplied by Lanemark Combustion Engineering Ltd but not manufactured by Lanemark.

will be included after this page if specifically requested by the Customer's order.

LANEMARK
COMBUSTION ENGINEERING

Declaration of Conformity

QAF 06-34

(In accordance with Machinery Directive 2006/42/EC) CE

Reference/ Serial No. J*****

Issued by: Lanemark Combustion Engineering Limited

Object of Declaration: DB04(MOD)N NATURAL GAS BURNER

Customers Name:

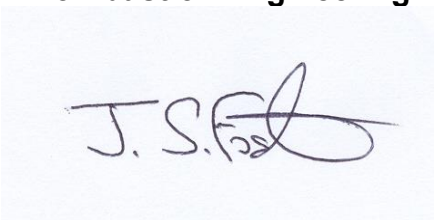
Purchase Order/ Reference:

The object of the declaration described above have been inspected and tested in accordance with the conditions and requirements of the purchase order and unless otherwise stated conform in all respects to the specifications(s) drawings relevant thereto and is in conformity with the requirements of the following documents:

2014/30/EC	Electromagnetic Compatibility Directive.
ISO 9001: 2015	Quality Management System – Requirements.
BS EN 746-2: 2010	Industrial Thermoprocessing Equipment, Safety requirements for combustion and fuel handling systems.
2014/35/EC	Low Voltage Directive (LVD).
BS EN 60204-1:2006	Safety of Machinery. Electrical equipment of machines General requirements.

Additional Information: If applicable (i.e. Applicable concessions, Raw materials, Cast numbers/Test results/Batch numbers.

Signed for and behalf of:
Lanemark Combustion Engineering Limited



Name/function: J. Foster/ Director. Name/function: P. Collier/ Managing Director

Date of Issue: DD/MM/YYYY

Place of Issue: As address below

Registered Address: Lanemark House, Whitacre Road, Nuneaton, Warwickshire, UK, CV11 6BW
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E-mail: info@lanemark.com Web site: http://www.lanemark.com
Company Registration No. 05471903 VAT No. GB 185 5272 84
Place of Registration: England & Wales
Directors: P.R. Collier, J.S. Foster, A.E. Thompson

Reg. No. 567424

LANEMARK
COMBUSTION ENGINEERING

Declaration of Incorporation For Partly Completed Machinery
QAF 06-35

(In accordance with The Machinery Directive 2006/42/EC) CE

Reference/ Serial No. J*****

Object of Declaration: DB04(MOD)N NATURAL GAS BURNER

Customers Name:

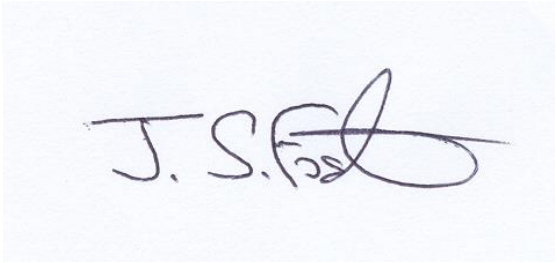
Purchase Order/ Reference:

LANEMARK COMBUSTION ENGINEERING LIMITED

Herby declares that the object of declaration identified above is in accordance with the relevant safety and health requirements of the EC Council Directive on Machinery.
It must be installed and commissioned in accordance with our customer installation and maintenance instructions.
We further declare that the equipment identified above as the object is intended to be incorporated into other equipment/machines to constitute machinery.
Our product must not be put into service until the assembled machinery has been declared in conformity with the provisions of the Machinery Directive 2006/42/EC.

Additional Information: If applicable:

Signed for and behalf of:
Lanemark Combustion Engineering Limited



Name/ function: Managing Director

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SECTION 1 GENERAL DESIGN

BRIEF BURNER SPECIFICATION

These burners are designed for oven and lower temperature heating applications and are available in a range of sizes to meet a wide range of industrial heating requirements.

The burners are available for both Natural Gas and L.P.G Propane Gas and fuel only is modulated to effect an accurate turndown to as low as 10kW (35,000 Btu/h). Short flame lengths and exceptional flame stability are achieved by the unique design combustion head.

These burners are designed to be fitted to the side of ducts that may or not be supplied by Lanemark International Ltd. The combustion air fan and the associated damper may also be supplied by the oven manufacturer to a specification supplied by Lanemark International Ltd.

The control panel contains the programmer unit, on/off switch and all controls necessary including two off 3 way air valves which allow the burner to be applied to ovens where the fan runs continuously.

The burners are supplied with 230V or 110V controls and gas trains as specified. The duct's fan motor is generally energised from a main motor control panel or alternatively can be energised from the burner's own control pack via an isolator, contactor and motor protection provided by others.

The burner mounting plate is painted in silver high temperature paint and is suitable for mounting directly onto the side of the duct. The orientation of the plate relative to the duct and the orientation of the gas train will be determined at the design stage and the burner built accordingly.

SHIPPING CONTENTS

The burner is shipped in a single heavy duty cardboard box with an infill of polyurethane foam. The gas train on larger models may be packed in a transport only position or supplied loose in the box. The control pack on larger models may also be supplied loose in the box.

CONSTRUCTION STANDARDS

The burners are generally constructed in accordance with :-

EN 746 Part 1: Common Safety Requirements For Industrial Thermoprocessing Equipment

EN 746 Part 2: Safety Requirements For Combustion And Fuel Handling Systems Of Industrial Thermoprocessing Equipment

As these burners are intended to be incorporated into another machine or system they are supplied with a Certificate Of Incorporation For Partly Completed Machiner as required by the Machinery Directive 2006/42/EC.

If these burners are to run continuously (more than 24 hours without shutting down) then special self checking burner control programmers must be specified at the design stage in order to comply with the above standards.

GENERAL DESIGN CONSIDERATIONS

The burner must be installed in accordance with the following regulations :-

I.E.E Regulations (BS7671)
Local Gas Service Area Recommendations
BS5440 Part 1 Specification For Installation Of Flues
BS2915 Specification For Bursting Discs And Bursting Disc Devices
BS5440 Part 2 Specification For Installation Of Ventilation For Gas Appliances
BS6644 Installation Of Gas Fired Boilers Between 60kW And 2MW
British Gas IM/30 Code Of Practice For Gas Fired Process Plant
British Gas IM/11 Flues For Commercial And Industrial Gas Fired Boilers And Air Heaters
British Gas IM12 Use Of Gas In High Temperature Plant
British Gas IM/18 Use If Gas In Low Temperature Plant
LPGA COP9 LPG Air Plant
LPGA COP17 Purging LPG Vessels And Systems
IGE/UP/1 Soundness Testing And Purging Of Industrial And Commercial Gas Installations
IGE/UP/4 Commissioning Of Gas Fired Plant On Industrial And Commercial Premises
IGE/UP/2 Gas Installation Pipe work, Boosters And Compressors On Industrial And Commercial Premises

INSTALLATION

It is UK Law that these burners are installed, commissioned and maintained by competent persons only e.g. ACS and GAS SAFE registered installers only. In other countries local gas regulations must be observed.

OVEN AND DUCT APPLICATION

The burners are suitable for direct firing into ducts that will generally be feeding hot gas into ovens and drying rooms. The duct and the profile plate within the duct that directs the flow of air around the burner head will be designed to give nominal conditions of :-

Velocity 14.4 m/s (2850 ft/min).
Pressure drop 1.3 m.bar (0.55 in.wg).

Normally the profile plate around the burner head will incorporate an adjuster mechanism so that the free gap can be closed down if necessary to increase the air velocity and pressure drop.

There should typically be a straight section of duct before and after the burner head so that the air flowing over the head is evenly distributed.

The outlet of the duct should have negligible resistance or back pressure could be created within the duct and the differential pressure across the burner head lost.

The duct's own air fan should have an air flow sensing system the will cut the burner off immediately if the air flow is lost.

These burners are generally used to generate hot air at typically 100 °C for drying applications. The system is also suitable for higher temperatures and other applications.

If the burner is to be used to fire into a closed oven the oven should be fitted with a suitable Bursting Disc or Explosion Relief Panel. If the burner is being retrofitted to an existing oven the original equipment manufacturer should be consulted to check the suitability of the application.

The start gas / low fire of the burner cannot exceed 30% of the full high setting to comply with standards.

Fig 1 DUCT BURNER GENERAL ARRANGEMENT DRAWING

A General Arrangement drawing of the burner system will be included in this manual showing in particular the burner head in relationship to the duct and the profile plate within the duct.

TEMPERATURE CONTROL

If Lanemark supplied temperature controls with a burner details of these will be contained in the section of this manual *Temperature Controls*. This section also gives additional detail on specifying, installing and commissioning these controls.

If this manual was sent out with an actual burner the specific wiring diagram will be contained in the section of the manual *Control Panels* and this will show electrical interconnections for temperature controls.

The burner can be supplied to operate depending on the specification ordered as :-

1. On / off
2. High / low
3. Modulating gas

to suit the application requirements.

It is anticipated that the burner will specified with modulating gas so as to maintain a constant air off-take temperature with a minimum input of typically 8 kW (25,000 Btu/h) depending on model size.

The maximum start gas stage is limited to 30% of the main flame by European Standards but generally the main burner flame will be lit by a separate small pilot flame. Once the main flame is lit and proved the pilot flame will be interrupted (switched off).

It is anticipated that a digital electronic temperature controller will be supplied either by Lanemark as an optional accessory or by the installer.

This controller should have a set point and an additional alarm stage with fixed differentials for high/low burners. Modulating burners will require a suitable controller that can provide the required control signal. These controllers will typically have full 3 term P.I.D control and Autotune to suit the characteristics of the application.

It is unlikely that simple mechanical thermostats will be suitable for controlling oven temperature because of the speed of response needed.

It is recommended that consideration be given to fitting a second totally independent temperature control device. This may be necessary if it is critical that the process being heated is never allowed to go over temperature. This will act as a High Temperature Trip Thermostat (Policeman Thermostat). Once its set point has been exceeded the burner is held off until manual intervention occurs to reset it.

FLUE SYSTEMS

The oven or duct must be fitted with a suitable exhaust discharging the burner's products of combustion outside the building in a down draught free area. If this is not possible the oven manufacturer or Lanemark International should be consulted.

If the duct burner is heating makeup air, typically for a drying room in w hich operators are w orking, then special consideration must be giving to sizing and proving the correct operation of the fan and ventilation systems.

For some installations Local and National Government Departments should be contacted for approval to discharge flue gas and this is the responsibility of the owner.

VENTILATION SYSTEMS

The burner should only be installed in an environment / area with sufficient natural or mechanical ventilation to ensure that there is adequate fresh air for complete combustion and adequate ex tract to maintain an acceptable working environment.

The burner should not be installed in an area where there is a high degree of powered mechanical extract but only natural ventilation inlet air. With such a combination the mechanical ex tract system may starve the burner of combustion air.

For suggested values for natural and mechanical ventilation see BS6644. Where the air supply quality cannot be ensured consideration should be given to ducting fresh air in from outside.

PROTECTION OF BURNER SYSTEMS

The burner control panel and the gas train are manufactured to IP54 w ith regard to their protection against water and dust. This standard is sufficient for most commercial applications.

In food hygiene areas w here " w ashing down " takes place or in areas of ex cessive condensation the burner's controls and gas train must be protected from the ingress of water or detergent.

If the air is very contaminated w ith chemicals or dust then the burner should have its air for combustion vented in from a source of fresh clean air.

Lanemark can supply equipment to higher IP standards, equipment manufactured from stainless steel for food preparation areas and w ith connections for fresh air ducts.

GAS SUPPLY GENERAL

Before the burner is connect ed to a new or existing gas supply the Local Gas Supply Service Provider must be consulted to ensure that the gas meter and supply are of adequate size for the load required.

The burner gas train includes an isolating ball valve and union to allow the burner to be isolated and removed for servicing and a coarse filter.

The pipe w ork final connections should be made such that it is possible to isol ate the gas supply and remove the burner for servicing w ithout removing any gas pipe work. Consideration may be given to making the final connection in an armoured fl exible gas hose that complies with current standards.

The gas supply pipe w ork should be designed and installed in accordance with the standards listed previously.

GAS SUPPLY NATURAL GAS

A stable gas supply pressure supply of:-

20 mBar (8 in.wg) minimum inlet pressure
35 mBar (14 in.wg) maximum inlet pressure

is required with the burner(s) running and if the supply is a medium pressure supply , or above the maximum required, an additional gas regul ator should be installed. Lanemark would be pleased to advise on types, sizes etc.

GAS SUPPLY PROPANE GAS

The burner should be connected to a Propane gas supply of sufficient capacity so that at the full burner out put, the gas flow rate of the storage system and its regulators is not exceeded. T his burner should not be used on Propane/Butane or Propane/Air mixtures. A stable supply pressure of:-

35 mBar (14 in.wg) minimum inlet pressure
50 mBar (20 in.wg) maximum inlet pressure

is required w ith the burner(s) running. If the supply is above the maximum required an additional gas regulator should be installed. Low and high pressure slam shut cut offs with vents must be fitted. Care should be taken in the design and selection to pr event governor lockup or nuisance trip of these. Lanemark would be pleased to advise on types, sizes etc.

ELECTRICAL SUPPLY

The burner is available with :-

230V 1 Phase 50 Hz or 110V 1 Phase 50 Hz

controls and gas trains as giv en on the Burner Data Plate (a duplicate is shown in the front of this manual).

The single phase 230V or 110V control panel supply should be made into the control panel through a M20 cable gland from a suitable isolator and fused supply. The cable should be run in cable of sizes suitable for the panel load of 250 VA . All cable should be suitable for a service temperature of 60 degrees centigrade.

THIS BURNER MUST BE EARTHED

The burners combustion air fan w ill generally have been provided by the oven or duct sy stem manufacturer. Alternatively Lanemark International may have supplied these. This will be 400V 3 phase or 230V single phase as specified. The fan motor pow er and the full load current will be contained on the burner's D ata Plate if supplied by Lanemark. A copy of which is in the front of this manual if this manual was sent out with a burner.

The fan motor should hav e an independent isolator, motor protection device, contactor w ith an aux iliary contact provided by others.

The fan will normally run continuously from the main plant control panel. T he burner must only run when the fan is running and stop immediately if the fan motor overload trips. An auxiliary contact on the motor overload should be interlocked to the burners ow n control panel. See the wiring diagram details.

Alternatively the fans motor contactor can be energised from the burners ow n control panel as shown in the wiring diagram.

All electrical installations should be in accordance w ith I.E.E Regulations (BS7671).

Output signals are available from the burners control panel, at 230V AC or 110V AC as appropriate for burner ON HIGH / ON LOW / AT LOCKOUT.

Time switches and O N/OFF switches should be connected as show n in the wiring diagram and temperature controllers as discussed later.

Main motor control panels must nev er backfeed into the Lanemark control panel.

Isolating or 110V transformers must be end and not centre tapped.

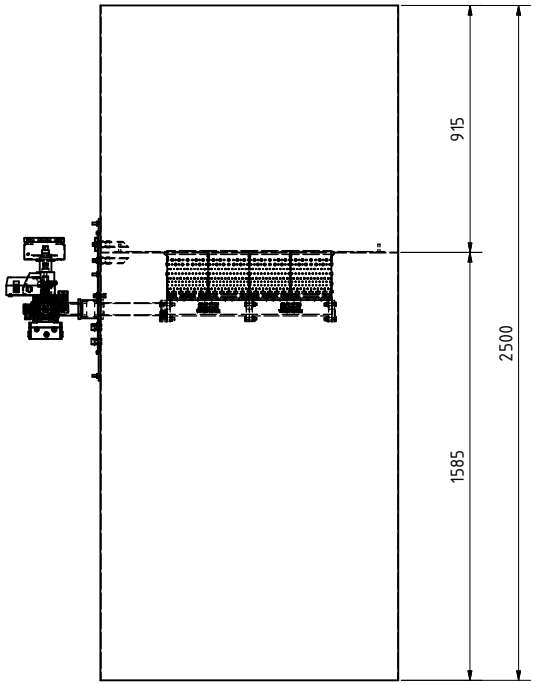
Depending on the model the burner control box may have over/under voltage protection and will not run if the supply voltage is incorrect.

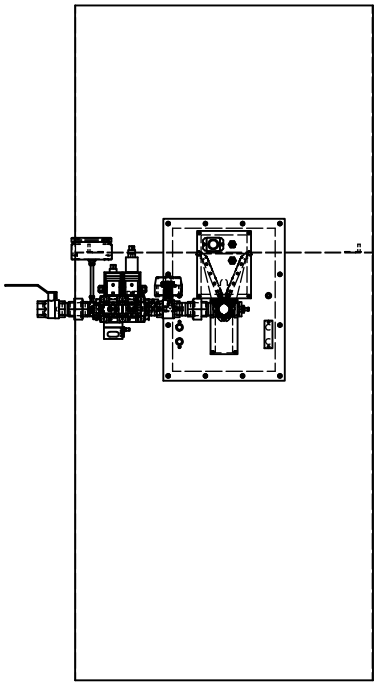
Remote reset of control box ***lockout*** is possible by briefly applying a 110V or 230V input reset signal or pulling the reset terminal down to neutral as appropriate for the box type. See the wiring diagram.

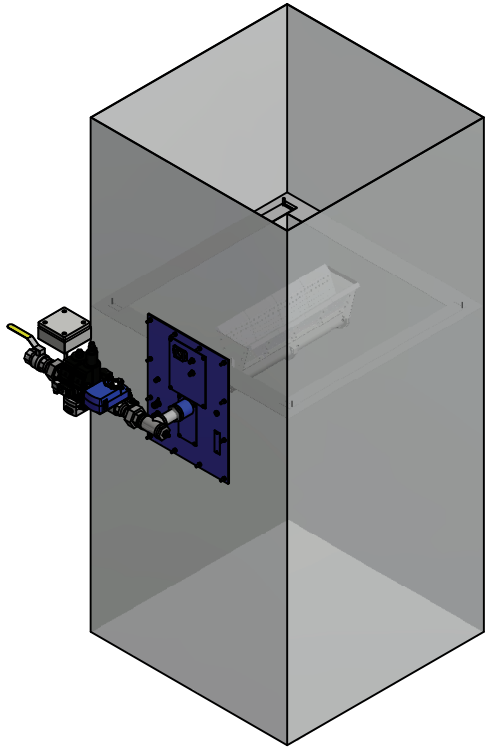
This reset cable must N OT pick up any induced voltage as it can interfere w ith the box. If there is a possibility of such voltages screened cable is recommended.

