

# OPERATING MANUAL

**MACHINE NAME    OVEN   FOR   BAKING(POTATO CHIPS)**

**MODEL                DIRECT / CYCLOTHERM HYBRID**

**DYFM**

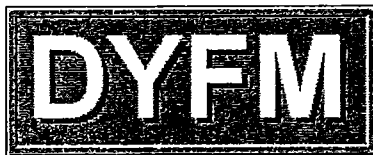
**DONGYANG DYNAMICS**

**(Operator should read this manual before start-up system to prevent accident or injury person)**

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**MACHINE NAME** OVEN FOR BAKING(POTATO CHIPS)

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**DONGYANG DYNAMICS**

Operator should read this manual before start-up system to prevent accident or injury person.

- Length	10.6M
- Number of zones	1 M
- Zone length	10.6M
- Fuel	LPG
- Total number of burners	23
- With three zones	12
- Single burner capacity	12,000Kcal/h
- Total capacity	<del>X</del> MAX. 372,000Kcal/h
- Pre-heating burners	8
- Number of natural draft steam chimneys	0
- Number of forced draft steam chimneys	2

## INDIRECT HEATING SECTION

- Length	26M
- Number of zones	2
- Zone length	13M
- Fuel	LPG
- Burner type	MAXON 415
- Total number of burners	2
- Single burner output	375,000Kcal/h
- Total output	<del>X</del> MAX. 375,000Kcal/h <del>X</del> 2
- Number of natural draft steam chimneys	0
- Number of forced draft steam chimneys	7

- Total length	37.6M
- Baking chamber length	1.1M
- Baking chamber width	41.36M
- Baking surface area	1.5M
- In feed extension length	2M
- Discharge extension length	Right
- Control side	

- Conveyor belt	Type	Caterpillar with apron
	Width	1.1M
	Length	82 M
	Return	out side the baking chamber
	Belt tensioning	take-up screw with comp. spring
	Belt tracking	guidance rail
- Baking time	From 2.5 to 7.5 min	
- Main drive	Motor	5.5Kw-4P-460V-60Hz
	Reduction gear	
	Variable speed drive	by frequency converter





## GENERAL DESCRIPTION

### GENERAL

A production line is composed of a set of machines that are synchronized to work together, controlled by precise electrical consents to the extent where no machine could work independent from the others.

The oven is the main machine in this production line and is the source of the majority of consents and controls for all the other machines that are part of the production line.

The following fuels can be used:

- natural gas CH<sub>4</sub>                      net heat value 8,000 -8,500 Kcal/Nm<sup>3</sup>
- propane gas C<sub>3</sub>H<sub>8</sub>                    net heat value 23,000-26,000 Kcal/ Nm<sup>3</sup>
- LPG                                      net heat value 26,200-26,800 Kcal/ Nm<sup>3</sup>
- fuel oil                                  viscosity 1.3-1.7°E at 20°C  
    net heat value 10,000-10,500 Kcal/Kg (8,000-8,500 Kcal/lit)
- naphtha                                 viscosity 3.5-5°E at 50°C  
    net heat value 9,300-9,700 Kcal/Kg (8,300-8,700 Kcal/lit)

### INDIRECT HEATING SECTION

In the direct gas-fired oven a certain number of linear burners are installed above and below the conveyor system and they are aimed in such a way that the flame follows the direction of the product. The pitch can be varied depending on the zone and on the oven heating capacity.

Burners are then divided into groups whose modulation takes place simultaneously thus forming "regulation zones".

Every burner is equipped with its own safety and control instruments, adequate gas and air supply pipes and mixing devices.

Combustion fumes build up inside the baking chamber and are evacuated together with evaporation products, through the chimneys.

## **Conveyor**

This is the support system for the product being baked. Type, pitch, thickness, weight and shape of the conveying unit depend on the type of product.

These changes also lead to changes in the diameters of drums, centering systems, guides, supports (cast-iron drums, rollers, welded structural frame).

List is signaled by a limit switch which activates the mechanical or pneumatic centering system.

The most common conveying units use mesh belts for most products and for baking inside containers, solid belts for poured products, slat belts which contain the products, stone slat belts for pizzas.

## **Oven control board**

This houses monitoring and control equipment, temperature regulators to select baking times, emergency stop and start push-buttons, alarm signals.

Connections to all users on the oven, except to the burners, start out from this control board.

## **DIRECT HEATING PARTS**

### **Baking chamber**

The baking chamber is made of high-temperature resistant electric welded sheet. It is divided in zones by an expansion joint. Channel is installed high inside the baking chamber for almost its entire length for aspiration of the vapors generated by the product being baked.

From the control side, outside the chamber, pipe with a suitable diameter comes out that permits connection to the burner and its fastening. Near each one of these pipes there is a bar across the chamber that supports and guides the burners during application.

The chamber is totally insulated by mineral wool contained in the outer panels.

### **Burner**

It consists of tubular casing called sword. In the tube there are stainless steel blades whose length is the same as the useful length of the baking belt; the mixture comes out of these blades and it is ignited by an electrode which also acts as a flame detector.

Air-gas mixing takes place in a Venturi tube where the combustion air arrives under pressure from its own circuit whereas the gas arrives at zero pressure from its own circuit.

A manual regulator is installed on the gas supply that changes the gas percentage in the mixture and a flow rate adjustment solenoid valve. There is a push-button panel for every burner together with equipment suitable to deliver voltage from 4000 to 7000 Volts to strike the spark.

The line operator can watch the flame through the binocular.

### Combustion air supply

Combustion air is taken from the environment or from outside the building; a centrifugal fan sucks the air in into a plenum to which a header is connected for distribution to top and bottom burners.

The air is filtered and a downstream safety thermostat detects its presence.

A modulating valve, a choke valve and a minimum flow valve are installed on the said headers.

The modulating valve regulates the amount of air for combustion and adjusts the flame either high or low. It is controlled by a temperature regulator installed on the oven control board.

The choke valve adjusts the general air delivery rate.

The minimum flow valve ensures a minimum air flow to the burners when the modulating valve is entirely closed to avoid internal combustions.

Air pressure to the burners can be read on the pressure gauges installed on a panel situated on top of the oven.

### Gas supply

The gas circuit does not change with the type of gas. Only the dimensions of the pipes and the size of the installed equipment change.

The main supply pipe is installed by the customer; the gas header, which includes a manual ball valve and a gas filter, is attached to this supply pipe.

The gas pressure is reduced downstream to the required ratings by a stabilizer/pressure regulator and a pressure switch ensures the presence of gas.

The main solenoid valve carries out the main check and safety functions and a "0 pressure" regulator reduces the gas pressure to negligible values.

Incoming and outgoing pressure is controlled by a pressure gauge and a pressure switch.

### Steam exhaust

Steam exhaust channels are installed on the top part of the baking chamber. These have adjustable dampers. These channels and the hood of the oven are connected to chimneys for expelling the steams outside the building.

A fan is installed on all the chimneys for forced ventilation. We achieve maximum extraction with fan damper closed in order to force the steams into the alternative path.

The steam exhaust dampers applied at the base of the chimney are adjusted depending on the technological requirements of the product. A connection for condensate drainage is located in this position.

For optimum chimney draft the chimneys must be lined with insulation with a minimum 50 mm. thickness. This will keep steams at a high temperature, guaranteeing better chimney draft and less condensate formation.

### Temperature control

The return signal that controls burner operation comes from the iron-costantan thermocouples located at points in the oven that ensure achievement of the desired baking temperature diagram. Baking chamber temperatures are monitored by thermometers with direct and/or control-board read-outs.

### Dampers

These are designed to adjust and control vapor aspiration to optimize the baking diagram and the consistency, weight, color and shape of the product being baked.

They can be controlled manually or can be motorized. Manufacturer and mechanic must be fully familiar with how these operate in order to achieve best baking results.

Installed dampers include:

- steam exhaust dampers for control of flow rate to be exhausted
- steam by-pass dampers positioned on the fan to obtain natural or forced draft.
- zone dampers, placed at divisions between zones, necessary to stop or regulate movement by hot air and vapor inside the oven.
- terminal dampers, placed at the oven input and output and required to prevent loss of steam through input and output and to create a beneficial steam bath to process the product.

### Burner control board

Each burner is served by its own board housing all its control equipment and main controls.

## INDIRECT HEATING PARTS

### Baking chamber

The baking chamber is made of high-temperature resistant electric welded sheet. It is divided lengthwise in individual 5 - 7.5 - 10 - 13 m. zones or in double zones each served by a single burner. An expansion joint is inserted between one zone and the next.

Channel is installed high inside the baking chamber for almost its entire length. It aspirates the vapors generated by the product being baked.

Heat is generated by two nests of tubes, one placed above and the other below the baking plane for the entire length of the zone.

The fumes produced by combustion are conveyed into the nest of tubes at the start of the zone by collection header and are recollected by exhaust header at the end of the zone.

The chamber is fully insulated by mineral wool contained in the outer panels.

## **Burners**

Burners are inserted in the combustion chamber and below the baking chamber.

They can be two-stage or modulating and can burn methane, propane, LPG, fuel oil, naphtha.

Each burner is equipped with electric fan for forced circulation of the combustion products. Burner and fan are interlocked and the burner cannot be turned on if the fan is not in operation.

The combustion units divide the oven into single or double baking zones.

Each combustion unit is equipped with a temperature regulator connected to thermocouple positioned on the smokestack and which monitors the real output temperature. The temperature regulator acts automatically on the burner to command high or low flame.

These frequent modulations achieve a constant baking temperature graph with only minimal temperature deviations from preset temperatures.

Two safety pyrostats prevent excess temperatures in the oven and damage to oven materials.

Each burner is supplied complete with inlet manifold which consists of the connection fitting for customer mains, a filter and a pressure regulator/stabilizer.

## **Fume recirculation**

Combustion products are generated in combustion chamber, contained by casing. Fumes move to mixing chamber which has overpressure safety door. Fumes proceed along a lengthwise path until they reach intake header where, through damper, they are distributed to either the ceiling or the bedplate in the desired percentages.

The direction of flow in the baking chamber, inside the radiant tubes along the ceiling and the bedplate, is in the same direction as the product. When the fumes reach exhaust header they encounter choke dampers both on the ceiling and the bedplate that are used to adjust crosswise baking temperatures. The quantity of fumes to recycle and expel is adjusted using a damper placed on chimney.

## **Steam exhaust**

Steam exhaust channels are installed on the top part of the baking chamber. These have adjustable dampers. These channels and the hood of the oven are connected to chimneys for expelling the vapors outside the building. Fan is installed on the chimney when forced ventilation is required because of high steam production. In this case we achieve maximum extraction with fan damper closed in order to force the steams into the alternative path.

The steam exhaust dampers applied at the base of the stack are adjusted depending on the technological requirements of the product. A connection for condensate drainage is located in this position.

## Temperature control

The return signal that commands burner operation comes from the iron-costantan thermocouples located at points in the oven that ensure achievement of the desired baking temperature diagram. Baking chamber temperatures are monitored by thermometers with direct and/or control-board read-outs.

## Dampers

These are designed to adjust and control flow rates of products of combustion and vapor to optimize the baking diagram and the consistency, weight, color and shape of the product being baked.

They can be controlled manually or can be motorized. Manufacturer and mechanic must be fully familiar with how these operate in order to achieve best baking results.

Installed dampers include:

- top/bottom dampers to distribute fumes above/below the product.
- chimney dampers to adjust the quantity of combustion products to recirculate or to expel to maximize fuel efficiency.
- branch dampers for dividing combustion products between the first and the second double zones.
- steam exhaust dampers to adjust the exhaust flow rates.
- steam by-pass dampers positioned on the fan, when a fan is provided, to obtain natural or forced draft.
- zone dampers, placed at divisions between zones, necessary to interrupt or regulate movement by hot air and vapor inside the oven.
- terminal dampers, placed at the oven's input and output and required to prevent loss of steam through input and output and to create a beneficial steam bath to process the product.
- fume choke dampers in the exhaust header. These are used to regulate the quantity of fumes inside each single radiant tube to adjust cross-wise heat distribution.

## Burner control board

Each burner is served by its own board housing all its control equipment and a synoptic panel that indicates functions, commands and signals relative to the zone being served by the burner.

A trouble-shooting indicator lamp is provided for each function.

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## GUARDS

The machine has been designed and manufactured taking full notice of the EN and IEC Standards. All rotating components and dangerous parts are inaccessible to the operators; various guards, covers and electrical safety components have been installed for this purpose.

The production line foreman must check that these are all efficient during machine assembly, testing, production and maintenance.

Burners are also furnished by their manufacturers complete with safety devices.

### Cladding

Oven appearance and efficiency are all ensured by proper cladding. Cladding also encloses oven control and rotating components so that the oven operator is only in contact with their adjustment mechanisms.

Cladding, given its special jointed connections, can be considered as a fixed guard.

### Fume recirculation fans

These are outside the cladding but are protected by a bin fastened rigid to the panels and can be considered a fixed protection.

Failure of these to operate prevents the burners from turning on.

### Inspection doors

These can be maneuvered without the danger of being burned. The only precaution is to keep your head away the moment they are opened to avoid being hit by a jet of steam.

### Overpressure safety door (anti-explosion)

This is installed in the mixing chamber facing the flame. Normally it is vertical. It opens if there is a sudden and violent increase in the pressure inside the combustion chamber. This pressure overcomes the counterweight on the door. Door opening is monitored by a sensor that will activate a solenoid valve to interrupt the fuel supply to the burner.

### Safety pyrostats

There are two of these, P1 and P2, positioned in the burner board and activated by the thermocouple positioned in the input header.

A maximum temperature is set for each of these. For example 500°C for P1 and 600°C for P2. The safety device will intervene when these temperatures are exceeded.

When the thermocouple monitors a 500°C temperature then pyrostat P1 will command the burner to operate at low flame level. If the temperature still continues to rise, due to a breakdown or



malfunction, then pyrostat P2 will trip at 600°C and shut off the electrical supply to the burner, turning the burner off.

TRIPPING BY PYROSTAT N° 2 INDICATES AN EMERGENCY SITUATION. THE CAUSES BEHIND THIS SITUATION MUST BE ELIMINATED.

Possible causes:

- fan belts loose or broken
- chimney too restricted and insufficient draft
- radiant tube choke dampers too closed
- pyrostat defective or improperly set
- mechanical impediments to free fume circulation inside the ducts
- water present at the base of the chimney

The burner will not automatically start up again. Restart must be commanded by the operator who must only do this after he has discovered and eliminated the reason why the pyrostat tripped.

#### **Emergency conveyor drive system**

If there is a power failure the product being baked would remain stopped in the baking chamber and could begin to burn and cause a fire. There is a coupling to the reduction unit that drives the conveyer. This either has a manual crank drive system or connects to an emergency stand-by electricity generator to keep driving the conveying system and unload the product.

#### **Conveyor stop**

A ring gear is mounted on the idle counterpressure shaft on the drive unit. This has a sensor that transmits pulses at a regular frequency to the oven control system. This shaft is driven by friction from movement by the belt. This means then when the belt stops either because of breakage of some mechanical component or the belt slips due to insufficient tension then the pulses either stop or come at irregular intervals. This cuts off the electric circuit that supplies the burners, causing them to immediately stop.

#### **Conveying system list**

Limit switches monitor excess list and stop the conveying system if this takes place. This also stops the burners.

#### **Belt elongation**

Limit switches monitor excess mesh belt elongation which could lead to slippage. The conveyer is stopped and the burners are turned off.

#### Safety devices/checks inserted in the gas burners

- pressure switch or centrifugal contact to monitor the presence of combustion air
- maximum and minimum gas pressure switch
- gas leak check during ignition
- pressure stabilizer built into the main solenoid valve
- gas circuit wash-out
- electrode flame monitoring unit
- safety devices that protect against voltage drop
- air pressure check at start-up
- safety block signal device
- standby time for air pressure confirmation
- pre-ventilation time
- pre-ignition time
- safety time with signal of flame presence
- monitor presence of premature flame
- monitor spark failure

#### Safety devices/checks inserted in fuel oil burners

- monitor flame presence
- wash out of oil circuit
- oil shut-off valve

#### Flame control

Every burner is equipped with an ignition/flame detector electrode and an electronic safety and control unit (series MM) approved by national authorities and in accordance to DIN-DVGW Standards

In case of flame failure, after a given waiting time, the unit feeds the ignition device; from this moment it is necessary to wait for the flame to stabilize for 10 seconds; during this time the unit will try ignition again if the flame goes off.

Release is manual and it can be done only after 10 seconds from stop.

#### Gas pressure stabilization

A stabilizer/pressure regulator is installed on the gas circuit to protect the circuit against unexpected irregular pressures; it also allows the pressure to be reduced from supply values to the required values. It is the diaphragm type and it can be fitted either horizontal or vertical.

### Gas presence

A pressure switch (P) set at 30 mbar is installed downstream the stabilizer; if pressure is lower than this setpoint, gas supply to the main solenoid valve is cut off and a sound alarm is given.

### Gas circuit safeties and control

These functions are performed by a normally closed solenoid valve with an IP 54 protection; it cuts off gas supply when the following conditions occur:

- vapor exhaust motor stalled
- chimney depression failure (signalled by a pressure switch)
- conveyer system stopped or listing
- combustion air fan stopped
- air supply failure signalled by the pressure switch on the plenum
- anti-explosion door open
- automatic shut-down control
- upstream zone in operation
- gas pressure downstream the stabilizer lower than the value set on pressure switch P

### Air pressure

A pressure switch with a minimum 50 mbar setpoint is installed in the plenum, downstream the fan; if the air pressure is less than this setpoint, gas supply is shut off and an alarm indicator lamp is turned on the control board.

### Steam exhaust

A mechanical stop is fitted on the damper situated at the base of the chimney to prevent complete closure and thus to ensure evacuation of gas and unburnt matter existing in the chamber.

## RESIDUAL DANGERS

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### Metal surface temperatures

Not all oven components are accessible for maintenance the moment the burners are turned off. This is because cool-down time varies depending on the mass and position of the component.

In these cases maintenance personnel must wear suitable protective clothing.

#### Average cool-down times:

- all surfaces inside the baking chamber	16 hours
- burner plates	8 hours
- input and output hoods	6 hours
- inspection door frames	4 hours
- steel band type belt	2 hours
- wire-mesh type belt	1 hour
- slat type belt	2 hours
- fume recirculation fans	0,5 hours

### Access doors to discharge and infeed extensions

These are fixed guards without safety microswitches because the oven must not be stopped unless there are dangerous situations. The key for the lock must be kept by assigned and expert personnel.

**WARNING: IT IS ABSOLUTELY PROHIBITED TO INHIBIT OPERATION OF THE SAFETY DEVICES INSTALLED ON THE MACHINE**

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## DESIGN USE

The dough (molded, cut, leavened and in any case in its final configuration) or containers (pans, trays, fillets, etc.) are loaded automatically onto the conveying system and start to approach the baking chamber.

Make sure that loads are centered on the conveying system and that no obstacles are present, such as siderails that are too close.

Some types of products require preheating of the conveying system. During this stage the product will undergo a first phase of gelatinization of proteins, denaturalization of starches, extraction of vapor from the bedplate and stabilization of forms and shapes.

Some products (bread) need to be sprayed with steam when they enter into the baking chamber.

The product proceeds down its path in the baking chamber. Baking phases, leavening, color, weight and shape are superintended by the baker through the inspection windows. These can be opened to remove samples to test.

When the baked product exits from the baking chamber it proceeds on the same conveying system for a few meters for preliminary cool-down and to facilitate detachment.

Depending on the type of product it will be picked up and delivered to the next conveyor by a flat scraper, comb scraper or motorized roller.

The oven is sized and designed to bake products according to the procedures specified in the contract. We recommend enquiring of the manufacturer when it is desired to bake different products in order to have an overall analysis of possible impediments and objections.

It is, for example, absolutely prohibited to bake in containers if this is not specified in the contract. It is also prohibited to change type of container.

Nor can the product conveying mechanism be changed without prior authorization from the manufacturer.

This is also true regarding types of burner or changing type of fuel. The oven manufacturer must be informed and you must wait until he gives his approval even if the burner manufacturer has already given his approval.

The machine is not built to work in an explosive atmosphere and consequently it is prohibited to use it in such an environment.

THE MANUFACTURER IS NOT RESPONSIBLE FOR ANY DAMAGE TO THE MACHINE CAUSED BY IMPROPER USE AND LEADING TO INVALIDATION OF GUARANTEE COVERAGE.

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## INSTALLATION

No skilled personnel is required for installation. The presence of at least one expert installer is sufficient.

The maximum installation height is 3100 mm.

Workers must wear protective gloves. Personnel charged with installing mineral wool must wear protective face masks.

## SITE

- Installation requires assembly of small to medium size components in hard-to-reach areas (below the baking chamber). As a consequence the installation site must be well illuminated.
- The space around the machine must be sufficient to permit easy maintenance. Remember that no particularly bulky components will require replacement. We recommend leaving at least 1400 mm. of space between oven and wall on the oven controls side and at least 1000 mm. on the opposite side.
- Condensate and wash water drain pits must already be installed and ready before installing the oven. Make sure they are not placed where the oven's legs will rest on the floor.
- If other production lines are working in the same area you must create a barrier or set up a curtain between the production zone and the assembly area during assembly.  
Do not install mineral wool in the oven with other production systems in operation even when this barrier has been set up. It is impossible to prevent migration of noxious mineral wool dust in the atmosphere during assembly.
- The floor at the installation site must be properly level. Variations up to 30 mm. in height can be compensated for by shimming up the oven support feet.
- Check the load capacity of the floor where the infeed and discharge expansions are positioned.

## ASSEMBLY

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- Before starting with assembly operations make sure there is a safety and accident prevention box nearby and accessible and equipped with first aid materials.
- The Customer's assigned officer must be present when the layout of the oven is marked on the floor since there may be requirements or needs that differ from what was specified in the contractual layout.
- Make sure that there is enough room to handle the drive and return units since these are only put in position at the end of the assembly process.
- Check levels with an electronic level or with a precision instrument. Maximum tolerance is 2 mm. of level difference for every 10 meters of oven.
- Chambers and stands are duly marked and must be assembled in the numerical order indicated in the drawing.
- All components are bolted together; check that bolts are properly tightened.  
Remember to insert seals and gaskets where these are specified.
- Use special care when tightening the radiant tube connection sleeves. Bolts must be tightened alternately and the open ring sheet must close down until its two ends are almost in contact and at a constant gap. Check that the sheet is not deformed or damaged.
- Use care when levelling the frames or rollers or drums that support the conveying belt to prevent it from listing.
- Infeed and discharge extensions are fastened to the floor by expansion sheaves. If floor and foundation are not strong enough to ensure a good anchor then create 6 - 8 pits with 30 mm. diameter anchor rods. Wait at least 48 hours for the cement to harden before fastening the structure in place.
- Keep to the manufacturer's instructions when putting the conveying belt together. In particular:
  - + belts can be welded or riveted: in the first case you need a welder and other equipment and a good understanding of joining techniques. This operation, as a consequence, should be done by the supplier's expert technician.

When riveting a belt together the belt comes with the equipment necessary for preparing its edges, stretching them, perforating and punching them, removing the punches, riveting and countersinking the rivets. If the joint is the overlapping type make sure the jump up is in the opposite direction to the direction of belt movement.

+ there is only one system for joining wire-mesh: the two ends must be clamped in vices that are brought together by sliding along threaded side bars. Insert the cross rod when the end coils overlap and spot weld it in place.

Be careful regarding the direction of movement of the belt. The selvage must be pulled and not pushed.

## DIRECT HEATING SECTION

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Gas supply: a fully assembled gas header is supplied for each zone. Hook-up to the header must be made with a 2" pipe painted yellow RAL 1021.

Paths and connections of cable trays, air pipelines and fuel pipelines etc. to the machine must be compatible with the use to which the machine is to be put. Pipelines, for example, must not be fastened to mobile guards.

Gas supply pressure, read on the manifold pressure gauge, must be 35 mbar; to be sure of this and to keep within the stabilizer operation range, gas supply pressure must not be less than 45 mbar nor higher than 100 mbar.

Combustion air supply: a centrifugal fan and a fully assembled header painted (Gray or white) are supplied for each zone.

Therefore no connection needs to be made on the site.

Max. air pressure in the circuit is 70~80 mbar.

## INDIRECT HEATING SECTION

Gas burners: these are supplied complete with input manifold. Supply is done using a 1 1/2" pipe going to the individual burner. This pipe must be painted RAL 1021 yellow.

Gas pressure when it enters the manifold pressure gauge must be 30-40 mbar.



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## OPERATION

Supervisors and machinery operators should be instructed and trained in at least the following:

- Machinery safety procedures, including emergency procedures.
- The correct and safe way of operating machinery.
- Knowledge and understanding of the dangers they face.
- Understanding the purpose and function of the safeguards which protect them.
- Reporting faults immediately, including guard defects.
- Wearing and care of protective clothing and equipment.
- Need for good housekeeping.
- Statutory requirements.

## SAFETY PROCEDURES

- Make sure that all the machine safety systems are in efficient working condition (emergency stop devices - earth connections - guard microswitches - optical and acoustic alarm systems)
- Before starting the machine ensure the immediate area around and on the machine is clear of unnecessary equipments.
- Never operate the machine with guards removed or insecurely fitted.
- Whilst the machine is in operation do not make any adjustments which are not part of the normal running procedures.
- Always ensure that operators are conversant with the machines functions and are fully aware of the position and purpose of control switches and emergency-stop buttons.
- Always isolate the machine at the mains before making adjustments to moving parts or electrical circuits.
- Never allow loose items of clothing to come in contact with the machine.
- Always ensure that only qualified personnel make adjustments to electrical circuits.
- Before starting the machine ensure all terminal box and trunking leads are securely fitted.

SAFETY DEVICES CAN BE INTENTIONALLY EXCLUDED DURING OVEN ASSEMBLY, START-UP AND TESTING.

IN THIS CASE THE OPERATOR MUST BE INSTRUCTED AND INFORMED REGARDING RESIDUAL DANGERS AND MUST WORK IN TOTAL SECURITY TO PREVENT HARM TO HIMSELF AND TO OTHERS.

ALL SAFETY DEVICES MUST BE IMMEDIATELY RESTORED TO FULL OPERATION WHEN THESE PROCEDURES ARE TERMINATED AND WHEN IT IS NO LONGER NECESSARY TO HAVE FREQUENT ACCESS TO THE DANGER ZONE.

THE MANUFACTURER IS NOT RESPONSIBLE FOR HARM TO PERSONS OR PROPERTY CAUSED BY TAMPERING WITH GUARDS AND SAFETY DEVICES.

## PRELIMINARY OPERATIONS

- Check the oil and grease levels in all components that use them.
- Clean protective oils and greases off all surfaces in contact with the dough.
- Check that there are no foreign bodies on the conveyor and in the hopper.
- Close the fixed and movable guards. A safety switch cuts off electrical power to the main motor and the machine will not start if the movable guards are not in position.
- Start the motors and check that all rotating components rotate in the right direction (especially the rotation direction of the fume recirculation fans).
- Check that the baking time indicated on the display corresponds to the real baking time. Do this by timing the time between entry and exit from the oven of a marker applied to the conveyor.
- Check that fuel pressure is correct.
- Check the height of the zone dampers in the baking chamber to make sure there is enough room for the product being baked to pass under them.
- Check the direction of rotation of zone dampers that open by a rotating movement. These must open in the same direction as the product moves forward. If this is not the case there could be a back up and the product could start to burn.
- See the EQUIPMENTS chapter for preliminary tests on the pneumatic circuit.
- Turn on pneumatic controls and check that all movements are correct.

## SET-UP

- Start the conveyor and use the selector to set the desired speed. Check the baking time on the time display.

The conveyor must be run for at least 4 hours without heating and with automatic centering units disengaged. This is to permit the operator to center the conveyor using the adjustment screws on the return roller and the support rollers.

- Actuate the main switch on the burner control board. Start the combustion air fans, the fume recirculation fans and the steam exhaust fans (if any).
- Start the indirect gas burners one after the other at 30 minute intervals and wait the wash-out time prior to flame ignition. Use the zone temperature control to set baking chamber temperature.

- Select the bottom and top direct burners that you want to turn on based on the required baking diagram.

Do not go past 130°C the first day of heating in the chambers. Do not go past 200°C the second day. Then, during following days, gradually increase the temperature until you reach the values in the baking diagram.

- Select the bottom and top direct burners that you want to turn on based on the required baking diagram.
- Ignite the selected burners one at a time; to do this, rotate the selector to the right, the indicator lamp will come on and at the same time the electrode strike the spark; the gas solenoid valve opens and the air-gas mixture is formed.

After ignition, the electrode detects the flame and ensures a steady flow of the mixture.

If the electrode does not detect the flame, the device will strike a spark again and if no flame detection occurs, the solenoid valve shuts off the gas flow causing burner blockage and the red indicator lamp comes on.

Repeat this procedure after 10 seconds but rotating the selector to the left for 2 seconds and then to the right; the red indicator lamp goes off and the burner starts up again.

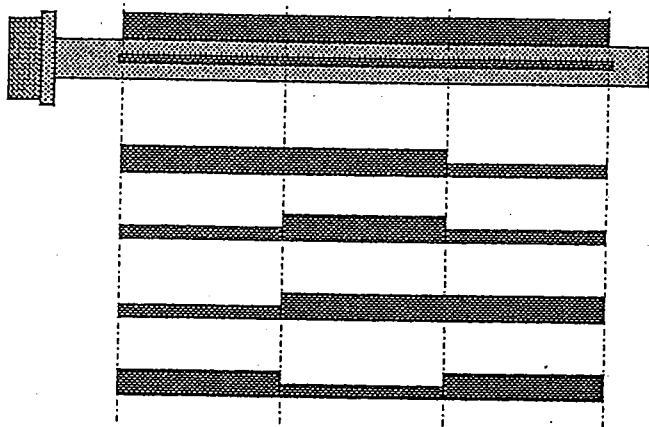
- Check the color and the length of the flame of every burner; the best flame must be 30 - 50 mm long and it must sky blue in color.

If there is too much gas the flame is red; if there is too much air the flame goes off.

A gas flow regulator is installed on every burner.

- Set the temperature in the chamber on the zone temperature regulator; on the first heating day do not exceed 130°C in the chambers and 200°C on the second day.

During the following days increase the temperature until the baking diagram values are reached.



- If three-zone controlled burners are installed, five election is made with a rotary distributor showing the five permissible positions.

①

②

③

④

⑤

- When performing tests with the product make all the adjustments and settings permitted by the dampers mounted on the oven.
- Turn the oven off by actuating "automatic turn-off". This turns the burners off first and keeps the following units in operation for about two hours until the main switch automatically disengages:
  - fume recirculation fans
  - steam exhaust fans
  - conveyor
  - safety devices and alarms
- When performing tests with the product make all the adjustments and settings permitted by the dampers mounted on the fume and steam circuits:
  - crosswise adjustment using the choke dampers. Rotating these clockwise shuts down the fume passage in each single radiant tube and consequently decreases the temperature.
  - for double zones rotating the damper clockwise increases the quantity of fumes delivered to the second zone.
  - adjust chimney draft and the quantity of fumes that is expelled.
  - adjust steam discharge with the guillotine damper. Pulling this out decreases the duct area.
  - adjust the external air supply.
  - check, after one week of full-speed operation, that all dampers move without impediments.
- Every day, during testing, check elongation of the conveyor belt. Generally the wire-mesh needs to be shortened after the first week of testing and again after one month of production.
- Check that auxiliary machines operate properly and are stable when they operate under a full load. Abnormal noises and/or vibrations mean that some component is not properly secured.
- Check, from outside, that fumes exit properly from the chimneys.
- Check, through the window on the burner support, that flame length is correct in both low and high flame modes.
- Do not open inspection doors during the ~~cool-down~~ phase at the end of the production cycle. Doing this could unevenly cool the conveyor and cause it to list.
- These operations, to protect operator safety, should NEVER be done with the machine in operation:
  - lubricate and top up with lubricants
  - clean the drive roller, pressure and conveyor support rollers
  - remove products through inspection doors by hand, without using the special tool.
- Oven stop systems:
  - turn off main switch.
  - actuate the emergency push-button on the oven board and the burner boards.
  - open moveable guards and safety devices.

## OVEN HEAT INERTIA

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Turn on the oven about an hour before starting production and raise it to a temperature which is 20°C lower than the required temperature. Set the required temperature only 10-13 minutes before starting production to avoid loading the product when the oven is running on a low flame.

If the required temperature is set immediately, the temperature will exceed the setpoint by 10°C due to the modulation effect, consequently half of the burners go out, the temperature drops below the setpoint and if the product is loaded now it will not be baked properly.

Example: required temperature 270°C (depending on the type of product)

- light the burners about one hour before beginning production
- set 270°C on the thermoregulator
- with an empty oven the temperature rises up to 280°C
- the temperature drops and, if the product is loaded during this phase, it will drop as far as for instance 230°C
- burners start working in low flame
- the temperature goes up again and takes a long time before it reaches 270°C because the product in the oven is cold.

Recommended cycle:

- light the burners about one hour before starting production
- set 250°C on the thermoregulator
- with a hot oven, the temperature can reach 260°C but it will never reach 280°C which would cause half the burners to go out
- 10-13 minutes before starting production, set 270°C on the thermoregulator
- the temperature will rise and when the setpoint is reached or slightly exceeded, load the product.

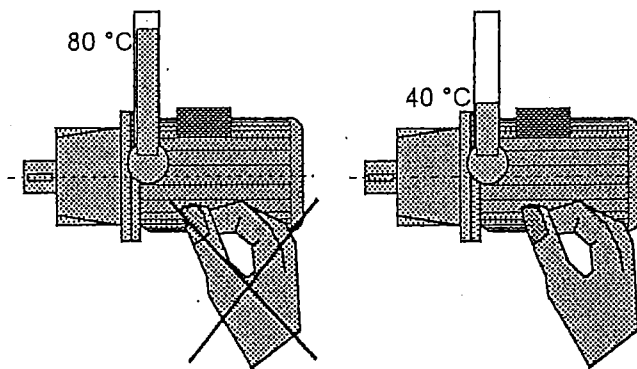
## MAINTENANCE

Maintenance staff should be trained in at least the following:

- Principles of the safeguarding machinery.
- Electrical and mechanical safety.
- Precautions during maintenance work, including safe systems of work.
- Wearing and care of protective clothing and equipment to minimize the risk of injury.
- Maintenance personnel must be specifically authorized to perform maintenance.
- They must be furnished with safety equipment including protective work garments.

## PRELIMINARY OPERATIONS

- When the problem seems to be malfunctioning of thermo-couples, thermometers, temperature regulators, etc., we recommend interchanging these with others installed in other parts of the oven to check if it is the device or its supply line that is defective.
- For pneumatic circuit maintenance: refer to the EQUIPMENTS chapter.
- To lubricate standard market components: comply with the general and specific guidelines given in the enclosed booklet.
- Caution: multiple source voltages in cabinet. All sources should be disconnected before servicing.
- Check that all other energy sources are turned off. Lock, for example, the compressed air shut-off valve and remove the key.
- Wait until the equipment cools before working.



- Caution: to reduce the risk of fire, replace only with same type and rating of fuse.

## DAILY

- Cleaning of components in contact with the dough must be done at the end of the work shift or the work day or, when the work cycle is round-the-clock, at least twice a week.
- Clean dough residue off the drive rollers and the belt support rollers.

- Make sure all rollers are free to rotate.
- Clean the scrapers and empty the crumb collection pans.
- Final cleaning of the machine and total elimination of residual dough can be done using the compressed air gun that serves the processing line:
- Run the machine a few seconds after cleaning it to dump off any residual dough crumbs and to check the electric system.
- Check that the belt is not damaged, especially along its edges and at its joint.
- Make sure belt tracking and tensioning systems are in efficient condition.
- Check the unit for signs of oil leakage (oil stains on the floor).
- Check the efficiency of ignition and detection electrodes. Ignition or flame detection failure can be due to wrong position of the electrode (its distance from the burner must be about 4 mm) or due to a short circuit in the connections.

## WEEKLY

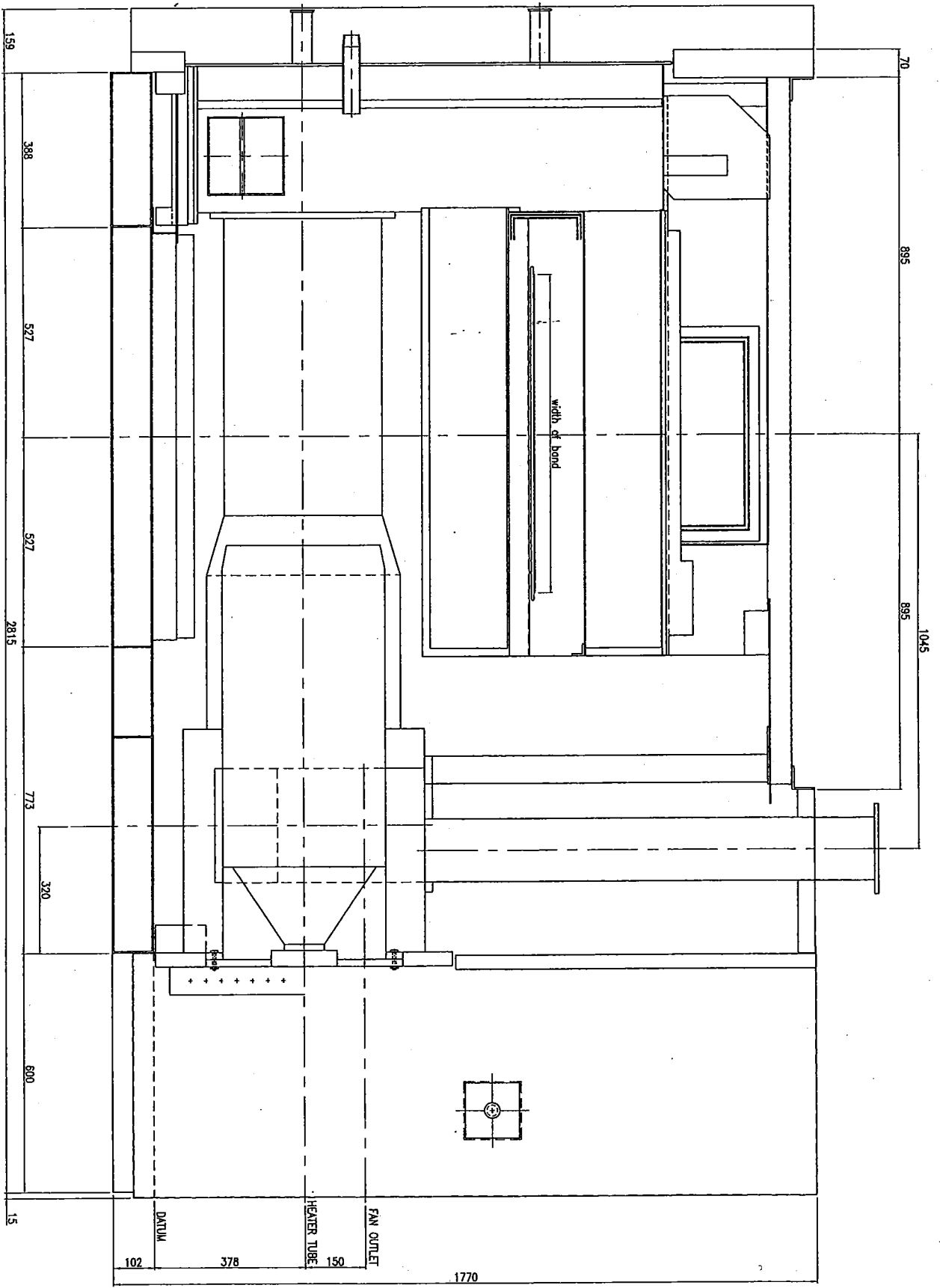
- Eliminate flour dust near the cooling air intake vents on the motors.
- Check that safety, warning and signal devices and systems are in proper working condition.
- Check the oil level in the reducer gears; top up as specified by its manufacturer.
- Check the chain drives and inspect for wear and tension; apply a small amount of chain lubricant to all links and sprockets.

## MONTHLY

- Check the tension of the fume fan belts.
- Check the tension of drive chains.
- Clean the burner heads.
- Check the state of wear of the conveyor support mechanisms: drums, rollers, frames.
- Check that limit switches function properly and that the conveyor is properly stretched.
- Check the inside of the electric boards for eventual deposits of flour, sugar, water, etc.  
Carefully clean the insides of the boards.
- Check the combustion chamber for deformation or perforation.  
If it is clearly damaged it must be replaced.
- Check the condition of the wire-mesh selvage.  
If necessary slightly widen the centering rollers mounted on the table.
- Check the temperature of oven panels. Add insulation, when the oven is stopped, where you think it is necessary.
- Clean the direct burners; particularly check the holes are not stopped.
- Check the efficiency of the combustion air fan filter





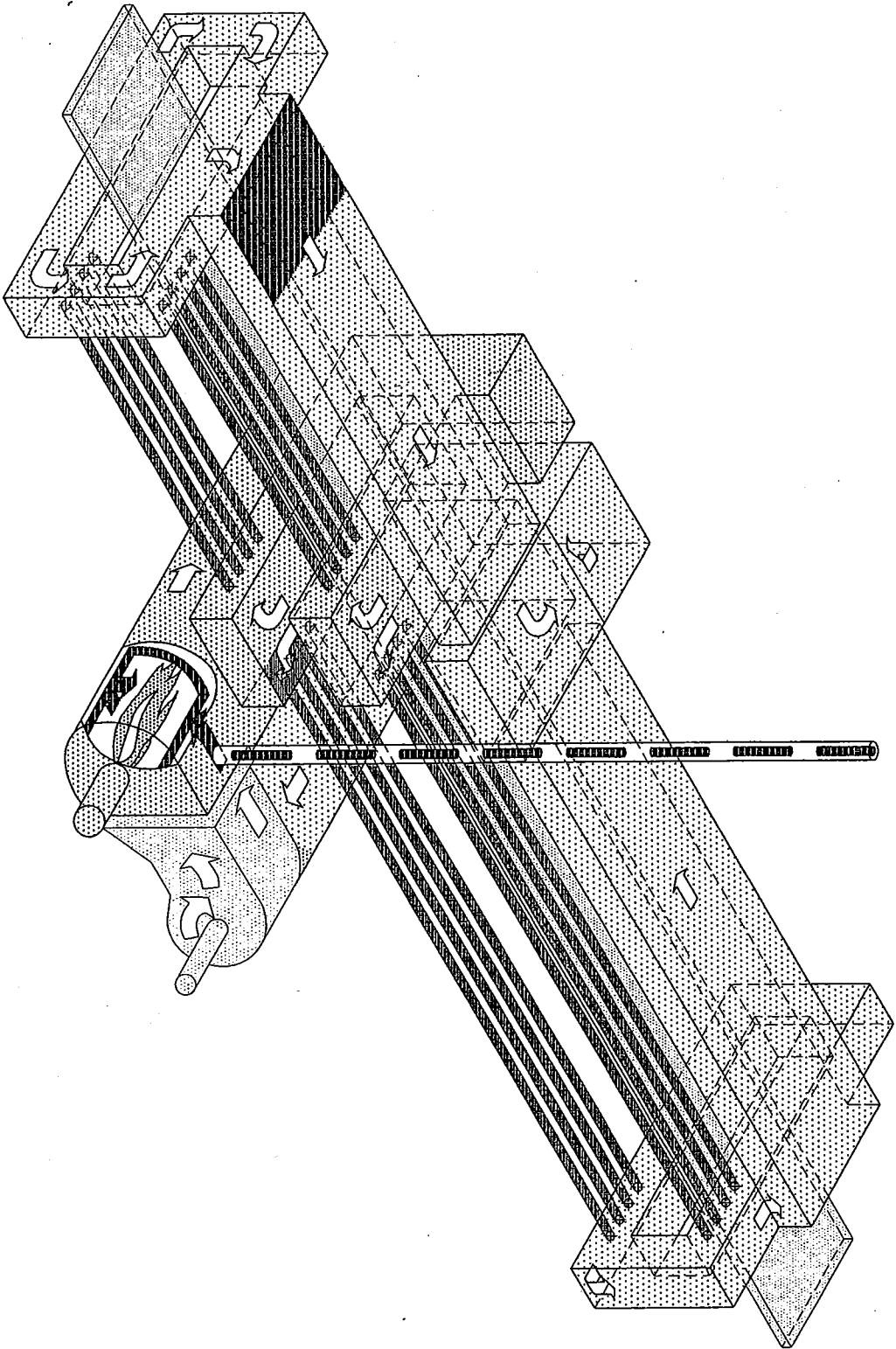


YANG FOOD MACHINERY CO.,LTD

FINISH	DATE	QUANTITY	MATE.	DRAWING NAME	CYCLOTRON TYPE
FILE NO	06.01.27	DESIGN	SCALE	DRAWING NO	ELECT BAKING OVEN 800W
		Y.S.CHDI	1/10		



FINISH	DATE	QUANTITY	MATE.	DRAWING NAME	CYCLOHERN TYPE
	06.01.27				(INDIRECT BAKING OVEN 800
FILE NO	DESIGN	Y.S.CHDI	SCALE	DRAWING NO	
			1/10		



YANG FOOD MACHINERY CO., LTD

FINISH

DATE

06.01.27

QUANTITY

MATE.

DRAWING NAME

FILE NO

DESIGN

Y.S.CHOI

SCALE

1/10

DRAWING NO

## ENSIGN *ENSIGN RIBBON BURNERS LLC*

101 Secor Lane Pelham Manor NY 10803-2791  
(914) 738-0600 Fax (914) 738-0928  
*A Subsidiary of Mondial International Corporation*

Burners

# Pipe Ribbon Burners

These burners are adaptable to practically any type of heat application and are fabricated of extra-heavy pipe incorporating a range of ribbon constructions of improved design. They ignite instantaneously, retain the flame without the use of baffles, and will not flash back on any degree of turndown. Ensign Ribbon Pipe Burners readily lend themselves to automatic temperature control, will operate in an atmosphere of steam and may be installed with the flame projecting in any direction.

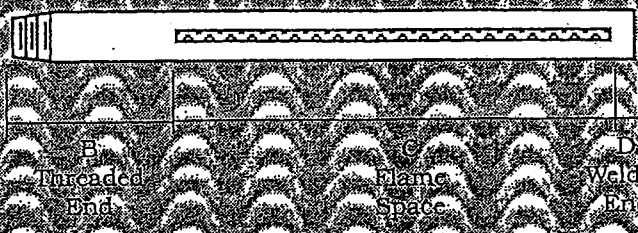
Any desirable flame space can be furnished, from 1 inch long, up to 21 feet in a single length. Individual burners range from 3/8" pipes a few inches long, up to 3" pipes a few yards long. The ribbons used in these burners allow for flame capacities of 500 BTU's per lineal inch, up to 10,000 BTU's per lineal inch. Of course, the combinations of pipe size and ribbon capacity must be considered. The patented ribbon construction used in all Ensign burners is non-corroding and non-oxidizing, forming a multiplicity of burner ports. This results in the port area of the burner being distributed across the entire flame space, allowing for consistency under all operating conditions. All capacities are for balanced flame ratings using Ensign Inspirators or any air-gas mixing system.

Ensign Ribbon Burners, Inc. has specialized in the development and manufacture of ribbon type burners for a variety of applications. Many thousands of these burners are in daily use operating on any type of gas available and with all types of gas mixing systems.

**High Capacity Burners:** Ensign High Capacity Pipe Burners having output ratings up to 10,000 BTU's per lineal inch of flame space can be furnished on request. These burners are used extensively for ink drying, singeing operations, etc., where maximum heat and absolute balance of the burner flame is essential.

**Custom-Built Burners:** Ensign builds special burners in a variety of shapes, with custom feed positions, pilot ribbons, and ribbon porting configurations.

*In order to properly quote a burner, we need to know some basic information which can be summarized as per the instructions below.*

Pipe Size - A NPT			
			
Desired Combustion Capacity (BTU's per Hour)		Gas Pressure Available	
Type of Gas Available		Or, lbs. or inches w.c.	
Type of Mixer to be used		BTU Content	
Inspirator (Orifice size)		Premix (Pressure available)	
Each end can be either Plain (P)		Threaded (T) (Male or Female) or Threaded & Capped (C)	
Welded (W)		If Burner will be used with an extension pipe, please specify added Length	

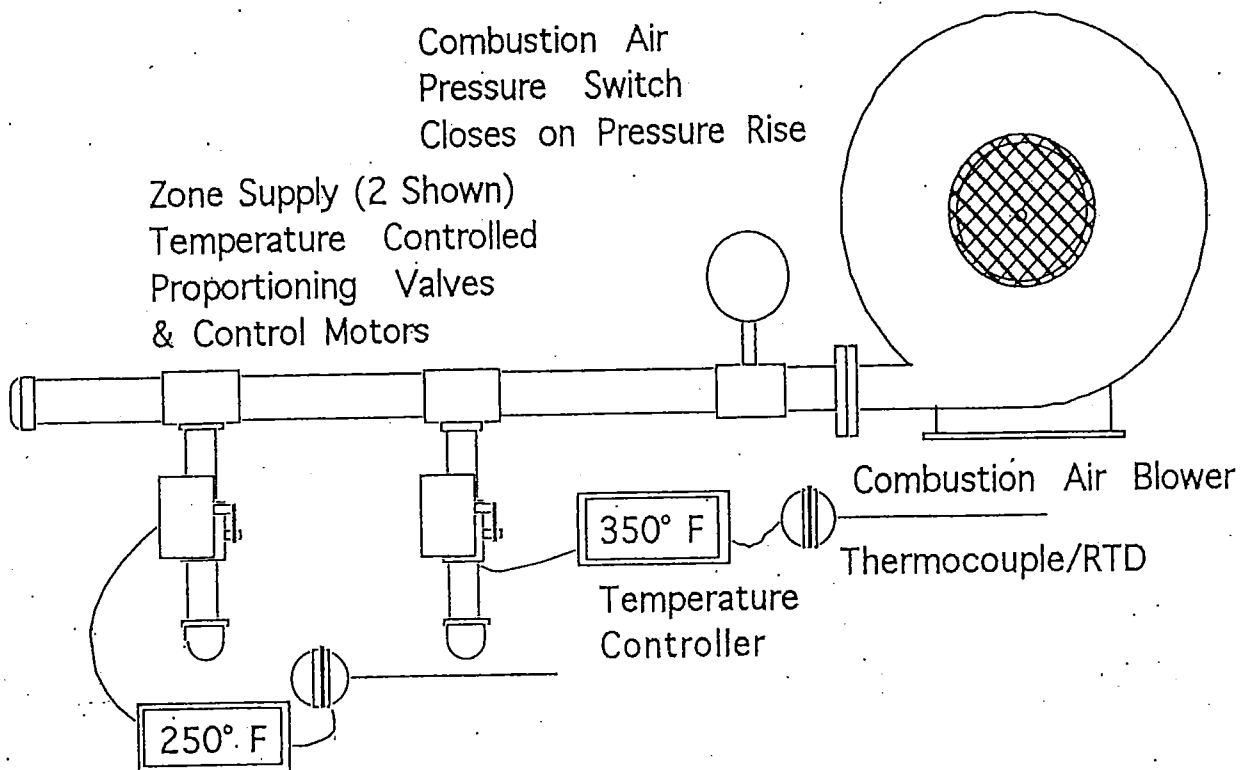
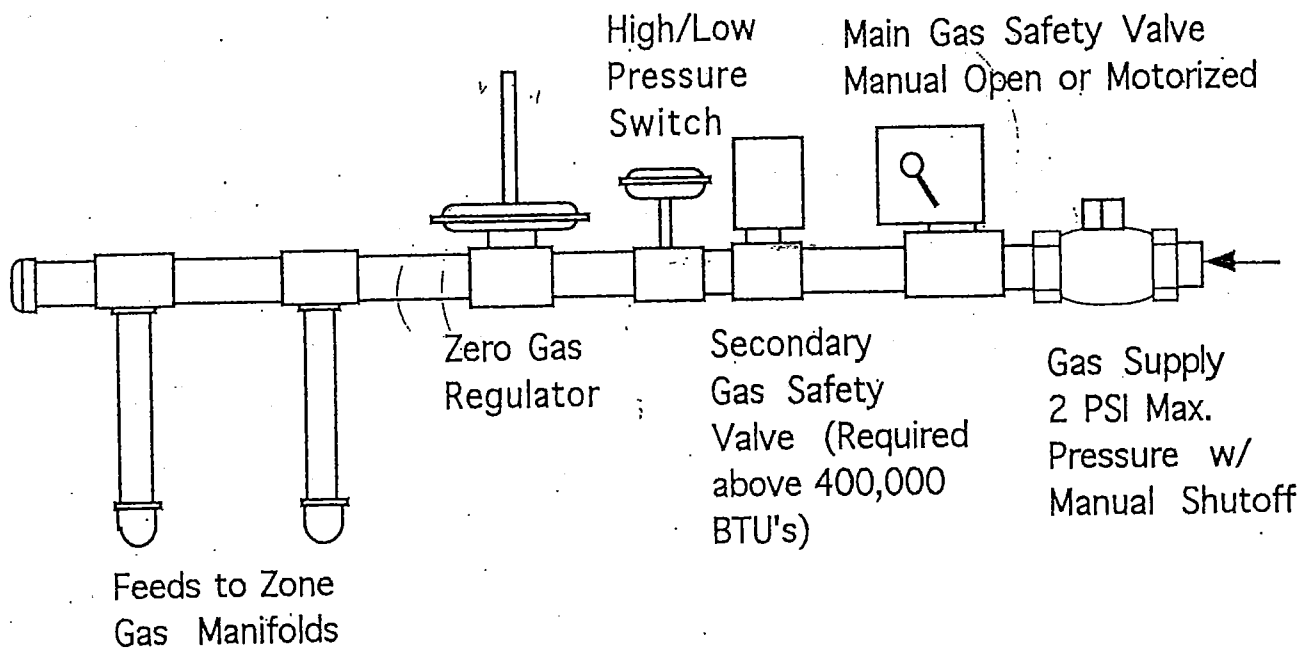
**Design Originators and Manufacturers of Pipe Ribbon Burners Since 1940**

**ENSIGN** *Ribbon Burners Inc.*

101 Secor Lane Pelham Manor NY 10803-2791  
(914) 738-0600 Fax (914) 738-0928  
A Subsidiary of Mondial International Corporation

Engineering

# Air/Gas Supply Schematic





Ensign Ribbon Burners LLC  
101 Secor Lane, Pelham Manor, NY 10803-2791/USA  
(914) 738-0600 / Fax (914) 738-0928  
E-Mail: Ensign @ Ensignrb.com  
Web: www.ensignrb.com

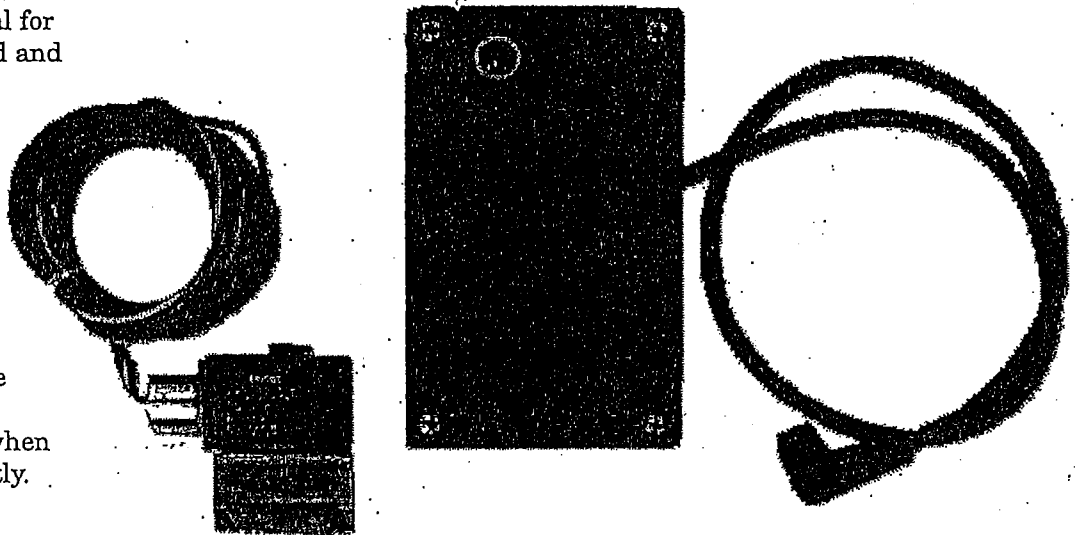
## IGNITION CONTROL FLAME SAFETY

### SNS-120, SNS-122

**Description** - The SNS 120 single probe and SNS 122 double probe units are small, very economical direct spark ignition control designed for use in general heating applications. It is supplied with a polarized 6 (SNS 120) or 7 (SNS 122) pin connector for quick changeover of connections. The SNS 120 and SNS 122 are supplied with a case, potted, with externally mounted fuse, switch, terminal strip, and indicator light(s). The box is 3-3/4 inches wide by 6-1/4 inches high and 2-1/2 inches deep. See figures 1 and 2 for dimensions. Wiring diagrams for the SNS 120 and SNS 122 are shown in figures 3 and 4. Note that the SNS 120 model has a spark electrode which functions as both the ignition and the flame probe. The SNS 122 model has a separate probe to sense a flame. (Available Summer 1998)

**Normal Operation - Heat Cycle** - Upon a call for heat, the SNS 120 enters the purge. At the end of the specific purge period, the unit enters the trial for ignition (TFI). At the start of the TFI, the valve opens and the unit begins sparking at a synchronous rate of 60 sparks/second. Sparking continues until the desired trial time has elapsed. If the unit does sense a flame, the valve is held open, to commence heating, until the thermostat is satisfied.

**Lockout if a flame is not established** - If a flame is not established during the trial for ignition, the valve is closed and the unit enters lockout. The thermostat must be opened and then closed again to provide another trial. The SNS 120 is equipped with quick reset circuitry so that the power interruption to restart the unit can be nearly instantaneous. The SNS 120 has an indicator lamp that is illuminated when the unit is working correctly.

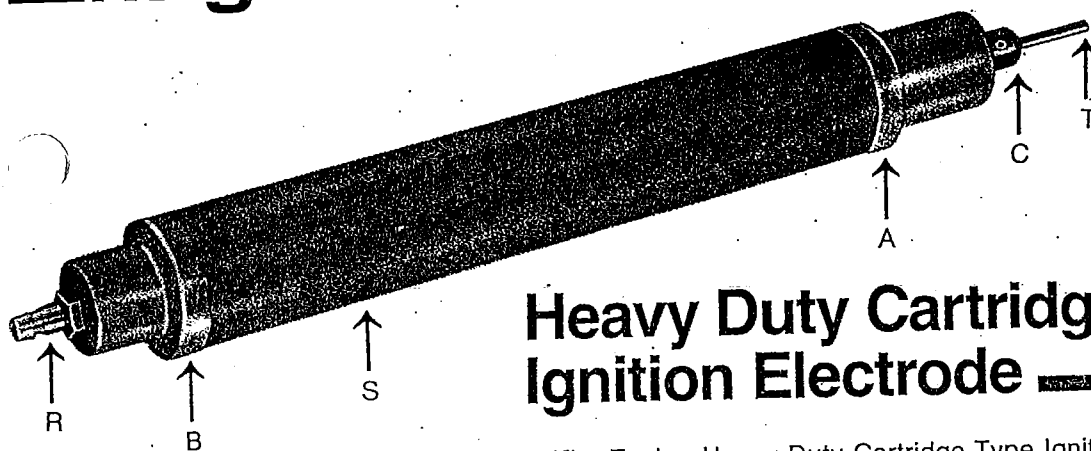


### Re-ignition after loss of flame or flame failure - If there

is a loss of an established flame during a burn cycle, the valve remains open and the spark is re-established within 0.8 seconds. This immediate ignition attempt after loss of flame is called "spark restoration". The advantage of spark restoration is that an unstable flame will not cause valve clatter. Once the flame is re-established, usually shortly after the spark restoration trial begins, the burn cycle will continue until the thermostat is satisfied.

**Power interruptions** - The quick reset circuitry on the SNS 120 enables it to react very well to short power interruptions. A power loss of about 30 milliseconds or less is not recognized by the unit meaning that the purge, trial, or burn cycle will continue as if no interruptions had occurred. A longer power loss causes the unit to recycle. Therefore, a power interruption of any duration does not lead to lockout. Make sure that any loss of power results in a repurging of any closed space prior to the re-initiation of combustion. (ie: Power failure causes exhaust blower to stop, resulting in a system purge prior to power application to the SNS unit.)

# Ensign Ribbon Burners, Inc.



## Heavy Duty Cartridge Type Ignition Electrode

The Ensign Heavy Duty Cartridge Type Ignition Electrode was specifically designed in accordance with Underwriters' specifications, to meet the ignition requirements for gas burners used in bakery band ovens and other multiple burner type bake ovens.

### The Ensign electrode has the following features:

The insulators (A) and (B) are made of the highest grade steatite having a dielectric strength of 240 volts per mil. They will withstand a current of 15,000 volts in a temperature of 1,700°F., without break-down. All insulators are heavily glazed to prevent moisture absorption.

The electrode spacer (S) is made of stainless steel tubing. The entire assembly is held together by means of a stainless steel rod and is completely non-corrosive, assuring long and trouble-free operation.

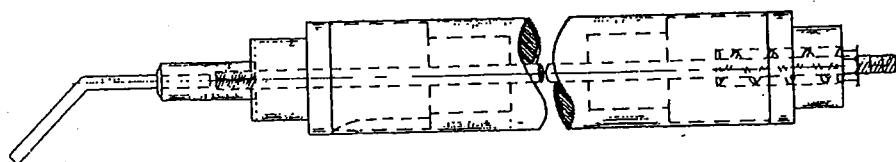
The electrode may be made any length desired and can, therefore, be adapted to any oven installation, without danger of short circuit, regardless of oven wall thickness or burner flame location.

The spark end of the electrode is arranged with a stainless steel connector (C) which holds the spark tip (T) in place and also allows for lateral adjustment of the tip. The tip can be readily and inexpensively replaced without replacing any other part of the electrode.

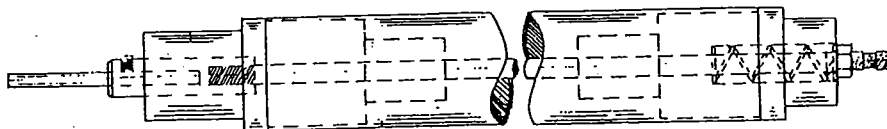
The oven plate end of the electrode is equipped with a Rajah stud (R). Rajah snap type connectors can be supplied for convenient connection between the high tension source and the electrode.

Ensign oven plates and electrode brackets are available for holding the electrodes securely in position and permitting the electrode to be withdrawn without disturbing the oven plates, burners, or piping. The oven plate is designed to allow full inspection of the burner flame and point of ignition.

All parts are interchangeable and may be replaced when necessary.



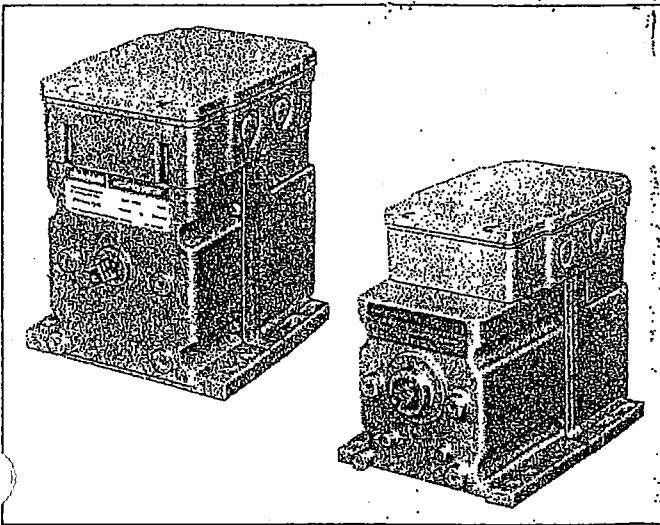
ASSEMBLY DRAWING IGNITION ELECTRODE  
(BENT TIP TYPE) 1 1/8" O.D.



ASSEMBLY DRAWING IGNITION ELECTRODE  
(STRAIGHT TIP) 1 1/8" O.D.

## Series 72 Modutrol IV™ Motors

### PRODUCT DATA



### FEATURES

- Replaces M744S,T,Y and M745S,T,Y Motors.
- M7261, M7274, M7281, M7284, and M7294 are non-spring return motors; M7272, M7282, M7285, and M7286 are spring return motors.
- Oil Immersed motor and gear train for reliable performance and long life.
- Wiring box provides NEMA 3 weather protection.
- Actuator motor and circuitry operate from 24 Vac. Models available with factory installed transformer or an Internal transformer can be field added.
- Quick connect terminals standard—screw terminal adapter available.
- Adapter bracket for matching shaft height of older motors is standard with replacement motors.
- Nominal timing of 30 seconds for 90° stroke and 60 seconds for 160° stroke.
- Valve and damper linkages, explosion-proof housing, and auxiliary switches available as accessories.
- Spring return motors are rated for 25 lb.-in. and 60 lb.-in torque.
- Non-spring return motors are rated for 35 lb.-in., 75 lb.-in., 150 lb.-in., and 300 lb.-in. torque.
- Models available with adjustable start (zero) and span.
- Models available with 4 to 20 mA input signal.
- Models available with 2 to 10 Vdc input signal.
- Die-cast aluminum housing.

### APPLICATION

The Series 72 Modutrol IV Motors are used to control dampers and valves. The motors accept a current or voltage signal from an electronic controller to position a damper or valve at any point between open and closed.

### Contents

Application .....	1
Features .....	1
Specifications .....	2
Ordering Information .....	2
Installation .....	5
Settings and Adjustments .....	10
Operation and Checkout .....	12







The  
New York Blower  
Company

Date: 11/8/2007  
File: C01950  
Sequence: 1  
Revision:

Control: 100  
Chg Order:  
Processor: FTD

Customer: DONG YANG FOOD MACHINERY CO

Purchase Order:  
Tagging:

Office Reference: DONG YANG

#### FAN INFORMATION

Quantity: 1  
Product Line: Pressure Blower  
Size: 2004A  
Class/Wheel Type: 0 / Aluminum  
Rotation: CCW  
Arrangement: 4  
Discharge: BH.  
Motor Position:  
Motor By: NYB  
Mounting By: NYB  
Bearing Mfg. & Model:

Total fan wt. With accessories: 379 lbs

#### DRIVE INFORMATION

QTY	DESCRIPTION	PART NUMBER
1	Motor Sheave	
	Motor Bushing	
1	Fan Sheave	
	Fan Bushing	
1	Belt	
	Belt Centers:	in

SF: 1.3  
Belt Tens:

#### FAN PERFORMANCE DATA

Capacity	CFM	SP	RPM	BHP	TEMP	DENS	ALT	MAX SS
STANDARD	0	0	3500	0	70	0.075	0	3900
OPERATING								
FUTURE								
TEST								

#### SALES MEMO INFORMATION

QTY	DESCRIPTION	Drawing#
1	CCW BH, SIZE 2004A5 PRESSURE BLOWER, ALUM-WHEEL, ARR-4 FLANGED INLET 06" FLANGED OUTLET 04"	C01950-100-02
1	5 HP, 3600 RPM, 3-60-230/460 V., TEFC ENCL., FRAME 184T MOTOR AND MOUNTING BY NYB	
1	MOTOR DATA SHEETS	
1	CERTIFIED VIBRATION REPORT	
1	INLET AND OUTLET SHIPPING COVERS	
1	WRAP FAN IN PLASTIC FOR SHIPMENT	
1	FAN INSTALLATION AND MAINTENANCE MANUAL REFERENCE NUMBER.	IM140.PDF

**Type S200 Series**

**용도**

- 도시가스, 산업용 Main Station 정압기
- 산업용 증기보일러

**특징**

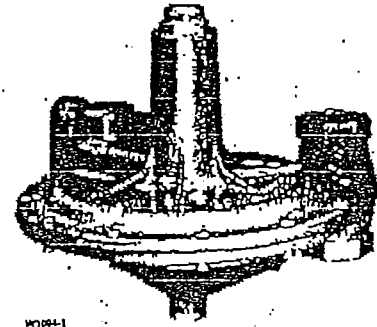
- 고정밀도
- 민감한 반응
- 급작스런 부하변동에도 빠른 응답성으로 하부기기 보호
- 최소한의 Lock-Up으로 양호한 기밀유지
- 수직 - 수평 배관가능 (360°회전)
- In-Line 보수유지가능
- Internal Relief (S202)

**사양**

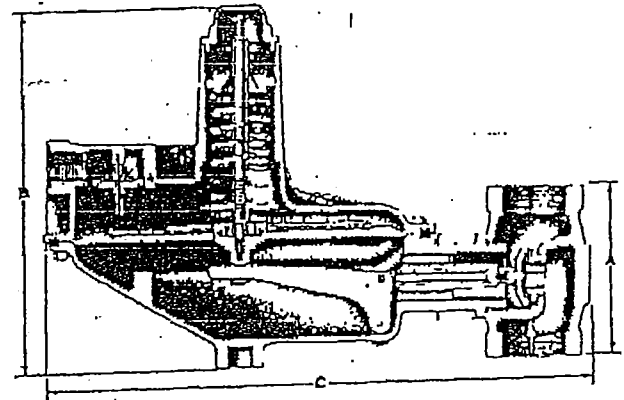
• 최대허용 입구압력 :

최대입구압력		Seat Ring Diameter, Inches (mm)
Psi	Bar	
125	7.6	1/4 (6.4)
126	7.6	3/8 (9.5)
100	6.8	1/2 (12.7)
50	4.1	3/4 (19.1)
25	1.7	1 (25.4)
13	0.8	1-3/16 (30.2)

- 출구압력 조정범위 : 표참조
- 사용 온도 범위 : -29°C ~ 66°C



W104-1



W104-1

TYPE S202

접속규격	크기						중량	
	Inches			mm				
	A	B	C	A	B	C	Pounds	kg
1-1/2, 2	8.12	12.88	19.56	165	327	497	28 ~	12

Gas- und Luftfilter Typ GF  
nach DIN 3386  
Gas and airfilter type GF  
as per DIN 3386  
Filtres pour gaz et air type GF  
selon DIN 3386

**DINGS®**

Mit extrem hoher Staubspeicherkapazität.

GF 5.../1 bis 0,5 bar (50 kPa)

GF 4.../1 bis 4,0 bar (400 kPa)

GF 4.../3 bis 4,0 bar (400 kPa)

GF 4... bis 4,0 bar (400 kPa)

EG-Baumusterprüfbescheinigung

With extremely high dust-storage capacity.

GF 5.../1 to 0.5 bar (50 kPa)

GF 4.../1 to 4.0 bar (400 kPa)

GF 4.../3 to 4.0 bar (400 kPa)

GF 4... to 4.0 bar (400 kPa)

EC-Type examination certificate

A très grande capacité d'accumulation  
des poussières.