SECTION 2 GENERAL ARRANGEMENT DRAWING

This section of the manual will contain the General Arrangement and detailed drawing prepared specifically for each project. It will show the burner head, gas train position and profile plate in the duct.







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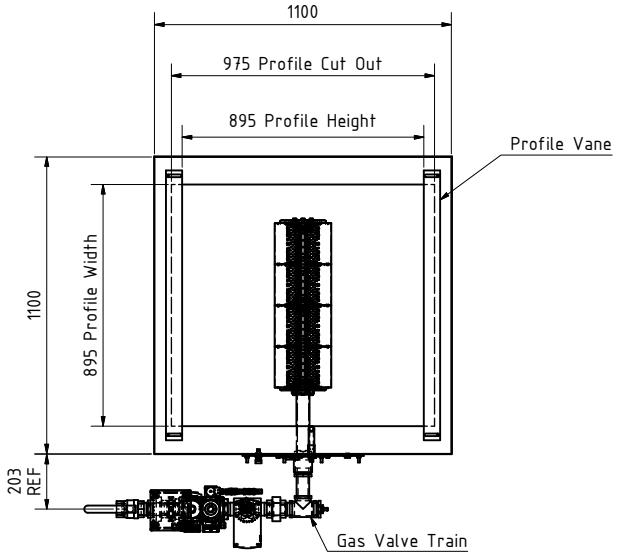

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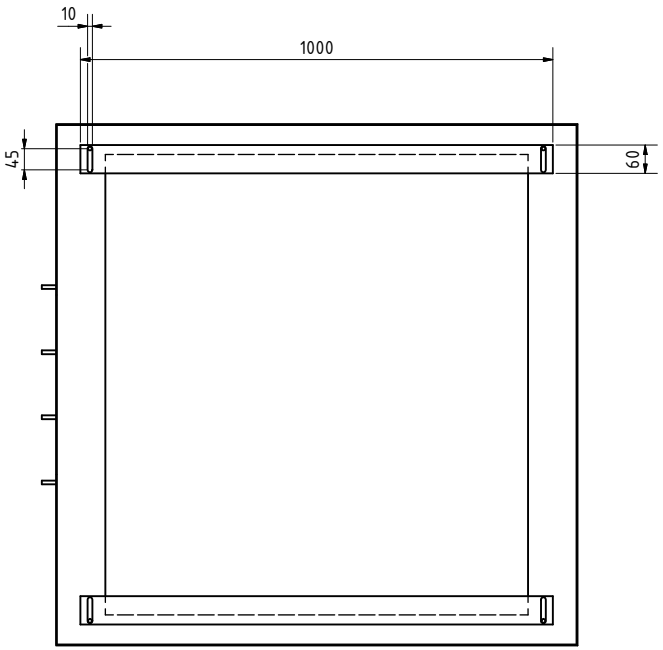

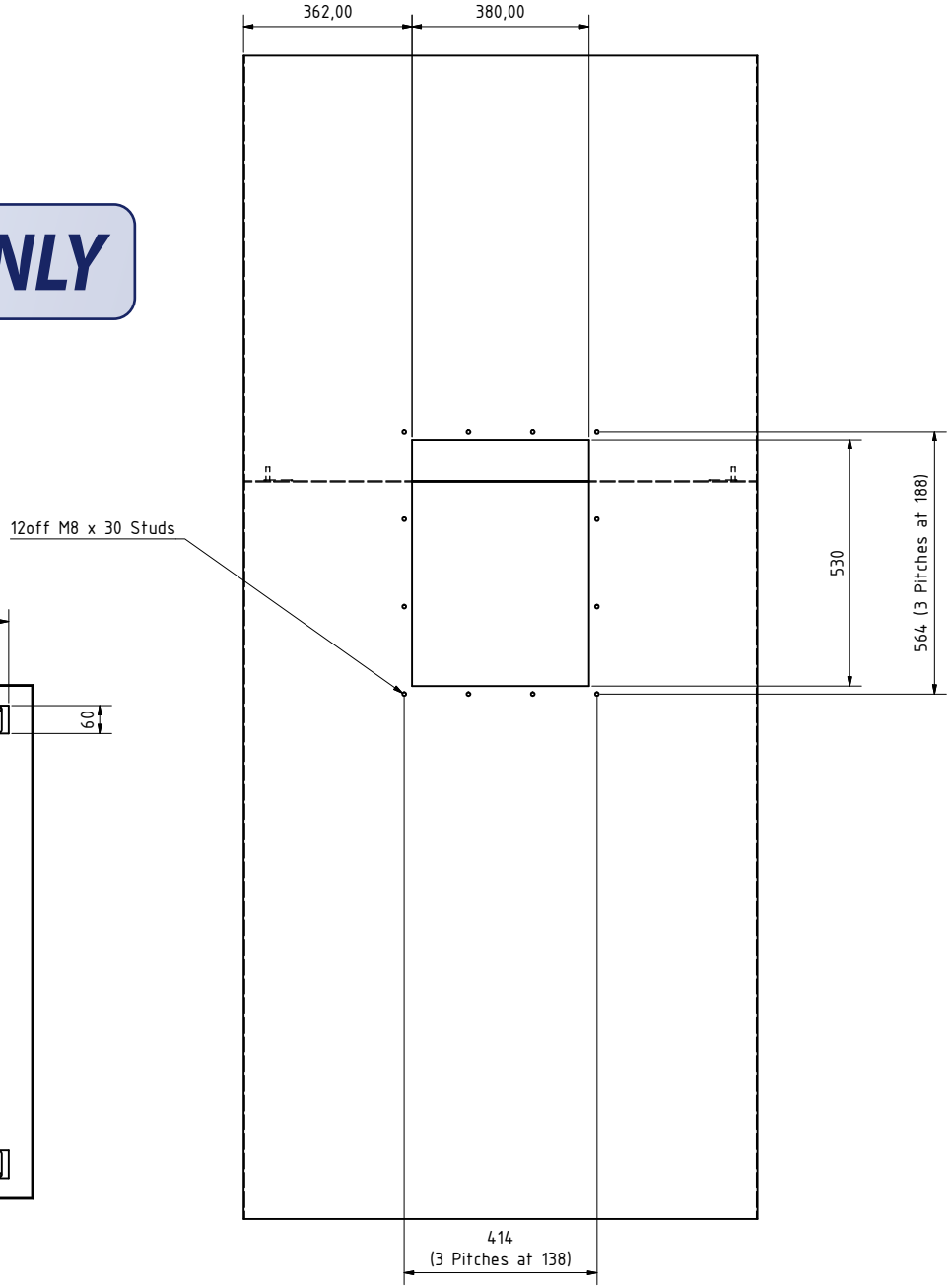

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DRAWING No: 96423
SHEET 2 OF 3

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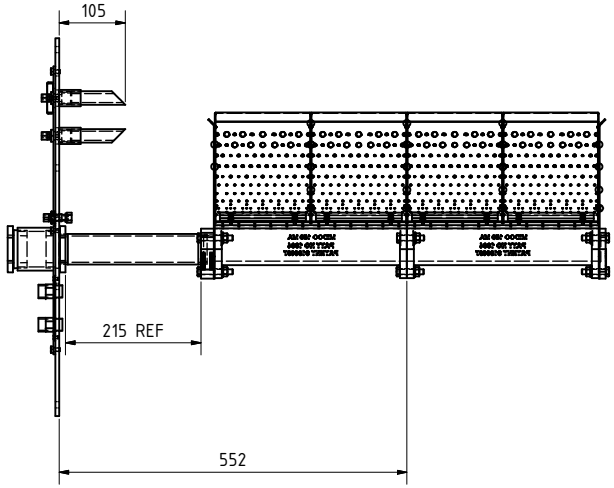

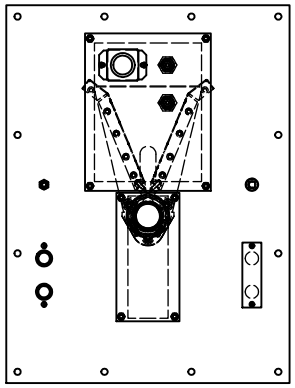

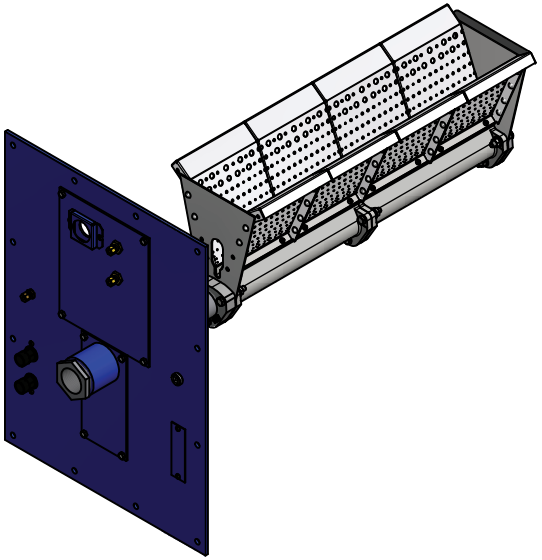

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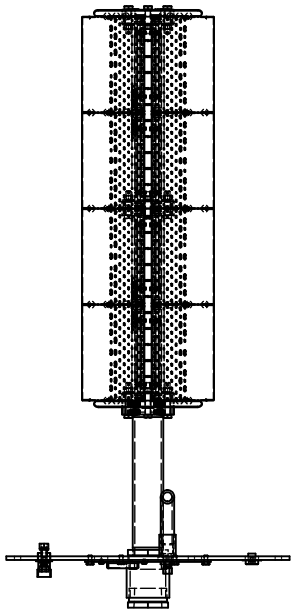

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ISSUE: 01	DRAWING No: 96423	SHEET 3 OF 3	

DRAWING No: 96423

SECTION 3 CONTROL PANEL DESIGN

CONTROLS

The standard controls are supplied in a polycarbonate control panel for mounting on a cool surface within 3 metres of the burner head.

If required a full steel control cabinet including motor control, time switch, temperature control etc. can be supplied for remote mounting near the burner. Occasionally burners are supplied with no controls and these are supplied by others.

The control panels supplied by Lanemark are generally designed to suit each individual customers requirements with regard to :-

Voltage 110V / 230V
Burner programmer (Satronic / Siemens /Honeywell)
Temperature controller
Fan motor control
Interface to gas train
Gas train modulation control

Figure 1 shows the standard polycarbonate box layout which contains :-

On / Off / Lockout Reset switch
Control fuse
Din Rail terminals to suit
Burner control programmer
Ignition transformer
3 way air valves
Air pressure switch

And if the application requires it :-

Temperature controller.
Modulating gas valve transformer and interface.
Time switch.

INTERFACE WIRING DIAGRAM

Lanemark produce an *Interface Wiring Diagram* for each burner supplied. If this manual was despatched with a burner this manual will contain the correct *Interface* drawing in this section of the manual.

The important interface connections are :-

1 Main 1 phase supply (110V or 230V as specified) rated for a 250VA load.
2a Remote reset of *burner lockout* by a brief 110V / 230V input. The cable must be protected from induced voltages (see the specific drawing).
2b Alternatively the box's reset terminal may require pulling down to neutral to effect the reset (see the specific wiring drawing).
3 Fan auxiliary contact on the fan motor's contactor which will stop the burner immediately if the fan motor overload trips in operation.
4 Fan motor *call* signal to fan contactor's coil.
5 Remote burner ON lamp.
6 Temperature control Set Point " SP " (high to low fire switch).
7 Temperature control alarm point " AL " (low fire to off switch and time clocks etc.).

If modulating gas valves are being used additional connections will be required to drive the modulating motor by a control signal and these should be connected with reference to the wiring diagram. Particular attention must be paid with 0-10 V dc or 4-20 mA signals in tying the neutrals (or grounds) together to complete the circuit.

In addition the duct's main fan will have its own air flow proving system and this will be interlocked into the burners control circuit so that if the air flow is not proved or interrupted the burner will switch off immediately.

Where several burners are connected back to a main control panel or share a single fan it is **IMPORTANT** that one burner's electrical interface connections do not backfeed to another burner.

Three more electrical connections are required :-

1 Connection to ignition probe on burner body.
2 Connection to flame sensing probe (or U.V cell).
3 Multicore connection to the gas train.

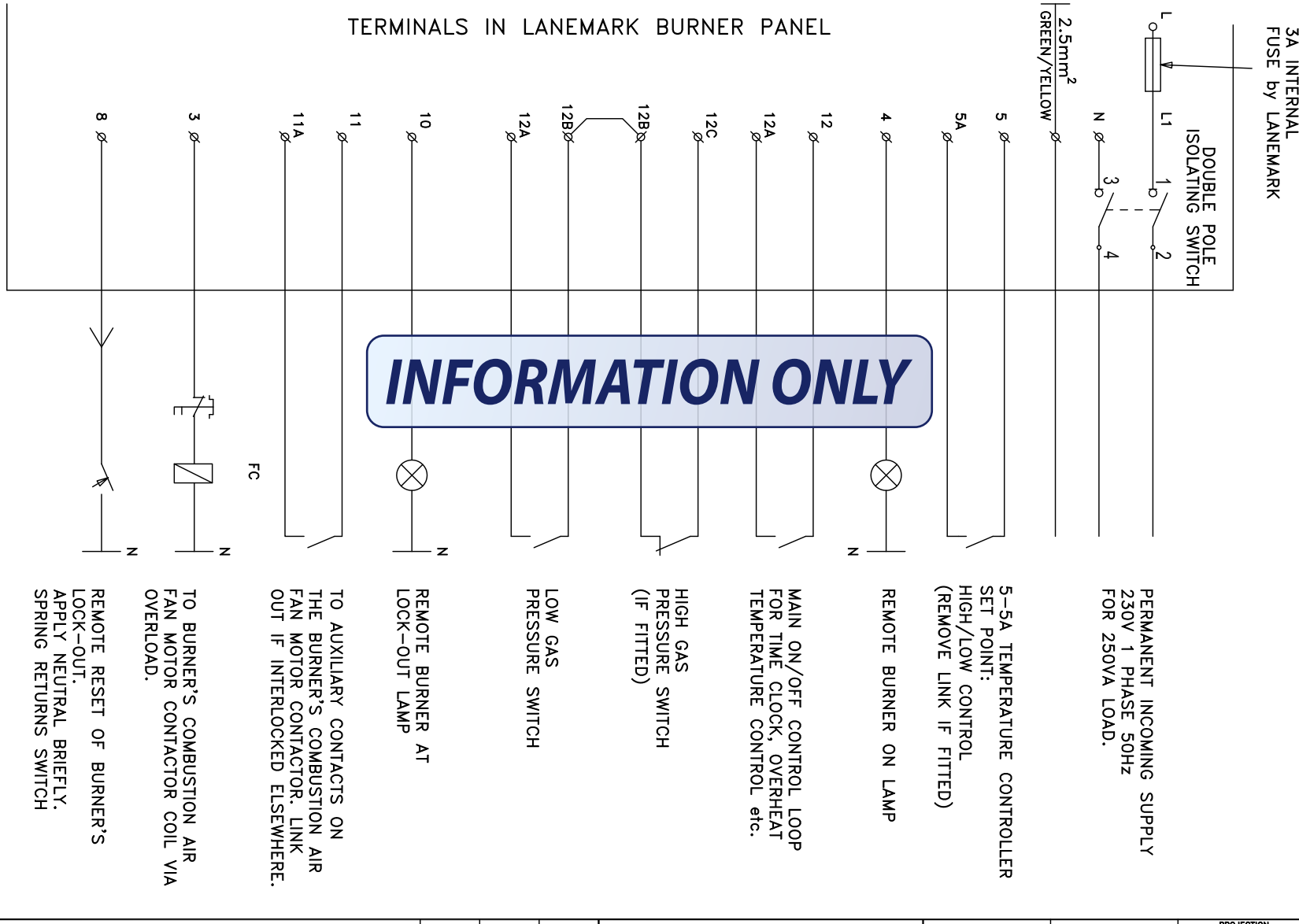
Lanemark premake these in 3 metre long PVC flexible conduit but disconnect them for transport. The terminals are labelled or numbered for reconnection on site.

Two off 6mm steel or copper pipe connections are made to the control panel's air pressure switch from the two connections on the burner mounting plate. These connections sense the differential air pressure across the head of the burner.

PANEL INTERNAL WIRING DIAGRAM

If this manual was despatched with a burner this manual will contain the correct *Internal Wiring Diagram* in this section of the manual.

The correct drawing number is given on each burner's Data Plate and a duplicate Data Plate is included in the front of this manual.



DRAWING No: 61053

ISSUE	DESCRIPTION	MOD No	DATE	BY
05	DOUBLE POLE ISOLATING SWITCH ADDED		13.04.11	AJS
04	NUMBERS CORRECTED ON RELAY	–	16.04.10	CPW
03	TIMED DELAY RELAY ADDED		14.07.10	AJS
02	FAN CONTACT MOVED TO 11 – 11A LAYOUT CHANGED	–	19.03.10	CPW
01	FIRST	–	17.08.09	CPW

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E-Mail: info@lanemark.com Website: www.lanemark.com

DRAWN BY: CPW
DATE: 11.08.09
CHECKED BY: D. Thompson
DATE: 13.04.11
ISSUE: 05

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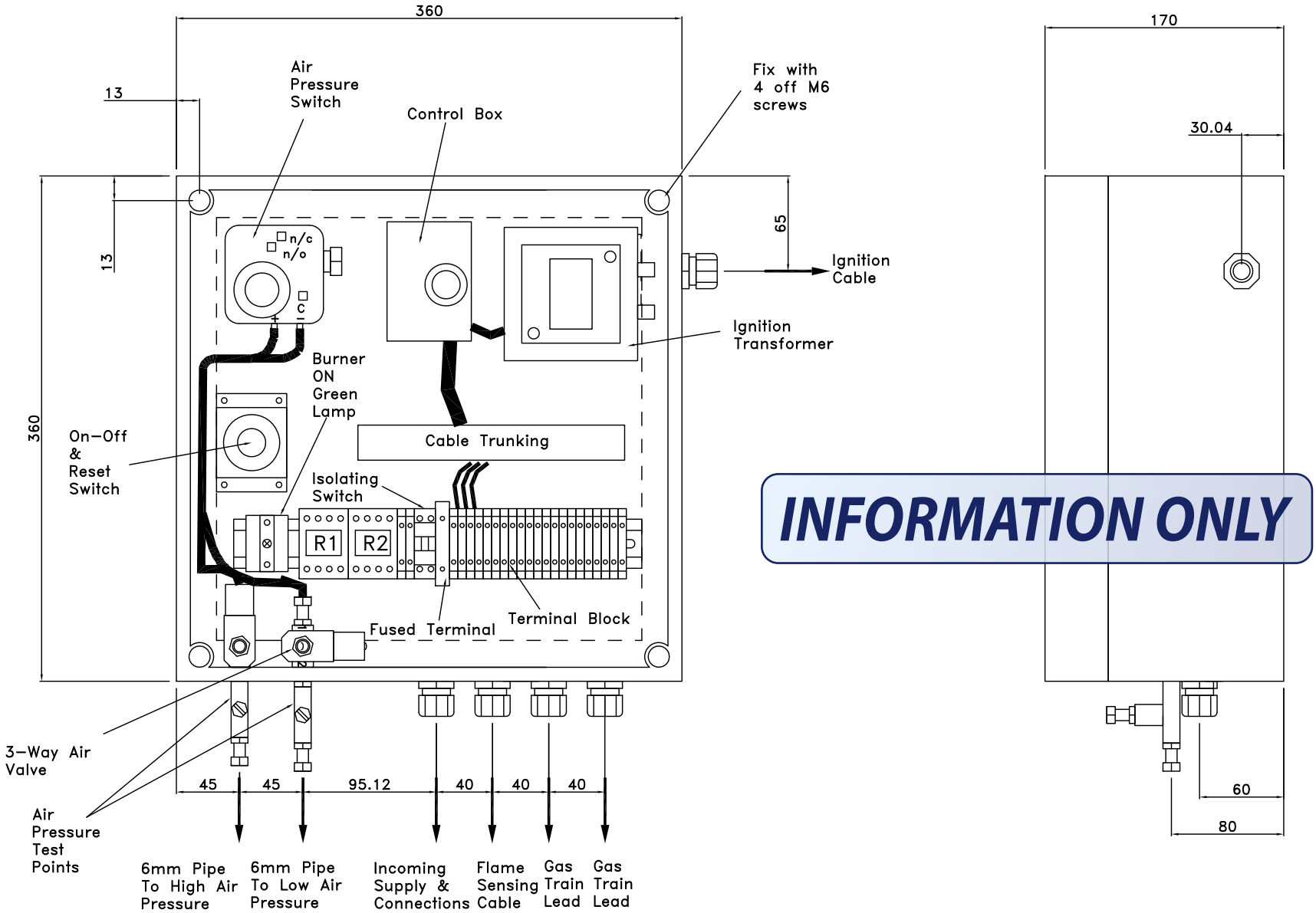
PROJECTION
This is a – angle drawing

TITLE: CONTROL PANEL WIRING
CONTROL B230B-S-M-H-4-2V
DB LME 21 LGPS

PROJECT No: –

DRAWING No: 61 053

SHEET 1 OF 4



INFORMATION ONLY

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PROJECTION

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TITLE: CONTROL PANEL WIRING
CONTROL B230B–S–M–H–4–2V
DB LME 21 LGPS

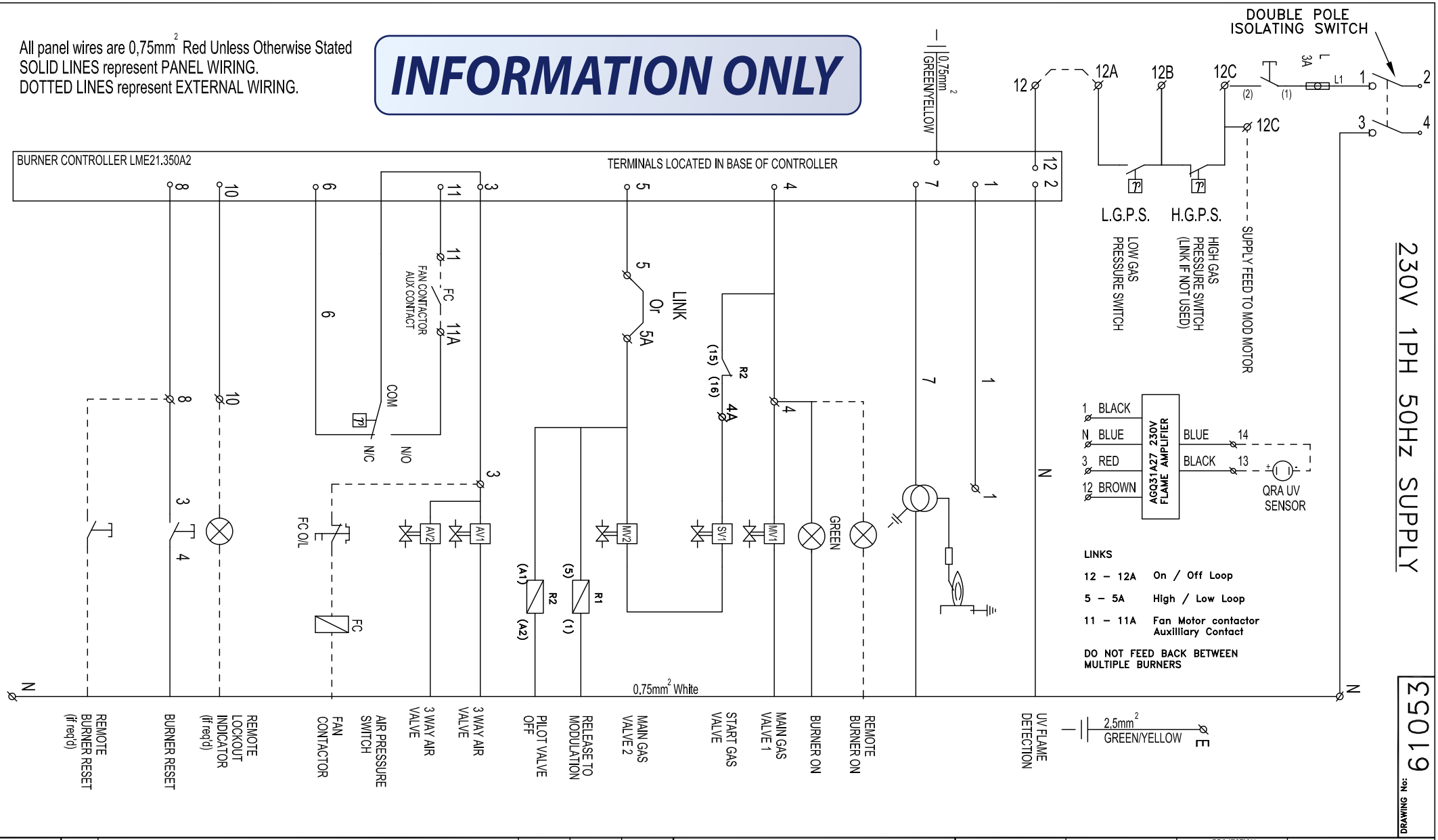
PROJECT No: –

DRAWING No: 61 053

SHEET 2 OF 4

All panel wires are 0,75mm² Red Unless Otherwise Stated
SOLID LINES represent PANEL WIRING.
DOTTED LINES represent EXTERNAL WIRING.

INFORMATION ONLY



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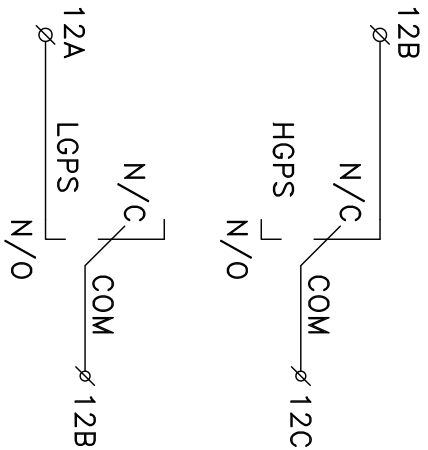
CONTROL B230B–S–M–H–4–2V
DB LME 21 LGPS

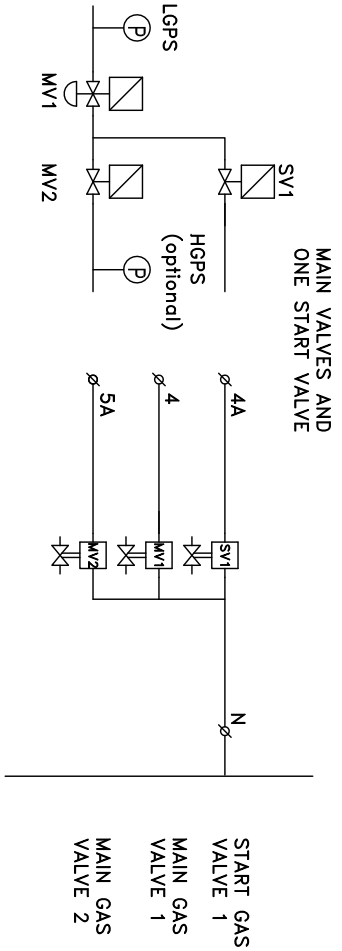
PROJECT No: –

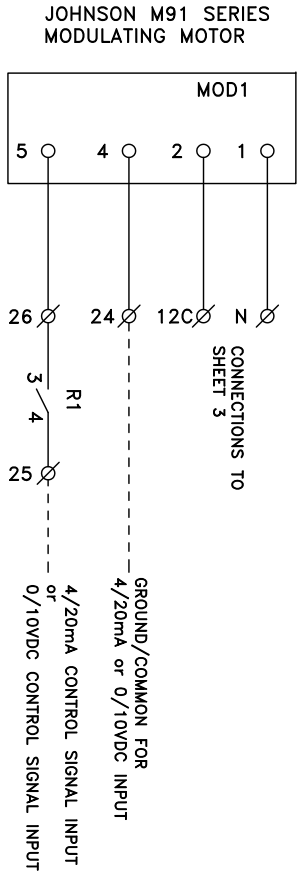
DRAWING No: 61 053

SHEET 3 OF 4

INFORMATION ONLY







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CONTROL B230B-S-M-H-4-2V
DB LME 21 LGPS

PROJECT No: –

DRAWING No: 61 053

SHEET 4 OF 4

SECTION 4

TEMPERATURE AND OTHER CONTROLS DESIGN

TEMPERATURE CONTROL

The burner can be supplied to operate depending on the application and specification ordered as :-

1. On / off 2. 2. High / low 3. Modulating gas

It is anticipated that the burner will be specified with modulating gas so as to maintain a constant air off-take temperature with a minimum input of typically 8 kW (25,000 Btu/h) depending on model size.

The maximum start gas stage is limited to 30% of the main flame by European Standards but generally the main burner flame will be lit by a separate small pilot flame. Once the main flame is lit and proved the pilot flame will be interrupted (switched off).

It is anticipated that a digital electronic temperature controller will be supplied either by Lanemark as an optional accessory or by the installer.

This controller should have a set point and an additional alarm stage with fixed differentials for high/low burners. Modulating burners will require a suitable controller that can provide the required control signal. These controllers will typically have full 3 term P.I.D control and Autotune to suit the characteristics of the application.

A second independent temperature controller may have been specified at the design stage to act as Policeman or High Limit Thermostat. Should the process temperature exceed the Set Point and also the normal Alarm Point (possibly because the main temperature controller has failed), then this second thermostat will switch the burner off and not allow automatic restart.

The temperature controllers for on/off or high/low control are typically digital electronic controllers that are programmed for on/off control and the P.I.D and Autotune facility are disabled. It is unlikely that simple mechanical thermostats will be suitable for controlling oven temperature because of the speed of response needed.

For processes that require accurate temperature control a modulating gas valve may be fitted and this will be driven by a :-

1. 0-10 V dc control signal
2. 4-20 mA control signal
3. 3 wire valve positioning signals

Lanemark normally use 24V AC modulating motors on gas valves and the 24V AC power supply is supplied by Lanemark if a control panel is supplied.

For 3 wire valve positioning motors (a simple 24V, 110V or 230V feed is used to open and then to close the modulating motor) the electronic temperature controller must have slave relays placed between itself and the modulating motor. This is to protect its internal contacts which are generally rated at a fraction of an Amp and not able to carry the associated in-rush current.

WIRING OF TEMPERATURE CONTROLLERS

If Lanemark supplied an electronic digital temperature controller and built it into the control panel the wiring diagrams contained in this manual will show this controller.

Generally the only additional field wiring will be to connect the temperature sensor back to the control panel. This must be done in suitable cable and screened.

PROGRAMMING TEMPERATURE CONTROLS

If Lanemark supplied temperature controls with a burner a Data Sheet will be contained in this section of the manual detailing how to programme and adjust them.

TEMPERATURE SENSORS

For electronic temperature controllers Lanemark supply Pt100 (platinum resistance) sensors to suit the controller with an industrial style housing. The standard sensor has a 300mm stainless steel stem and a fixing collar with a ½" BSP male thread. Longer length sensors may been specified to suit the application.

The oven / duct will require a ½" BSP boss adding to the wall in a position where the sensor will detect a representative temperature. This position must be such that the sensor will not be damaged when work passes through the oven or be shielded form sensing the heat by the work pieces.

A data sheet will be included in this section of the manual if such a sensor was supplied.

OTHER CONTROLS

When specified Lanemark can supply and build other controls into the control panel to suit the application. Typical additional controls are :-

1. Time clocks
2. Hours run meters
3. Fan motor controls (overload / contactor)

This section of the manual will contain Data Sheets on wiring, setting and programming.

SECTION 5

DUCT FAN & DAMPERS

If the duct burner's main fan or dampers were supplied by Lanemark International details of these will be contained in this section of the manual.

SECTION 6 GAS TRAIN DESIGN

GAS VALVE TRAIN

Lanemark DB duct burner system gas valve train assemblies are designed to meet specific application and customer requirements e.g.

1. Type and Volume of Gas
2. Voltage (110V or 230V AC)
3. Class of IP Protection Standard required
4. Destination Country
5. Special Features - Pressure Switches, Fine Filters and High Gas Pressure Regulators
6. Modulating Actuator Control Signal requirement

The gas valve train gas inlet position should have been specified during the design stage to suit the process application. Once the gas valve train assembly has been built and delivered to the specified configuration, it must not be modified on site without prior consultation from Lanemark.

The standard gas valve train assembly is suitable for a maximum inlet gas pressure as shown on the burner Rating Plate and IP54 protection standards unless specifically requested during the design stage. Lanemark will be pleased to offer advice on special gas pressure requirements and supply special gas pressure regulators to suit.

Generally the gas valve train assemblies are supplied loose for fitting on site. A union is used and only has to be remade to refit the gas valve train assembly.

All electrical connections will have been fully made for testing at Lanemark but will have been disconnected for transport. Each cable core will be tagged with terminal numbers that should be reconnected with reference to the wiring diagram contained in *Section 3 - Control Box Design.*

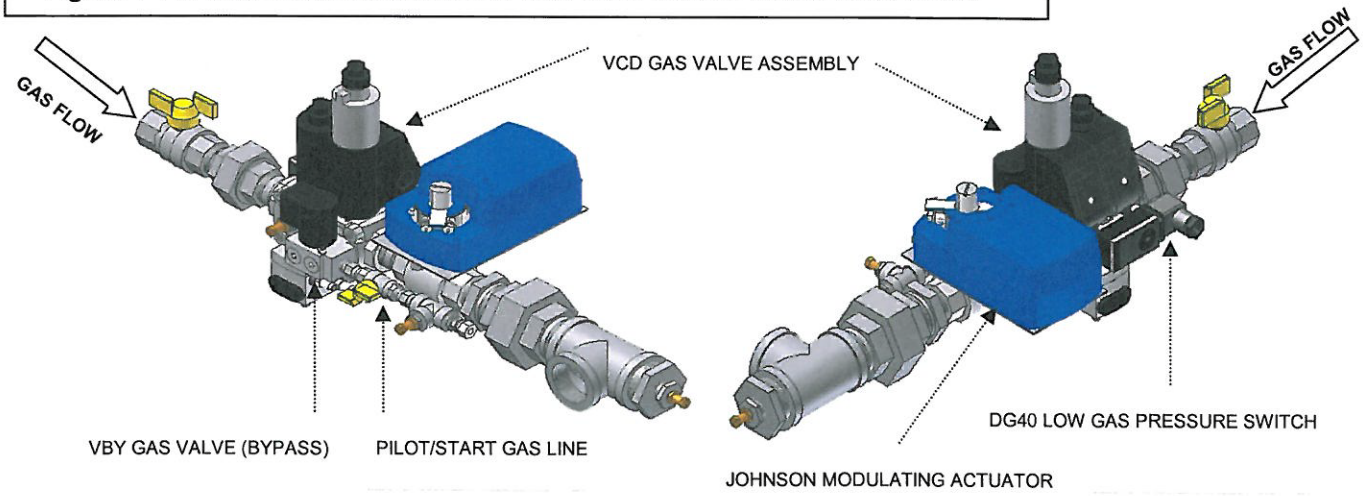
GAS VALVE TRAIN WIRING

Lanemark DB duct burner system gas valve train assemblies are connected back to the burner control box. This wiring connection is generally run in a 3m flexible PVC conduit which will have been disconnected for transport and will need to be remade on site. Each cable core will be tagged with terminal numbers that should be reconnected with reference to the wiring diagram contained in *Section 3 - Control Box Design.*

GAS VALVE TRAIN ASSEMBLY DRAWING

A copy of the gas valve train assembly drawing is included in this section of the manual. The gas valve train assembly drawing number can be found on the burner Rating Plate. A copy of this Rating Plate can be found in the front of this manual.

Figure 1 **TYPICAL KROMSCHRODER VCD GAS VALVE TRAIN ASSEMBLY**



NOTE: All Kromschröder gas valve train assemblies include a DG40 low gas pressure switch (5-40mbar) as standard.