GF 5.../1 à 0,5 bar (50 kPa)

GF 4.../1 à 4,0 bar (400 kPa)

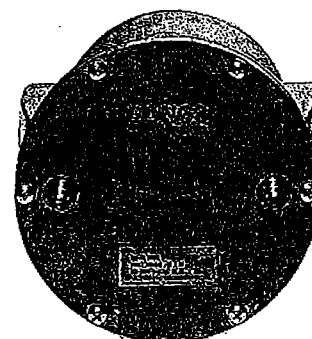
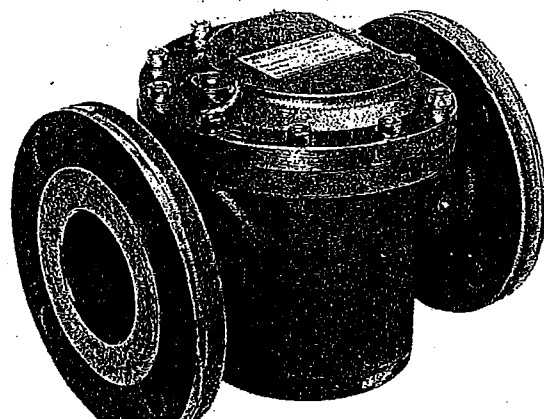
GF 4.../3 à 4,0 bar (400 kPa)

GF 4... à 4,0 bar (400 kPa)

Certificat d'examen CE de type

Artikelbezeichnung Article designation Désignation de l'article	Anschluß/Connection/Raccord Gewinde Thread Filet	Flansch Flange Bride	Bestell-Nummer Ordering Number No. de commande
---	---	----------------------------	--

GF 505/1	Rp 1/2		066191
GF 507/1	Rp 3/4		066209
GF 510/1	Rp 1		066217
GF 515/1	Rp 1 1/2		066225
GF 520/1	Rp 2		066233
GF 4005/1	Rp 1/2		228073
GF 4007/1	Rp 3/4		228074
GF 4010/1	Rp 1		228075
GF 4015/1	Rp 1 1/2		228076
GF 4020/1	Rp 2		228077
GF 40 040/3		DN 40	222637
GF 40 050/3		DN 50	222638
GF 40 065/3		DN 65	222639
GF 40 080/3		DN 80	222640
GF 40 100/3		DN 100	222641
GF 40125		DN 125	218162
GF 40150		DN 150	218163
GF 40200		DN 200	218164



anlagen nach EN 1854  
Overpressure switches for firing  
systems as per EN 1854  
Pressostats pour surpression pour  
installations de chauffe selon EN 1854

**DUNGS®**

Druckwächter sind geeignet zum Ein-, Aus-  
oder Umschalten eines Stromkreises bei  
sich änderndem Druck-Istwert zum ein-  
gestellten Sollwert.

GW...A4/...A4 Mini-Maxi Compact-  
GW...A6/...A6 doppeldruck-  
wächter

EG-Baumusterprüfbescheinigung

Pressure switches are suitable for swit-  
ching a circuit on, off or over when the set  
setpoint is exceeded or not attained.

GW...A4/...A4 Mini-Maxi compact  
GW...A6/...A6 double-pressure  
switch

EC-Type examination certificate

Les pressostats sont appropriés pour  
ouvrir, fermer ou commuter un circuit élec-  
trique lors du changement de la pression  
préréglée.

GW...A4/...A4 Mini-Maxi pressos-  
stat double compact  
GW...A6/...A6

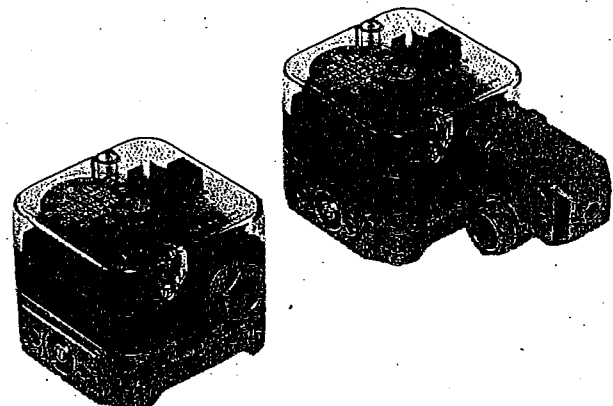
Certificat d'examen CE de type

Artikelbezeichnung  
Article designation  
Désignation de l'article

Einstellbereiche [mbar]  
Adjusting ranges [mbar]  
Plages de réglage [mbar]

Bestell-Nummer  
Ordering Number  
No. de commande

GW 3 A4/ 3 A4	0,4 - 3	0,4 - 3	209929
GW 3 A4/ 10 A4	0,4 - 3	1 - 10	208930
GW 10 A4/ 10 A4	1 - 10	1 - 10	208931
GW 10 A4/ 50 A4	1 - 10	2,5 - 50	208932
GW 10 A4/ 150 A4	1 - 10	30 - 150	208933
GW 50 A4/ 50 A4	2,5 - 50	2,5 - 50	208934
GW 50 A4/ 150 A4	2,5 - 50	30 - 150	208935
GW 150 A4/ 150 A4	30 - 150	30 - 150	208936
GW 500 A4/ 500 A4	100 - 500	100 - 500	208937
GW 3 A6/ 3 A6	0,7 - 3	0,7 - 3	229235
GW 3 A6/ 10 A6	0,7 - 3	2 - 10	229236
GW 10 A6/ 10 A6	2 - 10	2 - 10	229237
GW 10 A6/ 50 A6	2 - 10	5 - 50	229238
GW 10 A6/ 150 A6	2 - 10	10 - 150	229239
GW 50 A6/ 50 A6	5 - 50	5 - 50	229240
GW 50 A6/ 150 A6	5 - 50	10 - 150	229241
GW 150 A6/ 150 A6	10 - 150	10 - 150	229242
GW 500 A6/ 500 A6	100 - 500	100 - 500	229243



# HINGGS®

Differenzdruckwächter für Luft,  
Rauch- und Abgase in Feuerungsan-  
lagen nach EN 1854

Differential pressure switches for air,  
waste and flue gases in firing systems  
as per EN 1854

Pressostat différentiels pour air et gaz  
brûlé dans installations de chauffe se-  
lon EN 1854

Differenzdruckwächter sind geeignet zum  
Ein-, Aus- oder Umschalten eines Strom-  
kreises bei sich ändernden Druck-Istwert  
um eingestellten Sollwert.

GW...A1 werkseitig justiert  
nach Kundenwunsch

GW...A2/ mit Sollwerteinsteller  
A4/C2

GW...A2 P zusätzlich mit Prüftaste  
G-Baumusterprüfbescheinigung

Differential Pressure switches are suitable  
for switching a circuit on, off or over when  
the setpoint is exceeded or not attained.

LGW...A1 switchpoint is factory-set  
as per customers demand

LGW...A2/ with adjusting scale  
A4/C2

LGW...A2 P test button incorporated  
EC-Type examination certificate

Pressostats différentiels sont appropriés  
pour ouvrir, fermer ou commuter un circuit  
électrique lors du changement de la pres-  
sion pré réglée.

LGW...A1 pré réglage en usine  
suivant demande client

LGW...A2/ avec disque de réglage  
A4/C2

LGW...A2 P touche de contrôle add.  
Certificat d'examen CE de type

Artikelbezeichnung  
Article designation  
Désignation de l'article

Einstellbereich [mbar]  
Adjusting range [mbar]  
Plage de réglage [mbar]

Bestell-Nummer  
Ordering Number  
No. de commande

LGW 1,5 A1  
LGW 3 A1  
LGW 10 A1  
LGW 50 A1  
LGW 150 A1  
Adapter LGW...A1  
LGW 3 A2  
LGW 10 A2  
LGW 50 A2  
LGW 150 A2  
LGW 3 A2P  
LGW 10 A2P  
LGW 50 A2P  
LGW 150 A2P

0,3 - 1,5

0,4 - 3

1 - 10

2,5 - 50

30 - 150

0,4 - 3

1 - 10

2,5 - 50

30 - 150

0,4 - 3

1 - 10

2,5 - 50

30 - 150

0,2 - 1,5

0,4 - 3

1 - 10

0,4 - 3

1 - 10

2,5 - 50

30 - 150

nach Spezifikation

as per specification

selon spécification

nach Spezifikation

as per specification

188590

107409

107417

107425

107433

120204

120212

221207

120238

212200

212571

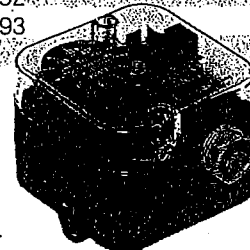
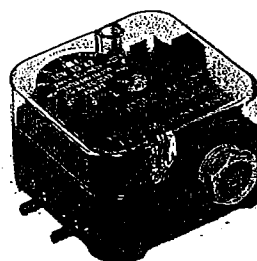
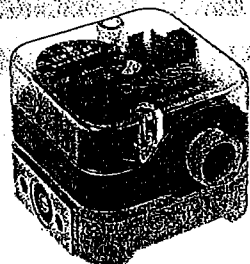
212572

221590

221591

221592

221593



einstufige Betriebsweise  
**GasMultiBloc**  
 one-stage operation  
**GasMultiBloc**  
 Fonctionnement à une allure

**DUNGS®**

GasMultiBlocs sind die Integration von  
 Filter, Regler, Ventilen und Min. Druck-  
 wächter in einer Kompaktarmatur,  
 MB 403 0,2 bar (20 kPa)  
 MB 053 0,06 bar (6 kPa)  
 MB 405-420 0,36 bar (36 kPa)  
 EG-Baumusterprüfbescheinigung

GasMultiBloc are compact units combi-  
 ning filter, regulator, valves and min. pres-  
 sure switch.  
 MB 403 0,2 bar (20 kPa)  
 MB 053 0,06 bar (6 kPa)  
 MB 405-420 0,36 bar (36 kPa)  
 EC-Type examination certificate

Le GasMultiBloc est l'intégration du filtre,  
 régulateur, vannes et min. pressostat dans  
 une armature compacte.  
 MB 403 0,2 bar (20 kPa)  
 MB 053 0,06 bar (6 kPa)  
 MB 405-420 0,36 bar (36 kPa)  
 Certificat d'examen CE de type

Artikelbezeichnung Article designation Désignation de l'article	Gewindeflansch Threaded flange Bride fileté	Ausgangsdruckbereich Regulating pressure range Plage de réglage [mbar]	Bestell-Nummer Ordering Number No. de commande
MB-DLE 403 B01 S20	Rp 3/8	4-20	226568
MB-DLE 405 B01 S20	Rp 1/2	4-20	226560
MB-DLE 407 B01 S20	Rp 3/4	4-20	226561
MB-DLE 410 B01 S20	Rp 1	4-20	226562
MB-DLE 412 B01 S20	Rp 1 1/4	4-20	226563
MB-DLE 415 B01 S20 <sup>1)</sup>	Rp 1 1/2	4-20	226799
MB-DLE 420 B01 S20 <sup>1)</sup>	Rp 2	4-20	226803
MB-DLE 405 B07 S22 <sup>2)</sup>	Rp 1/2	4-20	191370
MB-DLE 407 B07 S22 <sup>2)</sup>	Rp 3/4	4-20	191380
MB-DLE 410 B07 S22 <sup>2)</sup>	Rp 1	4-20	182270
MB-DLE 412 B07 S22 <sup>2)</sup>	Rp 1 1/4	4-20	182040
MB-DLE 405 B01 S50	Rp 1/2	4-50	226875
MB-DLE 407 B01 S50	Rp 3/4	4-50	226874
MB-DLE 410 B01 S50	Rp 1	4-50	226873
MB-DLE 412 B01 S50	Rp 1 1/4	4-50	226872
MB-DLE 415 B01 S50 <sup>1)</sup>	Rp 1 1/2	20-50	226801
MB-DLE 420 B01 S50 <sup>1)</sup>	Rp 2	20-50	226805
MB-DLE 053 B01 S20	Rp 3/8	4-20	226570

Stecker und Flansche sind separat zu  
 bestellen (siehe Seite 38).  
 Unterschiedliche Gewindeflanschgrößen  
 pro MB Type möglich.

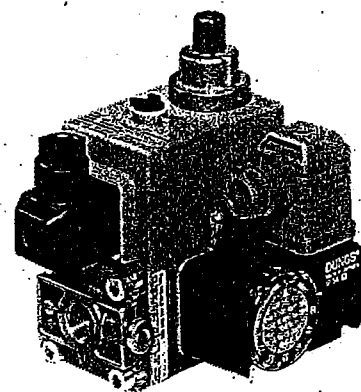
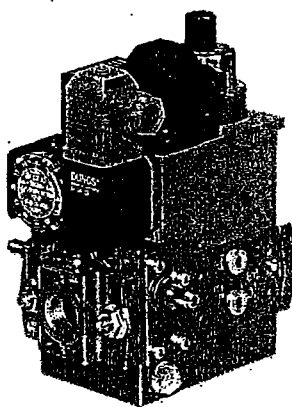
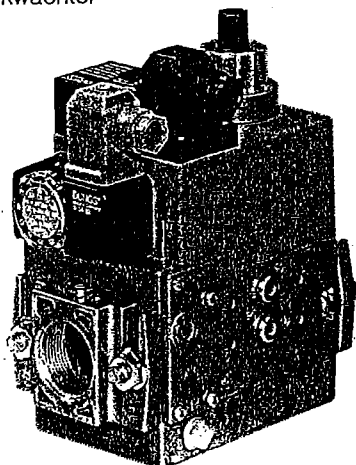
Plugs and flanges have to be ordered  
 separately (see page 38).  
 Different sizes of threaded flanges possi-  
 ble per MB type.

Prises et brides sont à commander sépa-  
 rément (voir page 38).  
 Différentes grandeurs de brides filetés  
 par MB sont possibles.

<sup>1)</sup> mit Vorbaufilter  
<sup>2)</sup> ohne Druckwächter

<sup>1)</sup> with pre-mount filter  
<sup>2)</sup> without pressure switch

<sup>1)</sup> avec filtre poche  
<sup>2)</sup> sans pressostat





Test Report No. F690501/LF-CTSAYA07-18927

Issued Date: August 29, 2007

Page 1 of 3

To: KOREA FINE CERAMIC CO., LTD.  
5-3, Bangye-ri  
Munmak-town  
Wonju-city  
KANGWON-DO  
Korea

The following merchandise was submitted and identified by the client as :

Product Name : CERAMICA  
SGS File No. : AYA07-18927  
Received Date : August 23, 2007  
Test Performing Date : August 24, 2007  
Test Performed : SGS Testing Korea tested the sample(s) selected by applicant with following results  
Test Results : For further details, please refer to following page(s)

SGS Testing Korea Co. Ltd.

Pluto Kim  
Monet Jeong  
Billy Oh / Testing Person

Jeff Jang / Chemical Lab Mgr

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# Test Report No. F690501/LF-CTSAYA07-18927

Issued Date: August 29, 2007

Page 2 of 3

Sample No. : AYA07-18927.001

Sample Description : CERAMICA

Item No./Part No. : CRC-1500H

## Heavy Metals

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	US EPA 3052(1996), US EPA 6010B(1996), ICP	0.5	N.D.
Lead (Pb)	mg/kg	US EPA 3052(1996), US EPA 6010B(1996), ICP	5	N.D.
Mercury (Hg)	mg/kg	US EPA 3052(1996), US EPA 6010B(1996), ICP	2	N.D.
Hexavalent Chromium (Cr VI)	mg/kg	US EPA 3060A(1996), US EPA 7196A(1992), UV	1	N.D.

## Flame Retardants PBBs/PBDEs

Test Items	Unit	Test Method	MDL	Results
Monobromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Dibromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Tribromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Tetrabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Pentabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Hexabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Heptabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Octabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Nonabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Decabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Monobromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Dibromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Tribromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Tetrabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Pentabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Hexabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Heptabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Octabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Nonabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Decabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.

- NOTE:
- (1) N.D. = Not detected.(<MDL)
  - (2) mg/kg = ppm
  - (3) MDL = Method Detection Limit
  - (4) - = No regulation
  - (5) \*\* = Qualitative analysis (No Unit)
  - (6) Negative = Undetectable / Positive = Detectable

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# Korea Merchandise Testing & Research Institute

459-28 KASAN-DONG, KUMCHON-GU, SEOUL, KOREA TEL:02)856-5615

FAX : 02)856-5618, 854-6667 <http://www.komtri.re.kr>

## TEST REPORT

NO : 02135

DATE : MAR. 4. 2000

(IN : FEB. 25. 2000)

CLIENT : KOREA FINE CERAMIC CO., LTD

SAMPLE DESCRIPTION : CERAMIC NON-STICK PAINT

### TEST RESULTS :

ITEMS		UNIT	LIMITATIONS	RESULTS
MATERIAL TEST	Lead(Pb)	%	Shall not exceed 10	0.0022
	Antimony(Sb)		Shall not exceed 5	0.0017
EXTRACTION TEST	Arsenic(As)	mg/ l	Shall not exceed 0.2	Less than 0.01
	Cadmium(Cd)		Shall not exceed 0.1	Less than 0.01
	Lead(Pb)		Shall not exceed 0.4	Less than 0.1
	Phenol		Shall not exceed 5.0	Conform
	Formaldehyde		Shall not exceed 4.0	Conform
	Extractable fraction in 4%-Acetic Acid		Shall not exceed 30	4

▶ TEST METHOD : KOREA FOOD AND DRUG ADMINISTRATION NOTICE NO.  
98-60 FOR FOOD PACKAGES AND CONTAINERS.

Signed by

C. M. Seo.

Chang Mo Seo, Manager  
Env. & Welfare Dept.

# KOREA FINE CERAMIC INC

## Material Safety Data Sheet (MSDS)

### Ceramica G-3000

Address 5-3 Bangyeri Moonmak-eup Wonju Kangwondo, Rep. Of Korea

Code KFCTRI-02C-C107

Prepared and revised by the concerned department of the Technical Institute 02.MAR.2002

Tel : (8233)731-7441~3

Emergency contact : same as the above department

Fax : (8233)731-8741

#### 1. Product Identification & Composition/Information on Ingredients

1. Distinction between the simple and mixture : mixture
2. Ingredients

Name of Chemicals	Product of reaction (Polysiloxane, alcohol, water, Inorganic filler, Inorganic pigment ) Ceramic coatings, Ceramica G-3000
Contents(wt%)	Polysiloxane 18-25%, , for alcohol, water, Inorganic filler and Inorganic pigment are stated below
Structure	As stated below
CAS No.	NA

※ Informations on chemical name of composed monomer and Ceramica G-3000 are commercially protected. Its toxic effects are not studied thoroughly.

#### 3. Contents of alcohol, water, Inorganic filler and Inorganic pigment

Trade name	Chemical name	content(wt%)	CAS No.
METHYL ALCOHOL	CH <sub>3</sub> OH	3.0~4.8	67-56-1
BUTYL CELLOSOLVE	C <sub>4</sub> H <sub>9</sub> OCH <sub>2</sub> CH <sub>2</sub> OH	0.8~1.0	111-76-2
WATER	H <sub>2</sub> O	23.5~30.7	7732-18-5
SILICA	SiO <sub>2</sub>	20~21.5	67762-90-7

- May cause irritation on a respiratory organ, skin and eyes
- Flammable liquid and vapor
- May cause explosion
- Should be isolated from all ignitions
- Avoid inhalation of vapor and dust
- Avoid eye, skin and clothing contact
- Should be used under proper ventilation
- To be handled with care

## ② Potential effect on health

### • Inhalation

#### - Short term exposure

May cause irritation

May cause same effect as swallowed in short term

May cause tinnitus, indigestion, dizziness, hypesthesia, twitch, trouble in visual organ and harm nerve additionally

#### - Long term effect

same effect as swallowed in short term

May cause headache

### • Skin contact

#### - Short term exposure

May cause irritation

May cause same effect as swallowed in short term

May cause dizziness and harm nerve additionally

#### - Long term effect

same effect as swallowed in short term

same effect as short term exposure

### • Eye contact

Get medical attention immediately .

② Skin Contact

• First aid treatment

Take off the polluted clothes and shoes immediately

Wash exposed parts with soap or mild detergent and large amount of water until no remaining trace of chemicals is found(at least 15-20 minutes)

③ Eye contact

• First aid treatment

Raise upper and lower eyelids immediately flushing with large amount of water or saline solution until no remaining trace of chemicals is found(at least 15-20 minutes)

Get medical attention immediately

④ Ingestion

• First aid treatment

Use emetics when found ingestion of G-3000 within 2 hours

Clean completely using water added with sodium bicarbonate

Get medical attention immediately

Gastrolavage must be performed by doctor or medical assistant

⑤ Information for doctors

• Antidote

The following antidotes are recommended ?usage of antidotes and the quantity should be judged by doctors or medical assistant.

Methanol toxic : oral ingestion of ethanol, 50%, 1.5mL/kg. 5% deluted solution for the first step. 0.5-1.0mL/Kg for 4 days and every two hours by oral ingestion or venous injection to decrease and eliminate Methanol metabolism. Thickness of methanol in blood should be maintained below 1-1.5mg/mL.

Dosage should be done by doctors or medical assistants.

Using 4-methylpyrazole through mouth or dosing into venous hamper alcohol dehydrogenase and effectively act as antidote for methanol or ethylene glycol toxic.

④ Harmful combustion product

It may produce toxic carbon oxide when decomposed by heat

## 5. Spillage and Accidental Release Measures

### ① Direct spillage

Isolate igniter

Stop spillage if possible

Use water to diminish vapor

If spillage is not substantial, use sand or other absorbent and keep inside the container for post action

If substantial spillage occurs, make a hilly spot far from the front of the point of leakage to coop in for post action

No smoking, spark or fire in dangerous area

Stop access of unnecessary personnel and isolate dangerous area and restricted area

Keep in a dry, clean and proper container for further step after cleanup

Do not let the leaked material drain into sewer

### ② Soil leakage

Prepare a spot for cooping in such as lagoon, pond or drain pit

Cooping in the hilly spot using soil, sandbag or polyurethane or concrete.

## 6. Handling and Storage

Abide by all the regulations of central and local governments in storing this product

Isolate this product from materials which can not be in the same place

Store in a manner noted in the manual of G-3000

Keep in a cool and dry and dark place after sealing

## 7. Exposure controls and Personal protection

- Molecular weight: NA
- Molecular formula: NA
- Boiling point: over 65(149)
- Melting point : over 794 (-137)
- Steam pressure: under 97.25 mmHg(at 20)
- Steam density: NA
- Gravity : 0.9-0.99
- PH: 4 ~6
- Evaporation rate: NA
- Viscosity : 4-6 cP (at 20)
- Solubility (water): good
- Solubility (solvent): Soluble with organic solvent such as alcohol, ketone

## 9. Stability and Reactivity

### ① Reactivity

Exothermic reaction was noted when maturing(maturing G-3000 A liquid with B liquid)

Stable at room temperature and at atmospheric pressure after maturing

### ② Conditions to avoid

Prevent heat, spark or other things which might ignite

Vapor may explode

Avoid vapor ingestion or contact to skin

Avoid water pollution caused by leakage

### ③ Substance to avoid

- Asethyl Bromide: rapid reaction generating hydrogen bromide
- Alkylaluminium solvent : rapid reaction

- sodium methoxide+chloroform : rapid reaction
- sulfuric acid: Ignitable and explosive

#### ④ Harmful decomposite products

thermal cracking may emit harmful carbon oxide

#### ⑤ Polymerization reaction

Polymerization reaction when aged(mixture of G-3000 A liquid and B liquid)

no dangerous polymerization reaction reported under normal temperature and pressure

polymerization reaction when vulcanized(dry and vulcanize after applying)

### 10. Information on toxicity

This information on toxicity is based on 100% methanol standard. Toxicity and irritation shall be referred as below the based standard for G-3000 with about 10% of methanol.

#### ① Irritation Information

-20mg/24hours, skin-rabbit : normal

-40mg, eye-rabbit : normal -40mg,

-100mg/24hours, eye-rabbit : normal

#### ② toxicity Information

-TCL0 : 86000mg/m<sup>3</sup>, inhalation-human being

-TCL0 : 300ppm, Inhalation-human being

-LC50 : 64000ppm/4hours, inhalation-rat

-LCL0 : 1000ppm, inhalation-monkey

-LCL0 : 50gm/m<sup>3</sup>/2hours, inhalation-mouse

-LCL0 : 44gm/m<sup>3</sup>/6hours, inhalation-cat

-TCL0 : 50mg/m<sup>3</sup>/12hours/13week, intermittent inhalation-rat

-LD50 : 15800mg/kg, skin-rabbit

-LDL0 : 393mg/kg, skin-monkey

-LDL0 : 428mg/kg, oral-human being

repeated headache when chronically exposed on 600~1,125ppm

- Skin contact : irritant/anesthetic/tetanospamin

- acute exposure

on G-3000 liquid may cause irritation

may acidize metabolism, affect eye and central nervous system as inhaled acutely when absorbed by skin

- chronic exposure

repeated and continuous fat-removing effect with liquid may cause edema, dewetting and eczema dermatitis    chronical absorption may acidize metabolism as inhaled acutely

- Eye contact: stimulant

- acute exposure

Vapor may cause irritation

It is reported that high concentration may cause acute conjunctivitis and defect on epithellum of cornea

diluted liquid may cause weak irritation

- chronic exposure

repeated and continuous exposure may cause conjunctivitis

Inhalation : anesthetic/tetanospamin

- acute exposure

may cause weak and impulse drowsiness and 12-48 hours of no symptoms will be followed

afterwards, caught, difficulty in breathing, headache, dull condition, weakness, dizziness, misjudgement diarrhea from time to time, anorexia, acute pain in the belly and limbs, instability, insensibility or impulse mental storm, unusual stimulation and mania , low breathing, chill and wet skin caused by acidized metabolism    may cause partial blindness or belated and temporary blindness

irreversible effect on central nervous system including continuous weakness and trouble when speaking, stiffness, tonic spasm and functional disease with decrease in sporting ability was reported

- chronic exposure

repeated inhalation may cause trouble in eyesight and also may cause affect overall body same as when acutely inhaled

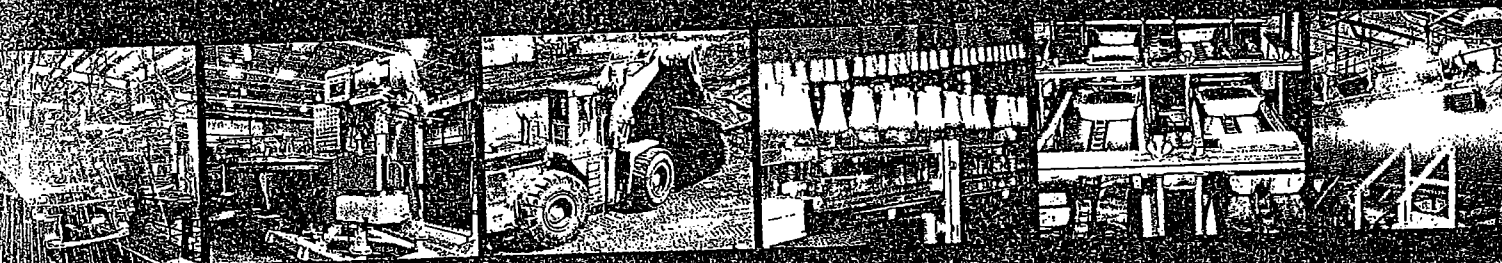


Mainly riped liquid mixture of G-3000 is noted and rising problems during mix riping are also included

For inquiries regarding this content, please contact the Technical Institute of Korea Fine Ceramic Corporation at 8233-731-7441~3

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High Performance Synthetic Fluids and Greases

Gear, Bearing & Recirculating Oils

Air Compressor and Vacuum Pump Oils

Hydraulic Fluids & Oils

Multi-Purpose Greases

Greases For Special Applications

Specialty Lubricants

Food Machinery Lubricants NSF H-1 Class

Automotive Lubricants

Motor Oils

Metal Working Fluids

Spray Lubricants, Grease Cartridges and Tubes



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SPECIALTY  
LUBRICANTS

한도상사

TEL : (02)2646-8606

FAX : (02)2646-9901

<http://www.lubriplate.co.kr>

E-mail : yjhwang@lubriplate.co.kr

**Lubriplate®**  
Lubrication Data Book

# Synthetic Multi-Purpose, Gear, Bearing, Chain & Recirculating Fluids

## In Lube 150-1000: Polyalphaolefin (PAO)-Based, 100% Synthetic Fluids.

These multi-purpose polyalphaolefin (PAO) based, zinc-free fluids are formulated with state-of-the-art additives. These fluids provide outstanding performance over extended drain intervals. They are recommended for gearboxes, bearings, chains and recirculating systems.

UBRIPLATE PRODUCT	PRODUCT PART NO.	ISO GRADE	AGMA NO.	SAE GEAR OIL NO.	VIS. cSt @ 40°C/100°C	VIS. SUS @ 100°F/210°F	VIS. INDEX	FLASH POINT	FIRE POINT	POUR POINT
N LUBE 150	L0974-	150	4	80W-90	151 / 20	762 / 97	156	510°F/266°C	555°F/291°C	-60°F/-51°C
N LUBE 220	L0975-	220	5	90	216 / 26	1088 / 128	155	510°F/266°C	555°F/291°C	-50°F/-46°C
N LUBE 320	L0976-	320	6	80W-140	311 / 34	1557 / 161	155	505°F/263°C	550°F/288°C	-50°F/-46°C
N LUBE 460	L0977-	460	7	140	446 / 45	2143 / 211	156	505°F/263°C	550°F/288°C	-45°F/-43°C
N LUBE 680	L0978-	680	8	-	623 / 57	3289 / 275	157	500°F/260°C	545°F/285°C	-45°F/-43°C
N LUBE 1000	L0979-	1000	8A	-	950 / 77	4900 / 372	157	500°F/260°C	545°F/285°C	-35°F/-37°C

Lube 150 through 1000 is available in Jugs, Pails, 1/4 Drums & Drums. See page 18 for package part number suffix.

## In Lube HD Series: Heavy-Duty, Extreme Pressure, Polyalphaolefin (PAO)-Based, 100% Synthetic Fluids.

These heavy-duty, zinc free, extreme pressure, 100% synthetic based, fluid lubricants are designed for applications where an extreme pressure synthetic fluid is required. They deliver outstanding extreme pressure protection, excellent anti-wear properties and very low coefficients of friction, resulting in lower operating temperatures, reduced power consumption and longer equipment life. Excellent thermal stability and oxidation resistance increases service life, providing extended drain intervals. Compatible with a broad range of seals. In Lube HD 220 and 460 pass 12 stages of the FZG Test.

UBRIPLATE PRODUCT	PRODUCT PART NO.	ISO GRADE	AGMA NO.	SAE GEAR OIL NO.	VIS. cSt @ 40°C/100°C	VIS. SUS @ 100°F/210°F	VIS. INDEX	FLASH POINT	FIRE POINT	POUR POINT
N LUBE HD 150	L1000-	150	4 EP	80W-90	162 / 21	816 / -	154	540°F/282°C	590°F/310°C	-60°F/-51°C
N LUBE HD 220	L1001-	220	5 EP	90	199 / 25	988 / -	154	540°F/282°C	580°F/304°C	-55°F/-48°C
N LUBE HD 320	L1002-	320	6 EP	80W-140	310 / 35	1545 / -	157	540°F/282°C	585°F/307°C	-50°F/-46°C
N LUBE HD 460	L1003-	460	7 EP	140	440 / 47	2191 / -	164	550°F/288°C	585°F/307°C	-50°F/-46°C
N LUBE HD 680	L1004-	680	8 EP	-	705 / 68	3384 / -	170	555°F/291°C	580°F/304°C	-45°F/-43°C

Lube HD Series Lubricants are available in Jugs, Pails, 1/4 Drums & Drums. See page 18 for package part number suffix.

## In Lube Worm Gear Lubricant: Polyalphaolefin (PAO)-Based, 100% Synthetic Fluid Lubricant.

This high performance, ISO 460 grade, synthetic gear lubricant is recommended for all types of worm gear reducers. Formulated with advanced additives, this 100% synthetic-based fluid provides outstanding anti-wear and anti-friction properties ideal for the high sliding action of worm gears. It works well over a wide range of temperature extremes. It is compatible with a broad range of seal materials. Excellent oxidation resistance insures long service life. Passes 12 stages of FZG Test.

UBRIPLATE PRODUCT	PRODUCT PART NO.	ISO GRADE	AGMA NO.	SAE GEAR OIL NO.	VIS. cSt @ 40°C/100°C	VIS. SUS @ 100°F/210°F	VIS. INDEX	FLASH POINT	FIRE POINT	POUR POINT
In Lube Worm Gear	L0981-	460	7	140	440 / 47	2191 / -	164	550°F/288°C	585°F/307°C	-50°F/-46°C

In Lube Worm Gear Lubricant is available in Bottles, Jugs, Pails, 1/4 Drums & Drums. See page 18 for package part number suffix.

## In Lube High Temp Fluids 68 and 220: 100% Ester-Based Fluids.

These 100% ester based synthetic lubricants are recommended for use on bakery oven chains, drying oven chains, tenter frame chains, heat treating chains, paint curing oven chains and any other type of bearing/slide/box applications where they are exposed to high operating temperatures and must maintain a clean lubricated surface. Available in ISO viscosity grades 68 and 220. Proven successful in applications in excess of 600°F/316°C.



UBRIPLATE PRODUCT	PRODUCT PART NO.	ISO GRADE	AGMA NO.	SAE GEAR OIL NO.	VIS. cSt @ 40°C/100°C	VIS. SUS @ 100°F/210°F	VIS. INDEX	FLASH POINT	FIRE POINT	POUR POINT
In Lube High Temp 68	L0778-	68	2	80W	74 / 11	364 / 58	109	554°F/290°C	640°F/338°C	-25°F/-32°C
In Lube High Temp 220	L0780-	220	5	90	220 / 19	1112 / 102	92	525°F/274°C	580°F/304°C	-5°F/-21°C

In Lube High Temp 68 & 220 is available in Pails & Drums. See page 18 for more information and package part number suffix.

## In Lube Synthetic Gear Fluids: 100% Polyalkylene Glycol (PAG)-Based Fluids.

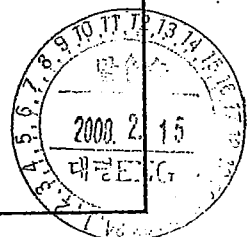
These 100% polyalkylene glycol fluids are designed to handle the most demanding operating conditions. These fluids deliver outstanding protection against micropitting, abrasion and wear. They deliver unsurpassed extreme pressure and anti-wear performance and provide outstanding thermal stability. They exceed 12 stages of the FZG test.

UBRIPLATE PRODUCT	PRODUCT PART NO.	ISO GRADE	AGMA NO.	SAE GEAR OIL NO.	VIS. cSt @ 40°C/100°C	VIS. SUS @ 100°F/210°F	VIS. INDEX	FLASH POINT	FIRE POINT	POUR POINT
O-220	L0838-	220	5	90	227 / 42	-	242	543°F/284°C	-	-44°F/-42°C
O-460	L0839-	460	7	140	477 / 83	-	262	543°F/284°C	-	-33°F/-36°C

Synthetic Gear Fluids are available in Pails & Drums. See page 18 for more information and package part number suffix.