Figure 2 TYPICAL KROMSCHRODER VCD GAS VALVE ASSEMBLY

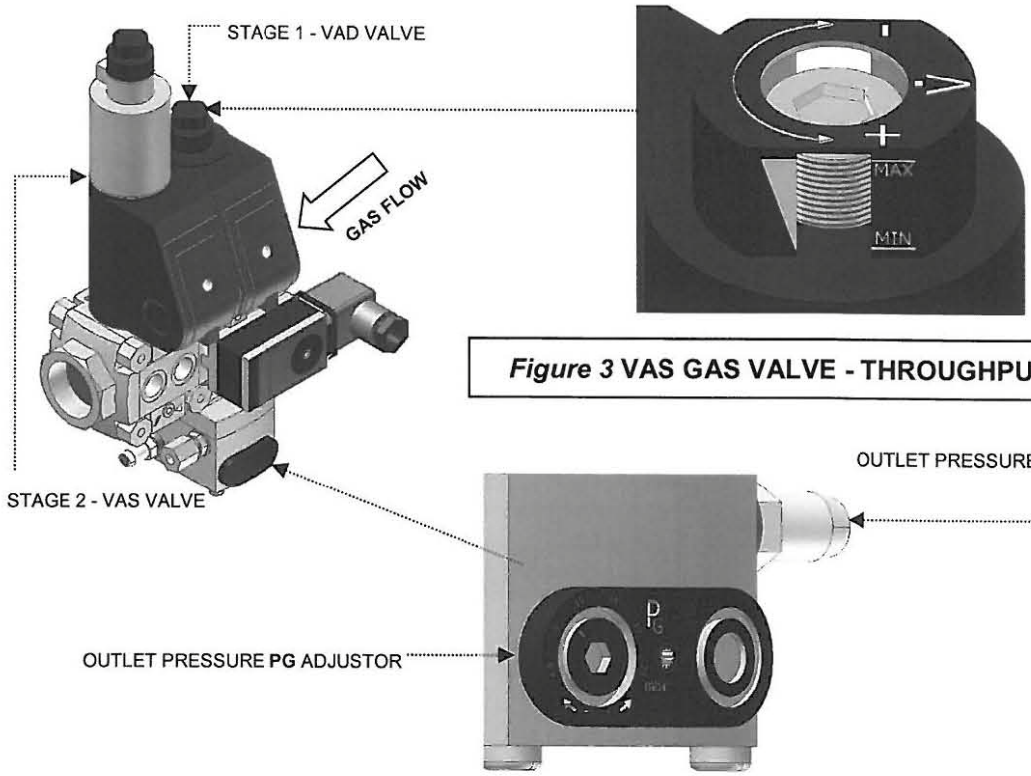


Figure 3 VAS GAS VALVE - THROUGHPUT ADJUSTOR

Figure 4 VAD GAS VALVE - OUTLET PRESSURE ADJUSTOR (P_G)

VAS GAS VALVE - TECHNICAL SPECIFICATION

VAS : Solenoid Valve for Safe-Guarding Gas
Inlet Pressure **PE** : 10 - 500mbar
Enclosure Rating : IP65

A valve throughput adjustor is located on the top of the VAS solenoid valve. The markings on the cover cap can be used for coarse adjustment of the gas flow rate. A 2.5mm Allen Key should be used for the adjustment with 1 complete turn being equivalent to a 0.75mm valve stroke, with a maximum of 5 complete turns *(figure 3)*.

VAD GAS VALVE - TECHNICAL SPECIFICATION

VAD : Constant Pressure Governor
Inlet Pressure **PE** : 10 - 500mbar
Outlet Pressure **PG** : 2.5 - 25mbar
Enclosure Rating : IP65

The outlet pressure can be adjusted by turning the outlet pressure **PG** adjustor with a 2.5mm Allen Key. A manometer will be needed to ensure the required outlet pressure is achieved at the outlet pressure test point **PG** *(figure 4)*.

JOHNSON MODULATING GAS BALL VALVE WITH M-91 SERIES ACTUATOR

The modulating gas ball valve is driven through 90° travel by an actuator with a 30 second travel time. The actuator is generally supplied for 110V or 230V AC operation, with a choice of different control signals as specified by the customer:

1. 0-10V DC Control Signal

Or

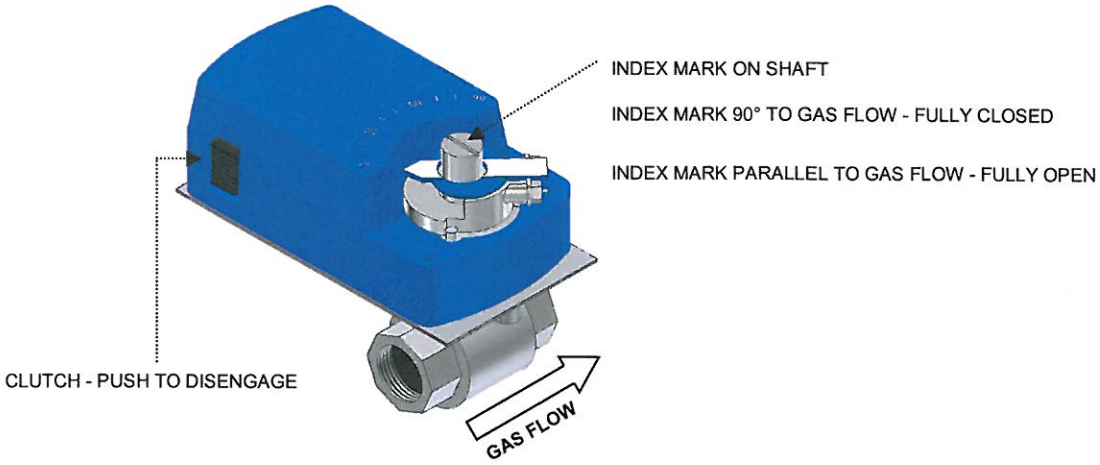
2. 0(4)-20mA Control Signal

Or

3. 3-Wire Direct Valve Positioning Signals

NOTE: The actuator is also available for 24V AC operation if specifically requested during the design stage. The actuator is maintenance free and once set-up should require no further adjustment.

Figure 5 JOHNSON MODULATING GAS BALL VALVE WITH M-91 SERIES ACTUATOR



IMPORTANT: If the clutch is manually disengaged during commissioning or servicing, the following procedure should be followed.

When the modulating actuator has moved past its end stop, the internal electronics switch off the supply to the actuator. Following the adjustment, the Lanemark DB duct burner system must be switched off at the main isolator (not the burner on/off switch) to allow the internal electronics to reset themselves.

SETTING THE JOHNSON M-91 SERIES ACTUATOR

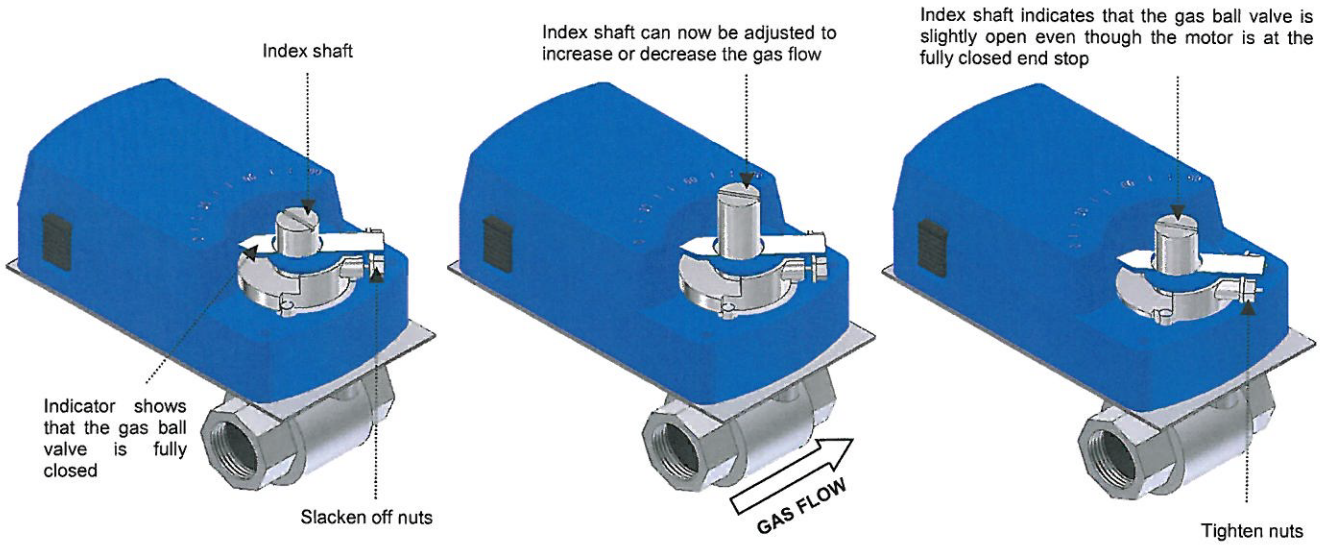
If the modulating gas ball valve can be driven fully closed by the control signal, the burner would receive no gas and would enter a *"lockout"* condition. The modulating gas ball valve is therefore set at the factory so that when the modulating actuator is fully closed, the modulating gas ball valve is still partially open.

If the Lanemark DB duct burner system is not starting reliably or the lowest setting is too low, the gas flow should be increased, there are two ways to make this adjustment.

The first method is the simplest however it is only suitable for very minor adjustments to the low setting because it also affects the high setting by making the modulating gas ball valve drive past the fully open position and start to close down again. This will usually not cause a problem for very small adjustments as a small amount of over travel past the fully open stop may not actually reduce the full flow gas volume rate.

The adjustment *(figure 6)* is made by using the clutch to set the actuator at the fully closed end stop. The 2 nuts on the yoke clamping the index shaft are slackened off and the index shaft can now be rotated to increase or decrease the gas flow. When the index shaft is in the adjusted position the 2 nuts must be retightened. The modulating actuators printed circuit board must be powered down from the burners isolator (not the burner control box on/off switch) to reset the electronics after the clutch has been used.

Figure 6 JOHNSON M-91 SERIES ACTUATOR ADJUSTMENT



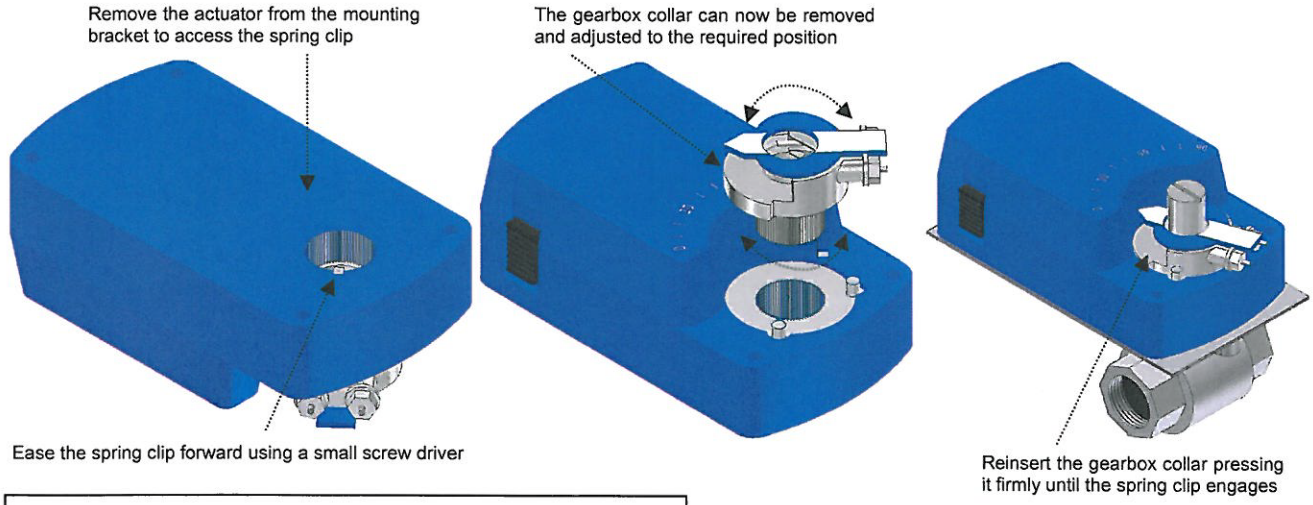
The second method of adjusting the volume of gas flowing through the modulating gas ball valve when the actuator is at the fully closed end stop is to make an adjustment to the actuator's gearbox.

The modulating actuator has to be removed completely from its mounting bracket to access a retaining spring clip. The spring clip can be released with a small screw driver and the gearbox (splined collar) pushed up and out of its fixing position.

The gearbox collar can now be reinserted at the required position, pressing firmly in until the spring clip engages. Each spline on the gear box collar is 5° of rotation.

Figure 7 details the second method of adjustment for the Johnson M-91 series actuator.

Figure 7 JOHNSON M-91 SERIES ACTUATOR ADJUSTMENT



WIRING THE JOHNSON M-91 SERIES ACTUATOR

The modulating actuator is despatched being fully wired at the actuator but disconnected from the burner control box for transport and will need to be remade on site. Each cable core will be tagged with terminal numbers that should be reconnected with reference to the wiring diagram contained in *Section 3 - Control Box Design.*

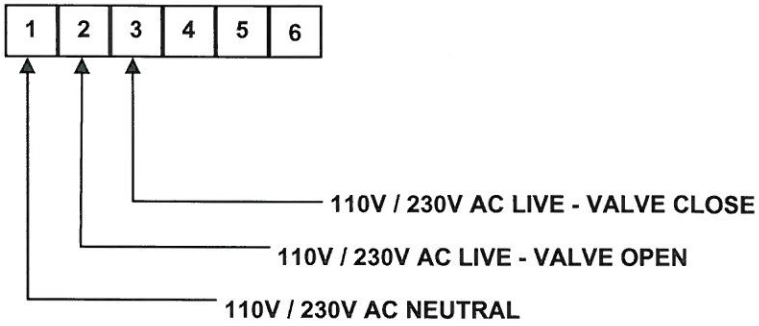
The modulating actuator is generally supplied for 110V/ 230V AC operation, which will usually have been specified at the design stage.

3-WIRE DIRECT VALVE POSITIONING CONTROL SIGNALS

If the modulating actuator rotates in the wrong direction, this can be altered by reversing the two wires that signal *"open"* or *"close"* . These two wires are connected into the burner control box and not the modulating actuator. The 2-way plug that connects directly onto the actuator should ***never*** be used to reverse the direction of rotation.

If a multimeter is used to check for the appropriate voltage on terminal 2 (110V/ 230V AC - valve open) simultaneously a small back-feed voltage will also be seen on terminal 3 and visa versa, this is normal and typical. An input feed must ***never*** be applied to terminals 2 and 3 simultaneously. *Figure 8* details the modulating actuator electrical terminals for 3-wire direct valve positioning control signals.

Figure 8 **ELECTRICAL TERMINALS**



0-10V DC OR 0(4)-20mA CONTROL SIGNALS

The modulating actuator terminals are shown in *figure 9*. The setting switches for 0-10V DC or 0(4)-20mA are shown in *figure 10*, these will normally have been set at Lanemark for the required control signal. The setting switch for the direction of rotation for the modulating actuator is shown in *figure 11* and will normally have been set at Lanemark for the required direction of rotation. The 2-way plug that connects directly onto the actuator should ***never*** be used to reverse the direction of rotation.

Figure 9 **ELECTRICAL TERMINALS**

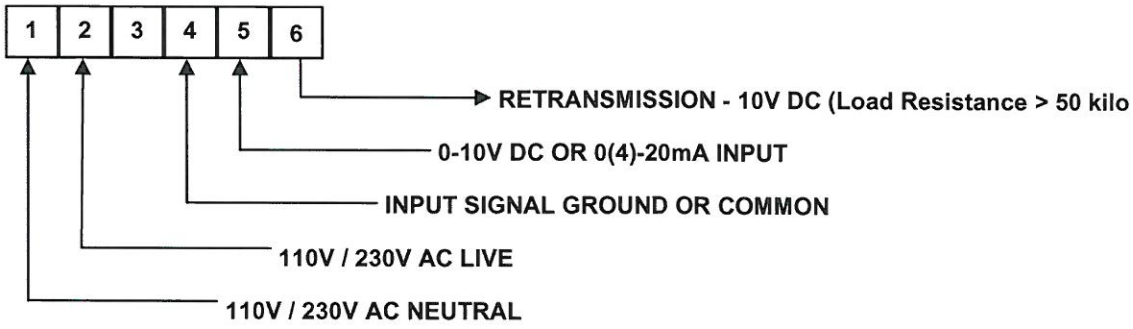


Figure 10 **SET 0V DC OR 0(4)mA BASE POINT**

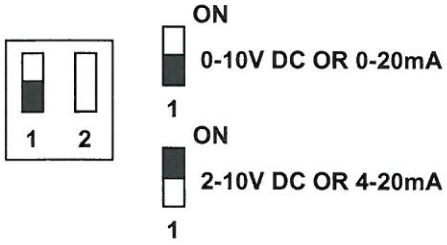
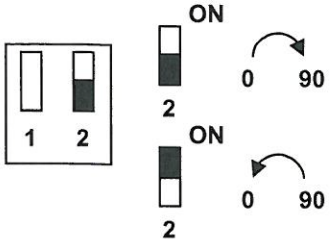
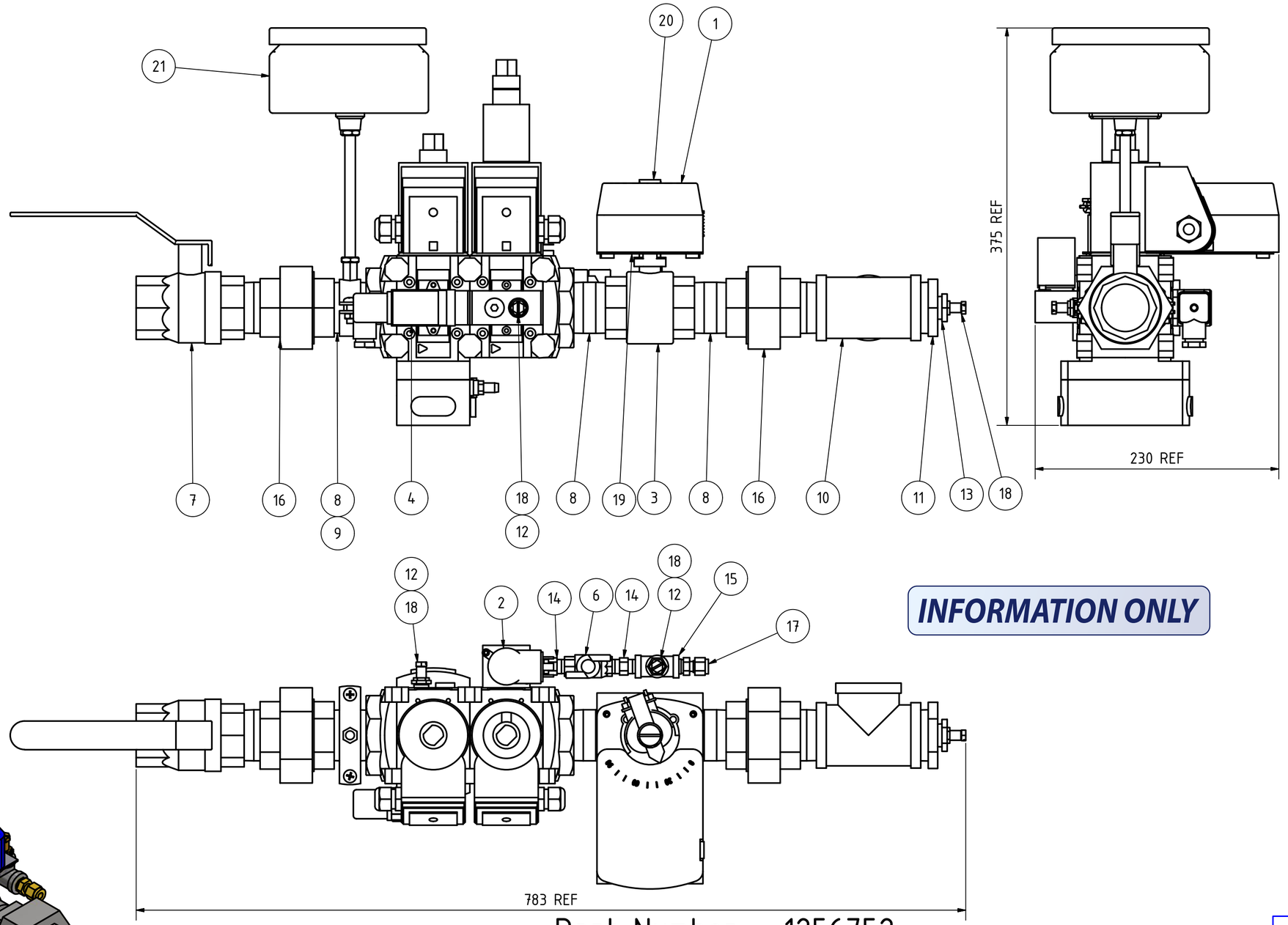


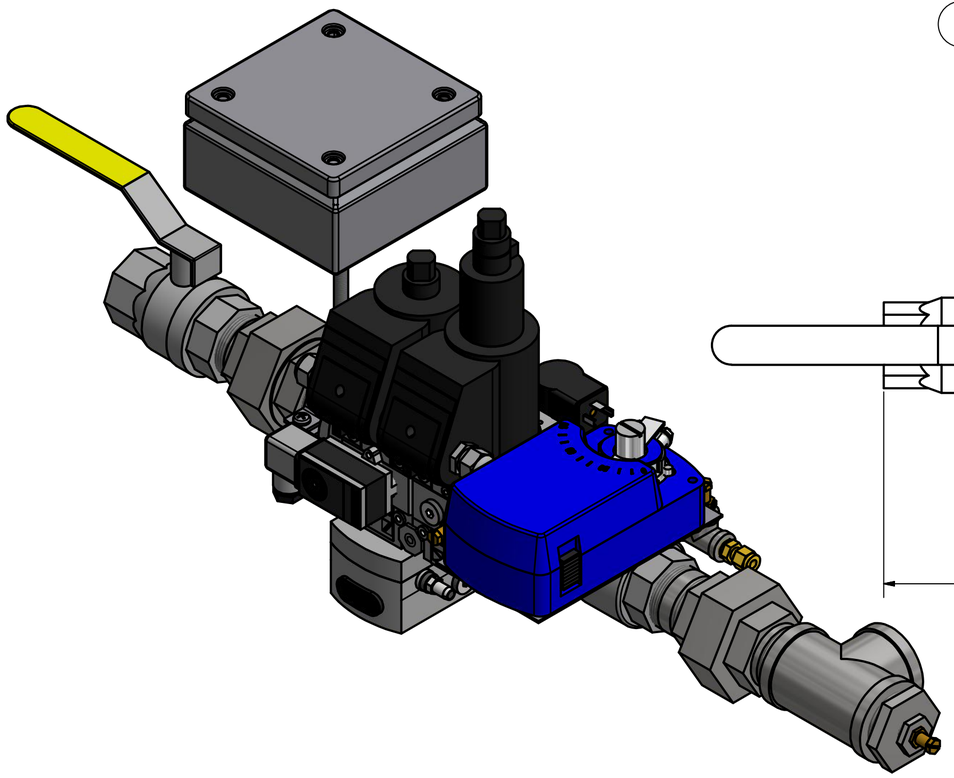
Figure 11 **SET DIRECTION OF ROTATION**



NOTE: Please see the wiring diagram contained in *Section 3 - Control Box Design,* or the actuator iabei found on the actuator lid, for confirmation of which system has been supplied.

Parts List			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	-	JOHNSON MOD MOTOR - SEE JOB PLAN
2	1	0010593	VBY8RW6L-RBD EXTERNAL 230V
3	1	0010716	1 1/2" MOD BALL VALVE
4	1	0010777	DG40 PRESSURE SWITCH
5	1	0010857	KROMSCHRÖDER GAS VALVE VCD2 1 1/2" 230V
6	1	0015049	1/4" BALL VALVE
7	1	0015106	1 1/2" LOCKABLE BALL VALVE
8	3	0021038	BARREL NIPPLE 1 1/2" S/S
9	1	0021041	40mm FLAMCO CLIP S/S
10	1	0021043	EQUAL TEE 1 1/2" S/S
11	1	0021044	1 1/2" X 1/2" REDUCING BUSH S/S
12	3	0021048	1/4" x 1/8" ST STL REDUCING BUSH
13	1	0021092	1/2" x 1/8" REDUCING BUSH S/S
14	2	0021108	1/4" HEX NIPPLE S/S
15	1	0021110	1/4" EQUAL TEE S/S
16	2	0021120	1 1/2" MALE/FEMALE UNION S/S
17	1	0022007	6mm X 1/4" MSC
18	4	0022030	PRESSURE TEST POINT 1/8"
19	1	0099016	MODULATING BALL VALVE MOUNTING BRACKET
20	1	0099017	MODULATING BALL VALVE KEY SHAFT
21	1	1012182	150x150x80 TERMINAL BOX





INFORMATION ONLY

Part Number - 1256752

Note:

Supply With 3m Of YY Cable From Junction Box.

Use 3 or 4 Core Cable For All Components

DRAWING No: 56752

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09			
08			
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02			
01	FIRST	14/12/2015	CPW

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TOLERANCE AS STATED OR ±

DRAWING SCALE (1 : 3)

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DRAWN BY: CPW

DATE: 14/12/2015

CHECKED BY: AJL

DATE: 14/12/2015

ISSUE: 01

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TITLE: GAS VALVE TRAIN DESING
DB 230V VCD2 1 1/2" MOD GAS
DB-230V-VCD2 1 1/2"-MG-2-1-2-3-3-9

PROJECT No: -

DRAWING No: 56752

SECTION 7 INSTALLATION

FITTING THE BURNER

The burner plate should be fitted to the duct using 8 or more studs fitted to the duc t as shown in previously in this manual. The burner plate mounting gasket should complete a gas tight seal.

Care should be tak en that the tw o air velocity sensing probes do not bec ome damaged when fitting the burner into the duct. The position of these probes relative to the air flow is critical to r eliably sense air flow.

FITTING THE CONTROL PANEL

The control panel will normally be supplied prewired to the burner plate and gas train junction box on smaller models but w ill require wiring on s ite on larger models.

The panel should be mounted within 3 metres of the burner on a cool surface. Make the 2 off 6mm steel bundy pipe c onnections from the high and low air sensing points on the bur ner plate to the two connections on the c ontrol panel m arked high and low air. Avoid long horizontal runs or U-traps that could collect condensation.

FITTING THE GAS TRAIN

The gas inlet position must be s pecified at the design stage e.g. " right hand bottom " to s uit the application. Once a gas train is built and deliver ed to this configuration it m ust not be modified on site without consulting Lanemark.

On smaller models the gas train will be prefitted but for larger models the gas train will be supplied loose or fitted in a transport only position. A union is used and only has to be remade to refit the gas train.

MAKING THE GAS CONNECTION

The gas connection should be m ade to the inlet point on the gas train to the is olating ball valve supplied.

The pipework final connection should be made in such a way that it is possible to isolate the gas with the ball valve provided and then to br eak the union and remove the c omplete burner without removing any further gas pipework.

The weight of the inc oming gas pipework will require independent s upport and m ust not be supported off the burner.

The burner must not be put into oper ation until the gas supply has been purged and pr oved sound as given under *Design* previously. The burners gas train is suitable for an inlet pr essure of 100 m .bar maximum.

If the gas supply system is to be pressure tested the gas train must be is olated first, as a pressure over 100 m.bar will destroy the gas valves.

INSULATING THE OVEN

The burner gas train and c ontrol panel c ontain many plastic parts and f ittings. These can be adversely affected by excessive heat being radiated from hot surfaces and also general ambient heat.

They should be pr otected from such heat typically by insulating the oven/duct in the ar ea of the burner and providing adequate ventilation.

MAKING THE ELECTRICAL CONNECTIONS

An external wiring interface and panel inter nal wiring diagram are contained in this manual.

THIS APPLIANCE MUST BE EARTHED

All wiring should be in ac cordance with I.E.E. Regulations (BS7671) and the requirements contained under *Design* given previously.

The voltage r equirements for each burner vary to meet the end users specification. If this manual has been sent out w ith an ac tual burner (or series of burners built to the s ame specification) then a Burner Data Plate duplicate label w ill have been stuck inside the f ront cover of this manual. This data plate will give the ex act as built elec trical details for a particular burner.

The high tens ion ignition and flame detection connections will have been pr emade to the control panel but may have been disconnected for transit.

The gas train has its own local electrical junction box to which each gas valve, pressure switch etc is prewired. This local box has a 3 m etre flexible conduit that has to be c onnected to the c ontrol panel.

The cable cores are tagged with the terminal numbers and should be reconnected back into the control panel with reference to the wiring diagram contained in this manual if needed.

The 230V or 110V 1 Phase supply to the burners control panel should be made through the 20 mm cable gland from a suitable isolator and fuse as given previously under *Design*. 110V supplies must be *end tapped* not from *centre tapped* transformers.

The main duct air fan will normally be supplied by others but may have been supplied by Lanemark International. The 230V 1 Phase or 415V 3 Phase AC 50 Hz supply to the fan motor should be made from a suitable isolator, motor protection device and contactor as given under *Design* earlier. The supply should be made into the terminals U – V – W for 3 phase and U – V for 1 phase motors.

The supply and motor protection device should be suitable for the motor's power and full load current. These are given on the burner's Data plate a copy of which is included in the front of this manual if Lanemark International supplied this fan and motor.

The auxiliary contact on the fan motor contactor, temperature controller and external burner lockout reset input signal should be connected back to the burners control panel. If the Satronic DMG digital electronic control box has been used the lockout reset cable must be screened and not allowed to pickup induced voltage.

The air fan must also have its own independent air flow proving system that should be connected back to the burner's control panel so that it is not possible to start the burner unless the air is flowing and the burner must switch off immediately if this air flow is lost. If the fan was supplied by Lanemark details of the fan and air flow proving device will be contained earlier in this manual.

HIGH / LOW TEMPERATURE CONTROLS

See *Section 4* . For high / low burners a temperature controller with a Set Point and an Alarm stage should be used with a suitable sensor. The internal contacts of the temperature controller should be suitable to carry the burners full load of 250VA and the in- rush current associated with valves opening and ignition transformers delivering a spark. It is recommended that interposing relays be used rated at 5 Amps.
The controller should not switch quicker than 30 seconds as on/off gas valves should not be cycled rapidly.

The temperature controller may however have been supplied by Lanemark as an optional extra with a suitable sensor which will require site wiring. details of the controller and sensor will be contained earlier in this manual.

The temperature controller should be wired to the control panel as shown in the wiring diagram contained using suitably screened cable for the sensor as necessary.

MODULATING TEMPERATURE CONTROL

For modulating gas burners the type of control signal i.e. 0-10 V dc , 4-20 mA or 3 wire direct control will have been determined at the design stage.

The modulating control signal should be made into the appropriate terminals as shown in the wiring diagram using suitable screened cable. A negative or 0V return is generally required by the temperature control instrument. This should be connected to the 24V AC neutral from the transformer feeding the modulating motor. This will complete the circuit.

For 3 wire direct control of a modulating valve, temperature controllers should have internal contacts suitable for the in- rush current of the modulating motor. Lanemark recommend that interposing relays be used that are rated for 10 Amp. Generally Lanemark supply these interposing relays. The temperature controller should have a minimum ON and OFF switching time of 0.6 seconds to allow the modulating motor (which has a 30 second travel time) to correctly interpret the signal and move the gas ball valve accordingly.

OVER TEMPERATURE PROTECTION

At the design stage it may have been decided that a second totally independent temperature controller to act as a High Temperature Trip Thermostat (Policeman Thermostat) is required because of the nature of the application. Once the overheat temperature has been exceeded the burner is held off until manual intervention occurs to reset this thermostat. This thermostat should be connected into the burners control circuit in such a way as to isolate the electrical supply to the burner.

DUCT BURNER INSTALLATION CHECKLIST

Before the burner is ready for commissioning the following should be checked to establish that the installation is complete in accordance with the installation details given in the Installation and Commissioning Manual.

Generally a Mechanical and Electrical Installation Drawing will have been prepared by the customer or his installer and Lanemark would be pleased to receive copies of these drawings for comment.

The gas supply should be turned off while performing these checks and electrical connections should be made with reference to the wiring diagram for connection numbers.

ITEM	DESCRIPTION	
1	The burner must be fitted to the duct with the insulating gasket. Generally the duct will have a ***profile*** and adjustable dampers to alter the air gap around the burner head to a drawing supplied by Lanemark. Typically 1 m of straight duct should be present before and after the burner so that the air flow is uniform over the burner head. Sufficient space should be left around the burner for access by the Service Engineer. Typically 1000mm is required in front of the burner and 300mm to the sides, top and bottom.	
2	The burner gas train may have been removed on larger models for packing and transport. If so the installer must refit the gas train and remake the electrical connections from the burner control panel to the gas train. When refitting the gas train it must be replaced so that the gas flows through the gas valves in the correct direction. There is an arrow engraved into the gas valve body to show the correct direction of flow. A flying lead in PVC flexible conduit will be provided by Lanemark and all the cables will have finished tails that are numbered for connection to the Lanemark wiring diagram.	
3	The gas train will have been assembled in accordance with the customers specification with regard to the orientation of the gas train relative to the burner body. The gas train should not be modified on site without consulting Lanemark.	
4	The gas supply should be made to the burner gas inlet connection.	
5	The gas supply system should be proved sound and purged and a Certificate will be required for a new system to prove this was done.	
6	The gas system should be capable of providing the specified volume of Natural Gas or Propane (LPG) Gas. The minimum inlet gas pressure to the burner with the burner running is 20mBar for Natural Gas and 35mBar for Propane. The maximum inlet pressure is 35mBar for Natural Gas and 50mBar for Propane.	
7	The combustion air fan will normally be supplied by the customer and built into the duct but it may have been supplied by Lanemark. If supplied by Lanemark the fan's electrical supply (generally 3 phase 415V 50 Hz) should be made to the fan motor through a contactor with a suitably sized overload usually supplied by others/or Lanemark to electrical terminals U-V-W. The contactor should have an auxiliary contact to interlock with the burners own controls to prove that the fan is running. The fan must have its own differential air pressure switch interlocked back to the burner's control circuit.	

8	The burner's control panel and the burner assembly itself have 2 off 6mm connections for sensing differential air pressure across the profile plate around the burner head. See the drawing supplied by Lanemark. The positive (upstream) and negative (downstream) pressure must be interconnected from the burner to the panel using the 6mm steel bundy pipe supplied by Lanemark. This pipe should be connected so as to avoid long horizontal runs or u-traps which could collect condensation and so loose the pressure signal.	
9	Generally the fans are designed to run continuously from a manual selector switch or similar or from a main control panel supplied by others. If the fan is to start only when required by the burner then a ***start*** signal should be connected from the burner to the coil of the fan motor contactor.	
10	The fan should be tested, the overload set and the direction of rotation checked.	
11	The temperature control sensor(s) and oven door interlocks, fan pressure switches etc. should be fitted and wired up. These should be wired back to their instruments or to the burner(s) control panel.	
12	The ***fan running*** interlock should be made from the fan's air pressure switch and fan contactor auxiliary contact to the burners interlock connections.	
13	The burners power supply and earth should be made from a local isolator with a suitable fuse (or MCB) for protection. This should be rated for a 250 VA load for 110V or 240V as specified.	
14	Temperature / time clocks / on/off controls etc. should be connected and tested. Any digital instruments should be configured and the correct temperatures and times set. If the burner is a modulating burner the 3 wire direct valve positioning, 4-20 mA or 0-10 V DC control signal should be connected to the burner as shown in the wiring diagram and the instrument tested to ensure the modulating valve responds to the input signal.	
15	Any remote burner status signals connections e.g. burner ON, LOCKOUT and REMOTE RESET should be wired in to the burners control panel and tested.	
16	The control panel and gas train in particular contain items made of plastic. The front of the duct and any hot structures adjacent to the burner's control panel and gas train must be insulated by the installer to prevent heat damage to these controls.	
17	The oven will generally have one or more air inlet dampers and flues which may have dampers. The oven may have a series of recirculation or air inlet or air extract fans. It is the responsibility of the installer to commission these and not the Lanemark Service Engineer.	
18	The general area must be made safe for Service Engineers to work in. If these burners are installed in ducts at high level then safe ladders, scaffolding or cat walks must be provided.	
19	In the UK the burner must only be put into operation and commissioned by a Service Engineer who is ACS and GAS SAFE registered for Industrial Gas Burners. In other countries local gas regulations must be complied with.	

SECTION 8 COMMISSIONING

IN THE UK COMMISSIONING OF GAS APPLIANCES CAN ONLY BE CARRIED OUT BY SUITABLY QUALIFIED TECHNICIANS WHO WILL BE GAS SAFE REGISTERED SPECIFICALLY TO UNDERTAKE WORK ON INDUSTRIAL GAS BURNERS. IN OTHER COUNTRIES LOCAL REGULATIONS MUST BE OBSERVED.