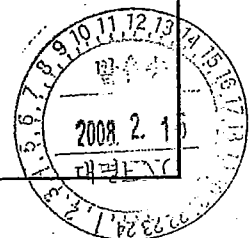
# INSPECTION TEST REPORT

FAN TYPE	TURBO FAN	AIRFOIL FAN	SIROCCO FAN
QT'Y	2 SET	2 SET	4 SET / 1SET
CUSTOMER	동양식품기계㈜		
USER	USA		
SUPPLIER	DAE-MYUNG E N G		



# CONTENTS

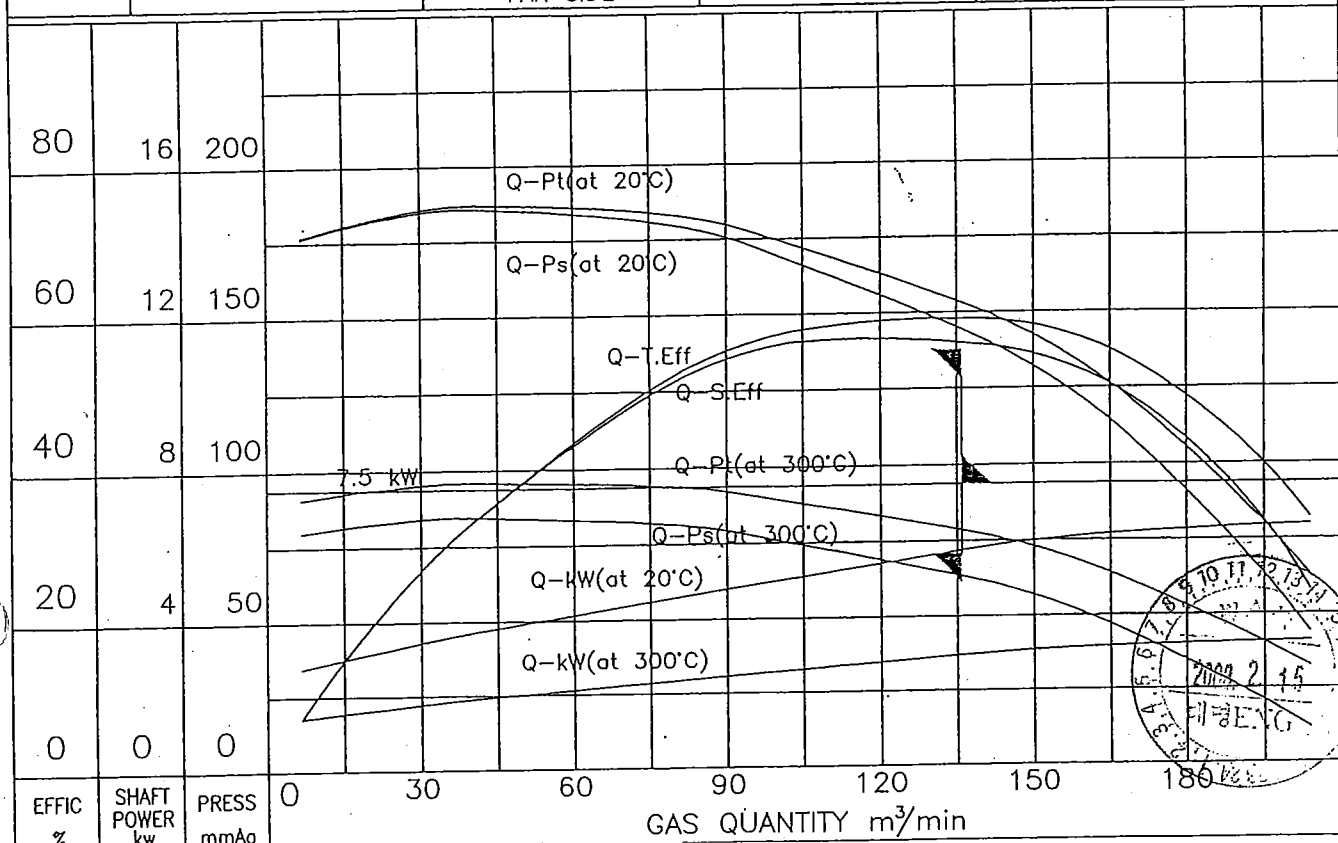
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# TEST REPORT & PERFORMANCE CURVE

Item No.	Test No.		Customer	동양 식품 기계
Serial No.	Testing Method: Pitot Tube, Manometer, (In) Out Let Side		User	
Type AIRFOIL FAN	Test Tube: Dia. $\phi 500$ mm, Length 6m Area $0.195m^2$		Test Date	2008.02.13.
Model DMLA-#3 1/2-S4	Nozzle: Inlet $\phi 500$ , $0.195m^2$ , Outlet $380 \times 360$ , $0.1368m^2$		Witness	
Gas Quantity $m^3/min$	136	136	MOTOR : Type TEFC Frame No.	Insulation FClass
Static Press. $mmAq$	71	138	7.5 kW, 4p, 1720rpm, 3 $\phi$ , 60Hz, 460/	Volt
Motor HP	7.5	7.5	13.7/	Amp, Serial No
Fan Speed	2190	2190	Bearing Size : #6311, #6308	Maker HICO
Efficiency	56	56	Power Drive : Coupling- , Belt 3VType 5101 X 3 ea	Test Temperature 20 $^{\circ}C$
Temperature $^{\circ}C$	300	20	Pulley : Fan $\phi 6"$ , Motor $\phi 7.5$	Relative Humidity 65 %
Gas Spec. W. $Kg/m^3$	0.616	1.2	Material : Impeller SS400 , Casing SS400	Gas Test Weight 1.2 $Kg/m^3$
		Shaft SM45C		

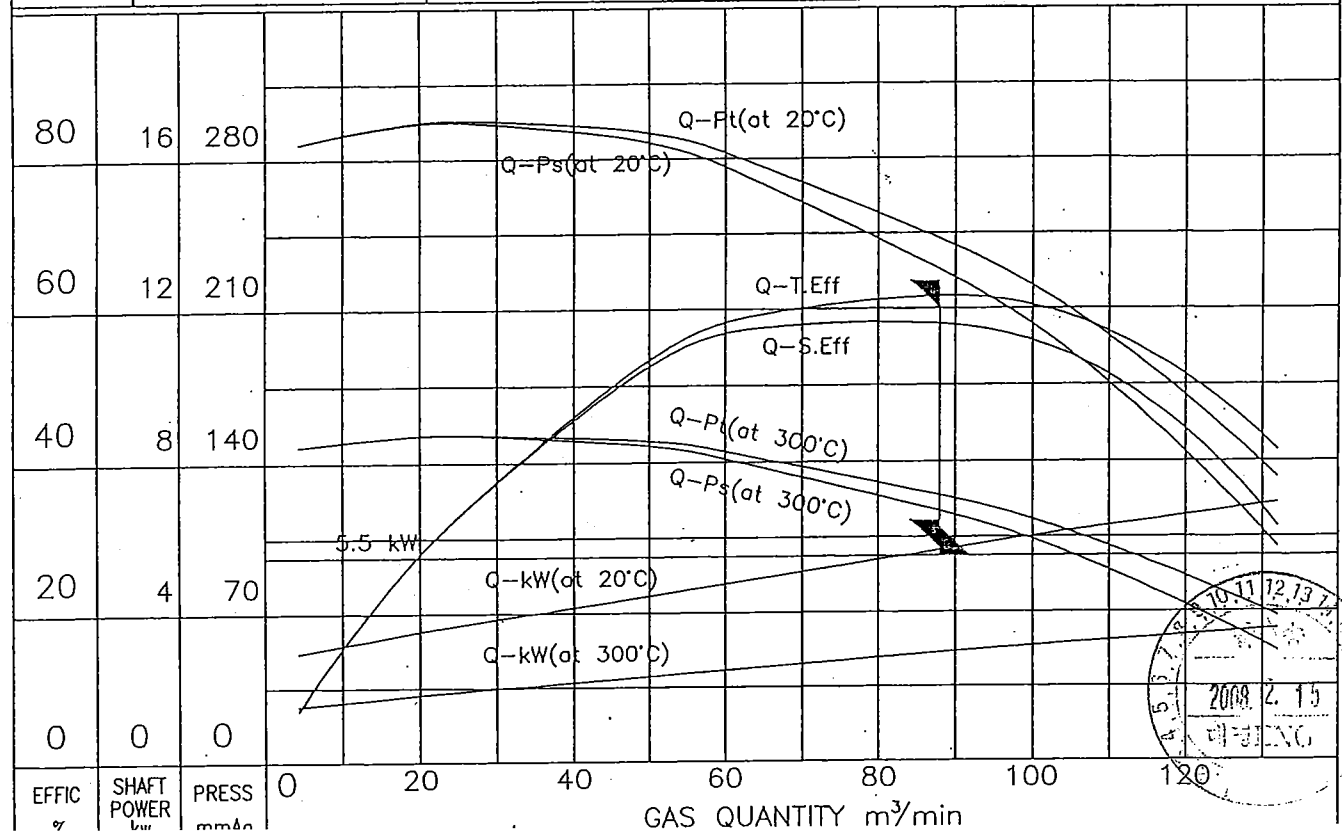
Survey No.		1	2	3	(4)	5	6	7	Ref. Data	
BLOWER	Static Press. (Ps) $mmAq$	176.8	186.3	179.8	145	44.5			Ku -	Ns -
	Velocity Press. (Pd) $mmAq$	0	0.7	2.9	8.1	18.4			U2 -	Cm2 -
	Total Press. (Pt) $mmAq$	176.9	187	182.7	153.1	62.9			D2 -	D1 -
	Gas Quantity (Q) $m^3/min$	6.8	40.7	81.5	136	204			B2 -	B1 -
	Speed (N) rpm	-	-	-	2195	-			Bt2 -	Bt1 -
	Static Air House P. (As) kW	0.19	1.24	2.39	3.22	1.48			Z -	
	Total Air House P. (At) kW	0.19	1.24	2.43	3.4	2.09			Equations $Q = 60Av$ $= 60A \sqrt{\frac{2g}{r} Pd}$	
	Static Efficiency (n) %	7.1	33.4	51.9	56	23.2				
	Total Efficiency (n) %	7.1	33.5	52.8	59.1	32.8				
	Voltage (E) V	460	460	460	460	460				
MOTOR	Current (I) Amp	5.04	6.78	8.42	10.50	11.65				
	Input Power (La) kW	-	-	-	-	-				
	Efficiency (nm) %	-	-	-	-	-				
	Output Power (Lb) kW	2.76	3.71	4.61	5.75	6.38				
	Static Press. $mmAq$	90.8	95.6	92.2	74.4	22.8				
Reduced to 300 $^{\circ}C$ 2190 rpm	Total Press. $mmAq$	90.8	96	93.8	78.6	32.3				
	Gas Quantity $m^3/min$	6.8	40.7	81.5	136	204				
	Brake House Power kW	1.41	1.9	2.36	2.95	3.27				
	Sound Level dB(A)									
Remarks	Vibration ( $\mu m$ )	H	V	A	H	V	A			
		FAN SIDE			MOTOR SIDE					



# TEST REPORT & PERFORMANCE CURVE

Item No.	Test No.			Customer	용양 식품 기계
Serial No.	Testing Method: Pitot Tube, Manometer, (In) Out Let Side			User	
Type TURBO FAN	Test Tube: Dia. $\phi 350$ mm, Length 3.79m Area $0.095 \text{ m}^2$			Test Date	2008.0.2.13
Model DMTF-#3 1/4-S4	Nozzle: Inlet $\phi 350$ , $0.095 \text{ m}^2$ , Outlet $300 \times 280$ , $0.084 \text{ m}^2$			Witness	
Gas Quantity $\text{m}^3/\text{min}$	88	88	MOTOR : Type TEFC Frame No. 132S Insulation FClass	Test	KIM C.K.
Static Press. $\text{mmAq}$	113	220	5.5 kW, 4p, 1720 rpm, 3 $\phi$ , 60Hz, 460/ Volt	Check	YOU Y.S.
Motor HP kW	5.5	5.5	10.1/ Amp, Serial No	Barometric Pressure	760 mmHg
Fan Speed rpm	2050	2050	Bearing Size : #6311, #6308	Test Temperature	20 $^{\circ}\text{C}$
Efficiency %	58	58	Power Drive : Coupling- , Belt 3VType 510I X 3 ea	Relative Humidity	65 %
Temperature $^{\circ}\text{C}$	300	20	Pulley : Fan $\phi 6"$ , Motor $\phi 7"$	Gas Test Weight	1.2 $\text{Kg}/\text{m}^3$
Gas Spec. W. $\text{Kg}/\text{m}^3$	0.616	1.2	Material : Impeller SS400 , Casing SS400 , Shaft SM45C		

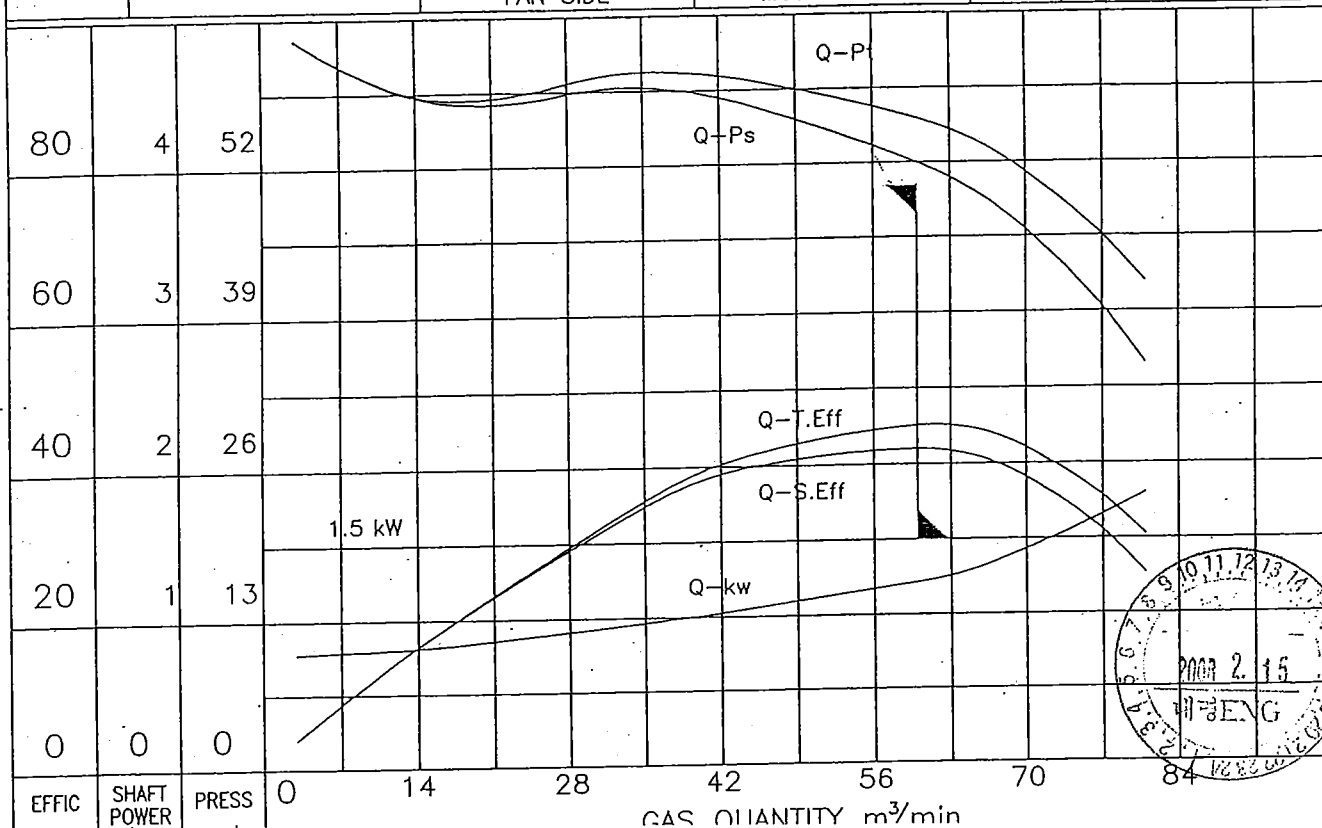
Survey No.		1	2	3	(4)	5	6	7	Ref. Data	
BLOWER	Static Press. (Ps) mmAq	287.2	297	285.2	228	100.3			Ku —	Ns —
	Velocity Press. (Pd) mmAq	0	1.2	5.1	14.2	32.1			U2 —	Cm2 —
	Total Press. (Pt) mmAq	287.3	298.3	290.3	242.2	132.4			D2 —	D1 —
	Gas Quantity (Q) m <sup>3</sup> /min	4.4	26.3	52.7	88	132			B2 —	B1 —
	Speed (N) rpm	—	—	—	2053	—			Bt2 —	Bt1 —
	Static Air House P. (As) kW	0.2	1.28	2.46	3.27	2.16			Z —	
	Total Air House P. (At) kW	0.2	1.28	2.5	3.48	2.85			Equations	
	Static Efficiency (n) %	7	34.2	54.1	58	31.3			Q=60Av	
MOTOR	Total Efficiency (n) %	7	34.3	55.1	61.6	41.4			$=60A\sqrt{\frac{2g}{r}Pd}$	
	Votage (E) V	220	220	220	220	220				
	Current (I) Amp	5.38	6.87	8.33	10.37	12.65				
	Input Power (Lo) kW	—	—	—	—	—				
	Efficiency (nm) %	—	—	—	—	—				
Reduced to 300°C 2050 rpm	Output Power (Lb) kW	2.93	3.74	4.54	5.65	6.89				
	Static Press. mmAq	147.4	152.5	146.4	117	51.4				
	Total Press. mmAq	147.4	153.1	149	124.3	68				
	Gas Quantity m <sup>3</sup> /min	4.4	26.3	52.7	88	132				
	Brake House Power kW	1.5	1.92	2.33	2.9	3.53				
Remarks	Sound Level dB(A)									
	Vibration (μm)	H	V	A	H	V	A			
		FAN SIDE			MOTOR SIDE					



# TEST REPORT & PERFORMANCE CURVE

Item No.	Test No.	Customer
Serial No.	Testing Method: Pitot Tube, Manometer, (In) Out Let Side	User
Type SIROCCO FAN	Test Tube: Dia. 400mm, Length 4.5m Area 0.126m <sup>2</sup>	Test Date 2008.02.13.
Model DMSF-2.5-S4	Nozzle: Inlet 400 Q. 126m <sup>2</sup> , Outlet X m <sup>2</sup>	Witness
Gas Quantity m <sup>3</sup> /min 60	MOTOR : Type TEFC Frame No. Insulation F Class	Test KIM C.K.
Static Press. mmAq 50	1.5kW, 4p, 1720rpm, 3φ, 60Hz, 460/ Volt	Check YOU Y.S.
Motor HP kW 1.5	3.1/ Amp, Serial No Maker HICO	Barometric Pressure 760 mmHg
Fan Speed rpm 1060	Bearing Size : #6308 X 2EA	Test Temperature 20 °C
Efficiency % 42	Power Drive : Coupling Belt 3V Type 390I X 2 ea	Relative Humidity 65 %
Temperature °C 20	Pulley : Fan φ 6.5" Motor φ 4"	Gas Test Weight 1.2 Kg/m <sup>3</sup>
Gas Spec. W. Kg/m <sup>3</sup> 1.2	Material : Impeller SS400 Casing SS400 Shaft SM45C	

Survey No.	1	2	3	(4)	5	6	7	Ref. Data
BLOWER								
Static Press. (Ps) mmAq	63.1	57.5	58.7	52	34.5			Ku - Ns -
Velocity Press. (Pd) mmAq	0	0.3	1.3	3.8	7			U2 - Cm2 -
Total Press. (Pt) mmAq	63.1	57.8	60.1	55.8	41.6			D2 - D1 -
Gas Quantity (Q) m <sup>3</sup> /min	3	18	36	60	81			B2 - B1 -
Speed (N) rpm	-	-	-	1065	-			Bt2 - Bt1 -
Static Air House P. (As) kW	0.029	0.16	0.34	0.5	0.45			Z -
Total Air House P. (At) kW	0.029	0.17	0.35	0.54	0.55			
Static Efficiency (n) %	3.9	20.3	35.5	42	25.4			Equations
Total Efficiency (n) %	3.9	20.4	36.4	45.1	30.5			Q=60Av
Voltage (E) V	462	462	462	462	462			=60A √ $\frac{2g}{r}$ Pd
Current (I) Amp	1.59	1.71	1.99	2.49	3.7			
Input Power (Lo) kW	-	-	-	-	-			
Efficiency (nm) %	-	-	-	-	-			
Output Power (Lb) kW	0.77	0.83	0.97	1.21	1.8			
Reduced to 20°C 1060 rpm								
Static Press. mmAq	63.1	57.5	58.7	52	34.5			
Total Press. mmAq	63.1	57.8	60.1	55.8	41.6			
Gas Quantity m <sup>3</sup> /min	3	18	36	60	81			
Brake House Power kW	0.77	0.83	0.97	1.21	1.8			
Sound Level dB(A)								
Remarks								
Vibration (μm)	H	V	A	H	V	A		
	FAN SIDE			MOTOR SIDE				

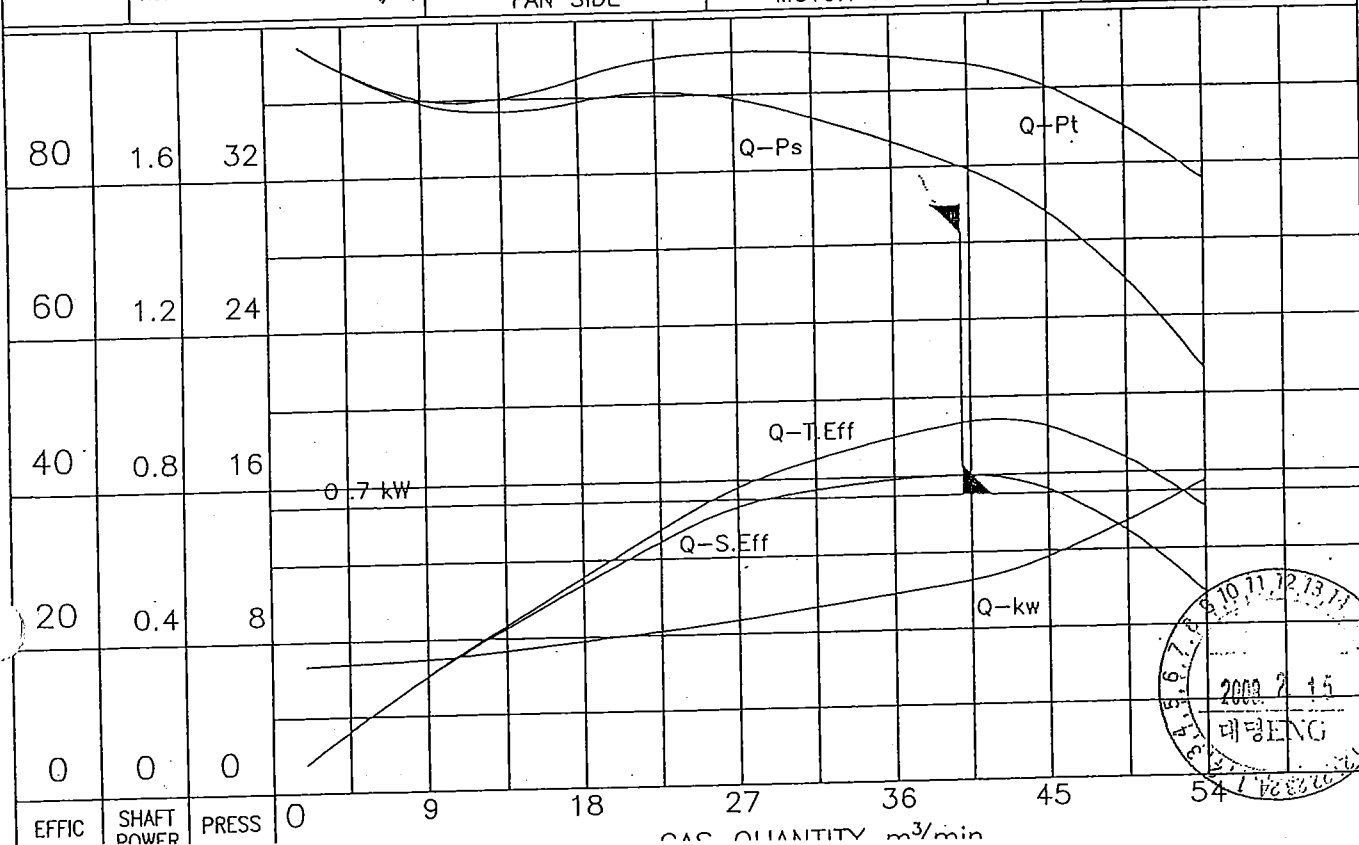




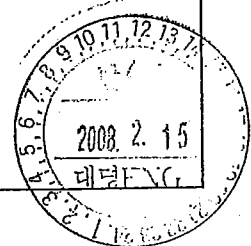
# TEST REPORT & PERFORMANCE CURVE

Item No.	Test No.			Customer	동양 식품 기계
Serial No.	Testing Method: Pitot Tube, Manometer, (In) Out Let Side			User	
Type SIROCCO FAN	Test Tube: Dia. $\phi 300$ mm, Length 3.5m Area $0.07 \text{ m}^2$			Test Date	2008.02.13
Model DMSF-#2-S4	Nozzle: Inlet $\phi 310$ , $0.075 \text{ m}^2$ , Outlet X , $\text{m}^2$			Witness	
Gas Quantity $\text{m}^3/\text{min}$	40	MOTOR : Type TEFC Frame No.		Insulation	Fclass
Static Press. $\text{mmAq}$	30	0.75kW, 4p, 1720rpm, 3 $\phi$ , 60Hz, 460/		Volt	Check
Motor HP	0.75	1.6/ Amp, Serial No		Maker	HICO
Fan Speed	1100	Bearing Size : #6306x2EA		Test Temperature	20 $^{\circ}\text{C}$
Efficiency	46.7	Power Drive : Coupling-- , Belt 3V Type 350 I X 2 ea		Relative Humidity	65 %
Temperature	$^{\circ}\text{C}$ 20	Pulley : Fan $\phi 5.5"$ , Motor $\phi 3.5"$		Gas Test Weight	1.2 $\text{Kg}/\text{m}^3$
Gas Spec. W. $\text{Kg}/\text{m}^3$	1.2	Material : Impeller SS400 , Casing SS400		Shaft SM45C	

Gas Spec. m. Kg/m <sup>3</sup>		T. °C		P. mmHg		V. m/s		Ref. Data	
Survey No.		1	2	3	(4)	5	6	7	Ku — Ns —
BLOWER	Static Press. (Ps) mmAq	38.8	35.3	36.1	32	21.2			U2 — Cm2 —
	Velocity Press. (Pd) mmAq	0	0.4	1.9	5.3	9.8			D2 — D1 —
	Total Press. (Pt) mmAq	38.8	35.8	38.1	37.3	31.1			B2 — B1 —
	Gas Quantity (Q) m <sup>3</sup> /min	2	12	24	40	54			Bt2 — Bt1 —
	Speed (N) rpm	—	—	—	1108	—			Z —
	Static Air House P. (As) kW	0.009	0.059	0.14	0.2	0.18			Equations Q=60Av  =60A√ $\frac{2g}{r}$ Pd
	Total Air House P. (At) kW	0.009	0.07	0.14	0.24	0.27			
	Static Efficiency (n) %	3.7	19.3	33.8	40	24.1			
	Total Efficiency (n) %	3.7	19.6	35.7	46.7	35.3			
Voltage (E) V	461	461	461	461	461				
MOTOR	Current (I) Amp	0.70	0.75	0.87	1.11	1.64			
	Input Power (La) kW	—	—	—	—	—			
	Efficiency (nm) %	—	—	—	—	—			
	Output Power (Lb) kW	0.33	0.35	0.41	0.52	0.77			
Reduced to 20°C 1100 rpm	Static Press. mmAq	38.8	35.3	36.1	32	21.2			
	Total Press. mmAq	38.8	35.8	38.1	37.3	31.1			
	Gas Quantity m <sup>3</sup> /min	2	12	24	40	54			
	Brake House Power kW	0.33	0.35	0.41	0.52	0.77			
Remarks	Sound Level dB(A)								
	Vibration (µm)	H 28	V 25	A 22	H 15	V 24	A 20		
		FAN SIDE			MOTOR SIDE				



DAE-MYUNG ENG		Vibration Test Report		Report No.: VIR-DP-0821		
				Sheet No. : 1 OF 5		
Tech. Spec. No.:		Equip Name/No. : AIRFOIL FAN / -		Customer : 동양 식품 기계 (주)		
Part Name/No : FAN ASS'Y		QP No. :	Procedure No.:	Sequence No. :		
Design Conditions / Test Conditions						
Test Item		Design Conditions		Test Conditions		
Fan Type/ Model		AIRFOIL FAN/DMLA-3.5-S4		AIRFOIL FAN/DMLA-3.5-S4		
Air Flow Rate( m <sup>3</sup> /min )		136		136		
RPM		2190		2195		
Air Temp. ( °C )		20		20		
Static Pressure( mmAq )		138		145		
Relative Humidity ( % )		N/A		N/A		
Rated Power Input ( Kw )		7.5		5.75		
Measuring Equipment (Type & Name)			VM-3304 ( Serial No: 01-02220-009 )			
<u>Test Results</u> (Measuring Unit : mm/sec)						
Measuring position		Acceptance Criteria (mm/sec)	Measuring value (mm/sec)		Results	Remark
Fan NO.	Position		Driving Side	Driven Side		
AIRFOIL FAN-1	Horizontal	6.3 Max.	2.2	2.7	O.K	
	Vertical		3.3	3.5		
	Axial		2.8	3.4		
AIRFOIL FAN-2	Horizontal	6.3 Max.	2.4	2.8	O.K	
	Vertical		3.1	3.7		
	Axial		2.4	2.9		
Prepared by : C.K.KIM		Remarks :				
QC Inspector						
Approved by : Y.S.YOU						
QA Dept. MGR						



DAE-MYUNG ENG		Vibration Test Report		Report No.: VIR-DP-0822
Tech. Spec. No.: -		Equip Name/No.: TURBO FAN / -		Sheet No. : 2 OF 5
Part Name/No.: FAN ASS'Y		QP No.: -	Procedure No.: -	Customer : 동양 식품 기계 (주)
				Sequence No. : -

Design Conditions / Test Conditions

Test Item	Design Conditions	Test Conditions
Fan Type/ Model	TURBO FAN/DMTF-3.25-S4	TURBO FAN/DMTF-3.25-S4
Air Flow Rate( m <sup>3</sup> /min )	88	88
RPM	2050	2060
Air Temp. ( ℃ )	20	20
Static Pressure( mmAq )	220	228
Relative Humidity ( % )	N/A	N/A
Rated Power Input ( Kw )	5.5	5.65
Measuring Equipment (Type & Name)		VM-3304 ( Serial No: 01-02220-009 )

Test Results

(Measuring Unit : mm/sec)

Measuring position		Acceptance Criteria (mm/sec)	Measuring value (mm/sec)		Results	Remark
Fan NO.	Position		Driving Side	Driven Side		
TURBO FAN-1	Horizontal	6.3 Max.	2.2	2.7	O.K	
	Vertical		3.3	3.0		
	Axial		1.7	2.1		
TURBO FAN-2	Horizontal	6.3 Max.	2.5	2.4	O.K	
	Vertical		3.2	3.3		
	Axial		1.9	2.1		

Prepared by : C.K.KIM  
QC Inspector

Remarks :

Approved by : Y.S.YOU  
QA Dept. MGR



DAE-MYUNG ENG		Vibration Test Report		Report No.: VIR-DP-0823
				Sheet No. : 3 OF 5
Tech. Spec. No.:		Equip Name/No. : SIROCCO FAN / -		Customer : 동양 식품 기계 (주)
Part Name/No. : FAN ASS'Y		QP No. : -	Procedure No. : -	Sequence No. : -

Design Conditions / Test Conditions

Test Item	Design Conditions	Test Conditions
Fan Type/ Model	SIROCCO FAN/DMSF-2.5-S4	SIROCCO FAN/DMSF-2.5-S4
Air Flow Rate( m <sup>3</sup> /min )	60	60
RPM	1060	1065
Air Temp. ( °C )	20	20
Static Pressure( mmAq )	50	52
Relative Humidity ( % )	N/A	N/A
Rated Power Input ( Kw )	1.5	1.21

Measuring Equipment (Type & Name) VM-3304 ( Serial No: 01-02220-009 )

Test Results

(Measuring Unit : mm/sec)

Measuring position		Acceptance Criteria (mm/sec)	Measuring value (mm/sec)		Results	Remark
Fan NO.	Position		Driving Side	Driven Side		
SIROCCO FAN	Horizontal	6.3 Max.	1.9	2.0	O.K	
	Vertical		1.7	1.5		
	Axial		1.8	1.5		
	Horizontal					
	Vertical					
	Axial					

Prepared by : C.K.KIM  
QC Inspector

Remarks :

Approved by : Y.S.YOU  
QA Dept. MGR



DAE-MYUNG ENG		Vibration Test Report		Report No.: VIR-DP-0824
				Sheet No. : 4 OF 5
Tech. Spec. No.:		Equip Name/No. : SIROCCO FAN / -		Customer : 동양 식품 기계 (주)
Part Name/No : FAN ASS'Y		QP No. : -	Procedure No. : -	Sequence No. : -

Design Conditions / Test Conditions

Test Item	Design Conditions	Test Conditions
Fan Type/ Model	SIROCCO FAN/DMSF-2-S4	SIROCCO FAN/DMSF-2-S4
Air Flow Rate( m <sup>3</sup> /min )	40	40
RPM	1100	1108
Air Temp. ( ℃ )	20	15
Static Pressure( mmAq )	30	32
Relative Humidity ( % )	N/A	N/A
Rated Power Input ( Kw )	0.75	0.52
Measuring Equipment (Type & Name)		VM-3304 ( Serial No: 01-02220-009 )

Test Results

(Measuring Unit : mm/sec)

Measuring position		Acceptance Criteria (mm/sec)	Measuring value (mm/sec)		Results	Remark
Fan NO.	Position		Driving Side	Driven Side		
SIROCCO FAN-1	Horizontal	6.3 Max.	1.6	1.7	O.K	
	Vertical		1.4	1.5		
	Axial		1.4	1.45		
SIROCCO FAN-2	Horizontal	6.3 Max.	1.8	1.7	O.K	
	Vertical		1.3	1.6		
	Axial		1.2	1.5		

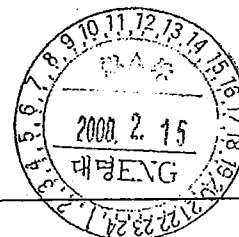
Prepared by : C.K.KIM  
QC Inspector

Remarks :

Approved by : Y.S.YOU  
QA Dept. MGR



DAE-MYUNG ENG		Vibration Test Report		Report No.: VIR-DP-0824		
				Sheet No. : 5 OF 5		
Tech. Spec. No.:		Equip Name/No. : SIROCCO FAN / -		Customer : 동양 식품 기계 (주)		
Part Name/No :  FAN ASS'Y		QP No. :  -	Procedure No.:	Sequence No. :  -		
Design Conditions / Test Conditions						
Test Item		Design Conditions		Test Conditions		
Fan Type/ Model		SIROCCO FAN/DMSF-2-S4		SIROCCO FAN/DMSF-2-S4		
Air Flow Rate( m <sup>3</sup> /min )		40		46		
RPM		1100		1108		
Air Temp. ( °C )		20		15		
Static Pressure( mmAq )		30		32		
Relative Humidity ( % )		N/A		N/A		
Rated Power Input ( Kw )		0.75		0.52		
Measuring Equipment (Type & Name)			VM-3304 ( Serial No: 01-02220-009 )			
<u>Test Results</u> (Measuring Unit : mm/sec)						
Measuring position		Acceptance Criteria (mm/sec)	Measuring value (mm/sec)		Results	Remark
Fan NO.	Position		Driving Side	Driven Side		
SIROCCO FAN-3	Horizontal	6.3 Max.	1.2	1.6	O.K	
	Vertical		1.1	1.5		
	Axial		1.2	1.1		
SIROCCO FAN-4	Horizontal	6.3 Max.	1.3	1.4	O.K	
	Vertical		1.2	1.2		
	Axial		1.5	1.3		
Prepared by : <u>C.K.KIM</u> Remarks : QC Inspector						
Approved by : <u>Y.S.YOU</u> <i>My</i> QA Dept. MGR						



DAE-MYUNG ENG		SOUND LEVEL TEST REPORT	Report No. : SOU-DP-0821. Sheet No. : 1 OF 9
Tech. Spec. No.:		Equip Name/No. : AIRFOIL FAN / -	Customer : 동양 식품 기 계 (주)
Part Name/No : FAN ASSY		QP No./ Seq No. :	Procedure No.:

Design Conditions / Test Conditions

Items	Design Conditions	Test Conditions
Fan Type	AIRFOIL FAN-1/DMLA-3.5-S4	AIRFOIL FAN-1/DMLA-3.5-S4
Air Flow Rate( m <sup>3</sup> /min )	136	136
RPM	2190	2195
Air Temp. ( ℃ )	N/A	N/A
Static Pressure ( mmAq )	138	145
Relative Humidity ( % )	N/A	N/A
Rated Power ( Kw )	7.5	5.75

Measuring Equipment (Type & Name)

Tester & Test Date

Test Results

(Measuring Unit : dBA)

Measuring position		Acceptance Criteria(dBA)	Sound Level dB(A)				Results
Number	Distance		Background Noise	Display value	Measuring value	Representa- tive value	
1	1M	MAX	73	84	86	(Suction Side)	O.K
2	1M	MAX	71.5	88	88	(Discharge side)	O.K
3	1M	MAX	72	83	83	(Casing)	O.K
4	1M	MAX	72	83.5	83.5	(Motor)	O.K

Note: 1. The locations which are subject to air flow effect shall not consider as a measuring point

2.