PRECOMMISSONING THE BURNERS ELECTRICAL CONTROL PANEL

THIS APPLIANCE MUST BE EARTHED

These tests can only be carried out by suitably qualified electricians.

Carry out the following electrical safety checks using a multimeter. Do not use a P.A.T (portable appliance tester) as high voltages generated could damage the electronics in temperature controllers and the Siemens Controller and give a false reading.

Earth Continuity Check

1. The appliance must be disconnected from the main supply.

2. Set the multimeter to Ohms x 1 scale and zero if necessary.

3. Measure the resistance between the earth connection point in the burner's junction box and the earth connection point from the supply panel or distribution board.

4. If the resistance is greater than 0.1 Ohm then check that the earth cable size is adequate and that all connections are clean, sound and correctly made.

Short Circuit Check

1. The burner must be electrically disconnected from the main supply and the burners own ON/OFF switch must be ON and any temperature controllers or time clocks interlinked should be calling.

2. Set the meter to the Ohms scale x 1 and measure the resistance between the incoming live and neutral terminals in the burner's junction box. If the meter reads zero then there is a direct short circuit and a fault that should be rectified.

3. Set the meter to Ohms x 100 scale and measure the resistance between the burner's earth connection point and the its incoming live terminal. If the resistance seen is less than infinity then there is a fault that requires rectifying.

Polarity Check

Connect the burner control panel to the incoming supply set the meter to read AC Volts by 300V scale.
If an isolating or step down transformer has been used the secondary side must be end tapped and not centre tapped as this can interfere with the operation of the Satronic programmer.

1. Measure the voltage between the incoming live and neutral terminals in the burner's junction box and it should read typically 230V AC or 110V as appropriate. The Satronic control box has under/over voltage protection and will not run if the supply is incorrect.

2. Measure the voltage between the incoming neutral and the earth connection in the burner's electrical junction box. The voltage should read less than 15V AC.

3. If these voltages are not seen than a neutral fault or polarity fault may exist. If very sensitive earth leakage trips have been fitted to the electrical installation then some types of multi meter may cause them to trip while attempting to measure voltages to earth.

Resistance to Earth Check

1. The burner must be electrically disconnected from the main supply and the burners own ON/OFF switch must be ON and any temperature controllers or time clocks interlinked should be calling.

2. Set the meter to Ohms x 100 scale.

3. Measure the resistance between the incoming live connection and the earth connection in the burner's electrical junction box. The reading should be infinity and if there is any other reading then there is a fault which should be isolated and rectified.

PRECOMMISSIONING THE BURNERS ELECTRICAL 1 OR 3 PHASE FAN GENERAL SUPPLIED BY OTHERS

1. Generally the connections will be checked in a similar way as given previously. Look for 230V to neutral on 1 phase and 400V between phases on 3 phase motors.

2. For 3 phase motors use the manual button on the motor contactor or similar and check the motor is rotating in the correct direction. If not isolate and reverse two of the phase connections.

3. For 1 and 3 phase motors set the overload or motor protection device in accordance with maker's instructions and with reference to the fan motor kW rating and full load current.

PRECOMMISSIONING GAS

The gas pipework system from the gas meter to the burner should be sound and purged in accordance with the standards given previously. A Test and Purging Certificate will be available to show this was completed. With the gas isolated at the main inlet, main gas train outlet (and pilot line outlet isolating valve if fitted) undertake the following checks to prove that the gas train valves are sound and have not been damaged in transit :-

LET-BY TEST ON ISOLATING VALVE.

1. With reference to the gas train schematic drawing fit a manometer to the inlet pressure test nipple.
2. Open the main isolating gas cock briefly and then close it. The gas trapped between the main isolating gas cock and the first main valve seat should remain at constant pressure for 2 minutes. If loss of pressure is seen then the main valves or the pilot bypass gas valve seats are letting by and it is faulty and must be replaced as given later under *Maintenance*. Replace all test nipples.

TEST RUN OF BURNER WITH LME21.350

With the main inlet gas isolating cock turned off and the burners own on/off switch turned off which is located on the burners electrical control box complete the following checks :-

1. Ensure that the oven/duct is put into operation with any recirculating fans or exhaust fans running. The burners own combustion air fan should be available to run and may have been wired back to the burner to get the start signal or it may receive a start signal from an independent main motor control panel.
2. Low inlet gas pressure switches are fitted to the gas train they require adequate inlet gas pressure to operate.
3. Switch on the burners on/off switch (press for approx. 1 second) and any isolators and the Siemens LME21.350 control box should start to run. If the box was left at *Lockout* previously the reset button will glow red and this should be reset by pressing it or the reset switch.
4. The auxiliary contact from the burner's combustion air fan motor starter should be interconnected into the same part of the control system as the burner's air pressure switch. See the wiring diagram. If this connection is missing the control box will lockout exactly as if there was a problem with the air pressure switch. Check this connection or put in a temporary link.
5. The Siemens box should become live and an orange light should be on the box. This first Section will also pull in the burners fan; if the contactor has been wired back to the burners own junction box. The two off 3 way solenoid valves fitted to the pipes going to the air pressure switch will also be energised. The pressure switch will now see the actual duct differential pressure either side of the duct profile plate. Or if an oven the suction from the oven. The box has 65 seconds to detect that the fan is running. If the Siemens box *locks out* at orange light this is because the air pressure switch is set too high. It is set to maximum at the factory. Adjust the switch to 1 m.bar and if the box again *locks out* at this stage it is because the pressure switch or box has failed to see that the fan is running. If this happens again investigate as given later under *Fault Finding.*
6. The Siemens box will continue to the ignition stage were the orange light will start to flash. Here the start (also low fire) gas valves will open (gas should be ON for Test run) and the ignition spark will attempt to light the start flame. At this stage the Siemens box will go to a green light to show that the burner is a light.

If the Siemens control box has run to green light then the burner is ready for commissioning.

SIEMENS LME2 SERIES OPERATION.

The lockout reset button «EK» is the key operating element for resetting the burner control and for activating / deactivating the diagnostics functions.

Red
Yellow
Green

The multicolor signal lamp (LED) in the lockout reset button is the key indicating element for visual diagnostics and interface diagnostics. Both «EK» and LED are located under the transparent cover of the lockout reset button.

Operation Status Indication.

Status	Colour Code	Colour
Waiting time	o.....	Off
Ignition phase	●○●○●○●○●○●	Flashing yellow
Operation, flame ok	□.....	Green
Operation, flame not ok	□○□○□○□○□○	Flashing Green
External light on startup	□▲□▲□▲□▲	Green-red
Undervoltage	●▲●▲●▲●▲●	Yellow-red
Fault, alarm	▲.....	Red
Error code output	▲○ ▲○ ▲○ ▲○	Flashing red
Interface diagnostics	▲ ▲ ▲ ▲ ▲ ▲	Red flicker light

..... Steady on
o Off

▲ Red
● Yellow
□ Green

After lockout, the red fault signal lamp ▲ will remain on. Diagnostics of the cause of the fault can be seen by pressing the lockout reset button for more than 3 seconds and referring to the Error Code Table in section 10 of this manual.

COMMISSIONING COMBUSTION

Final burner settings can only be set on site to suit a particular application.

The following settings and checks should be made after the precommissioning procedure has been completed.

The main inlet gas isolating cock should be OFF and the burner should be turned off at its own on/off switch.

Air Pressure Switch and Air Inlet Damper

1. The air pressure switch was despatched set to maximum. This has then been turned down to typically 1 m.bar during the precommissioning stage to allow the burner to run. If not do this now.
2. Any air inlet dampers on the duct and the profile plate setting within the duct should be set. Refer to the drawings of the duct assembly contained in this manual and the oven/duct manufacturer's instructions.
3. The electrical link in the control panel (5A – 5B) should be removed so that the burner will run in start/low gas stage only. (Alternatively if the burner's gas train has a separate start gas line then the gas cock on the main gas line can be turned off).
4. The burners on/off switch and any other external controls should be brought on and the main isolating gas cock should be turned on.
5. The burner will start to run and the Siemens programmer will run as shown previously until the ignition stage is reached. If the gas pipework is not completely purged of air the burner may lock out on the first few attempts at ignition. If lockout does occur the cause should be found by interpreting the lockout blink code from the Siemens control box. The most common reasons will be air pressure problem or failure to light and detect the start gas flame (refer to fault finding section 10).
6. Once the start gas flame is established the Siemens box would normally bring on the main gas but as the electrical link 5A – 5B has been removed (or the main gas cock turned off) the main gas valve coil will not open.
7. The start gas flame can be adjusted to give a reliable flame by adjusting the *start gas rate adjuster* screw. (The position of this adjuster screw is shown previously in this manual). To comply with European burner standards it must not exceed 30% of the main flame rate. However for duct burners a small independent pilot is used which is interrupted (switched off) once the main flame is lit.
8. Switch the burner off and replace the electrical link 5A – 5B if removed and turn the main gas ball cock 2/3 rds off. Fit a manometer to the gas pressure test point on the burner main valve outlet or head. From the burners Data Plate (or the graphs contained in this manual) obtains the gas head pressure required to set the burner on the required rate.
9. Restart the burner and it will run to the main flame stage this time. As the burner runs to main flame watch the gas head pressure rise and progressively open the inlet gas ball cock and set the main gas pressure on the main gas valve governor. (An illustration of the adjuster position is contained previously in this manual and there may be a protective dust cover over the adjuster screw proper). To increase gas pressures turn the governor screw clockwise and anticlockwise to decrease.
10. Once the gas pressure has been correctly set for main flame the combustion should be set. On many applications it is not possible to measure combustion but the following figures are typical for high fire settings if the burner were to be installed on an indirect heat exchanger or similar.

Natural Gas

Oxygen	(O2)	6.0 %
Carbon dioxide	(CO_2)	8.5 %
Carbon monoxide	(CO)	100ppm (maximum)

Propane Gas

Oxygen	(O_2)	6.5 %
Carbon dioxide	(CO_2)	9.5 %
Carbon monoxide	(CO)	100ppm (maximum)

The flue gas temperature when the system is up to its operating temperature will depend entirely on the characteristics of the system.

In all cases the CO (carbon monoxide) should be negligible (only a few parts per million) if personnel are working in the hot air stream from the burner under all running conditions.

11. The air pressure switch should be set when the flue and combustion system are cold and after any dampers or the duct's profile plate have been set. With the combustion air fan and any other fans fitted to the oven/duct running, but with the burner off, measure the differential air pressure at the 2 test point on the control panel burner body labelled *high* and *low* air.

The pressure switch should be set to typically 50% of the measured air pressure. If the pressure switch is set too high then there is a possibility that nuisance lockout could occur when detecting air pressure. If the pressure switch is set too low then there is the possibility that the pressure switch would not switch the burner off if there was an air flow problem e.g. a dirty filter.

The pressure switch should never be set to minimum because it can stick. **An air pressure switch must never be set too low to sacrifice safety for reliability**.

12. Fit a differential manometer to the air pressure test points. With the burner running to the air prepurge stage the pressure switch should be turned *up* to test that the air pressure switch prevents the burner from firing and that it locks out. If the air pressure switch cannot be turned up high enough to cause lockout, then disconnect one of the air sensing pipes to mimic loss of air.
13. With the burner running the pressure switch should be turned up and the burner should lockout due to loss of the air pressure signal. alternatively disconnect one of the air sensing pipes.
14. With the burner running turn off the main gas isolating cock and check that the burner locks out due to loss of flame signal.
15. With the burner running in main flame the inlet gas pressure should checked to ensure it is within specification :-

Natural Gas

100 m.bar (40 in.wg) maximum
17.5 m.bar (7.0 in.wg) minimum and typical

Propane Gas

100 m.bar (40 in.wg) maximum
35 m.bar (14 in.wg) minimum and typical

If the inlet pressure is above the maximum an additional regulator must be fitted. If the inlet pressure is below the minimum then the local Gas Supply Authority should be contacted to establish the cause. If the inlet pressure is unstable (the pressure may fall at times of peak demand) then as the burner has been commissioned relative to the standard inlet pressures problems may well occur during periods of low pressure.

On Propane systems ***overpressure cut out*** with vents and ***under pressure cut out*** devices must be fitted. The settings of these should be checked for suitability and recorded.

If low inlet and high outlet gas pressure switches have been fitted these should be set and their operation checked. If the gas pressure is sufficient to make the switch the burner will turn off, but not lock out.
A low inlet gas pressure switch will be set to 5 m.bar below the minimum inlet pressure specified above. A high outlet gas pressure switch should typically be set to 3 m.bar above the normal high fire gas pressure.

The slow opening adjuster on the main gas valve (if fitted) may need adjusting to slow the opening down or a pressure pulse may occur on normal opening and trip the pressure switch.

Modulating Motors On Gas Ball Valves

16. If a modulating motor is fitted to a ball valve the motor end stop must be set so that when it is at its fullest closed position, there is still sufficient gas flow, to light reliably and sustain a stable flame. The temperature controller should be set and the correct response of the modulating motor to the control signal should be checked. See the Data Sheet on the motor that will be contained in this manual.

Final Checks

17. Check the operation of any mechanical or electronic temperature controllers. Record the set points and for electronic temperature controllers record the set-up parameters. Generally the burner should not be called to start more than 6 times an hour and should not switch from high flame to pilot / low flame more than 60 times an hour.
18. Check that there is adequate ventilation for safe combustion as given under *design considerations* previously.
19. The owner/operator of the burner system should be instructed in the basic operation of the burner and its controls.

FINALLY replace all pressure test points and complete a commissioning form similar to the sample contained in this manual.

IMPORTANT: IF FOR ANY REASON THE COMMISSIONING HAS NOT BEEN FULLY COMPLETED OR IF THERE IS A PROBLEM WITH THE GAS SUPPLY , FLUE, VENTILATION OR SAFETY CONTROLS THEN THE SYSTEM SHOULD NOT BE LEFT CAPABLE OF BEING RUN. THE OWNER / OPERATOR OF THE BURNER SYSTEM SHOULD BE MADE AWARE BEFORE LEAVING SITE.

SECTION 8: DUCT BURNER COMMISSIONING REPORT FORM

CUSTOMER NAME: ……
SITE ADDRESS: ……

BURNER MODEL: ……**SERIAL No:** …… **GAS TYPE:** ……
CONTROL PANEL VOLTAGE:……**V** **GAS TRAIN TYPE:** ……..
BURNER MOTOR POWER ……**kW** **VOLTAGE:**……**V** **RUN CURRENT:**……**Amp**
(The above can be found on the burner data plate stuck to the burner body and also a duplicate may be stuck in the inside cover of this manual)

PRECOMMISSIONING CHECKS:

1 BURNER EARTHED:…….. **Y / N**
2 BURNER CONTROL PANEL ELECTRICAL INSTALLATION CHECKED:…..…….. **Y / N**
3 BURNER FAN MOTOR ELECTRICAL INSTALLATION CHECKED:…… **Y / N**
4 FAN MOTOR OVERLOAD SET (COLD) TO: ……**Amp**
5 GAS INSTALLATION SOUNDNESS TESTED AND PURGED:…… **Y / N**
6 BURNER GAS TRAIN SOUNDNESS TESTED:…… **Y / N**
7 BURNER DRY RUN COMPLETED:…… **Y / N**

COMMISSIONING CHECKS

1 AIR INLET DAMPER SETTING	**% OPEN**				
2 AIR PRESSURE SWITCH SETTING	**mBar**				

PILOT / LOW FIRE SETTINGS

1 BURNER HEAD PRESSURE	**mBar**				
2 COMBUSTION CHAMBER PRESSURE	**mBar**				
3 WIND BOX DIFFERENTIAL AIR PRESSURE	**mBar**				
4 FLAME SIGNAL STRENGTH					
5 OXYGEN	**%O_2**				
6 CARBON DIOXIDE	**%CO_2**				
7 CARBON MONOXIDE	**%CO**				
8 NET FLUE GAS TEMPERATURE	**°C**				
9 PROCESS TEMPERATURE	**°C**				
10 GAS FLOW RATE	**m^3/h**				

HIGH FIRE SETTINGS

1 BURNER HEAD PRESSURE	**mBar**				
2 COMBUSTION CHAMBER PRESSURE	**mBar**				
3 WIND BOX DIFFERENTIAL AIR PRESSURE	**mBar**				
4 FLAME SIGNAL	**(neons on or microamps)**				
5 OXYGEN	**%O_2**				
6 CARBON DIOXIDE	**%CO_2**				
7 CARBON MONOXIDE	**%CO**				
8 NET FLUE GAS TEMPERATURE	**°C**				
9 PROCESS TEMPERATURE	**°C**				
10 GAS FLOW RATE	**m^3/h**				

(It may not be practical to take some of the above readings depending on the application)

NOTES:

SIGNED: **FOR:** **DATE:**

SECTION 9 MAINTENANCE

CLEANING AND MAINTENANCE

It is UK law that Lanemark Midco HMA2a series air heating burners are installed, commissioned and maintained by competent persons only, e.g. A.C.S and GAS SAFE registered installers only. In other countries local gas regulations must be observed.

Maintenance of the burner system(s) should be conducted at regular intervals dependent upon the application and the operating conditions.
Note: It is recommended that a minimum of one maintenance check is completed annually.

HMA2A SERIES BURNER HEAD

To clean and inspect the burner head assembly the following instructions should be followed:

- Isolate the gas and electrical supply to the burner.
- Remove the duct access hatch to enable work to be completed on the burner head assembly in its current position.
- The burnerhead will typically have a light covering of dust on the baffle plates and associated pipework. This should be removed with a lint free cloth or soft brush and vacuumed up as necessary. The dust must be treated with care and a disposable mask and safety goggles worn to prevent irritation.
- The burner electrodes should be checked for their serviceability and if found faulty must be replaced.
- The ignition and flame sensing electrodes should be set as shown in the *figure* below. A U.V. cell may be used as an alternative method of flame sensing and if installed, the lens inspected and cleaned to remove dust particles.
- Upon completion of the cleaning process, all services and supplies to the burner should be reinstated.

CLEANING THE FAN IMPELLOR

On some applications the duct and fan may have been supplied by Lanemark International Limited. If the fan is operating in a contaminated area with significant atmospheric dust present the fan impeller may require cleaning.

- Isolate the gas supply at the service gas cock provided as part of the gas train. Isolate all electrical supplies to the burner. Isolate and make safe any other fuel and electrical supplies to the oven/process.
- If the electrical connection to the impellor and motor assembly has been run in flexible conduit it may be possible to remove the impellor and motor assembly without disconnecting this. The electrical supply must be isolated. If the electrical supply has been made through fixed conduit then it will require disassembling once the supply is isolated.

- The removal of the fan impellor will depend on the actual type supplied, but this will normally have been selected and designed into the the duct to allow ready access for maintenance.
- The weight of the fan impeller and motor assembly must be supported as not to strain the electrical conduit connection.
- Once cleaned replace the fan impeller assembly as the reverse of the above.
- If any electrical connections have been disturbed they must be checked for correct reassembly as given previously under *Precommissioning Electrical.*

GAS TRAIN AND CONTROLS

The following checks should be made annually.

- The operation and soundness of the isolating gas cocks on the gas train should be checked. This should be done by a gas engineer by pressure testing up to the seal of the ball valve and establishing that there is no loss of pressure in a similar way to that used to test the main gas valve seats.
- The gas soundness of the gas train gas valves should be checked as above.
- The setting of the air pressure switch and the lockout function of the burner controller checked for correct operation. By incorrectly setting the air pressure switch so that the controller locks out on air proving and closing the gas cock so the controller locks out on flame failure. Components should be correctly reset after the checks have been carried out and the position of the air pressure switch recorded.
- The gas train and control should be visually inspected for signs of obvious damage or deterioration.

Figure **HMA2A PILOT ASSEMBLY – MOUNTING DETAILS**

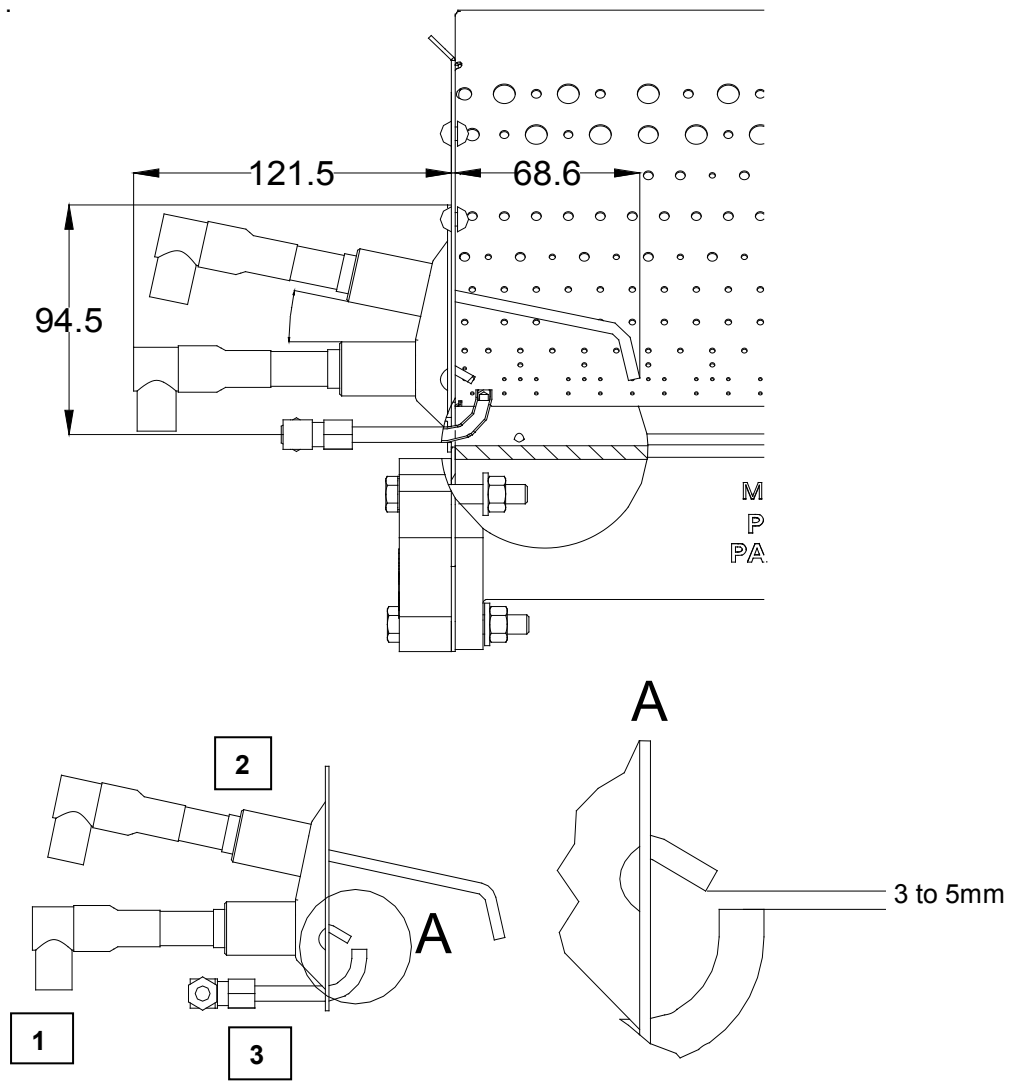


Figure shows the HMA2A Pilot Assembly mounting details including:

1. Ignition Electrode - Electrode Assembly is Part No. M1342 –95

2. Flame Sensing Electrode - Electrode Assembly is Part No. M1360-05
   N.B. A UV cell is available as an option.

3. Pilot Gas Burner - Various options are available.

SECTION 10 FAULT FINDING

NOTE: If the fault persists and the cause cannot be isolated, contact Lanemark Combustion Engineering Ltd to arrange for a visit by one of our Service Engineers.

Lanemark Combustion Engineering Ltd,
Whitacre Rd,
Nuneaton,
Warwickshire.
CV11 6BW

Tel: 024 7635 2000
Fax: 024 7634 1166

Tel Int: + 44 (0) 24 7635 2000
Fax Int: + 44 (0) 24 7634 1166

Web site : http://www.lanemark.com
e-mail : info@lanemark.com

FAULT FINDING GENERAL - SIEMENS LME21 BOX

SYMPTOM	FAULT	ACTION
Burner's Siemens control box at *lockout* or not attempting to start.	Burner fault or safety interlocks holding the burner off. The supply voltage is above/below the nominal supply voltage value (110 or 240V) and the Siemens box will not operate. The remote burner lockout reset has been continuously switched on.	Refer to the later section specifically on burner control faults. Correct the supply voltage. Release the reset switch.
Process temperature rising above the required temperature.	Thermostat is set incorrectly. Thermostat is not sensing a representative process temperature. Thermostat is not switching down to low fire or modulating downwards. Low fire is set too high.	Reset thermostat. Check the actual temperature in the area of the sensor. Check the wiring and settings of electronic controls and replace if necessary. Reset low fire.
Process temperature fails to reach the required temperature.	Thermostat is set incorrectly. Thermostat is holding burner in low fire or not modulating upwards. The burner performance has not been matched to the process requirement. The process conditions have been changed since commissioning. High fire coil has failed.	Reset thermostat. Check the wiring and settings of electronic controls and replace if necessary. Recommission the burner. Recommission the burner. Replace coil.
Evidence of poor combustion conditions e.g. sooting or smells.	Original commissioning settings have been altered. **Do not use equipment**	Recommission the burner.

FAULT FINDING TEMPERATURE CONTROLLERS

SYMPTOM	FAULT	ACTION
Burner runs to ignition and the temperature controller switches the burner off and it attempts to cycle again.	The ignition spark is interfering with the electronics of the temperature controller.	Check that the ignition spark plug cap is an original part or replacement and suppressed with a 5 kilo ohm resistor.

FAULT FINDING GAS VALVES

SYMPTOM	FAULT	ACTION
1st valve or governor will not open.	High pressure gas trapped between 1st and 2nd main valve seats and locking up 1st valve.	Remove test point between seats. Tap valve to release 1st valve seat. Open up by-pass valve to allow more gas to flow.
2nd main valve not opening.	The throughput restrictor has been fully or almost fully closed. The slow opening adjuster is set to the *slowest* opening. Coil failed.	Open up the through put restrictor and increase the speed of lift of the slow opening adjuster. Replace faulty coil.
No pilot/start gas.	The adjuster on the pilot / start gas valve closed or nearly fully closed. Pilot coil failed.	Use the adjuster to increase the pilot/start gas flow. Replace pilot coil.

FAULT FINDING BURNER CONTROLS SIEMENS LME21 PROGRAMMER

The burner faults can be diagnosed by looking at the flashes on the Siemens LME22 programmer.

SYMPTOM FAULT		ACTION
If there is no lights on even if the rest button is pressed	No power supply to the controller.	Check terminal 12 in the base of the controller is at 110V (or 230V as appropriate) and that terminal 2 is a neutral. If voltage is present replace the box.
Burner at lockout and will not reset.	Control box is seeing a flame signal. Fault on remote reset. Control box is faulty. Faulty box.	Look for flame being present due to the gas valves having failed to close. Check that terminal 8 is not being held at permanent neutral which initiates remote reset of the box. Replace box.

Control on but no Lights on the box .	Control circuit not complete. Air pressure switch is in the normally open position i.e. it is sensing air when an air flow signal should not be present.	Check for continuity between terminals 12B, 12A, 12. Check that any interlocks fitted in this circuit are calling. Look at the wiring to the air pressure switch and establish if the air pressure switch has stuck at normally open (n/o), if so replace the switch. If the oven has its own fan the draught from this fan may be holding the air pressure switch at normally open. There are 2 off 3 way air valves fitted into the 2 off air sensing pipes and these should be venting the air pressure switch to atmosphere. Check that these 3 way valves are not fitted in the wrong direction or have stuck in the wrong position. Check that the pipes are not blocked
Burner starts but *locks out* after the orange light has been on	The air pressure switch has not detected that the burner fan is running and moved across to the normally open position within 65 seconds.	Check that the fan motor auxiliary contact has pulled in across terminals 11-11A Check that the 2 off 3-way air valves are being energised and not venting the air pressure being created to atmosphere. Check that the air pressure switch contacts are changing across. Use a manometer to measure the actual differential air pressure being created and compare this to the pressure switch setting.
Lockout after the orange light and when the light is green.	Air pressure switch has returned to the normally closed position.	Check with a manometer the air pressure being seen and the operation of the switch. Check the 3 way air valves are venting the pressure being generated.
Pilot flame established but lockout after orange flashing light.	Failure to detect the start gas flame.	Check the ionisation current. It should be a minimum of 3 microamps dc for a flame rod or 3 microamps for a U.V cell. Check the position of the detection probe and the connections to it. Check if the pilot flame is too weak or being over aired. If UV cell, clean the sight glass. Replace box or U.V cell.

Pilot flame NOT established lockout at green.	Failure to provide gas and or air. Failure to provide a spark.	Check that the gas supply is on and that the start gas valve is opening and that gas pressure is reaching the burner head. Check that the pilot stage is not being over aired or under gassed and producing a mixture that will not light. Check the ignition probe spark gap. Check that the probe is not earthing and the connections are OK. Check that the ignition transformer is being energised via terminal 7.
Lockout after green light.	Unstable pilot flame. Weak flame signal. Unstable main flame as main valves open. Weak main flame signal.	Check the flame signal strength as given previously and look for a dip in signal. Adjust the start gas rate or the air damper as appropriate. Check the position of the flame sensing probe and the connections. Put a manometer on the burner head test point. Look for the gas pressure increasing progressively. If the pressure increases rapidly when the main valve opens, check for excessively high inlet gas pressure. Check the setting and operation of the governor. Check that the flame detection probe is positioned as given in this manual.

FAULT FINDING BURNER CONTROLS LANDIS LME21 PROGRAMMER

The burner faults can be diagnosed by looking at the indicator light on the control box.

Color code table for multicolor signal lamp (LED)		
Status	**Color code**	**Color**
Waiting time «tw», other waiting states	❍.....	Off
Ignition phase, ignition controlled	● ❍ ● ❍ ● ❍ ● ❍ ● ❍ ●	Flashing yellow
Operation, flame o.k.	□.....	Green
Operation, flame not o.k.	□ ❍ □ ❍ □ ❍ □ ❍ □ ❍	Flashing green
Extraneous light on burner startup	□ ▲ □ ▲ □ ▲ □ ▲ □ ▲	Green-red
Undervoltage	● ▲ ● ▲ ● ▲ ● ▲ ● ▲	Yellow-red
Fault, alarm	▲.....	Red
Error code output (refer to «Error code table»)	▲❍ ▲❍ ▲❍ ▲❍	Flashing red
Interface diagnostics	▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲	Red flicker light

..... Steady on
❍ Off

▲ Red
● Yellow
□ Green

Error code table		
Red blink code of signal lamp (LED)	**«AL» at term. 10**	**Possible cause**
2 blinks	On	No establishment of flame at the end of «TSA» - Faulty or soiled fuel valves - Faulty or soiled flame detector - Poor adjustment of burner, no fuel - Faulty ignition equipment
3 x blinks	On	«LP» faulty - Loss of air pressure signal after «t10» - «LP» is welded in normal position
4 blinks	On	Extraneous light when burner startup
5 blinks	On	Time out «LP» - «LP» is welded in working position
6 blinks	On	Free
7 blinks	On	Too many losses of flame during operation (limitation of repetitions) - Faulty or soiled fuel valves - Faulty or soiled flame detector - Poor adjustment of burner
8 x blinks	On	Free
9 blinks	On	Free
10 blinks	Off	Wiring error or internal error, output contacts, other faults
14 blinks	On	CPI contact not closed

During the time the cause of fault is diagnosed, the control outputs are deactivated
- Burner remains shut down
- External fault indication remains deactivated
- Fault status signal «AL» at terminal 10, according to the error code table

The diagnostics of the cause of fault is quit and the burner switched on again by resetting the burner control. Press the lockout reset button for about 1 second (< 3 seconds).

NOTE: With 10 & 14 Blink faults there is no lockout indication.

SECTION 11 COMPONENT REPLACEMENT

COMPONENT REPLACEMENT

COMPONENT REPLACEMENT CAN O NLY BE CARRIED OUT BY S UITABLY Q UALIFIED TECHNICIANS WHO WILL BE GAS SAFE AND ACS REGISTERED SPECIFICALLY TO UNDERTAKE WORK ON INDUSTRIAL GAS BURNERS

ONLY ORIGINAL EQUIPMENT SPARES SUPPLIED BY L ANEMARK I NTERNATIONAL S HOULD BE FITTED T O T HESE BU RNERS T O E NSURE T HE SAFE A ND CO RRECT O PERATION OF THE BURNER.

IGNITION AND FLAME DETECTION PROBES

1. Isolate the gas supply at the service gas cock provided as part of the gas train. Isolate all electrical supplies to the burner. Isolate and make safe all other fuel and electrical supplies to the oven.
2. To replace the UV cell if fitted simply remove it from the fixing collar.
3. To replace probes remove the burner assembly complete on its mounting plate from the duct. Fit a temporary earth connection and then break the gas union to the burner gas train. Remove the nuts holding the burner body mounting plate to the duct and remove the complete burner head assembly.
4. The probes can be r eplaced individually by pushing them out through their spring clip fixing collars or the complete pilot assembly can be replaced. Check their position of the probes against the drawing in this manual.
5. Replacement is the reversal of the above. Check the operation of the ignition and detection probes by starting the burner and looking for satisfactory ignition and a good f lame detection signal as described previously under *Commissioning.*

BURNER HEAD ASSEMBLY

1. Isolate the gas supply at the service gas cock provided as part of the gas train. Isolate all electrical supplies to the burner. Isolate and make safe all other fuel and electrical supplies to the oven.
2. Fit a temporary earth connection and then break the gas union to the burner gas train. Remove the nuts holding the burner body mounting plate to the duct.
3. It should now be pos sible to remove the burner head assembly on its burner mounting plate.
4. If the burner is left unattended at this stage the incoming gas pipe must be capped off. It must not be left isolated on the gas cock alone.
5. The burner head can be released from its pipework and mounting plate. The pilot assembly will normally be supplied separately if ordered and will require fitting. A new mounting plate gasket should be used if the old one has deteriorated.
6. The burner electrodes should be checked for their correct position as shown in the drawing in this manual before the burner is replaced.
7. After such work the integrity of the gas safety valves and t he soundness of any gas pipework disturbed must be shown to be safe, as given previously under *Precommissioning Gas*. The burner settings must be checked as given previously under *Commissioning* and a written record made.

FAN IMPELLER AND MOTOR

On some application the duct and fan may have been supplied by Lanemark Ltd.

1. Isolate the gas supply at the service gas cock provided as part of the gas train. Isolate all electrical supplies to the burner. Isolate and make safe all other fuel and electrical supplies to the oven.
2. The fan impeller and motor will generally be replaced as a unit as they are balanced and cannot be replaced individually on site.
3. Remove the electrical connections to the motor junction box and if the burner is to be left unattended these connections must be l eft in a safe condition.
4. The removal of the fan motor and i mpeller will depend on the actual type supplied but this will normally have been selected and designed into the duct to allow ready access for maintenance
5. Replace the fan assembly as the reverse of the above using a new gasket if necessary.
6. The electrical connections must be c hecked for correct reassembly as given previously under *Precommissioning Electrical*.

GAS VALVE COILS

Warning – Solenoid coils run hot in operation, allow sufficient t ime to cool before removal.

1. Isolate the gas supply at the service gas cock provided as part of the gas train. Isolate all electrical supplies to the burner. Isolate and make safe all other fuel and electrical supplies to the oven.
2. Remove the electrical connections to the gas valve by removing the push on pl ug caps or the connections to the valve terminal blocks. Make a note of the position of the connections to aid replacement later.

3. Remove the coil from the body of the gas valve by releasing the fixing nut or retaining clip on the top of the gas valve. This fixing may be located under a plastic cover.
4. Fit a new coil as the reverse of the above ensuring that replacement is of the same voltage as that removed.
5. After such work the integrity of the gas safety valves and the soundness of any gas pipework disturbed must be shown to be safe, as given previously under *Precommissioning Gas.* The burner settings must be checked as given previously under *Commissioning* and a written record made.

GAS VALVES BODIES

1. Isolate the gas supply at the service gas cock provided as part of the gas train. Isolate all electrical supplies to the burner. Isolate and make safe all other fuel and electrical supplies.
2. Remove the electrical connections to the gas valves by removing the push on plug caps or the connections to the valve terminal blocks. Make a note of the position of the connections to aid replacement later.
3. Fit a temporary earth continuity connection and then break the gas unions on the burner gas train.
4. Remove the faulty gas valve body and replace using a new “O” Ring or replace pipework using a proprietary gas jointing compound. Ensure that the direction of gas flow through the gas valve is correct by looking for the direction arrow stamped on the casting
5. Replace the complete gas train assembly as the reverse of the above.
6. After such work the integrity of the gas safety valves and the soundness of any gas pipework disturbed must be shown to be safe, as given previously under *Precommissioning Gas.* The burner settings must be checked as given previously under *Commissioning* and a written record made.