Prepared by : C.K.KIM  
QC Inspector

Remarks :

Approved by : Y.S.YOU  
QA Dept. MGR



DAE-MYUNG ENG		SOUND LEVEL TEST REPORT	Report No. : SOU-DP-0821 Sheet No. : 2 OF 9
Tech. Spec. No.:		Equip Name/No. : AIRFOIL FAN / -	Customer : 동양 식품 기계 (주)
Part Name/No : FAN ASS'Y		QP No./ Seq No. :	Procedure No.:

**Design Conditions / Test Conditions**

Items	Design Conditions	Test Conditions
Fan Typel	AIRFOIL FAN-2DMLA-3.5-S4	AIRFOIL FAN-2DMLA-3.5-S4
Air Flow Rate( m <sup>3</sup> /min )	136	--
RPM	2190	--
Air Temp. ( ℃ )	N/A	N/A
Static Pressure ( mmAq )	138	--
Relative Humidity ( % )	N/A	N/A
Rated Power ( Kw )	7.5	--

Measuring Equipment (Type & Name)

Tester & Test Date

Test Results

(Measuring Unit : dBA)

Measuring position		Acceptance Criteria(dBA)	Sound Level dB(A)				Results
Number	Distance		Background Noise	Display value	Measuring value	Representa- tive value	
1	1M	MAX	74	85	87	(Suction Side)	O.K
2	1M	MAX	725	87	88	(Discharge side)	O.K
3	1M	MAX	71	85	83.5	(Casing)	O.K
4	1M	MAX	72	83	84	(Motor)	O.K

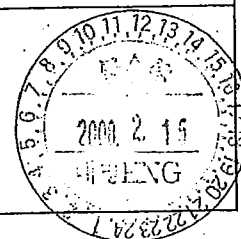
Note: 1. The locations which are subject to air flow effect shall not consider as a measuring point

2.

Prepared by : C.K.KIM  
QC Inspector

Remarks :

Approved by : Y.S.YOU  
QA Dept. MGR





DAE-MYUNG ENG		SOUND LEVEL TEST REPORT	Report No. : SOU-DP-0822 Sheet No. : 3 OF 9
Tech. Spec. No.:		Equip Name/No. : TURBO FAN / -	Customer : 동양 식품 기 계 (주)
Part Name/No : FAN ASS'Y		QP No./ Seq No. :	Procedure No.:

Design Conditions / Test Conditions

Items	Design Conditions	Test Conditions
Fan Type	TURBO FAN-1/DMTF-3.25-S4	TURBO FAN-1/DMTF-3.25-S4
Air Flow Rate( m <sup>3</sup> /min )	88	88
RPM	2050	2053
Air Temp. ( ℃ )	N/A	N/A
Static Pressure ( mmAq )	220	228
Relative Humidity ( % )	N/A	N/A
Rated Power ( Kw )	5.5	5.65

Measuring Equipment (Type & Name)

Tester & Test Date

Test Results

(Measuring Unit : dBA)

Measuring position		Acceptance Criteria(dBA)	Sound Level dB(A)				Results
Number	Distance		Background Noise	Display value	Measuring value	Representa- tive value	
1	1M	MAX	72	82	82	(Suction Side)	O.K
2	1M	MAX	72	87	87	(Discharge side)	O.K
3	1M	MAX	72.5	83	83	(Casing)	O.K
4	1M	MAX	72	82	82	(Motor)	O.K

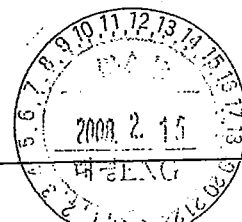
Note: 1. The locations which are subject to air flow effect shall not consider as a measuring point

2.

Prepared by : C.K.KIM  
QC Inspector

Remarks :

Approved by : Y.S.YOU  
QA Dept. MGR



DAE-MYUNG ENG		SOUND LEVEL TEST REPORT	Report No. : SOU-DP-0822 Sheet No. : 4 OF 9
Tech. Spec. No.:		Equip Name/No. : TURBO FAN / -	Customer : 동양 식품 기 계 (주)
Part Name/No : FAN ASSY		QP No./ Seq No. :	Procedure No.:

Design Conditions / Test Conditions

Items	Design Conditions	Test Conditions
Fan Type	TURBO FAN-2/DMTF-3.25-S4	TURBO FAN-2/DMTF-3.25-S4
Air Flow Rate( m <sup>3</sup> /min )	88	--
RPM	2050	--
Air Temp. ( ℃ )	N/A	N/A
Static Pressure ( mmAq )	220	--
Relative Humidity ( % )	N/A	N/A
Rated Power ( Kw )	5.5	--

Measuring Equipment (Type & Name)

Tester & Test Date

Test Results

(Measuring Unit : dBA)

Measuring position		Acceptance Criteria(dBA)	Sound Level dB(A)				Results
Number	Distance		Background Noise	Display value	Measuring value	Representa- tive value	
1	1M	MAX	71	84	85	(Suction Side)	O.K
2	1M	MAX	73	84	85	(Discharge side)	O.K
3	1M	MAX	73.5	84	83	(Casing)	O.K
4	1M	MAX	74	84	83	(Motor)	O.K

Note: 1. The locations which are subject to air flow effect shall not consider as a measuring point

2.

Prepared by : C.K.KIM  
QC Inspector

Remarks :

Approved by : Y.S.YOU  
QA Dept. MGR



DAE-MYUNG ENG		SOUND LEVEL TEST REPORT	Report No. : SOU-DP-0823 Sheet No. : 5 OF 9
Tech. Spec. No.:		Equip Name/No. : SIROCCO FAN / -	Customer : 동양 식품 기계 (주)
Part Name/No : FAN ASSY		QP No./ Seq No. :	Procedure No.:

Design Conditions / Test Conditions		
Items	Design Conditions	Test Conditions
Fan Type	SIROCCO FAN/DMSF-2.5-S4	SIROCCO FAN/DMSF-2.5-S4
Air Flow Rate( m <sup>3</sup> /min )	60	60
RPM	1060	1065
Air Temp. ( ℃ )	N/A	N/A
Static Pressure ( mmAq )	50	52
Relative Humidity ( % )	N/A	N/A
Rated Power ( Kw )	1.5	1.21
Measuring Equipment (Type & Name)		
Tester & Test Date		

Test Results			(Measuring Unit : dBA)				
Measuring position		Acceptance Criteria(dBA)	Sound Level dB(A)				Results
Number	Distance		Background Noise	Display value	Measuring value	Representa- tive value	
1	1M	MAX	55	60.5	60.5	(Suction Side)	O.K
2	1M	MAX	54.5	63.5	63.5	(Discharge side)	O.K
3	1M	MAX	55	64	64	(Casing)	O.K
4	1M	MAX	55	63	63	(Motor)	O.K

Note: 1. The locations which are subject to air flow effect shall not consider as a measuring point

2.

Prepared by : C.K.KIM  
QC Inspector

Approved by : Y.S.YOU  
QA Dept. MGR

Remarks :



DAE-MYUNG ENG	SOUND LEVEL TEST REPORT	Report No. : SOU-DP-0824 Sheet No. : 6 OF 9
Tech. Spec. No.:	Equip Name/No. : SIROCCO FAN / -	Customer : 동양 식품 기계 (주)
Part Name/No : FAN ASSY	QP No./ Seq No. :	Procedure No.:

**Design Conditions / Test Conditions**

Items	Design Conditions	Test Conditions
Fan Typel	SIROCCO FAN-1/DMSF-2-S4	SIROCCO FAN-1/DMSF-2-S4
Air Flow Rate( m <sup>3</sup> /min )	40	46
RPM	1100	1108
Air Temp. ( °C )	N/A	N/A
Static Pressure ( mmAq )	30	32
Relative Humidity ( % )	N/A	N/A
Rated Power ( Kw )	0.75	0.52

Measuring Equipment (Type & Name)

Tester & Test Date

**Test Results**

(Measuring Unit : dBA)

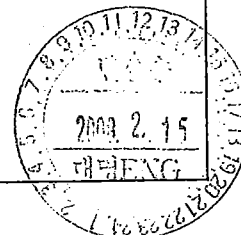
Measuring position		Acceptance Criteria(dBA)	Sound Level dB(A)				Results
Number	Distance		Background Noise	Display value	Measuring value	Representa- tive value	
1	1M	MAX	65	70.5	70.5	(Suction Side)	O.K
2	1M	MAX	64.5	73.5	73.5	(Discharge side)	O.K
3	1M	MAX	65	74	74	(Casing)	O.K
4	1M	MAX	65	73	73	(Motor)	O.K

Note: 1. The locations which are subject to air flow effect shall not consider as measuring point  
2.

Prepared by : C.K.KIM  
QC Inspector

Remarks :

Approved by : Y.S.YOU  
QA Dept. MGR



DAE-MYUNG ENG	SOUND LEVEL TEST REPORT	Report No. : SOU-DP-0824 Sheet No. : 7 OF 9
Tech. Spec. No.:	Equip Name/No. : SIROCCO FAN / -	Customer : 동양 식품 기 계 (주)
Part Name/No : FAN ASS'Y	QP No./ Seq No. :	Procedure No.:

**Design Conditions / Test Conditions**

Items	Design Conditions	Test Conditions
Fan Typel	SIROCCO FAN-2/DMSF-2-S4	SIROCCO FAN-2/DMSF-2-S4
Air Flow Rate( m <sup>3</sup> /min )	40	--
RPM	1100	--
Air Temp. ( °C )	N/A	N/A
Static Pressure ( mmAq )	30	--
Relative Humidity ( % )	N/A	N/A
Rated Power ( Kw )	0.75	--

Measuring Equipment (Type & Name)

Tester & Test Date

**Test Results**

(Measuring Unit : dBA)

Measuring position		Acceptance Criteria(dBA)	Sound Level dB(A)				Results
Number	Distance		Background Noise	Display value	Measuring value	Representa- tive value	
1	1M	MAX	65	71.5	70.5	(Suction Side)	O.K
2	1M	MAX	64	73.5	72	(Discharge side)	O.K
3	1M	MAX	64	73	75	(Casing)	O.K
4	1M	MAX	65	73	74	(Motor)	O.K


Note: 1. The locations which are subject to air flow effect shall not consider as a measuring point  
2.

Prepared by : C.K.KIM  
QC Inspector

Remarks :

Approved by : Y.S.YOU  
QA Dept. MGR



DAE-MYUNG ENG		SOUND LEVEL TEST REPORT		Report No. : SOU-DP-0824			
				Sheet No. : 8 OF 9			
Tech. Spec. No.:		Equip Name/No. : SIROCCO FAN / -		Customer : 동양 식품 기 계 (주)			
Part Name/No : FAN ASSY		QP No./ Seq No. : -		Procedure No.:			
Design Conditions / Test Conditions							
Items		Design Conditions		Test Conditions			
Fan Type		SIROCCO FAN-3/DMSF-2-S4		SIROCCO FAN-3/DMSF-2-S4			
Air Flow Rate( m <sup>3</sup> /min )		40		--			
RPM		1100		--			
Air Temp. ( °C )		N/A		N/A			
Static Pressure ( mmAq )		30		--			
Relative Humidity ( % )		N/A		N/A			
Rated Power ( Kw )		0.75		--			
Measuring Equipment (Type & Name)							
Tester & Test Date							
<u>Test Results</u> (Measuring Unit : dBA)							
Measuring position		Acceptance Criteria(dBA)	Sound Level dB(A)				Results
Number	Distance		Background Noise	Display value	Measuring value	Representa- tive value	
1	1M	MAX	65	71	70.5	(Suction Side)	O.K
2	1M	MAX	64.5	74	723.5	(Discharge side)	O.K
3	1M	MAX	64	74.5	74	(Casing)	O.K
4	1M	MAX	65	73.5	73	(Motor)	O.K
Note: 1. The locations which are subject to air flow effect shall not consider as a measuring point 2.							
Prepared by : C.K.KIM QC Inspector				Remarks :			
Approved by : Y.S.YOU QA Dept. MGR							

DAE-MYUNG ENG		SOUND LEVEL TEST REPORT		Report No. : SOU-DP-0824
Tech. Spec. No.:		Equip Name/No. : SIROCCO FAN / -		Sheet No. : 9 OF 9
Part Name/No :  FAN ASSY		QP No./ Seq No. : -		Customer : 동양 식품 기계 (주)
				Procedure No.:

Design Conditions / Test Conditions

Items	Design Conditions	Test Conditions
Fan Typel	SIROCCO FAN-4/DMSF-2-S4	SIROCCO FAN-4/DMSF-2-S4
Air Flow Rate( m <sup>3</sup> /min )	40	--
RPM	1100	--
Air Temp. ( ℃ )	N/A	N/A
Static Pressure ( mmAq )	30	--
Relative Humidity ( % )	N/A	N/A
Rated Power ( Kw )	0.75	--

Measuring Equipment (Type & Name)

Tester & Test Date

Test Results

(Measuring Unit : dBA)

Measuring position		Acceptance Criteria(dBA)	Sound Level dB(A)				Results
Number	Distance		Background Noise	Display value	Measuring value	Representa- tive value	
1	1M	MAX	62	71.5	71.5	(Suction Side)	O.K
2	1M	MAX	62.5	72.5	72.5	(Discharge side)	O.K
3	1M	MAX	64	73	73	(Casing)	O.K
4	1M	MAX	64	72	72	(Motor)	O.K

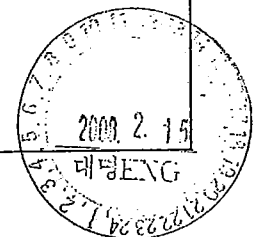
Note: 1. The locations which are subject to air flow effect shall not consider as a measuring point

2.

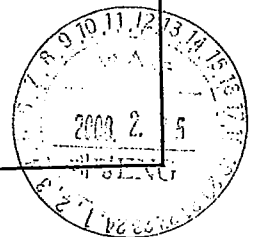
Prepared by : C.K.KIM  
QC Inspector

Remarks :

Approved by : Y.S.YOU  
QA Dept. MGR



<div style="display: flex; justify-content: space-between;"> <span>DAE-MYUNG ENG</span> <span>BALANCING CHECK SHEET</span> </div>		Doc. No.: BA-DP-0821			
		Sheet No : 1 of 9			
계약번호 : N / A		Equip. Name/No.: AIRFOIL FAN			
Part Name/ NO : AIRFOIL FAN - IMPELLER		Customer : 동양 식품 기계 (주)			
구매규격서 번호 : N / A		Sequence No. : N / A			
Descriptions		Dynamic Balancing			
Rotor Model	DMLA-#3.5-S4	Rotor Radius	Ø530 mm		
Rotor Weight	32 Kg	Rotor Revolution	610 RPM		
Testing Equip.	Dynamic Balancing M/C				
1 ) Dynamic Balancing Check Result ⇒ <input type="checkbox"/> : Acceptable, <input type="checkbox"/> : Unacceptable					
Positions	Acceptable Residual Unbalancing mass ( G6.3 , g-rad )	Initial Unbalancing		Residual Unbalancing	
		Angle(deg.)	Mass( g )	Angle(deg.)	Mass( g )
Left Side	6.31 (µm)	98	43.5	215	0.8
Right Side	6.31 (µm)	145	52	115	0.7
2) Overspeed Test ( Customer Witness : )					
Test Item	Design Conditions	Actual Conditions	Acceptance Criteria	Results	
Revolutions	RPM	RPM	No deformation and No crack		
Duration	Min.	Min.			
<p>Note : 1) Dynamic Balancing Acceptance Criteria : G 6.3</p> <p>2) Calculation : - Balance quality( 6.3 mm/sec ) = <math>\epsilon \cdot n / 9550</math>.</p> <p>- Unbalancing mass(mr: g-mm) = <math>\epsilon \cdot M / 2</math> ( 2면 평형 ) or M(1면 평형)</p> <p>- Unbalancing mass(g-rad ) = <math>1/2 \times 6.3 \times 9,550 / n \times M / R</math></p> <p>Where, <math>\epsilon</math> = Correction plane mass eccentricity(µm)</p> <p>M = rotor weight( Kg)</p> <p>n = rpm. R = rotor radius.</p>					
Prepared by : <u>C.K.KIM</u> QC Inspector			Remarks :		
Approved by : <u>Y.S.YOU</u> QA Dept. MGR					





DAE-MYUNG ENG		BALANCING CHECK SHEET		Doc. No.: BA-DP-0821
				Sheet No : 2 of 9
계약번호. : N / A		Equip. Name/No.: AIRFOIL FAN		Customer : 동양 식품 기계 (주)
Part Name/ NO : AIRFOIL FAN - IMPELLER		구매규격서 번호 : N / A		Sequence No. : N / A
Descriptions		Dynamic Balancing		
Rotor Model		DMLA-#3.5-S4	Rotor Radius	Ø530 mm
Rotor Weight		32 Kg	Rotor Revolution	605 RPM
Testing Equip.		Dynamic Balancing M/C		

1 ) Dynamic Balancing Check Result ⇒ ☐ : Acceptable, ☐ : Unacceptable

Positions	Acceptable Residual Unbalancing mass ( G6.3 , g-rad )	Initial Unbalancing		Residual Unbalancing	
		Angle(deg.)	Mass( g )	Angle(deg.)	Mass( g )
Left Side	6.36 (µm)	112	38	95	1.3
Right Side	6.36 (µm)	252	58	88	1.1

2) Overspeed Test ( Customer Witness : )

Test Item	Design Conditions	Actual Conditions	Acceptance Criteria	Results
Revolutions	RPM	RPM	No deformation and No crack	
Duration	Min.	Min.		

Note : 1) Dynamic Balancing Acceptance Criteria : G 6.3

2) Calculation : - Balance quality( 6.3 mm/sec) =  $\epsilon \cdot n / 9550$ .

- Unbalancing mass(mr: g-mm) =  $\epsilon \cdot M / 2$  ( 2면 평형 ) or M(1면 평형)

- Unbalancing mass(g-rad ) =  $1/2 \times 6.3 \times 9,550/n \times M/R$

Where,  $\epsilon$  = Correction plane mass eccentricity(µm)

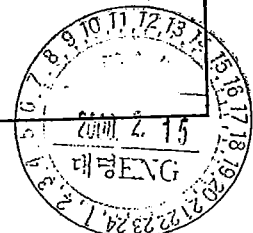
M = rotor weight( Kg)

n = rpm. R = rotor radius.

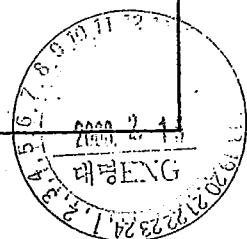
Prepared by : C.K.KIM  
QC Inspector

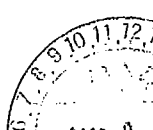
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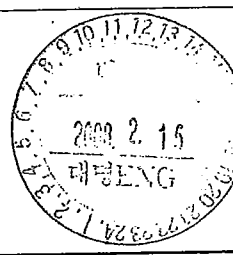
Approved by : Y.S.YOU  
QA Dept. MGR.

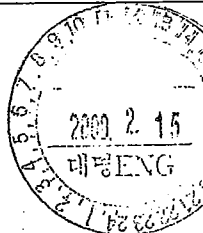


<b>DAE-MYUNG ENG</b>		<b>BALANCING CHECK SHEET</b>		Doc. No.: BA-DP-0822	
				Sheet No : 3 of 9	
계약번호 : N / A		Equip. Name/No.: TURBO FAN		Customer : 동양 식품 기계 (주)	
Part Name/ NO : TURBO FAN - IMPELLER		구매규격서 번호 : N / A		Sequence No. : N / A	
Descriptions		Dynamic Balancing			
Rotor Model		DMTF-#3.25-S4		Rotor Radius	Ø490 mm
Rotor Weight		21 Kg		Rotor Revolution	607 RPM
Testing Equip.		Dynamic Balancing M/C			
1 ) Dynamic Balancing Check Result ⇒ <input type="checkbox"/> : Acceptable, <input type="checkbox"/> : Unacceptable					
Positions	Acceptable Residual Unbalancing mass ( G6.3 , g-rad )	Initial Unbalancing		Residual Unbalancing	
		Angle(deg.)	Mass( g )	Angle(deg.)	Mass( g )
Left Side	4.5 (µm)	74	42	42	1.0
Right Side	4.6 (µm)	118	50	265	1.3
2) Overspeed Test ( Customer Witness : )					
Test Item	Design Conditions	Actual Conditions	Acceptance Criteria	Results	
Revolutions	RPM	RPM	No deformation and No crack		
Duration	Min.	Min.			
<p>Note : 1) Dynamic Balancing Acceptance Criteria : G 6.3</p> <p>2) Calculation : - Balance quality( 6.3 mm/sec ) = <math>\epsilon \cdot n / 9550</math>.</p> <p>- Unbalancing mass(mr: g-mm) = <math>\epsilon \cdot M / 2</math> ( 2면 평형 ) or <math>M</math> ( 1면 평형 )</p> <p>- Unbalancing mass(g-rad ) = <math>1/2 \times 6.3 \times 9,550 / n \times M / R</math></p> <p>Where, <math>\epsilon</math> = Correction plane mass eccentricity(µm)</p> <p>M = rotor weight( Kg)</p> <p>n = rpm. R = rotor radius.</p>					
Prepared by : C.K.KIM			Remarks :		
QC Inspector					
Approved by : Y.S.YOU					
QA Dept. MGR					

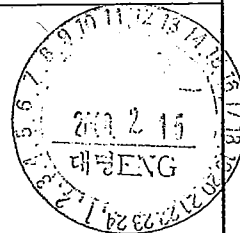


DAE-MYUNG ENG		BALANCING CHECK SHEET		Doc. No.: BA-DP-0822	
				Sheet No : 4 of 9	
계약번호 : N / A		Equip. Name/No.: TURBO FAN		Customer : 동양 식품 기계 (주)	
Part Name/ NO : TURBO FAN - IMPELLER		구매규격서 번호 : N / A		Sequence No. : N / A	
Descriptions		Dynamic Balancing			
Rotor Model		DMTF-#3.25-S4		Rotor Radius	Ø490 mm
Rotor Weight		21 Kg		Rotor Revolution	607 RPM
Testing Equip.		Dynamic Balancing M/C			
1 ) Dynamic Balancing Check Result ⇒ <input type="checkbox"/> : Acceptable, <input type="checkbox"/> : Unacceptable					
Positions	Acceptable Residual Unbalancing mass ( G6.3 , g-rad )	Initial Unbalancing		Residual Unbalancing	
		Angle(deg.)	Mass( g )	Angle(deg.)	Mass( g )
Left Side	4.5 (µm)	74	42	42	1.0
Right Side	4.6 (µm)	118	50	265	1.3
2) Overspeed Test ( Customer Witness : )					
Test Item	Design Conditions	Actual Conditions	Acceptance Criteria	Results	
Revolutions	RPM	RPM	No deformation and No crack		
Duration	Min.	Min.			
<p>Note : 1) Dynamic Balancing Acceptance Criteria : G 6.3</p> <p>2) Calculation : - Balance quality( 6.3 mm/sec ) = <math>\epsilon \cdot n / 9550</math>.</p> <p>- Unbalancing mass(mr: g-mm) = <math>\epsilon \cdot M / 2</math> ( 2면 평형 ) or <math>M</math> ( 1면 평형 )</p> <p>- Unbalancing mass(g-rad ) = <math>1/2 \times 6.3 \times 9,550/n \times M/R</math></p> <p>Where, <math>\epsilon</math> = Correction plane mass eccentricity(µm)</p> <p>M = rotor weight( Kg)</p> <p>n = rpm. R = rotor radius.</p>					
Prepared by : C.K.KIM QC Inspector			Remarks :		
Approved by : Y.S.YOU QA Dept. MGR					

DAE-MYUNG ENG		BALANCING CHECK SHEET		Doc. No.: BA-DP-0823	
				Sheet No : 5 of 9	
계약번호 : N / A		Equip. Name/No.: SIROCCO FAN		Customer : 동양 식품 기계 (주)	
Part Name/ NO : SIROCCO FAN - IMPELLER		구매규격서 번호 : N / A		Sequence No. : N / A	
Descriptions		Dynamic Balancing			
Rotor Model		DMSF-#2.5-S4		Rotor Radius	Ø380 mm
Rotor Weight		11 Kg		Rotor Revolution	580 RPM
Testing Equip.		Dynamic Balancing M/C			
1 ) Dynamic Balancing Check Result ⇒ <input type="checkbox"/> : Acceptable, <input type="checkbox"/> : Unacceptable					
Positions	Acceptable Residual Unbalancing mass ( G6.3 , g-rad )	Initial Unbalancing		Residual Unbalancing	
		Angle(deg.)	Mass( g )	Angle(deg.)	Mass( g )
Left Side	3.2 (µm)	132	15	122	1.0
Right Side	3.2 (µm)	95	12	245	0.8
2) Overspeed Test ( Customer Witness : )					
Test Item	Design Conditions	Actual Conditions	Acceptance Criteria	Results	
Revolutions	RPM	RPM	No deformation and No crack		
Duration	Min.	Min.			
<p>Note : 1) Dynamic Balancing Acceptance Criteria : G 6.3</p> <p>2) Calculation : - Balance quality( 6.3 mm/sec ) = <math>\epsilon \cdot n / 9550</math>.</p> <p>- Unbalancing mass(mr: g-mm) = <math>\epsilon \cdot M / 2</math> ( 2면 평형 ) or M(1면 평형)</p> <p>- Unbalancing mass(g-rad ) = <math>1/2 \times 6.3 \times 9,550 / n \times M / R</math></p> <p>Where, <math>\epsilon</math> = Correction plane mass eccentricity(µm)</p> <p>M = rotor weight( Kg)</p> <p>n = rpm. R = rotor radius.</p>					
Prepared by : C.K.KIM QC Inspector			Remarks :		
Approved by : Y.S.YOU QA Dept. MGR					

DAE-MYUNG ENG	BALANCING CHECK SHEET		Doc. No.: BA-DP-0824		
			Sheet No : 6 of 9		
계약번호 : N / A	Equip. Name/No.: SIROCCO FAN		Customer : 동양 식품 기계 (주)		
Part Name/ NO : SIROCCO FAN - IMPELLER	구매규격서 번호 : N / A		Sequence No. : N / A		
Descriptions	Dynamic Balancing				
Rotor Model	DMSF-#2-S4	Rotor Radius	Ø305 mm		
Rotor Weight	7.5 Kg	Rotor Revolution	582 RPM		
Testing Equip.	Dynamic Balancing M/C				
1 ) Dynamic Balancing Check Result ⇒ <input type="checkbox"/> : Acceptable, <input type="checkbox"/> : Unacceptable					
Positions	Acceptable Residual Unbalancing mass ( G6.3 , g-rad )	Initial Unbalancing		Residual Unbalancing	
		Angle(deg.)	Mass( g )	Angle(deg.)	Mass( g )
Left Side	2.8 (µm)	38	15	42	1.0
Right Side	2.8 (µm)	132	12	105	0.8
2) Overspeed Test ( Customer Witness : )					
Test Item	Design Conditions	Actual Conditions	Acceptance Criteria	Results	
Revolutions	RPM	RPM	No deformation and No crack		
Duration	Min.	Min.			
<p>Note : 1) Dynamic Balancing Acceptance Criteria : G 6.3</p> <p>2) Calculation : - Balance quality( 6.3 mm/sec ) = <math>\epsilon \cdot n / 9550</math>.</p> <p>- Unbalancing mass(mr: g-mm) = <math>\epsilon \cdot M / 2</math> ( 2면 평형 ) or M(1면 평형)</p> <p>- Unbalancing mass(g-rad ) = <math>1/2 \times 6.3 \times 9,550 / n \times M / R</math></p> <p>Where, <math>\epsilon</math> = Correction plane mass eccentricity(µm)</p> <p>M = rotor weight( Kg)</p> <p>n = rpm. R = rotor radius.</p>					
Prepared by : C.K.KIM QC Inspector			Remarks :		
Approved by : Y.S.YOU QA Dept. MGR					

DAE-MYUNG ENG		BALANCING CHECK SHEET		Doc. No.: BA-DP-0824	
				Sheet No : 7 of 9	
계약번호 : N / A		Equip. Name/No.: SIROCCO FAN		Customer : 동양 식품 기계 (주)	
Part Name/ NO : SIROCCO FAN - IMPELLER		구매규격서 번호 : N / A		Sequence No. : N / A	
Descriptions		Dynamic Balancing			
Rotor Model		DMSF-#2-S4		Rotor Radius	Ø305 mm
Rotor Weight		7.5 Kg		Rotor Revolution	582 RPM
Testing Equip.		Dynamic Balancing M/C			
1 ) Dynamic Balancing Check Result ⇒ <input type="checkbox"/> : Acceptable, <input type="checkbox"/> : Unacceptable					
Positions	Acceptable Residual Unbalancing mass ( G6.3 , g-rad )	Initial Unbalancing		Residual Unbalancing	
		Angle(deg.)	Mass( g )	Angle(deg.)	Mass( g )
Left Side	2.8 (µm)	85	18	115	0.8
Right Side	2.8 (µm)	25	10	285	0.7
2) Overspeed Test ( Customer Witness : )					
Test Item	Design Conditions	Actual Conditions	Acceptance Criteria	Results	
Revolutions	RPM	RPM	No deformation and No crack		
Duration	Min.	Min.			
<p>Note : 1) Dynamic Balancing Acceptance Criteria : G 6.3</p> <p>2) Calculation : - Balance quality( 6.3 mm/sec ) = <math>\epsilon \cdot n / 9550</math>.</p> <p>- Unbalancing mass(mr: g-mm) = <math>\epsilon \cdot M / 2</math> ( 2면 평형 ) or M(1면 평형)</p> <p>- Unbalancing mass(g-rad ) = <math>1/2 \times 6.3 \times 9,550/n \times M/R</math></p> <p>Where, <math>\epsilon</math> = Correction plane mass eccentricity(µm)</p> <p>M = rotor weight( Kg)</p> <p>n = rpm. R = rotor radius.</p>					
Prepared by : C.K.KIM		Remarks :			
QC Inspector					
Approved by : Y.S.YOU					
QA Dept. MGR					

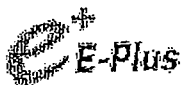


DAE-MYUNG ENG		BALANCING CHECK SHEET		Doc. No.: BA-DP-0824	
				Sheet No : 8 of 9	
계약번호 : N / A		Equip. Name/No.: SIROCCO FAN		Customer : 동양 식품 기계 (주)	
Part Name/ NO : SIROCCO FAN - IMPELLER		구매규격서 번호 : N / A		Sequence No. : N / A	
Descriptions		Dynamic Balancing			
Rotor Model		DMSF-#2-S4		Rotor Radius	ø305 mm
Rotor Weight		7.4 Kg		Rotor Revolution	580 RPM
Testing Equip.		Dynamic Balancing M/C			
1 ) Dynamic Balancing Check Result ⇒ <input type="checkbox"/> : Acceptable, <input type="checkbox"/> : Unacceptable					
Positions	Acceptable Residual Unbalancing mass ( G6.3 , g-rad )	Initial Unbalancing		Residual Unbalancing	
		Angle(deg.)	Mass( g )	Angle(deg.)	Mass( g )
Left Side	2.8 (µm)	320	11	115	0.8
Right Side	2.8 (µm)	75	9.5	48	1.1
2) Overspeed Test ( Customer Witness : )					
Test Item	Design Conditions	Actual Conditions	Acceptance Criteria	Results	
Revolutions	RPM	RPM	No deformation and No crack		
Duration	Min.	Min.			
<p>Note : 1) Dynamic Balancing Acceptance Criteria : G 6.3</p> <p>2) Calculation : - Balance quality( 6.3 mm/sec ) = <math>\epsilon \cdot n / 9550</math>.</p> <p>- Unbalancing mass(mr: g-mm) = <math>\epsilon \cdot M / 2</math> ( 2면 평형 ) or M(1면 평형)</p> <p>- Unbalancing mass(g-rad ) = <math>1/2 \times 6.3 \times 9,550 / n \times M / R</math></p> <p>Where, <math>\epsilon</math> = Correction plane mass eccentricity(µm)</p> <p>M = rotor weight( Kg)</p> <p>n = rpm. R = rotor radius.</p>					
Prepared by : C.K.KIM		Remarks :			
QC Inspector					
Approved by : Y.S.YOU					
QA Dept. MGR					



DAE-MYUNG ENG	BALANCING CHECK SHEET	Doc. No.: BA-DP-0824	Sheet No : 9 of 9		
계약번호 : N / A	Equip. Name/No.: SIROCCO FAN	Customer : 동양 식품 기계 (주)			
Part Name/ NO : SIROCCO FAN - IMPELLER	구매규격서 번호 : N / A	Sequence No. : N / A			
Descriptions	Dynamic Balancing				
Rotor Model	DMSF-#2-S4	Rotor Radius	Ø305 mm		
Rotor Weight	7.5 Kg	Rotor Revolution	583 RPM		
Testing Equip.	Dynamic Balancing M/C				
1 ) Dynamic Balancing Check Result ⇒    □ : Acceptable,    □ : Unacceptable					
Positions	Acceptable Residual Unbalancing mass ( G6.3 , g-rad )	Initial Unbalancing		Residual Unbalancing	
		Angle(deg.)	Mass( g )	Angle(deg.)	Mass( g )
Left Side	2.8 (µm)	183	14	77	0.8
Right Side	2.8 (µm)	98	15	112	0.5
2) Overspeed Test ( Customer Witness : _____ )					
Test Item	Design Conditions	Actual Conditions	Acceptance Criteria	Results	
Revolutions	RPM	RPM	No deformation and No crack		
Duration	Min.	Min.			
Note : 1) Dynamic Balancing Acceptance Criteria : G 6.3 2) Calculation :     - Balance quality( 6.3 mm/sec) = $\epsilon \cdot n / 9550$ . - Unbalancing mass(mr: g-mm) = $\epsilon^* M / 2$ ( 2면 평형 ) or M(1면 평형) - Unbalancing mass(g-rad ) = $1/2 \times 6.3 \times 9,550/n \times M/R$ Where, $\epsilon$ = Correction plane mass eccentricity(µm) M = rotor weight( Kg) n = rpm. R = rotor radius.					
Prepared by : C.K.KIM QC Inspector			Remarks :		
Approved by : Y.S.YOU QA Dept. MGR					





# TEST REPORT FOR THREE PHASE INDUCTION MOTOR

삼상 유도 전동기 시험 성적서

CUSTOMER 주문처 효성기전판매  
PROJECT No. SH19038401  
DATE 2008년 02월  
TYPE 형식 TEFC  
SERIAL No. 19038401001

OUTPUT 출력	7.5	kW	POLE 극수	4	P	VOLT 전압	460	V	FREQUENCY 주파수	60	Hz
RATING 정격	CONT		INSUL. CLASS 절연계급	F		PHASE 상수	3	Φ	FRAME No.	215T	

## \* MEASUREMENT OF WINDING RESISTANCE (at 15 °C)

STATOR 고정자	1.005	Ω
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## \* NO LOAD TEST

VOLTAGE 전압	460	V	CURRENT 전류	6.18	A	LOSS 손실	331	W	FREQUENCY 주파수	60	Hz
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## \* LOCKED ROTOR TEST

VOLTAGE 전압	94.5	V	CURRENT 전류	13.27	A	LOSS 손실	830	W	FREQUENCY 주파수	60	Hz
VOLTAGE 전압	-	V	CURRENT 전류	-	A	LOSS 손실	-	W	FREQUENCY 주파수	-	Hz

## \* LOAD TEST

LOAD FACTOR 하중	CURRENT 전류(A)	EFFICIENCY 효율(%)	POWER FACTOR 역률(%)	SPEED 회전수(r/min)	TORQUE 회전력(kgf · m)
25%	6.77	85.84	40.52	1792	1.02
50%	8.28	90.94	62.50	1783	2.05
75%	10.42	91.43	74.09	1773	3.09
100%	13.02	90.47	79.91	1762	4.15
125%	16.03	88.73	82.72	1750	5.22

START CURRENT 기동전류	77.50	A
START TORQUE 기동회전력	233.20	%
MAX. TORQUE 최대회전력	278.40	%

## \* TEMPERATURE RISE TEST

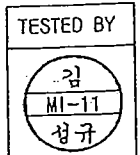
TIME 시간	STATOR 고정자권선	ROTOR 회전자권선	BEARING 축 수		AMB. TEMP 주위온도
			Drive 부하측	Non-Drive 반부하측	
3.5 h	66 K	- K	42 K	- K	15 °C

## \* INSULATION & HIGH VOLTAGE TEST

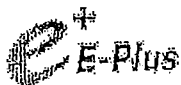
	INSULATION TEST 절연저항 500 V	HIGH VOLTAGE TEST 절연내력 1 min
STATOR 고정자	500 MΩ	1920 V GOOD
ROTOR 회전자	- MΩ	- V GOOD

## \* REMARKS \*

High Eff. Motor (고효율 전동기) / IP54



HYOSUNG CORPORATION  
기 전 품 질 보 증 팀



# TEST REPORT FOR THREE PHASE INDUCTION MOTOR

상상 유도 전동기 시험 성적서

CUSTOMER 주문처 호성기전판매 DATE 2008년 02월  
PROJECT No. SH19038401 TYPE 형식 TEFC SERIAL No. 19038401002

OUTPUT 출력	7.5	kW	POLE 극수	4	P	VOLT 전압	460	V	FREQUENCY 주파수	60	Hz
RATING 정격	CONT		INSUL. CLASS 절연계급	F		PHASE 상수	3	Φ	FRAME No.	215T	

## \* MEASUREMENT OF WINDING RESISTANCE (at 15 °C)

STATOR (권선)	1.005	Ω
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## \* NO LOAD TEST

VOLTAGE 전압	460	V	CURRENT 전류	6.18	A	LOSS 손실	331	W	FREQUENCY 주파수	60	Hz
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## \* LOCKED ROTOR TEST

VOLTAGE 전압	94.5	V	CURRENT 전류	13.27	A	LOSS 손실	829	W	FREQUENCY 주파수	60	Hz
VOLTAGE 전압	-	V	CURRENT 전류	-	A	LOSS 손실	-	W	FREQUENCY 주파수	-	Hz

## \* LOAD TEST

LOAD FACTOR 하중	CURRENT 전류(A)	EFFICIENCY 효율(%)	POWER FACTOR 역률(%)	SPEED 회전수(r/min)	TORQUE 회전력(kgf · m)
25%	6.76	85.83	40.58	1792	1.02
50%	8.27	90.94	62.59	1782	2.05
75%	10.41	91.42	74.20	1773	3.09
100%	13.00	90.47	80.04	1762	4.15
125%	16.01	88.73	82.85	1750	5.22

START CURRENT 기동전류	77.50	A
START TORQUE 기동회전력	233.10	%
MAX. TORQUE 최대회전력	278.40	%

## \* TEMPERATURE RISE TEST

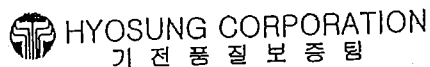
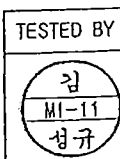
TIME 시간	STATOR 고정자권선	ROTOR 회전자권선	BEARING 축 수		AMB. TEMP 주위온도
			Drive 부하측	Non-Drive 반부하측	
3.5 h	66 K	- K	42 K	- K	15 °C

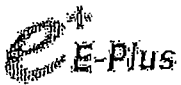
## \* INSULATION & HIGH VOLTAGE TEST

	INSULATION TEST 절연저항 500 V	HIGH VOLTAGE TEST 절연내력 1 min
STATOR 고정자	500 MΩ	1920 V GOOD
ROTOR 회전자	- MΩ	- V GOOD

## \* REMARKS \*

High Eff. Motor (고효율 전동기) / IP54





# TEST REPORT FOR THREE PHASE INDUCTION MOTOR

삼성 유도 전동기 시험 성적서

CUSTOMER 주문처 **호성기전판매** DATE **2008년 02월**  
PROJECT No. **SH19038402** TYPE 형식 **TEFC** SERIAL No. **19038402001**

OUTPUT 출력	5.5	kW	POLE 극수	4	P	VOLT 전압	460	V	FREQUENCY 주파수	60	Hz
RATING 정격	CONT		INSUL. CLASS 절연계급	F		PHASE 상수	3	Φ	FRAME No.	213T	

## \* MEASUREMENT OF WINDING RESISTANCE (at 15 °C)

STATOR 고정자	1.468	Ω
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## \* NO LOAD TEST

VOLTAGE 전압	460	V	CURRENT 전류	4.2	A	LOSS 손실	291	W	FREQUENCY 주파수	60	Hz
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## \* LOCKED ROTOR TEST

VOLTAGE 전압	94.4	V	CURRENT 전류	9.62	A	LOSS 손실	589	W	FREQUENCY 주파수	60	Hz
VOLTAGE 전압	-	V	CURRENT 전류	-	A	LOSS 손실	-	W	FREQUENCY 주파수	-	Hz

## \* LOAD TEST

LOAD FACTOR 부하율	CURRENT 전류 (A)	EFFICIENCY 효율 (%)	POWER FACTOR 역률 (%)	SPEED 회전수 (r/min)	TORQUE 회전력 (kgf · m)
25%	4.78	83.69	43.16	1792	0.75
50%	5.99	89.91	64.05	1784	1.50
75%	7.65	90.88	74.50	1776	2.26
100%	9.62	90.19	79.56	1766	3.03
125%	11.89	88.62	81.89	1755	3.81

START CURRENT 기동전류	55.92	A
START TORQUE 기동회전력	222.32	%
MAX. TORQUE 최대회전력	272.82	%

## \* TEMPERATURE RISE TEST

TIME 시간	STATOR 고정자권선	ROTOR 회전자권선	BEARING 축 수		AMB. TEMP 주위온도
			Drive 부하측	Non-Drive 반부하측	
3.5 h	62 K	- K	40 K	- K	15 °C

## \* INSULATION & HIGH VOLTAGE TEST

	INSULATION TEST 절연저항 500 V	HIGH VOLTAGE TEST 절연내력 1 min
STATOR 고정자	500 MΩ	1920 V GOOD
ROTOR 회전자	- MΩ	- V GOOD

## \* REMARKS \*

High Eff. Motor (고효율 전동기) / IP54

TESTED BY

김  
MI-11  
성규



HYOSUNG CORPORATION  
기 전 품 질 보 증 칭



# TEST REPORT FOR THREE PHASE INDUCTION MOTOR

상상 유도 전동기 시험 성적서

CUSTOMER 주문처 효성기전판매  
PROJECT No. SH19038402  
제품

TYPE  
형식

TEFC

DATE 2008년 02월

SERIAL No. 19038402002

OUTPUT 출력	5.5	KW	POLE 극수	4	P	VOLT 전압	460	V	FREQUENCY 주파수	60	Hz
RATING 정격	CONT		INSUL. CLASS 절연계급	F		PHASE 상수	3	Φ	FRAME No.	213T	

\* MEASUREMENT OF WINDING RESISTANCE (at 15 °C)

STATOR 고정자	1.468	Ω
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\* NO LOAD TEST

VOLTAGE 전압	460	V	CURRENT 전류	4.2	A	LOSS 손실	292	W	FREQUENCY 주파수	60	Hz
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\* LOCKED ROTOR TEST

VOLTAGE 전압	94.4	V	CURRENT 전류	9.62	A	LOSS 손실	588	W	FREQUENCY 주파수	60	Hz
VOLTAGE 전압	-	V	CURRENT 전류	-	A	LOSS 손실	-	W	FREQUENCY 주파수	-	Hz

\* LOAD TEST

FACTOR 하중	CURRENT 전류(A)	EFFICIENCY 효율(%)	POWER FACTOR 역률(%)	SPEED 회전수(r/min)	TORQUE 회전력(kgf · m)
25%	4.78	83.71	43.14	1792	0.75
50%	5.99	89.96	64.01	1784	1.50
75%	7.65	90.94	74.44	1776	2.26
100%	9.62	90.27	79.49	1766	3.03
125%	11.89	88.70	81.82	1755	3.81

START CURRENT 기동전류	55.90	A
START TORQUE 기동회전력	222.73	%
MAX. TORQUE 최대회전력	272.36	%

\* TEMPERATURE RISE TEST

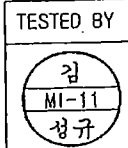
TIME 시간	STATOR 고정자권선	ROTOR 회전자권선	BEARING 축 수		AMB. TEMP 주위온도
			Drive 부하측	Non-Drive 반부하측	
3.5 h	62 K	- K	40 K	- K	15 °C

\* INSULATION & HIGH VOLTAGE TEST

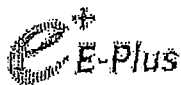
	INSULATION TEST 절연저항 500 V	HIGH VOLTAGE TEST 절연내력 1 min
STATOR 고정자	500 MΩ	1920 V GOOD
ROTOR 회전자	- MΩ	- V GOOD

\* REMARKS \*

High Eff. Motor (고효율 전동기) / IP54



HYOSUNG CORPORATION  
기 전 품 질 보 증 팀



# TEST REPORT FOR THREE PHASE INDUCTION MOTOR

상상 유도 전동기 시험 성적서

CUSTOMER  
주문처 호성기전판매  
PROJECT No. SH19038405  
제번

TYPE  
형식 TEFC

DATE 2008년 02월

SERIAL No. 19038405001

OUTPUT 출력	1.5	kW	POLE 극수	4	P	VOLT 전압	460	V	FREQUENCY 주파수	60	Hz
RATING 정격	CONT		INSUL. CLASS 절연계급	F		PHASE 상수	3	Φ	FRAME No.	145T	

## \* MEASUREMENT OF WINDING RESISTANCE (at 15 °C)

STATOR 고정자	7.565	Ω
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## \* NO LOAD TEST

VOLTAGE 전압	460	V	CURRENT 전류	1.94	A	LOSS 손실	131.2	W	FREQUENCY 주파수	60	Hz
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## \* LOCKED ROTOR TEST

VOLTAGE 전압	79.4	V	CURRENT 전류	3.02	A	LOSS 손실	190.8	W	FREQUENCY 주파수	60	Hz
VOLTAGE 전압	-	V	CURRENT 전류	-	A	LOSS 손실	-	W	FREQUENCY 주파수	-	Hz

## \* LOAD TEST

LOAD FACTOR 하중률	CURRENT 전류(A)	EFFICIENCY 효율(%)	POWER FACTOR 역률(%)	SPEED 회전수(r/min)	TORQUE 회전력(kgf · m)
25%	1.96	73.00	32.98	1788	0.20
50%	2.16	82.43	52.85	1776	0.41
75%	2.48	85.11	66.91	1763	0.62
100%	2.89	85.62	76.09	1749	0.84
125%	3.38	85.09	81.89	1733	1.05
START CURRENT 기동전류					18.40 A
START TORQUE 기동회전력					245.50 %
MAX. TORQUE 최대회전력					302.00 %

## \* TEMPERATURE RISE TEST

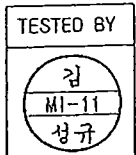
TIME 시간	STATOR 고정자권선	ROTOR 회전자권선	BEARING 축수		AMB. TEMP 주위온도
			Drive 부하측	Non-Drive 반부하측	
3.5 h	36.9 K	- K	20 K	- K	15 °C

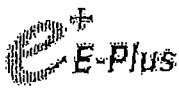
## \* INSULATION & HIGH VOLTAGE TEST

	INSULATION TEST 절연저항 500 V	HIGH VOLTAGE TEST 절연내력 1 min
STATOR 고정자	500 MΩ	1920 V GOOD
ROTOR 회전자	- MΩ	- V GOOD

## \* REMARKS \*

High Eff. Motor (고효율 전동기) / IP54





# TEST REPORT FOR THREE PHASE INDUCTION MOTOR

상상 유도 전동기 시험 성적서

CUSTOMER 주문처 **호성기전판매** DATE **2008년 02월**  
PROJECT No. SH19038403 TYPE 형식 **TEFC** SERIAL No. **19038403001**  
제번

OUTPUT 출력	0.75	kW	POLE 극수	4	P	VOLT 전압	460	V	FREQUENCY 주파수	60	Hz
RATING 정격	CONT		INSUL. CLASS 절연계급	F		PHASE 상수	3	Φ	FRAME No.	143T	

\* MEASUREMENT OF WINDING RESISTANCE (at 15 °C)

STATOR 고정자	16.02	Ω
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\* NO LOAD TEST

VOLTAGE 전압	460	V	CURRENT 전류	0.9	A	LOSS 손실	83.2	W	FREQUENCY 주파수	60	Hz
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\* LOCKED ROTOR TEST

VOLTAGE 전압	90.3	V	CURRENT 전류	1.59	A	LOSS 손실	110.9	W	FREQUENCY 주파수	60	Hz
VOLTAGE 전압	-	V	CURRENT 전류	-	A	LOSS 손실	-	W	FREQUENCY 주파수	-	Hz

\* LOAD TEST

LOAD FACTOR 하중	CURRENT 전류(A)	EFFICIENCY 효율(%)	POWER FACTOR 역률(%)	SPEED 회전수(r/min)	TORQUE 회전력(kgf · m)
25%	0.95	68.35	36.36	1788	0.10
50%	1.07	79.33	55.61	1775	0.21
75%	1.25	82.78	68.49	1762	0.31
100%	1.47	83.71	76.50	1747	0.42
125%	1.73	83.39	81.35	1730	0.53

START CURRENT 기동전류	9.11	A
START TORQUE 기동회전력	282.30	%
MAX. TORQUE 최대회전력	335.30	%

\* TEMPERATURE RISE TEST

TIME 시간	STATOR 고정자권선	ROTOR 회전자권선	BEARING 축 수		AMB. TEMP 주위온도
			Drive 부하측	Non-Drive 반부하측	
3.5 h	19 K	- K	11 K	- K	15 °C

\* INSULATION & HIGH VOLTAGE TEST

	INSULATION TEST 절연저항 500 V	HIGH VOLTAGE TEST 절연내력 1 min
STATOR 고정자	500 MΩ	1920 V GOOD
ROTOR 회전자	- MΩ	- V GOOD

\* REMARKS \*

High Eff. Motor (고효율 전동기)/IP54

TESTED BY



HYOSUNG CORPORATION  
기 전 품 질 보 증 팀

# TEST REPORT FOR THREE PHASE INDUCTION MOTOR

삼상 유도 전동기 시험 성적서

CUSTOMER  
주요처  
PROJECT No.  
제번

효성기전판매  
SH19038403

TYPE  
형식

TEFC

DATE 2008년 02월

SERIAL No. 19038403002

OUTPUT 출력	0.75	kW	POLE 극수	4	P	VOLT 전압	460	V	FREQUENCY 주파수	60	Hz
RATING 정격	CONT		INSUL. CLASS 절연계급	F		PHASE 상수	3	Φ	FRAME No.	143T	

\* MEASUREMENT OF WINDING RESISTANCE (at 15 °C)

STATOR 고정자	16.02	Ω
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\* NO LOAD TEST

VOLTAGE 전압	460	V	CURRENT 전류	0.91	A	LOSS 손실	83.1	W	FREQUENCY 주파수	60	Hz
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\* LOCKED ROTOR TEST

VOLTAGE 전압	90.2	V	CURRENT 전류	1.59	A	LOSS 손실	111	W	FREQUENCY 주파수	60	Hz
VOLTAGE 전압	-	V	CURRENT 전류	-	A	LOSS 손실	-	W	FREQUENCY 주파수	-	Hz

\* LOAD TEST

LOAD FACTOR 하중	CURRENT 전류 (A)	EFFICIENCY 효율 (%)	POWER FACTOR 역률 (%)	SPEED 회전수 (r/min)	TORQUE 회전력 (kgf · m)
25%	0.95	68.38	36.14	1788	0.10
50%	1.07	79.35	55.40	1775	0.21
75%	1.25	82.79	68.38	1762	0.31
100%	1.47	83.71	76.50	1747	0.42
125%	1.73	83.39	81.44	1731	0.53

START CURRENT 기동전류	9.10	A
START TORQUE 기동회전력	282.50	%
MAX. TORQUE 최대회전력	335.20	%

\* TEMPERATURE RISE TEST

TIME 시간	STATOR 고정자권선	ROTOR 회전자권선	BEARING 축		AMB. TEMP 주위온도
			Drive 부하측	Non-Drive 반부하측	
3.5 h	19 K	- K	11 K	- K	15 °C

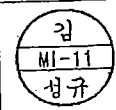
\* INSULATION & HIGH VOLTAGE TEST

	INSULATION TEST 절연저항 500 V	HIGH VOLTAGE TEST 절연내력 1 min
STATOR 고정자	500 MΩ	1920 V GOOD
ROTOR 회전자	- MΩ	- V GOOD

\* REMARKS \*

High Eff. Motor (고효율 전동기)/IP54

TESTED BY



HYOSUNG CORPORATION  
기 전 품 질 보 증 협



# TEST REPORT FOR THREE PHASE INDUCTION MOTOR

삼상 유도 전동기 시험 성적서

CUSTOMER 주문처	호성기전판매	DATE	2008년 02월
PROJECT No. 제번	SH19038404	TYPE 형식	TEFC
		SERIAL No.	19038404001
OUTPUT 출력	0.75 kW	POLE 극수	4 P
RATING 정격	CONT	INSUL. CLASS 절연계급	F
		VOLT 전압	460 V
		PHASE 상수	3 $\Phi$
		FREQUENCY 주파수	60 Hz
		FRAME No.	143T

## \* MEASUREMENT OF WINDING RESISTANCE (at 15 °C)

STATOR 고정자	16.02 $\Omega$
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## \* NO LOAD TEST

VOLTAGE 전압	460 V	CURRENT 전류	0.9 A	LOSS 손실	83.1 W	FREQUENCY 주파수	60 Hz
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## \* LOCKED ROTOR TEST

VOLTAGE 전압	90.2 V	CURRENT 전류	1.59 A	LOSS 손실	111 W	FREQUENCY 주파수	60 Hz
VOLTAGE 전압	- V	CURRENT 전류	- A	LOSS 손실	- W	FREQUENCY 주파수	- Hz

## \* LOAD TEST

FACTOR 하중	CURRENT 전류(A)	EFFICIENCY 효율(%)	POWER FACTOR 역률(%)	SPEED 회전수(r/min)	TORQUE 회전력(kgf · m)
25%	0.94	68.52	36.51	1788	0.10
50%	1.06	79.52	55.85	1776	0.21
75%	1.24	82.97	68.80	1762	0.31
100%	1.46	83.89	76.85	1747	0.42
125%	1.72	83.58	81.73	1731	0.53

START CURRENT 기동전류	9.10 A
START TORQUE 기동회전력	282.90 %
MAX. TORQUE 최대회전력	335.50 %

## \* TEMPERATURE RISE TEST

TIME 시간	STATOR 고정자권선	ROTOR 회전자권선	BEARING 축수		AMB. TEMP 주위온도
			Drive 부하측	Non-Drive 반부하측	
3.5 h	19 K	- K	11 K	- K	15 °C

## \* INSULATION & HIGH VOLTAGE TEST

	INSULATION TEST 절연저항 500 V	HIGH VOLTAGE TEST 절연내력 1 min
STATOR 고정자	500 M $\Omega$	1920 V GOOD
ROTOR 회전자	- M $\Omega$	- V GOOD

## \* REMARKS \*

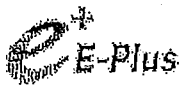
High Eff. Motor (고효율 전동기)/IP54

TESTED BY



HYOSUNG CORPORATION  
기 전 품 질 보 증 팀





# TEST REPORT FOR THREE PHASE INDUCTION MOTOR

삼상 유도 전동기 시험 성적서

CUSTOMER 주문처 효성기전판매 DATE 2008년 02월  
PROJECT No. SH19038404 TYPE 형식 TEFC SERIAL No. 19038404002

OUTPUT 출력	0.75 kW	POLE 극수	4 P	VOLT 전압	460 V	FREQUENCY 주파수	60 Hz
RATING 정격	CONT	INSUL. CLASS 절연계급	F	PHASE 상수	3 Φ	FRAME No.	143T

## \* MEASUREMENT OF WINDING RESISTANCE (at 15 °C)

STATOR 고정자	16.02 Ω
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## \* NO LOAD TEST

VOLTAGE 전압	460 V	CURRENT 전류	0.9 A	LOSS 손실	83 W	FREQUENCY 주파수	60 Hz
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## \* LOCKED ROTOR TEST

VOLTAGE 전압	90.1 V	CURRENT 전류	1.59 A	LOSS 손실	111 W	FREQUENCY 주파수	60 Hz
VOLTAGE 전압	- V	CURRENT 전류	- A	LOSS 손실	- W	FREQUENCY 주파수	- Hz

## \* LOAD TEST

LOAD FACTOR 하중	CURRENT 전류 (A)	EFFICIENCY 효율 (%)	POWER FACTOR 역률 (%)	SPEED 회전수 (r/min)	TORQUE 회전력 (kgf · m)
25%	0.94	68.69	36.41	1788	0.10
50%	1.06	79.70	55.72	1775	0.21
75%	1.24	83.16	68.64	1762	0.31
100%	1.46	84.08	76.68	1747	0.42
125%	1.72	83.76	81.55	1731	0.53
START CURRENT 기동전류					9.00 A
START TORQUE 기동회전력					282.20 %
MAX. TORQUE 최대회전력					335.60 %

## \* TEMPERATURE RISE TEST

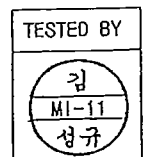
TIME 시간	STATOR 고정자권선	ROTOR 회전자권선	BEARING 축 수		AMB. TEMP 주위온도
			Drive 부하측	Non-Drive 반부하측	
3.5 h	19 K	- K	11 K	- K	15 °C

## \* INSULATION & HIGH VOLTAGE TEST

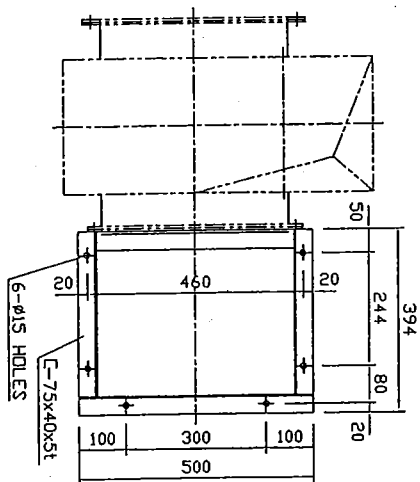
	INSULATION TEST 절연저항 500 V	HIGH VOLTAGE TEST 절연내력 1 min
STATOR 고정자	500 MΩ	1920 V GOOD
ROTOR 회전자	- MΩ	- V GOOD

## \* REMARKS \*

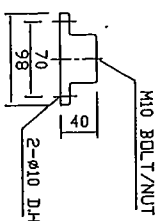
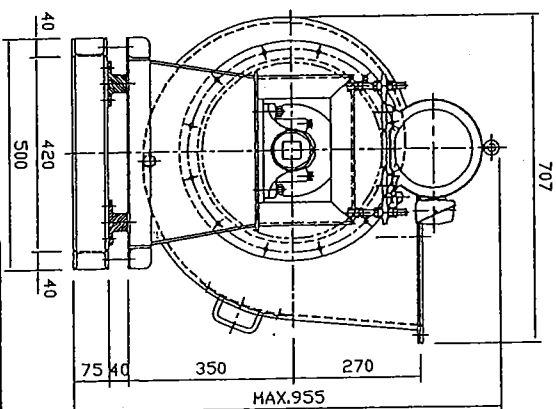
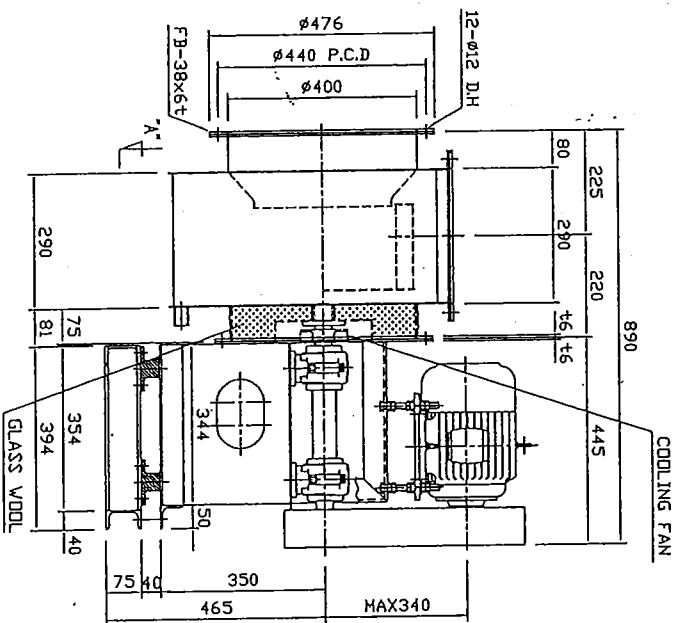
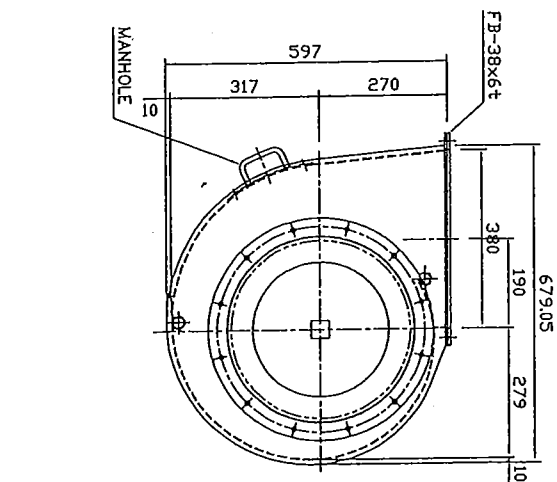
High Eff. Motor (고효율 전동기)/IP54



HYOSUNG CORPORATION  
기 전 품 질 보 증 팀

[illegible]

SECTION : A-A'



### DETAIL OF VIB. ISOLATOR


T Y P E	SIRCOO FAN (DMF - #2 1/2 - S4)		
SPECIFICATION	AIR VOLUME 60 m <sup>3</sup> /min	STATIC PRESS 50 mmHg	
	REV. 1060 T.P.M.	TEMP. 20 (MAX300) °C	
HANDLING GAS	HOT AIR		
DRIVER UL MARK	1.5 Kw 4 P 1720 r.p.m.	460 V 60 Hz 3 ph.	
ACCESSORIES	FAN PULLEY	3WV - 2P - #6 1/2	
	MOTOR PULLEY	3WV - 2P - #4	
	COUPLING	-	
BEARING	NO. #6308x2EA	LUB.	GREASE
PART	MUNSELL NO.		
MATERIAL	CASING SS400	IMPELLER SS400	SHAFT SM450
NET WEIGHT	FAN Kg	MOTOR Kg	TOTAL Kg
INSTALLATION	<input type="checkbox"/> IN DOOR	<input type="checkbox"/> OUT DOOR	

MFG.NO.	Q"TY	CUSTOMER	동양식품기계
	1 SET		

DATE	SCALE	USER	미국 수출용
2008.01.05.	1 / 11		

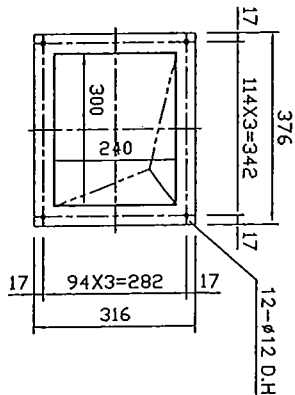
APPR'D	CH'D	DR'G	TITLE
you	Mr.	Engr.	

LAYOUT OF SIROCCO FA  
c - #2 1/2 - S4)

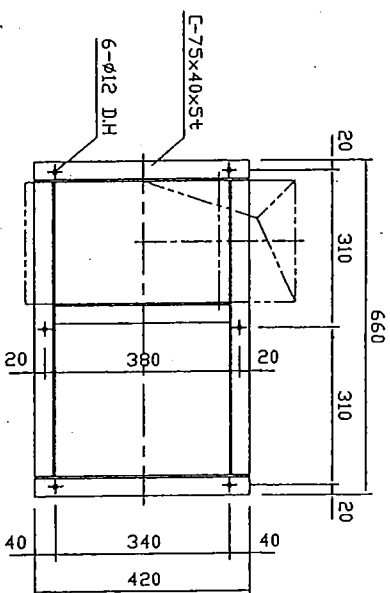
 <b>DAE MYUNG</b> ENGINEERING & MFG.CO.	DRG.NO.	DYF-18
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필립 & 토출 FLANGE 각 1EA 공급요망  
방진고무-6EA + SPARE 4EA 공급요망  
내열 구리이스 공급 할것

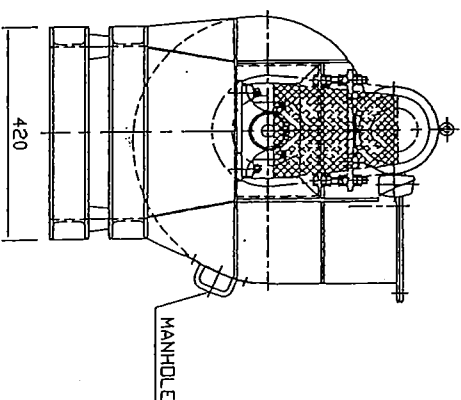
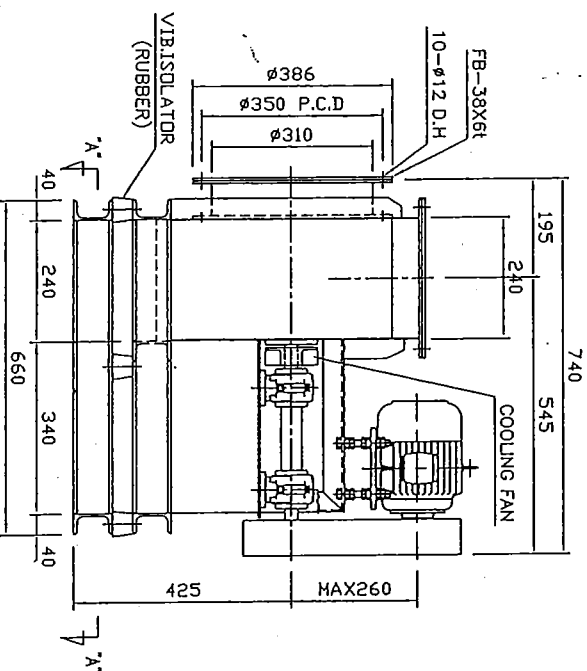
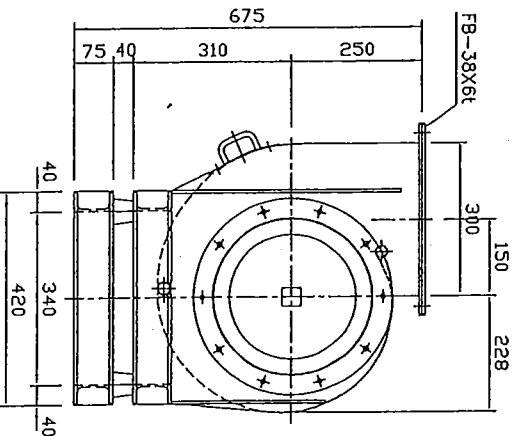
41-HD  
 40-JD  
 01-JD  
 41-HD



DETAIL OF OUTLET



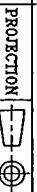
SECTION : A-A'



FOR APPROVAL

T Y P E	SIROCCO FAN (DMSF - # 2 - S4)		
AIR VOLUME	40 m <sup>3</sup> /min	STATIC PRESS	30 mmHg
SPECIFICATION	REV.	TEMP.	20 (MAX30) °C
HANDLING GAS	AIR	1100 r.p.m	
DRIVER (UL MARK)	0.75 Kw	480 V	60 Hz 3 ph.
PAN PULLEY	4 P	1720 r.p.m	Motor HICO
MOTOR PULLEY	3V - 2P - ø3 1/2"		
ACCESSORIES	Coupling	3V - 2P - ø3 1/2"	
BEARING	NO. #306 x 2 EA	LUB. GREASE	
PAINT	KUNSELL NO.	DEPELLER	SHAFT S44SC
MATERIAL	CASING SS400	MOTOR	SS400 TOTAL
NET WEIGHT	Kg		Kg
INSTALLATION	<input type="checkbox"/> IN DOOR	<input type="checkbox"/> OUT DOOR	

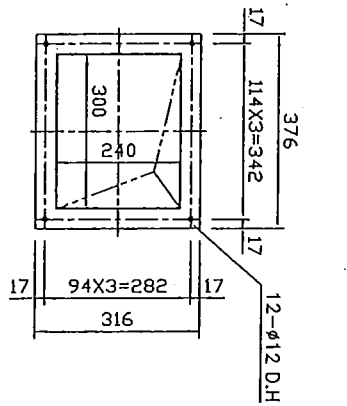
Δ X					
Δ X					
REV.		DESCRIPTION	DATE	REVISED	APPROVED
REF.					
DWG.					