BURNER CONTROLLER

1. Isolate the gas supply at the service gas cock provided as part of the gas train. Isolate all electrical supplies to the burner.

2. Honeywell burner controllers have a fixing screw holding the controller to its base, this must be removed to pull the box out. Siemens Burner controllers are retained to the base by two spring clips which have to be sprung to remove the controller.

3. Replace as the reverse of the above.
4. The burner settings must be checked as given previously under *Commissioning* and a written record made.

IGNITION TRANSFORMER

1. Isolate the gas supply at the service gas cock provided as part of the gas train. Isolate all electrical supplies to the burner.
2. Remove the Burner controller as described previously and release the connections from the ignition transformer to it.
3. Unscrew the ignition cable from the ignition transformer.
4. Release the fixing screw holding the ignition transformer to the back plate.
5. Replace as the reverse of the above.
6. The burner settings must be checked as given previously under *Commissioning* and a written record made.

3 WAY AIR VALVES

1. Isolate the gas supply at the service gas cock provided as part of the gas train. Isolate all electrical supplies to the burner.
2. Open the plastic junction box and release the connections from the valve to it.
3. Release the retaining nut from the stem of the valve and the coil can now be lifted away.
4. If the valve body itself is faulty the body can be released from the plastic tube by releasing the push on pipe connections. A screwdriver should be used to push the collars inwards then the pipe can be pulled out.
5. Release the valve body if necessary by releasing the backnut holding the valve to the backplate.
6. Replace as the reverse of the above.
7. The burner settings must be checked as given previously under *Commissioning* and a written record made.

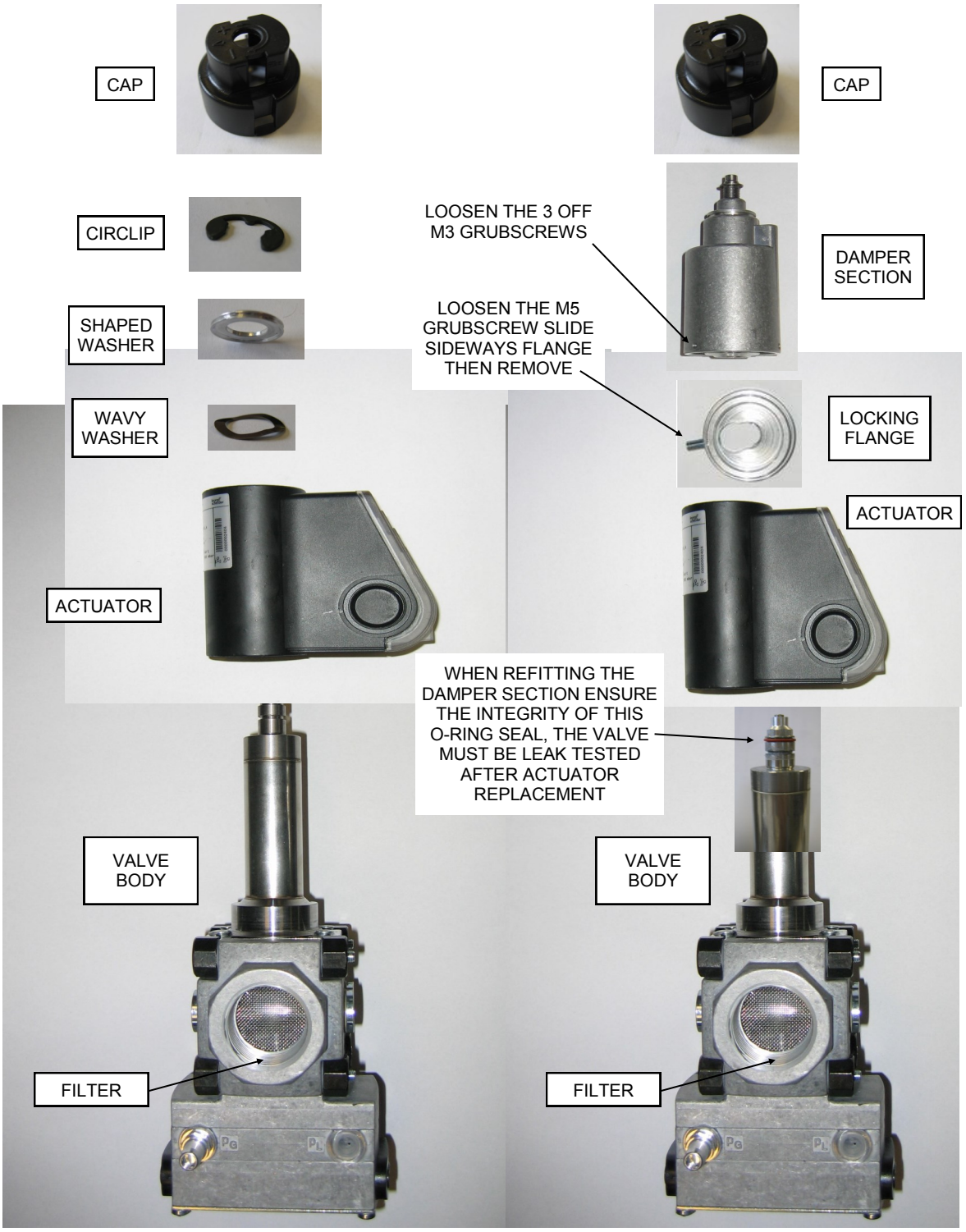
AIR PRESSURE SWITCH

1. Isolate the gas supply at the service gas cock provided as part of the gas train. Isolate all electrical supplies to the burner.
2. Remove the plastic cover over the pressure switch and release the electrical connections and the switch fixing screw.
3. Replace as the reverse of the above.
4. The burner settings must be checked as given previously under *Commissioning* and a written record made.

REPLACEMENT OF ACTUATOR ON KROMSCHRODER VALVES

FIXING OF ACTUATOR ON VALVE BODY

FAST OPENING

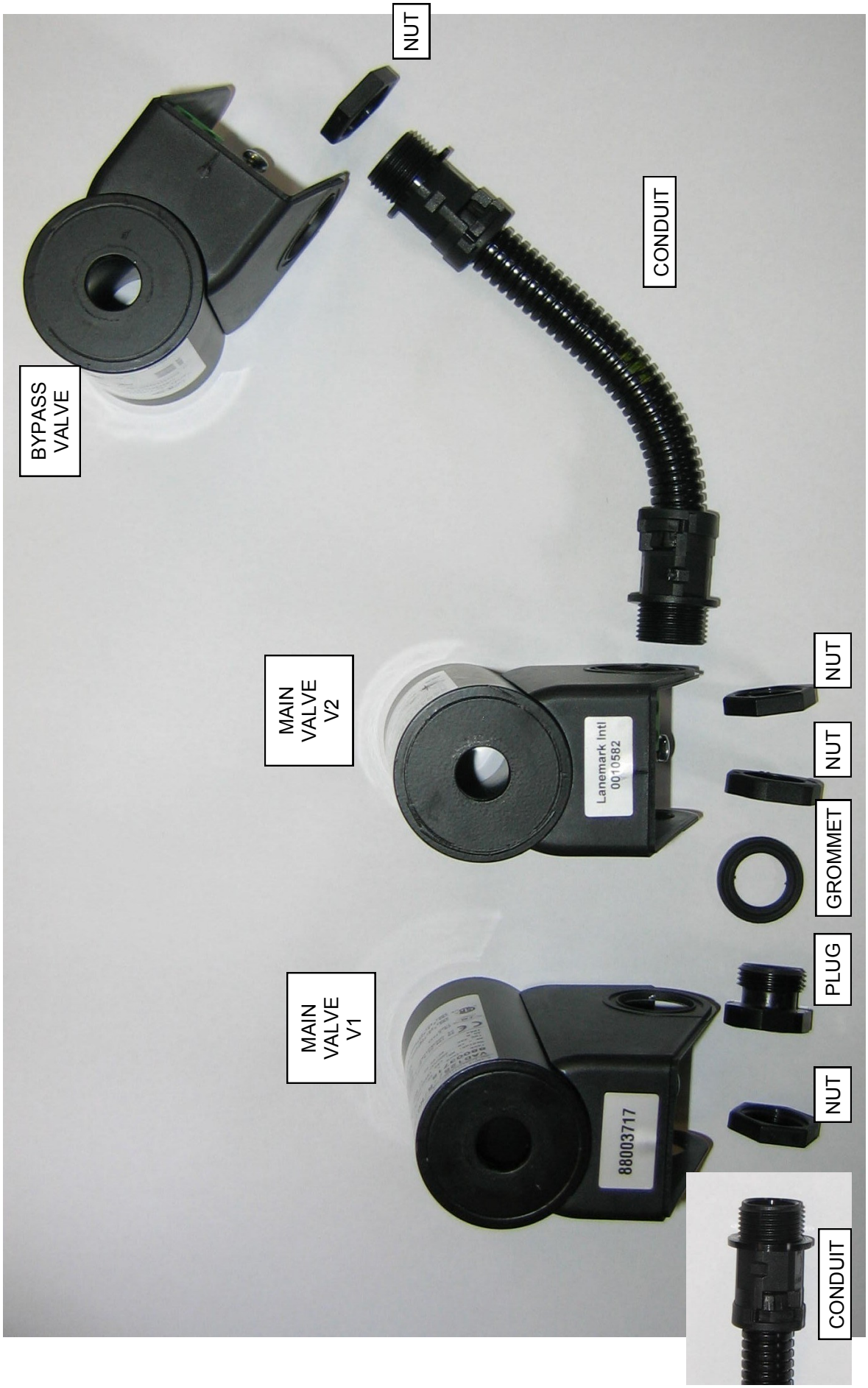


FIXING OF ACTUATOR ON VALVE BODY

SLOW OPENING

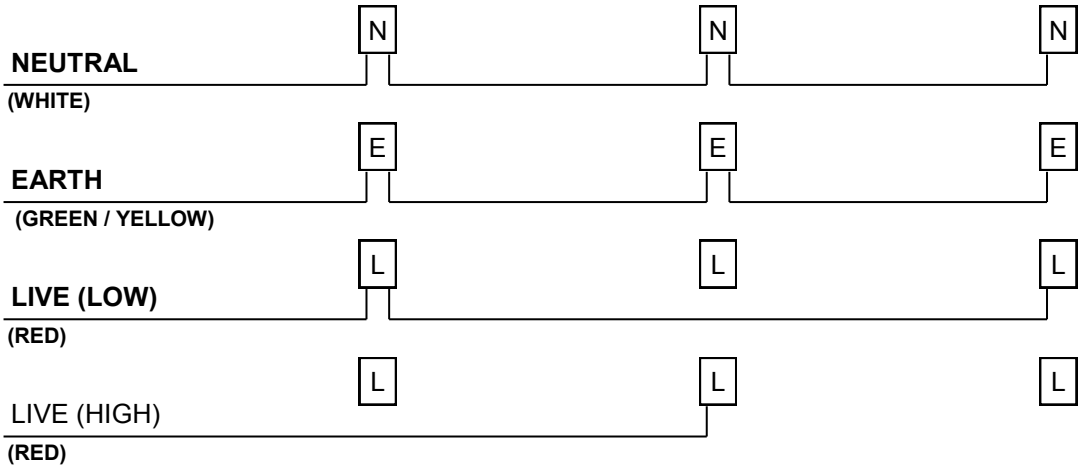
Part Numbers: **VA1 230V = 10771** **VA2 230V = 10773** **VBY 230V = 10779**
VA1 110V = 10772 **VA2 110V = 10774** **VBY 110V = 10778**

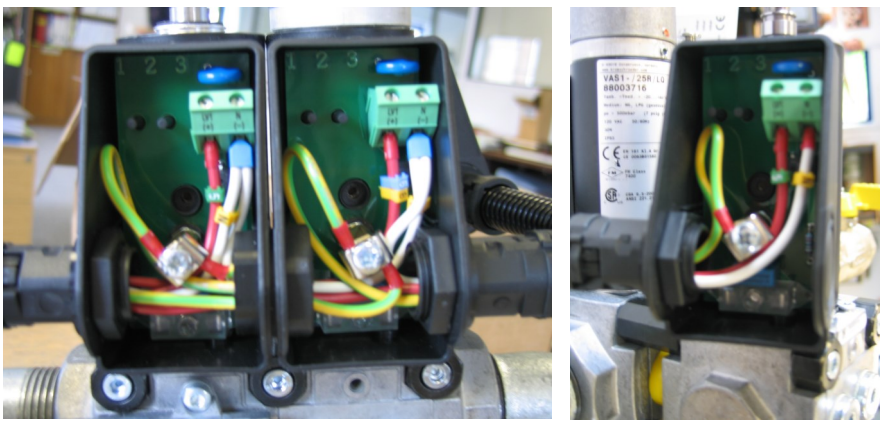
WIRING OF KROMSCHRODER VALVES



WIRING OF KROMSCHRODER VALVES

MAIN VALVE V1	MAIN VALVE V2	BY-PASS VALVE





NOTE:- TO REPLACE ANY SOLENOID FIRST ISOLATE THE POWER SUPPLY, REMOVE THE FRONT COVER AND DISCONNECT THE WIRING AND CONDUIT AS REQUIRED. FOR REPLACEMENT OF VALVE ACTUATORS ON V1 OR V2 IT WILL BE NECESSARY TO DISCONNECT THE NEUTRAL ON THE BYPASS VALVE AND

SECTION 12 SPECIAL FEATURES

If any Special Features were designed and supplied with a burner details will be contained in this section. This could be Data Sheets for special components and additional operating and commissioning instructions.

SECTION 13 RECOMMENDED SPARES

If this manual was sent out with a burner then the Recommended Spares list will be contained in this section of the manual for the burner and any accessories e.g. Temperature Controllers.

LANEMARK
COMBUSTION ENGINEERING

Job No: **J*****

Part No	Description
	ESSENTIAL SPARES
0010773	KROMSCHRÖDER GAS VALVE COIL VA2 (230V)
0010777	KROMSCHRÖDER GAS PRESSURE SWITCH DG40/VC-6W (5-40mbar)
0010779	KROMSCHRÖDER GAS VALVE COIL VBY (230V)
0012193	DUNGS AIR PRESSURE SWITCH KS150A2 (20-150Pa)
0013023	MCT IGNITION TRANSFORMER (230V)
0013041	CONTROL BOX FUSE (3.15A) 20x5mm
0013201	FINDER SINGLE RELAY (230V)
0013443	SIEMENS BURNER CONTROL BOX LME21.350 (230V)
0013568	FINDER TIME DELAY RELAY 80.11.0.240.0000
0013805	SIEMENS UV CELL QRA4
M1342-95	SPARK ROD ASSY HMA2A BRUTE
M8408-07	MIDCO SPARK ROD CAP
	OTHER SPARES
0010031	3-WAY AIR VALVE ASSEMBLY (230V)
0010593	KROMSCHRÖDER PILOT GAS VALVE VBY (230V)
0010857	KROMSCHRÖDER GAS VALVE VCD2 1 1/2" 230v excl. LGPS
M1200450	BRUTE PROPANE GAS PILOT WITH SPARK ROD & UV MOUNT

INFORMATION ONLY

Registered Address: Lanemark House, Whitacre Road, Nuneaton, Warwickshire, UK, CV11 6BW
Tel: +44 (0) 24 7635 2000 Fax: +44 (0) 24 7634 1166
E-mail: info@lanemark.com Web site: http://www.lanemark.com
Company Registration No.05471903 VAT No. GB 185 5272 84
Place of Registration: England & Wales
Directors: P.R. Collier, J.S. Foster, A.E. Thompson

SECTION 14 HEALTH AND SAFETY

C.O.S.H.H (CONTROL OF SUBSTANCES HAZARDOUS TO HEALTH)

The burner as delivered including packaging contains no chemicals or substances that represent a hazard to health during installation or operation if installed in accordance with these instructions.

GASKETS

The gaskets as supplied as original equipment are ceramic fibre with binder. They are pre-cut to shape and prefitted to the burner. These gaskets do not need cutting on site.
For service work when fitting new gaskets, use gloves and protective goggles and do not allow this material to come into contact with the skin, eyes or inhale or ingest it.

PAINTS

During first operation there may be a faint smell but if the burner is operated in an area ventilated in accordance with this manual this represents no hazard.

SEALANTS

Gas tight joints are made with a proprietary gas jointing compound and no other chemical sealants are used.

HEALTH AND SAFETY

The following should be considered when installing, operating or servicing this burner.

LIFTING

The weight of the burner, gas train, fan & duct (if supplied) should be assessed before lifting commences. The gas train may be removed if necessary to reduce the weight of the burner and so aid safe lifting.
Two persons may be required to lift larger burners & fans.
Burners and fans (if supplied) should not be left unsupported.

SHARP EDGES

Any sheet metal edge that does not have a safety edge or protective covering should be handled with gloves.

ELECTRICAL

THIS BURNER MUST BE EARTHED

The burner must only be installed and maintained electrically by trained competent electricians.

GAS

In the UK this burner must only be installed and maintained by trained technicians who are GAS SAFE registered and ACS accredited specifically for industrial gas burners. In other countries local regulations must be complied with.

RECYCLING

The burner is made from:

Mild and stainless steel sheet and tube.
Aluminium / cast iron castings.
Copper wire and windings.
Plastic switches, terminals, controls etc.

These burners contain the minimum of welding required and they can easily be unassembled into their main material group. Approximately 95% by weight can be recycled.

DISPOSAL OF PACKAGING AND BURNER

The cardboard box and polyurethane packing can be recycled or disposed of to an appropriate facility.

The burner body can be stripped down and the materials recycled or disposed of to an appropriate facility.

Lanemark International Ltd would be pleased to receive back by prior arrangement the burner or its packaging for recycling.

SECTION 15 NOTES

NOTES

CUSTOMER NAME: ……
SITE ADDRESS: ……
BURNER MODEL: ……
SERIAL No: …J……
GAS TYPE: ……
CONTROL VOLTAGE:……
GAS TRAIN VALVE TYPE: ……

(The above information can all be found on the burner Rating Plate located on the burner and in section 0 of this manual)

DATE	NOTES	SIGNED