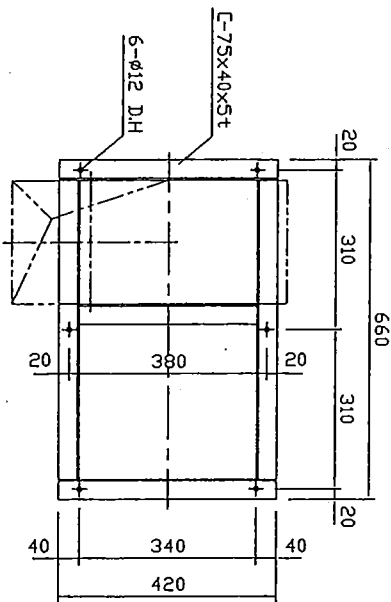
플랑 FLANGE-3EA, 토출 FLANGE-1EA 공금 할 것  
 4월 구리이스 공금 할 것  
 방진고무 SPARE로 4EA 공금 할 것

MFG.NO.	QTY	CUSTOMER	용양 사품 기계 (주)
DATE	SCALE	USER	미국 수출용
2008.01.05.	1 / 10		
APPROD CH'D	DR'G	TITLE	LAYOUT OF SIROCCO FAN
YOU Y.S.	KIM S.M.		SF - #2 - S4
DAE MYUNG ENGINEERING & MFG.CO.	DWG.NO.	DYF-17	

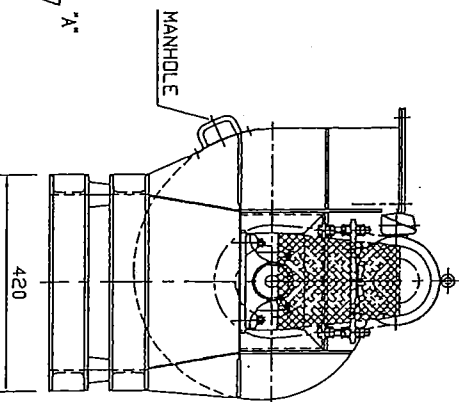
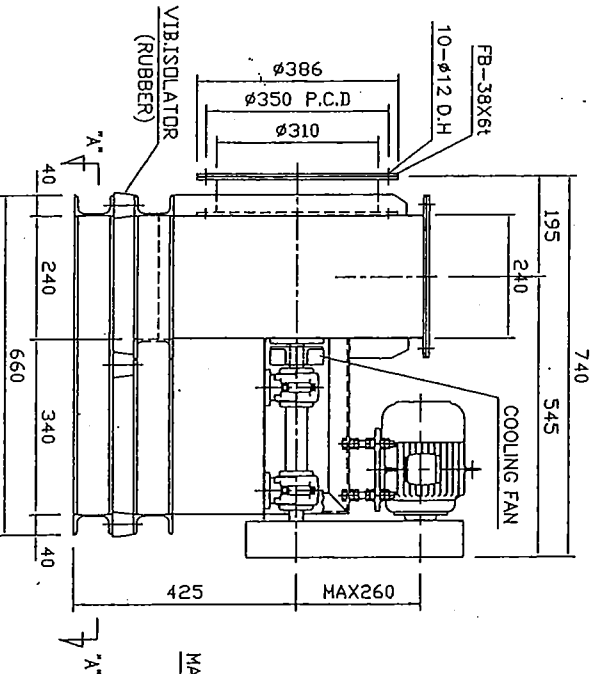
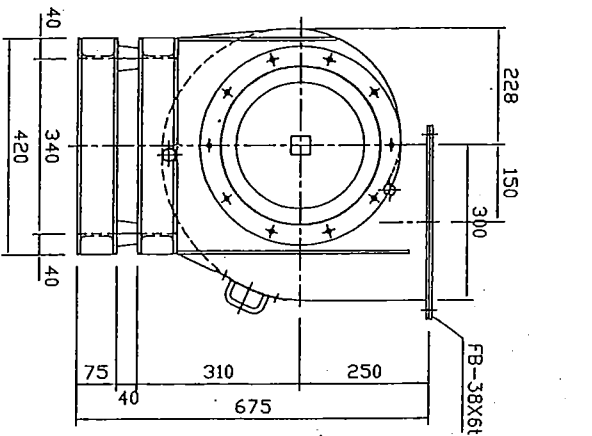
L-11-J11 3MM 311  
01-FJG  
10-FJG  
11-HQ



DETAIL OF OUTLET



SECTION : A-A'



FOR APPROVAL

TYPE		SIROCCO FAN (DMSE - # 2 - S4)	
SPECIFICATION	AIR VOLUME	40 m <sup>3</sup> /min	STATIC PRESS 30 mmHg
REV.	1100 r.p.m	TEMP.	20 (MAX) °C
HANDLING GAS		AIR	
DRIVER (UL MARK)	0.75 Kw	480 V	60 Hz 3 ph.
FAN PULLEY	4 P	1720 r.p.m	Motor HICO
MOTOR PULLEY	3V - 2P - 15 1/2"	3V - 2P - 15 1/2"	
ACCESSORIES		COUPLING	
BEARING	NO. 6306 x 2 EA	LUB. GREASE	
PAINT	MUNSKILL NO.		
MATERIAL	CASING SS400	DEPILER	SHAFT SM45C
NET WEIGHT	FAN Kg	MOTOR Kg	TOTAL Kg
INSTALLATION		□ IN DOOR □ OUT DOOR	

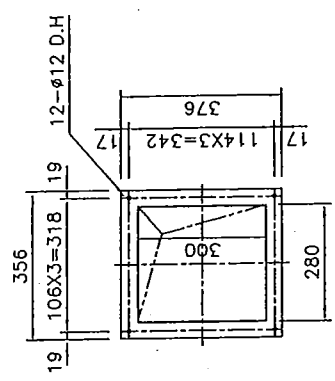
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PRODUCTION

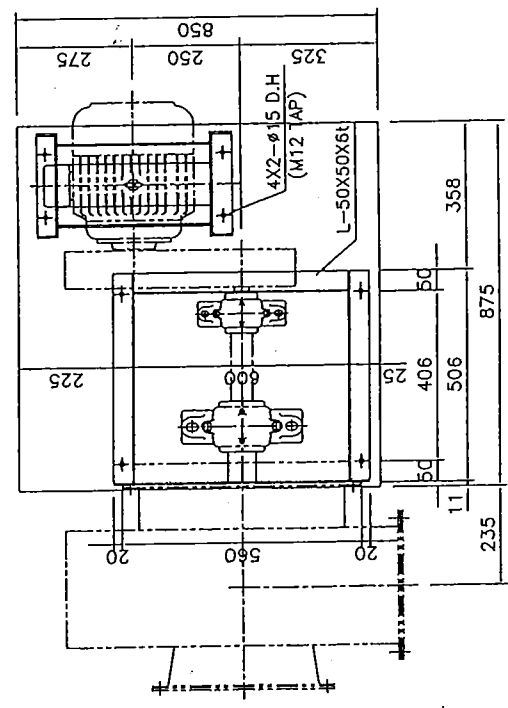
플임 FLANGE-3EA, 토출 FLANGE-1EA 공금 할것  
구리이스 공금할것  
고무 SPARE로 4EA 공금할것

MEG.NO.	Q'TY	CUSTOMER	동양 식품 기계 (주)
	2 SETS		
DATE	SCALE	USER	미국 수출용
2008.01.05.	1 / 10		
APPR'D	CH'D	DR'G	LAYER OF SIROCCO FAN
YOU	Y.S.	KIM S.M.	- #2 - S4)
DAE MYUNG ENGINEERING & MFG.CO.		DRG.NO.	DYF-17-1

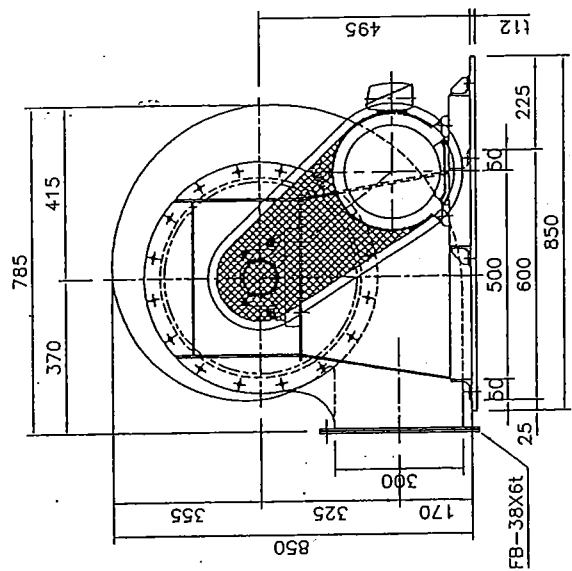
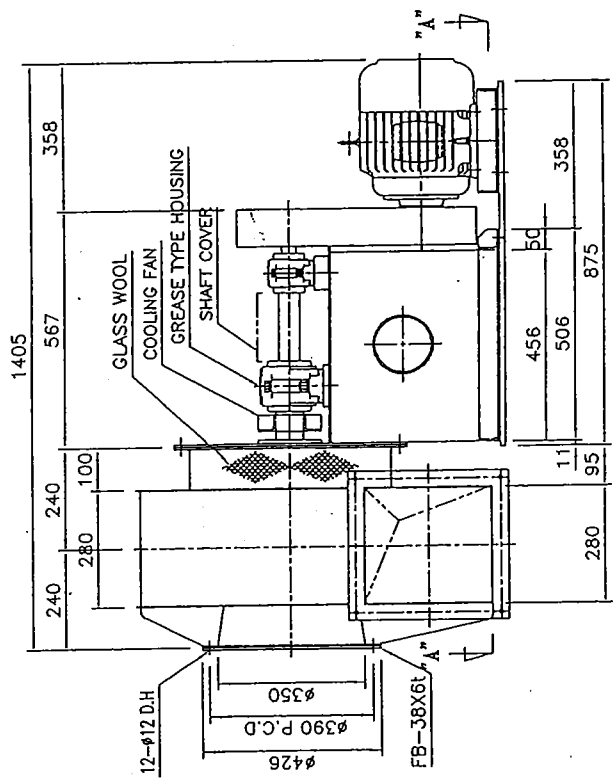
T Y P E		TURBO FAN (DMTF - # 3 1/4 - S4)	
SPECIFICATION	AIR VOLUME	88 m <sup>3</sup> /min	STATIC PRESS 220 mmHg
	REV.	2050 r.p.m	TEMP. 20 (MAX300) °C
HANDLING GAS	DRIVER	480 V 60 Hz 3 ph.	
	(UL MARK)	4 P 1750 r.p.m	Maker HICO
ACCESSORIES	FAN PULLEY	3V - 3P - #6"	
	MOTOR PULLEY	3V - 3P - #7"	
COUPLING	BEARING	NO. #6311, #6308	LUB. GREASE
	PAINT	MUNSELL NO.	
MATERIAL	CASING	SS400 IMPELLER	SLAFT SS445C
	FAN	SS400 MOTOR	Kg TOTAL Kg
NET WEIGHT	INSTALLATION	<input type="checkbox"/> IN DOOR <input type="checkbox"/> OUT DOOR	



DETAIL OF OUTLET



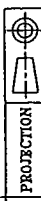
SECTION : A-A'



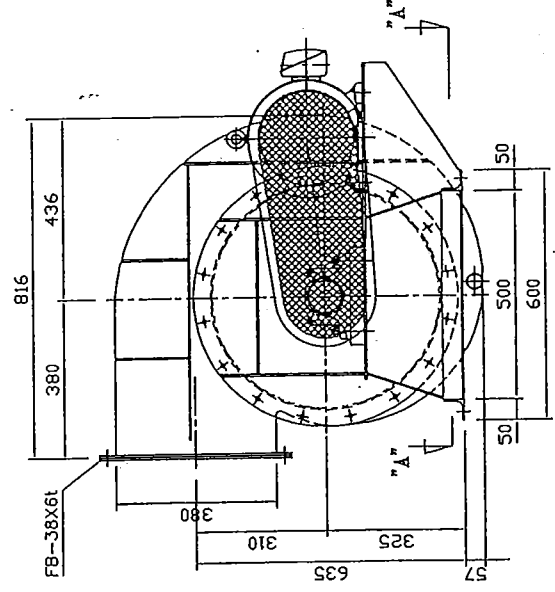
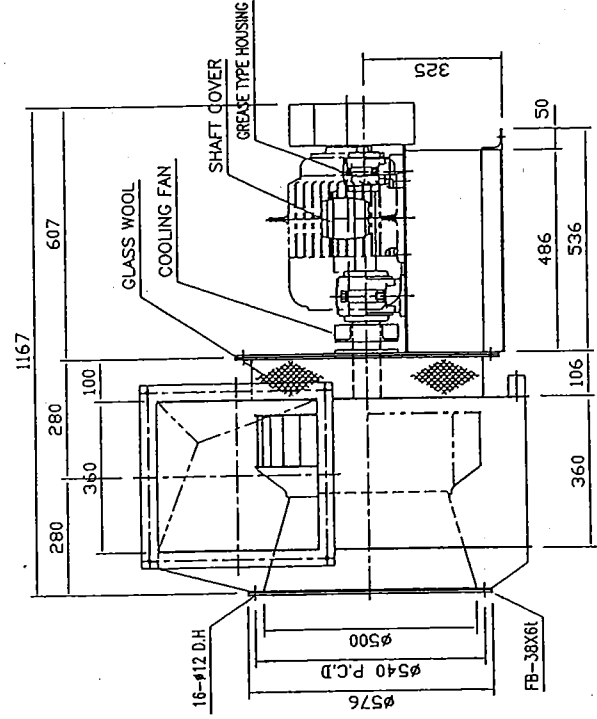
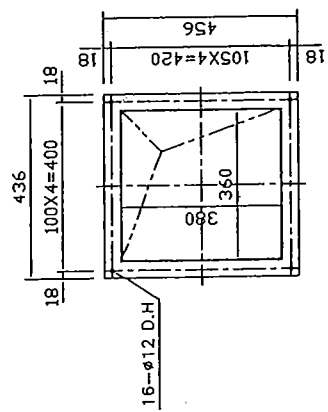
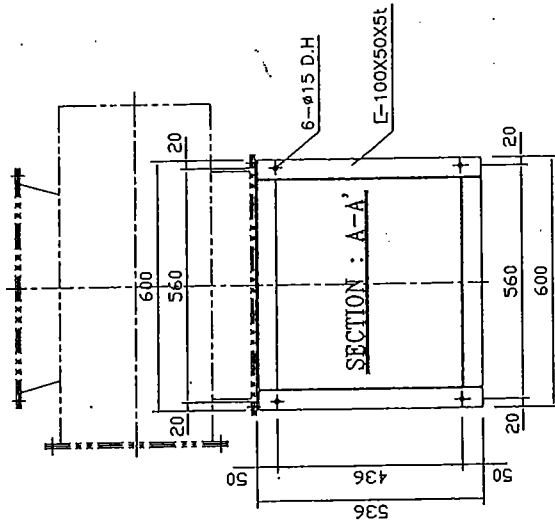
상대 불연지 흡입 포물 1EA 내지 나폴로  
내열 구리이스 공급 함것

MFG.NO.	Q'TY	CUSTOMER	동양 식플 기계 (주)
DATE	SCALE	USER	미국 수출용
2008.01.05.	1 / 12		
APPRO'D	DR'G	TITLE	LAYOUT OF TURBO FAN (DMTF - #3 1/4 - S4)
YOU Y.S.	KIM S.M.		
DAE MYUNG ENGINEERING & MFG.CO.		DWG.NO.	DYF-16

REV.	MFG.NO.	DESCRIPTION	DATE	REVISED	APPROVED
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T Y P E		AIRFOIL FAN (DMA - #3 1/2 - S4)	
SPECIFICATION	AIR VOLUME	138 m <sup>3</sup> /min	STATIC PRESS.
	REF.	2190 r.p.m.	TEMP. 20 (MINIMUM) °C
HANDLING GAS	DRIVER	7.5 Kw	400 V 60 Hz 3 ph.
	(UL MARK)	4 P	1750 r.p.m. maker HICO
ACCESSORIES	FAN PULLEY	3V - 3P - #8	
	MOTOR PULLEY	3V - 3P - #7 1/2"	
COUPLING			
BEARING NO. #4311L #4308 LUB. {GRASS}			
PAINT			
MATERIAL		CASING SS400 IMPELLER SS400 TOTAL SA46C	
NET WEIGHT		CASING Kg IMPELLER Kg TOTAL Kg	
INSTALLATION		<input type="checkbox"/> IN DOOR <input type="checkbox"/> OUT DOOR	



REV.	MFG.NO.	DESCRIPTION	DATE	REVISED	APPROVED
1	SN10	CHANGED BEARING HOUSING	2005.09.14	S.M.KIM	Y.S.YOU

상대 풍량지 불연, 보온 1EA 먼저 공급  
내열 구리이스 공급 불적

MFG.NO.	Q'TY 1 SET	CUSTOMER	동양 식품 기계
DATE	SCALE	USER	미국 수출용
2008.01.05.	1 / 12		
APPRO'D	CH'D	TITLE	LAYOUT OF AIRFOIL FAN (DMA - #3 1/2 - S4)
<div>1<sup>st</sup></div> <div>2<sup>nd</sup></div> <div>3<sup>rd</sup></div>	<div>1<sup>st</sup></div> <div>2<sup>nd</sup></div> <div>3<sup>rd</sup></div>		
DAE MYUNG ENGINEERING & MFG.CO.			DWG.NO. DYF-15

SPECIFICATION & DRAWING  
OF  
MAXON GAS BURNER

## A. GENERAL

1. PROJECT NAME : SHPP-415 OVENPAK BURNER

2. CUSTOMER :

3. DESIGN CONDITION

BURNER CAPACITY (MAX.) : 375,000 KCAL/HR

4. ELECTRIC POWER

MAIN : AC 460 V/  $\Psi$  3/ 60HZ

CONTROL : AC 110 V/  $\Psi$  1/ 60HZ

5. UTILITY

PROPANE : 23,500 Kcal/NM<sup>3</sup>

PRESSURE : 5,000mmAq

6. SCOPE OF SUPPLY

-SHPP-415 BURNER (2SETS)

-COMPACT GAS TRAIN UNIT (2SETS)

-BURNER START-UP PANEL (2SETS)

-PRE-WIRING

-ENGINEERING



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## B. EQUIPMENT LIST

### (1) OVEN BURNER SPECIFICATION

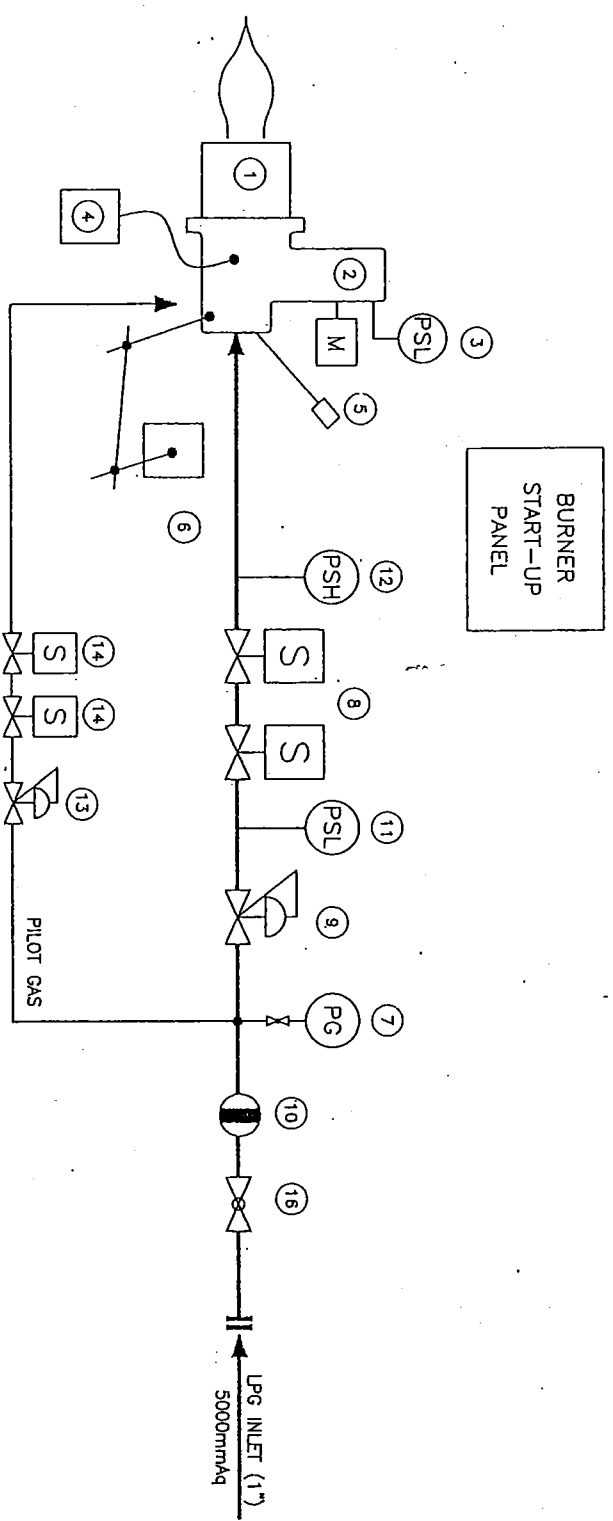
QTY	2 SETS
BURNER TYPE	415 OVENPAK
MAKER	MAXON
BURNER CAPACITY	375,000 Kcal/Hr
TURN DOWN RATIO	20:1 OR ABOVE
ACCESSORIES	CONTROL MOTOR (M7284Q1009)
	UV FLAME DETECTOR
	SPARK IGNITOR

## B. EQUIPMENT LIST

### B-1. SHPP-415 OVENPAK BURNER EQUIPMENT SPECIFICATION : 2 SETS

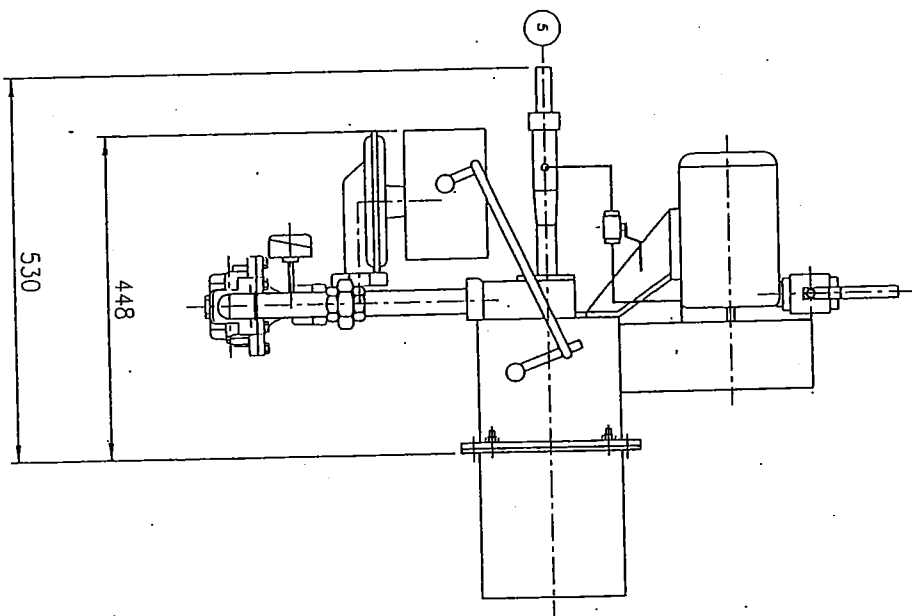
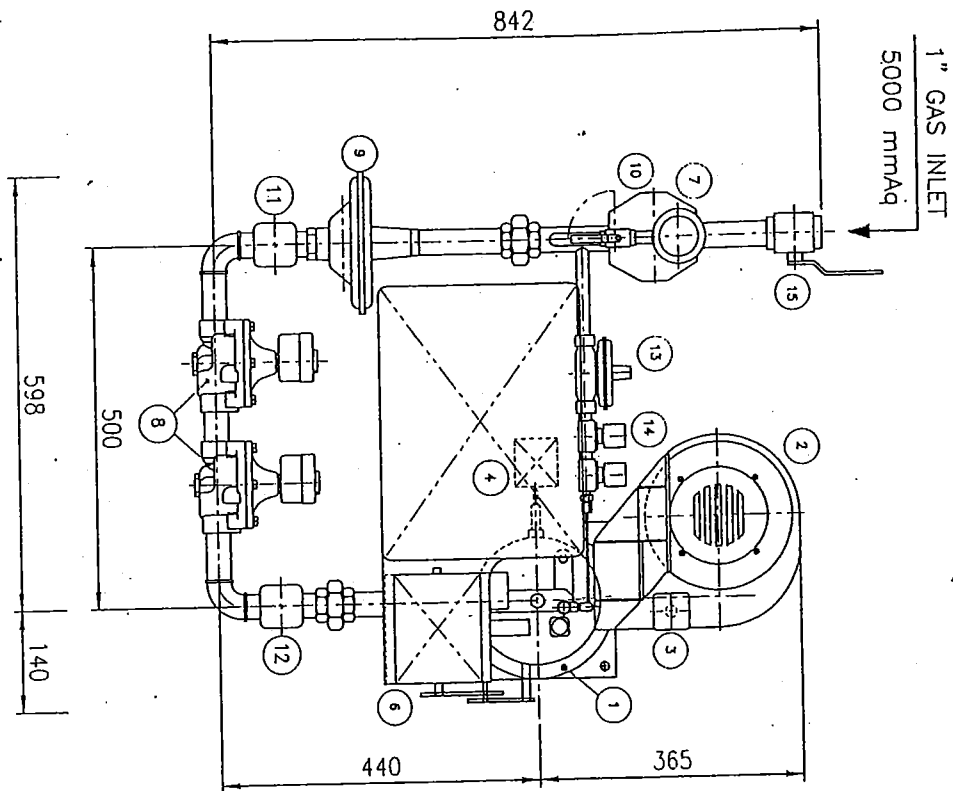
NO	DESCRIPTION	MODEL	MAKER	SPECIFICATION	Q'TY	REMARK
1	BURNER	415	MAXON	SEE BURNER SPEC.	1	
2	BURNER BLOWER	INCLUDE BURNER	MAXON	AC460V/60Hz/3Ph 1/3HP	1	
3	AIR PRESSURE SWITCH(LOW)	C6097A1004	HONEYWELL	0.4" ~ 5" W.C	1	
4	IGNITION TRANSFORMER	A06	DONGAN	AC 110V/60HZ HIGH VOLTAGE	1	
5	UV DETECTOR	PC-II	PROTECTION CONTROLS	w/LENS	1	
6	CONTROL MOTOR	M7284Q1009	HONEYWELL	4 ~ 20mA INPUT	1	
7	GAS PRESSURE GAUGE		KONICS	0 ~ 1Kg/Cm2	1	
8	GAS SOLENOID VALVE	8215B50	ASCO	1" PT, N.C AC110V/60Hz	2	
9	GAS REGULATOR	143-80-1	SENSUS	1", ORI. : 1/4" SPR. : 3.5" ~ 6.5"	1	
10	GAS FILTER	SJG-03	SUNGJIN	1", 1Bar	1	
11	GAS PRESSURE SWITCH(LOW)	C6097A1004	HONEYWELL	0.4" ~ 5" W.C	1	
12	GAS PRESSURE SWITCH(HIGH)	C6097A1053	HONEYWELL	3" ~ 21" W.C	1	
13	PILOT GAS REGULATOR	325-3	MAXITROL	3/8" PT	1	
14	PILOT GAS SOLENOID VALVE	8215G10	ASCO	3/8" PT, N.C AC110V/60Hz	2	
15	BALL VALVE	1" PT	KOREA	KS 10K/SCR'D BRASS	1	

NO.	DESCRIPTION	DIMENSIONS	QTY	REMARK
1	BURNER	415 OVERPAK	1	YAXON
2	BURNER BLOWER	AC460/60Hz/3Ph, 1/3HP	1	YAXON
3	AIR PRESS. S/W	C6097A1004	1	HONEYWELL
4	IGNITION TRANSFORMER	AC110V, A06	1	DONGAN
5	UV DETECTOR	PC-II	1	PROTECTION
6	CONTROL MOTOR	M7284A1009	1	HONEYWELL
7	GAS PRESS. GAUGE	0~1kg/cm2	1	KONICS
8	GAS SOLENOID VALVE	B215B50, 1", 110V	2	ASCO
9	GAS REGULATOR	1", 14.3~80-1	1	SENSUS
10	GAS FILTER	SJG-02, 1"	1	SUNGJIN
11	GAS PRESS. S/W(CMV)	C6097A1004	1	HONEYWELL
12	GAS PRESS. S/W(HIGH)	C6097A1053	1	HONEYWELL
13	PILOT GAS REGULATOR	1/2", 325-3	1	MAXTROL
14	PILOT GAS SOL. VALVE	B215G20, 1/2", 110V	2	ASCO
15	BALL VALVE	1", SCRD	1	KOREA



- \*NOTE
1. QTY : 2 SETS
  2. CAPA. : 375,000Kcal/Hr
  4. FUEL : PROPANE
  5. POWER : MAIN - AC460V/60Hz/3Ph  
CONTROL - AC110V/60Hz/1Ph

 ENGINEERING & SALES CO., LTD.		PROJECT : SHPP-415 CUSTOMER : 동양에너지(주)	
PJT NO : PJ-2008-6906 TITLE : 415 OVERPAK BURNER		END USER : USA	
SCALE : NONE			
DATE : 2008.01.16			
DWN : S.H.K			
CHK : S.H.Y			
DWG. NO. : M6906-001			
REV. : A			



NO.	DESCRIPTION	DIMENSIONS	QTY	REMARK
1	BURNER	415 OVENPAK	1	WAXO
2	BURNER BLOWER	AC480/50Hz/2HP 1/2HP	1	WAXO
3	AIR PRESS. S/W	C6097A1004	1	HONEYW
4	IGNITION TRANSFORMER	AC110V, A06	1	DONG
5	UV DETECTOR	PC-II	1	PROTEC
6	CONTROL MOTOR	M7284Q1009	1	HONEYW
7	GAS PRESS. GAUGE	0-1kg/Cm2	1	KONIC
8	GAS SOLENOID VALVE	B215850, 1", 110V	2	ASC
9	GAS REGULATOR	1", 143-80-1	1	SENSI
10	GAS FILTER	S/G-03, 1"	1	SUNG
11	GAS PRESS. S/W(LOW)	C6097A1004	1	HONEYW
12	GAS PRESS. S/W(HIGH)	C6097A1053	1	HONEYW
13	PILOT GAS REGULATOR	1/2", J25-3	1	WAXMT
14	PILOT GAS SOL. VALVE	B215820, 1/2", 110V	2	ASC
15	BALL VALVE	1", SCRD	1	KORE

#### UTILITY & EQUIPMENT DATA

NO	DESCRIPTION	SPECIFICATION
1	BURNER MODEL	415 OVENPAK
2	MAX. CAPACITY	375,000Kcal/hr
3	QUANTITY	2 SET
4	POWER	CONTROL MAIN
5	FUEL	<input checked="" type="checkbox"/> LPG <input type="checkbox"/> LNG
6	FLAME DETECTOR	PC-II

**SEOUL ENERGY**  
ENGINEERING & SALES CO., LTD.

NO.	DATE	DESCRIPTION	DWN	CHK
1	2008.01.16	FOR APPROVAL	SHK	SHY
2	2008.01.16	FOR APPROVAL	DWN	CHK
3	2008.01.16	FOR APPROVAL	SHK	SHY
4	2008.01.16	FOR APPROVAL	DWN	CHK
5	2008.01.16	FOR APPROVAL	SHK	SHY
6	2008.01.16	FOR APPROVAL	DWN	CHK
7	2008.01.16	FOR APPROVAL	SHK	SHY
8	2008.01.16	FOR APPROVAL	DWN	CHK
9	2008.01.16	FOR APPROVAL	SHK	SHY
10	2008.01.16	FOR APPROVAL	DWN	CHK
11	2008.01.16	FOR APPROVAL	SHK	SHY
12	2008.01.16	FOR APPROVAL	DWN	CHK
13	2008.01.16	FOR APPROVAL	SHK	SHY
14	2008.01.16	FOR APPROVAL	DWN	CHK
15	2008.01.16	FOR APPROVAL	SHK	SHY

GAS TRAIN UNIT

FOR 415 OVENPAK BURNER

REV. 06-002

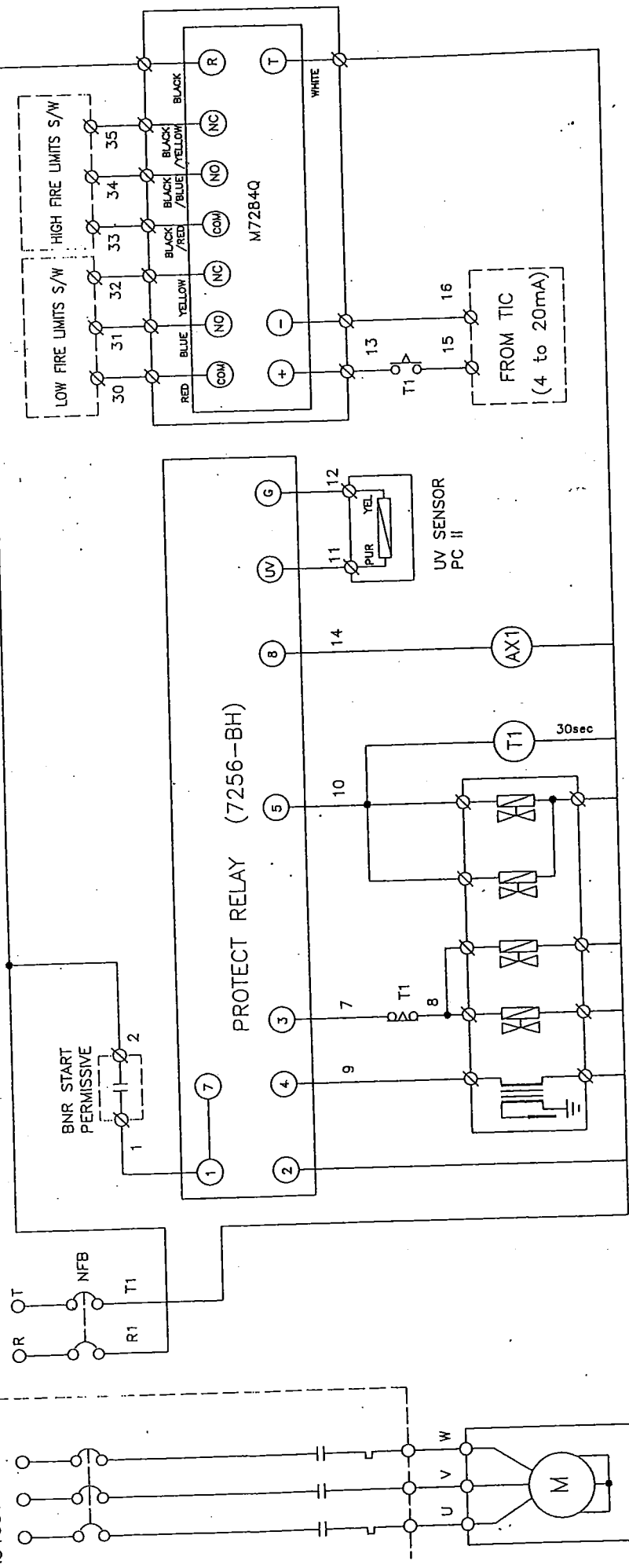


1. "B": MAIN FUEL GAS INLET NPT.
2. FILTER의 치수 및 기입하지 않은 치수는 CATALOGUES 참조.
3. " " 부분은 로내압이 "+" 일 경우에만 CERAMIC 으로 충전한다.
4. 만약, OVEN WALL이 150mm 이상일 경우에는 서플로너의 열의한다.

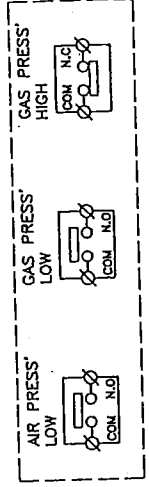
4. 안약, OVEN WALL이 150mm 이상일 경우													
FOR APPROVAL													
△		2008.01.18		NO.		DATE		DESCRIPTION		S.H.K		S.H.Y	
△		NO.		DATE		DESCRIPTION		S.H.K		S.H.Y		APP	
SEOUL ENERGY ENGINEERING & SALES CO.,LTD.													
PROJECT		SHPP-415		CUSTOMER		동양식품기계(주)		END USER		USA		REV.	
PJT NO		PJ-2007-6906		TITLE		400 OVENPAK		BURNER ASS'Y DRAWING		DWG. NO.		M6906-003	
SCALE		NONE		DATE		2002.04.10		OWN S.H.K		CHK S.H.Y		APP S.H.Y	
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INCOMING POWER  
 10460V 60HZ 3Ø  
 AC110V 60HZ 1Ø



IGNITION PILOT SOL V/V MAIN V/V FLAME ON MISS FIRE  
 T/R (#1, #2) (#1, #2)



LOCAL INSTRUMENT

Q'TY : 2SET  
 UL 인증제품사용

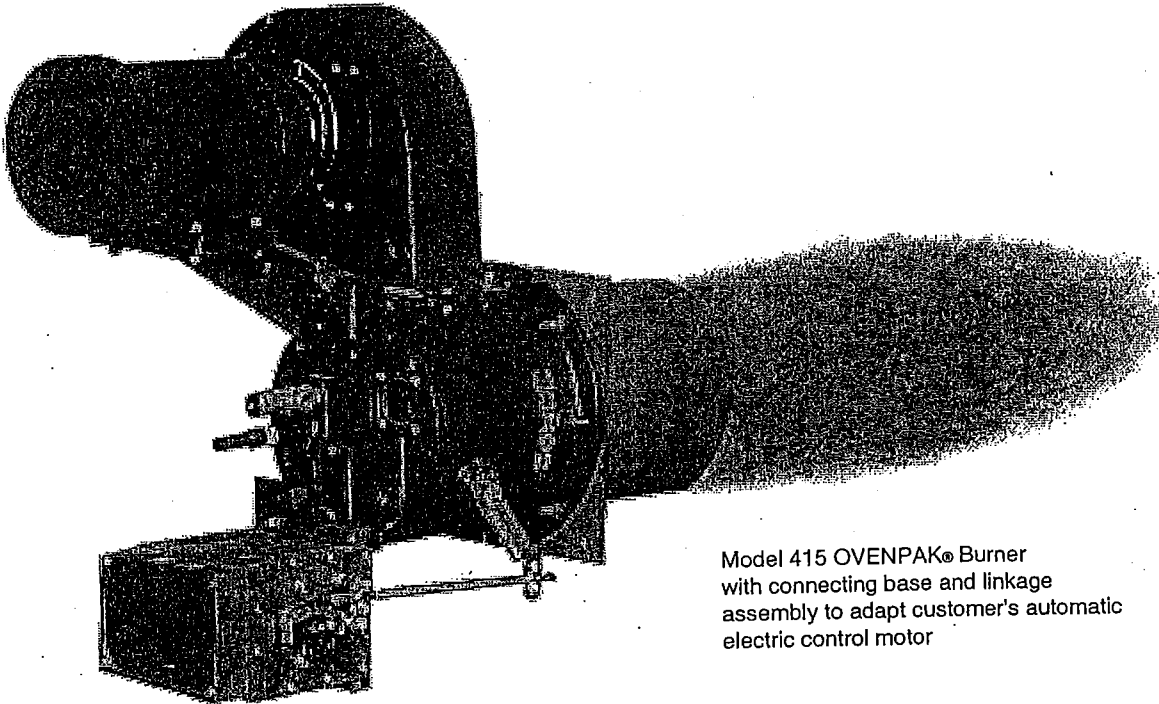
TITLE  
 BURNER  
 CONTROL PANEL

SEOUL ENERGY  
 ENGINEERING & SALES CO.

PROJECT SHPP-415  
 CUSTOMER 동양식품기계(주)  
 END USER USA  
 PJT NO. PJ-2008-6906  
 DWG NO. E690601  
 SHEET NO. 01

DATE	FOR APPROVAL	REV.D	CHK.D	BY	BY
7.01.15	seo	seo	seo	seo	seo
DATE	CONTENTS	BY	BY	BY	BY

## Maxon Model "400" OVENPAK® Gas Burners



Model 415 OVENPAK® Burner  
with connecting base and linkage  
assembly to adapt customer's automatic  
electric control motor

- Burns any clean fuel gas
- Fires into passing air streams
- Requires only low pressure gas
- Provides clean combustion with low NOx levels
- Compact burner design provides quick and easy installation
- Simple field adjustment and maintenance

Model "400" OVENPAK® Burner applications have included:

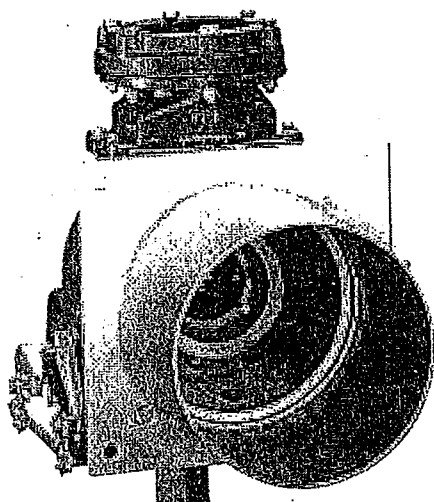
Air heating in ovens and dryers, paint finishing lines, paper and textile machines, food baking ovens, coffee roasters, grain dryers, and fume incinerators. Manufactured under U.S. patent #3,574,508; Canadian and European patents granted and pending.



CORPORATION 201 East 18th Street, P.O. Box 2068, Muncie, Indiana, 47307-0068. Phone: (765) 284-3304. Fax (765) 286-8394



# Maxon Model "400" OVENPAK® Gas Burners

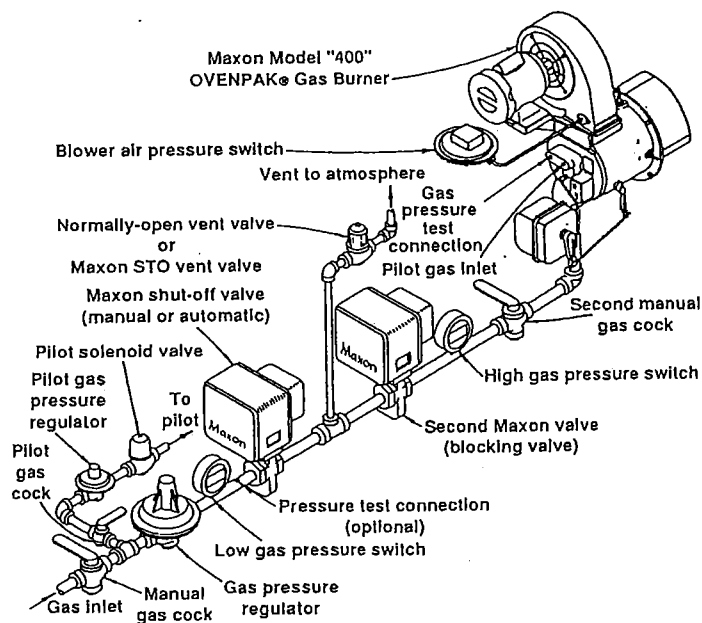


Model EB-3 OVENPAK® Burner with connecting base and linkage assembly

*Provide application flexibility with:*

- 40:1 turndown or more
- Over 90 different styles and sizes
- Heat releases to 16,500,000 Btu/hr
- Cost-effective external blower (EB) version

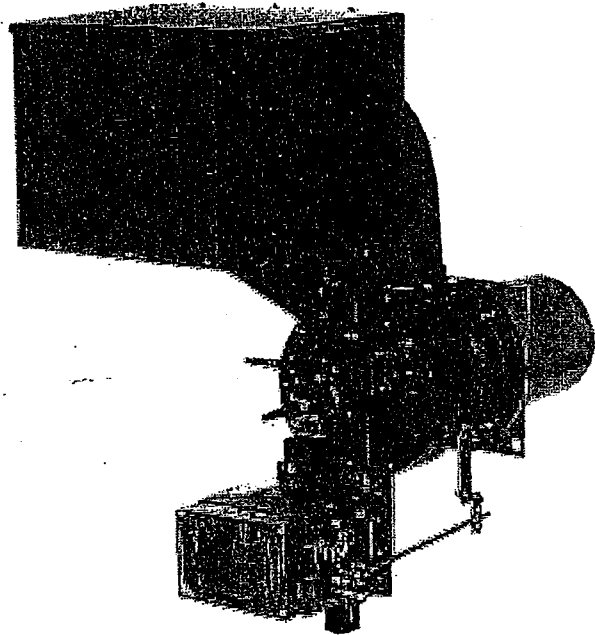
Typical piping layout with "Block and Bleed" gas train arrangement



## Design and Application Details

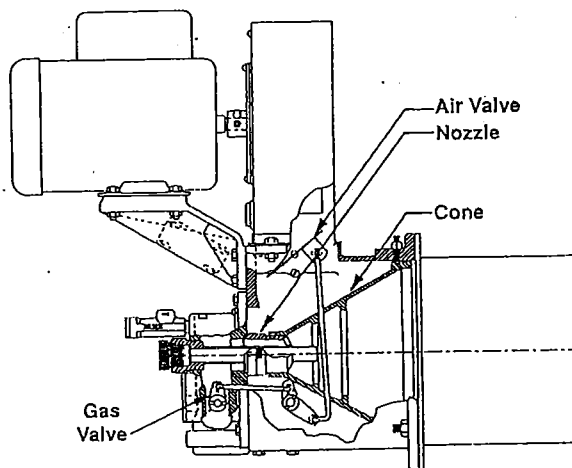
OVENPAK® Burners are nozzle-mixing gas burners for many industrial direct-fired applications where clean combustion and high turndown are required. They are simple and versatile for use on a variety of heating applications.

The Model "400" OVENPAK® Burner (shown at right) includes a combustion air blower with non-sparking paddle wheel-type impeller, pilot, spark ignitor, stainless steel discharge sleeve, mixing cone, self-contained internal air and gas proportioning valves, and provision for your flame safeguard sensor.



Right: Model 415 OVENPAK® Gas Burner with optional:

- combustion air filter
- connecting base and linkage assembly
- electrical control motor (by others)



Cross sectional view of a Model "400" OVENPAK® Gas Burner

### Principle of operation (illustrated at left)

The OVENPAK® Burner is designed for industrial air heating applications. It is available in two basic versions: 1) packaged with integral combustion air blower, or 2) for use with an external blower. Both versions include a gas and air valve, internally linked together to control the gas-air ratio over the full operating range. The gas flows through the nozzle, then along the inside of the burner cone where combustion air is progressively and tangentially mixed with the gas. This produces a very wide turndown range and a highly stable flame under a variety of operating conditions.

## Capacities and Specifications – 60 Hertz

Standard Model "400" OVENPAK® Burner includes a combustion air blower with motor.

Maximum capacity of Model "400" OVENPAK® Burner is affected by the static pressure within the combustion chamber. Data shown assumes firing in the open, or into an airstream with enough oxygen to complete the combustion process. If burner is fired into an oxygen-starved chamber or airstream, capacities may be reduced as much as 25-30%. Do not attempt to operate beyond the duct static pressure range shown. For higher back pressure applications, select from Model "EB" or "EB-MRV" OVENPAK® Burner options.

All gas pressures are differential pressures and are measured at the gas pressure test connection on the backplate of each OVENPAK® Burner. Differential pressures shown are approximate.

## 60 Hz Motor Voltages Available

Horsepower	Type	115/208-230/1/60	208-230/460/3/60	575/3/60
1/3 & 1/2	Totally Enclosed	X	X	X
3/4 & 1	Totally Enclosed	X	X	X
1-1/2, 2 & 3	Totally Enclosed	Not Available	X	X

## Capacities and Operating Data – Model 405 through 422M

Burner Model		405	407M	408	408M	412M	413M	415	422M
Motor Specification	Horsepower:	1/3	1/2	1/3	3/4	1/2	3/4	1/3	3/4
	Frame Number:	48	48	48	56	48	56	48	56
Maximum Capacities (1000's Btu/hr) with Natural Gas Pressures ("wc)	DUCT STATIC PRESSURES	-5.0 to -0.5" wc	550 2.8"	---	880 3.4"	---	---	1650 1.7"	---
		±0" wc	500 2.3"	750 2.5"	800 2.8"	790 2.7"	1200 2.8"	1300 3.3"	1500 1.4"
		+1.0" wc	475 2.1"	700 2.2"	760 2.6"	750 2.5"	1100 2.4"	1190 2.8"	1425 1.3"
		+2.0" wc	450 1.9"	600 1.6"	720 2.3"	640 1.8"	925 1.7"	1100 2.4"	1350 1.1"
		+3.0" wc	---	510 1.1"	---	550 1.3"	800 1.3"	1000 2.0"	---
		+4.0" wc	---	450 0.9"	---	495 1.1"	750 1.1"	900 1.6"	---
		+5.0" wc	---	---	---	475 1.0"	---	800 1.3"	---
		---	---	---	---	---	---	---	---
Minimum Capacities (1000's Btu/hr)	Main plus pilot	15			20			37	
	Pilot only	10			15			20	
Required natural gas differential pressure to burner inlet ("wc)		3.0		3.5	4.1	4.5	5.2	4.2	7.2
Approximate flame length in still air		1/2 to 1 ft.		1 to 1-1/2 ft.	1/2 to 1 ft.	1 to 2-1/2 ft.		2-1/2 to 3-1/2 ft.	1-1/2 to 2 ft.

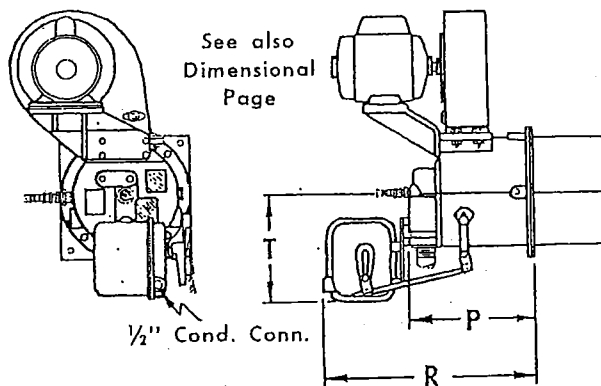
GAS PR ΔP = 1.3"wc × 25.4 ≈ 33 mmHg

Q<sub>gas</sub> = 1425 × 1000 Btu/hr = 1,425,000 Btu/hr

필요한 가스 압력 = 1425000 Btu/hr ÷ 43000 Btu/hr + 33 mmHg  
(at MAX. Q<sub>gas</sub>)

## Accessory Options

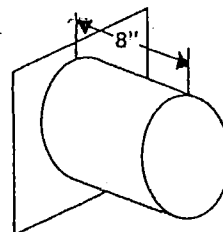
**Hi/Lo Control Motor Sets** for high or low firing. Optional set includes 2-position unidirectional 11-second 120v 50/60 Hz motor and connecting base with mounting linkage. See table below for dimensions which differ from standard burner.



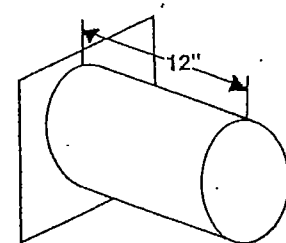
Burner Model		Dimensions in Inches		
		P	R	T
EB-1, 2	405 - 413M	10.25	17.63	7.75
EB-3	415 - 422M	10.19	17.56	7.75
EB-4, 5	425 to 442M	11.69	19.06	8.75
EB-6, 7	445 - 487M	16.69	24.06	8.75

**Discharge Sleeves** are available in 3 versions:

- Standard sleeve is 8" long, made of #310 SS, and is suitable for downstream temperatures up to 1000°F (538°C).
- For higher velocities, specify 12" long sleeve made of #310 SS for downstream temperatures up to 1000°F (538°C).
- For higher downstream temperatures between 1000°F (538°C) and 1500°F (816°C), specify 8" long, #RA 330 SS sleeve.



→ 310 SS (std.) or  
RA 330 (Hi Temp.)

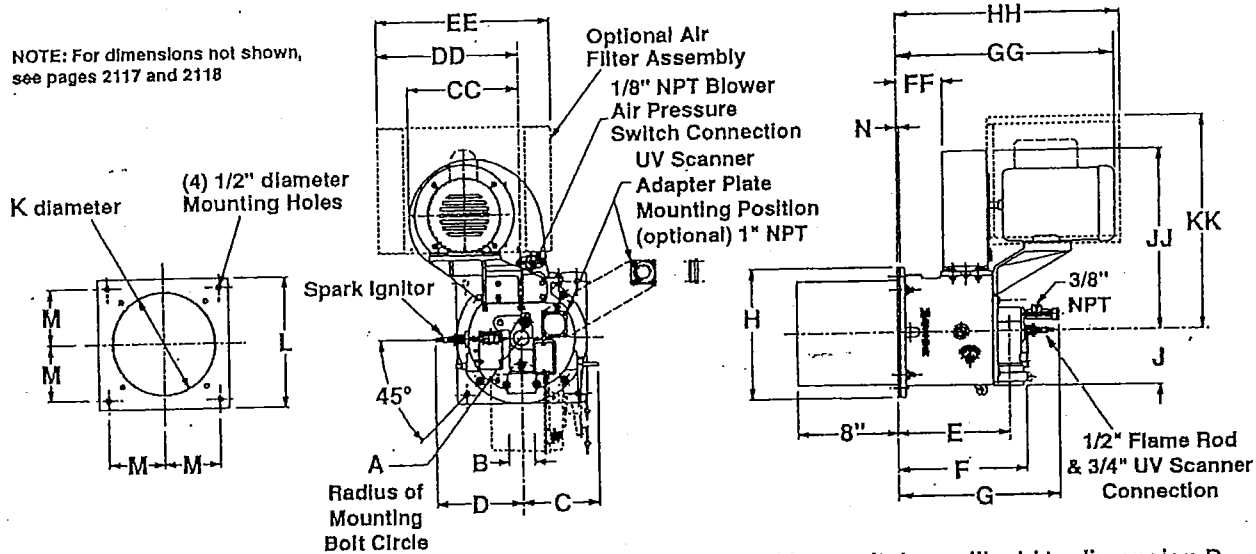


310 SS

## Dimensions (in Inches)

## Model "400" and "400-MA" OVENPAK® Burners

NOTE: For dimensions not shown, see pages 2117 and 2118



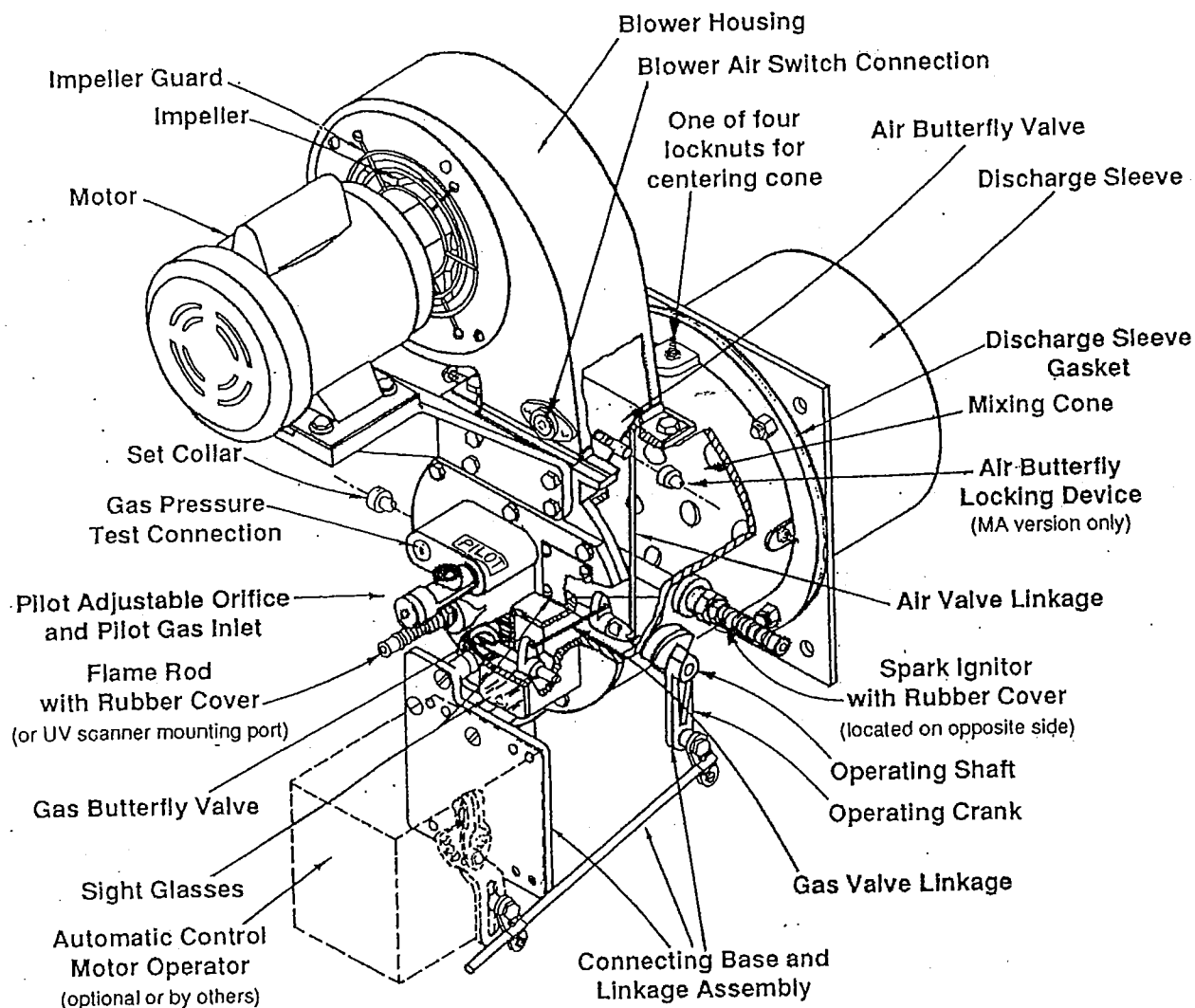
NOTE: Use of auxiliary switches will add to dimension D.

Model	A	B*	C	D	E	F	G	H	J	K	L	M	N	CC	DD	EE	FF	GG	HH	JJ	KK
405														8.81	11.37	14	3.66	17.31	17.81	14.37	17.06
407M														15.25	15.87	18	4.69		19.69	21.69	18.62
408	3.75	1		6.62	8.87	10.30		8.44		6.31	8.44	3.62		8.81	11.37	14	3.66	19.12	17.81	14.37	17.06
408M			5.44				13.19		4.37				0.25	15.25	15.87	18	4.69	17.31	19.69	21.69	18.62
412M																		19.12			
413M														8.81	11.37	14		17.31	17.75	14.37	17.06
415	4.75	1-1/4		7.69	8.81	10.25		10.37		8.25	10.37	4.44		15.25	15.87		3.59	17.31	19.56	21.69	18.62
422M														12.12	14.44		3.94		20.5	20.25	19.75
425		1-1/2												15.25	15.87		2.81	18.25	21.25	23.56	29.62
432M	5.75				10.06	11.88	14.69	12.50	5.44	10.25	12.5	5.62		12.12	14.44	18	3.94		20.5	20.25	19.75
435																	2.81		21.25	23.56	
442M		2	6.06	8.62									0.37	15.25	15.87			22.5	25	23.5	29.62
445																					
456M	6.81				14.38	16.88	19.31	14.62	6.5	12.25	14.75	6.69					5.37	24	26.81	25.94	
470M														17.75	17.79	19					
487M		3																			

\*Main fuel gas inlet NPT

Pipe threads on this page conform to NPT (ANSI Standard B2.1)

## Component Identification



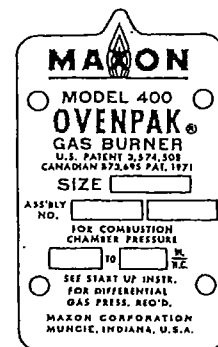
### Suggested spare parts

- Spark Ignitor
- Flame Rod, if used
- Filter Elements, if used
- Mixing Cone
- Discharge Sleeve and Gasket
- Motor
- Impeller
- Gas/Air Valve Linkage Kit

To order parts for an existing OVENPAK® Burner assembly, list:

1. Name(s) of part(s) from above illustration
2. Quantity of each required
3. OVENPAK® Burner nameplate information:
  - size and model number of burner
  - assembly number
  - date of manufacture
  - if available, serial number of Maxon fuel shut-off valve in-line to OVENPAK® Burner (This serial number is on Maxon valve's nameplate.)

### Nameplate



Date of Mfr.

## Suggested Maintenance/Inspection Procedures

### Discharge sleeve and cone alignment

Centering of the mixing cone provides a small annular opening for the flow of some cooling combustion air along the discharge sleeve wall. We SUGGEST periodic inspection from the discharge side of the burner to assure that this alignment is maintained.

**Caution:** Tightening can lead to cone distortion and greatly reduce cone and discharge sleeve life. Cone should be free to move and allow for thermal expansion.

If re-adjustment is necessary, back out the four lock nuts and re-center mixing cone with adjusting screws handtight. Back each screw out one-half turn before re-locking. This allows for thermal expansion as cone gets hot.

Filters should be inspected regularly and cleaned, using a vacuum to remove loose/dry accumulations, then washing and/or degreasing as appropriate for the filter type used.

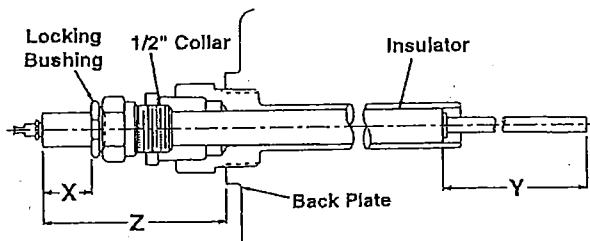
### To replace flame rod or spark ignitor:

1. Check Table 1 at right for dimension "Y" and cut tip to length shown.
2. Insert 1/2" NPT collar into burner and snug into position.
3. Insert insulator through collar into burner.
4. Check table for dimension "X", position accordingly, and tighten locking bushing until insulator is held firmly.

**WARNING:** Over-tightening locking bushing may damage insulator.

**NOTE:** A full-wave 6000 volt spark ignition transformer is suggested for use with Maxon burner equipment.

### Flame Rod



NOTE: 1/2" x 1" adapter bushing supplied by others

Table 1: Flame rod and spark ignitor dimensions for all Model "400" OVENPAK® Burners manufactured after 1/1/91.

Burner Model		Spark Ignitor Dimensions		Flame Rod Dimensions		
		X	Y	X	Y	Z
EB-1 EB-2	405	1.3	.4	.4	6	2.9
	407M					
	408M					
	408					
	412M					
EB-3	413M	1.5	.4	.4	6	2.9
	415					
EB-4 EB-5	422M	1.2	.4	.8	10.8	3.5
	425					
	432M					
	435					
EB-6 EB-7	442M	1.3	.4	.4	12.8	2.9
	445					
	456M					
	470M					
EB-7	487M					

① Manufactured date is stamped on metal nameplate of Model "400" OVENPAK® Burner. For specifics relative to units manufactured prior to 1/1/91, see Product Information Sheet 2100-3.

## Installation Instructions

### General Instructions

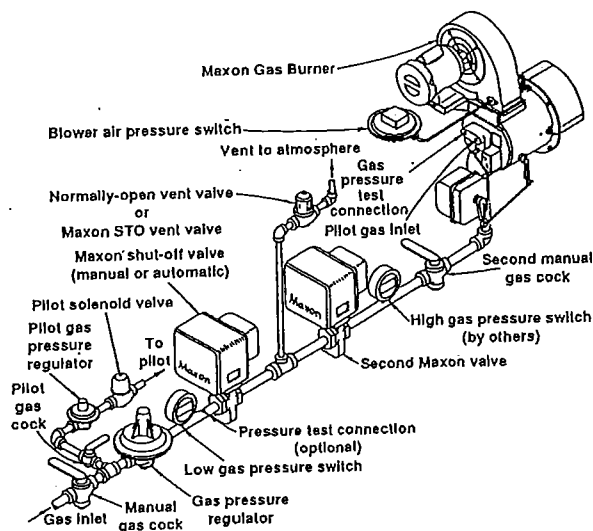
**Important:** Do not discard packing material until all loose items are accounted for.

To prevent damage in transit, the spark ignitor, discharge sleeve, mounting gaskets, flame rod and connecting linkage components may be packed separately and shipped loose with your new Maxon OVENPAK® Burner.

The burner itself is normally only a part of your complete combustion system. Additional pipe train accessories and control components will be required for a complete system installation. The sketch below shows a typical gas train as might be used with OVENPAK® gas fired burners.

### Piping Layout as sometimes required by insurance and standards groups

Block and Bleed gas train arrangement illustrated with Model "400" OVENPAK® Burner



Model "400" OVENPAK® Burners provide the air supply (except for EB versions, which require a separate combustion air blower). They also serve as a fuel flow control and fuel/air mixing device. Model "200" OVENPAK® Burners serve as a mixing device and usually have an externally-mounted gas control valve.

Burner should not be exposed to direct radiant heat or positioned where it might draw in inert gases. If such conditions exist, consider filters, relocation and/or use of the EB version and external air supply.

Electrical service must match the voltage, phase and cycle of all electrical system components and be

compatible with burner nameplate ratings. Insure that all normal control safeguards are satisfied. Combustion air blower should continue to run after shutdown to allow burner to cool.

Gas supply piping must be large enough to maintain the required fuel pressures cataloged for the particular burner size used with burner operating at full rated capacity.

Anything more than minimal distance or piping turns may necessitate oversizing piping runs to keep pressure drops within acceptable ranges.

Inlet pipe leading to any burner should be at least four pipe diameters in length. If multiple burners are fed from a single gas train, care should be taken to minimize pressure drop and give maximum uniformity.

Clean fuel lines are essential to prevent blockage of pipe train components or burner gas ports.

Main Shut-Off Cock should be upstream of both the main gas regulator and pilot line take-off. Use it to shut off fuel to both pilot and main burner during shutdown periods of more than a few hours.

The fuel throttling valve contained within a Maxon burner is not intended for tight shut-off.

Main gas regulator is essential to maintain a uniform system supply pressure. If one pipe train supplies multiple burners, provide a separate regulator in the branch leading to each burner system.

Size the regulator for full system capacity at the required pressure, carefully considering pipe train losses. Follow the instructions attached to the regulator during installation and be sure to remove any shipping pin or block.

Pilot take-off should be upstream of the main gas regulator, but downstream of the main gas cock. It should normally include its own pilot gas regulator, a solenoid valve and shut-off cock. A pilot adjustable orifice at the pilot inlet simplifies adjustment.

Pilot piping must be large enough to provide for the full flow and pressures shown in the catalog for your particular burner size.

Fuel Shut-Off Valves (when properly connected to a control system) shut the fuel supply off when a hazardous operating condition is sensed. Manual reset valves require operator attendance each time the system is started up (or restarted after a trip-out). Motorized shut-off valves permit automatic start-restart when used with an appropriate control system.

Test connections are essential for burner adjustment. They should be provided immediately downstream of the regulator and are included in the burner itself. Test connections must be plugged except when readings are being taken.



## Installation Instructions

Horizontal mounting is preferred, but burner may be mounted in any position suitable for automatic control motor and UV scanner (if used).

OVENPAK® Burners will typically be installed through an oven wall or insulated air duct. Cut opening approximately 1" larger in diameter than discharge sleeve to allow for thermal expansion of sleeve.

Burner mounting requires four studs and a flat mounting surface perfectly centered on the discharge sleeve.

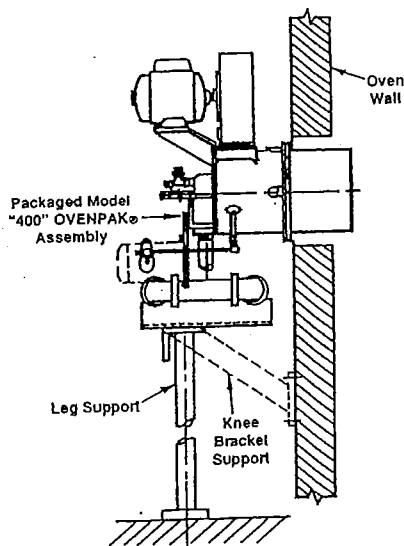
After placing burner in position over studs, add lock washers and nuts, then draw up hand-tight only. Check that burner is seated evenly all around the flange, filling any gaps to prevent air leakage, then tighten all nuts firmly.

For proper performance of any burner, air inlet and motor should be surrounded by clean, fresh, cool air.

Burner and pipe manifold support will be required to support weight of the burner and connected pipe train components. Air control motors, in particular, require additional support. Maxon connecting base and linkage assemblies are designed to position the control motors to work with the burner, not to support their weight.

The Packaged Model "400" OVENPAK® Burner requires external auxiliary support provided by the user. The support configuration may be similar to the leg support or knee bracket support illustrated below.

### Suggested supporting arrangements for Packaged Model "400" OVENPAK® Burners:

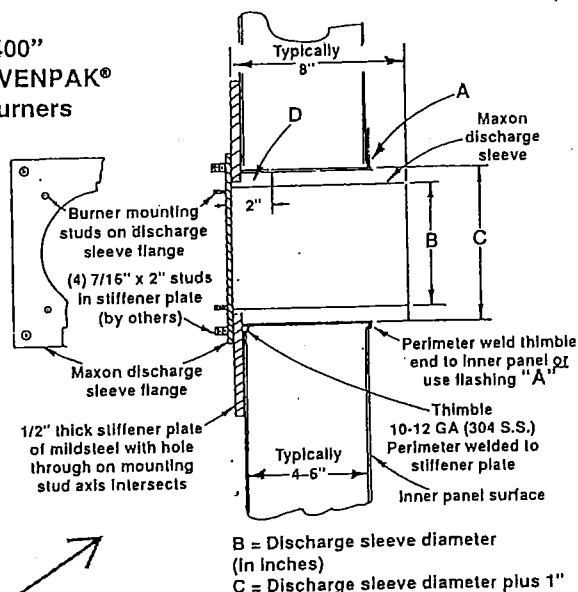


Additional burner support may be required in conjunction with a stiffener plate when mounting OVENPAK® Burner (weighing 100-350 pounds) through typical thin wall of heater/oven panels.

For push-through systems, use Maxon special back pressure gasket between stiffener plate and discharge sleeve flange and use (2) ring gaskets between discharge sleeve flange and burner casting to prevent back flow of high temperature air. Fill area D (see sketch below) with no more than 2" of high temperature packing (too little will overheat mounting; too much will overheat sleeve).

### Typical discharge sleeve mounting recommendations

#### "400" OVENPAK® Burners



For pull-through systems, spacers may be installed on stud bolts and area D left empty to admit cooling air past the sleeve.

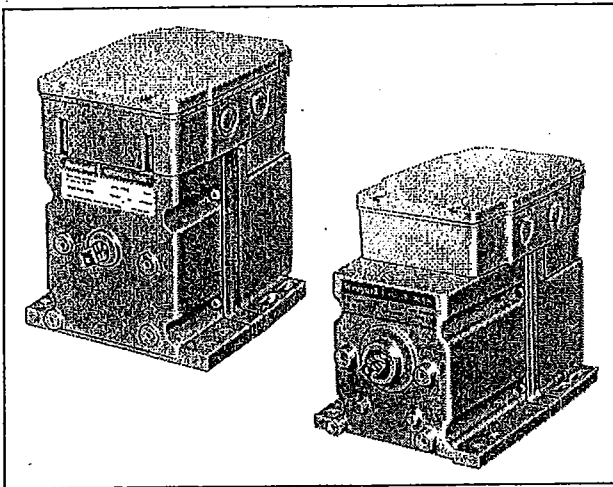
**WARNING:** Welding of burner flange to stiffener plate may cause warpage of burner flange and require additional seal material to prevent leakage.

Four lock screws permit centering of mixing cone within burner body and sleeve.

# Honeywell

## Series 72 Modutrol IV™ Motors

PRODUCT DATA



### APPLICATION

The Series 72 Modutrol IV Motors are used to control dampers and valves. The motors accept a current or voltage signal from an electronic controller to position a damper or valve at any point between open and closed.

### FEATURES

- Replaces M744S,T,Y and M745S,T,Y Motors.
- M7261, M7274, M7281, M7284, and M7294 are non-spring return motors; M7272, M7282, M7285, and M7286 are spring return motors.
- Oil immersed motor and gear train for reliable performance and long life.
- Wiring box provides NEMA 3 weather protection.
- Actuator motor and circuitry operate from 24 Vac. Models available with factory installed transformer or an internal transformer can be field added.
- Quick connect terminals standard—screw terminal adapter available.
- Adapter bracket for matching shaft height of older motors is standard with replacement motors.
- Nominal timing of 30 seconds for 90° stroke and 60 seconds for 160° stroke.
- Valve and damper linkages, explosion-proof housing, and auxiliary switches available as accessories.
- Spring return motors are rated for 25 lb.-in. and 60 lb.-in. torque.
- Non-spring return motors are rated for 35 lb.-in., 75 lb.-in., 150 lb.-in., and 300 lb.-in. torque.
- Models available with adjustable start (zero) and span.
- Models available with 4 to 20 mA input signal.
- Models available with 2 to 10 Vdc input signal.
- Die-cast aluminum housing.

### Contents

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Ordering Information .....	2
Installation .....	5
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## SPECIFICATIONS

**Models:** TRADELINE models are selected and packaged to provide ease of stocking, ease of handling and maximum replacement value. TRADELINE model specifications are the same as those of standard models unless specified otherwise. TRADELINE models have auxiliary switch cams.

**NOTE:** Auxiliary switches can only be added to motors that include auxiliary switch cams. (These cams cannot be field-added.)

### IMPORTANT

*The specifications given in this publication do not include normal manufacturing tolerances. Therefore, an individual unit may not exactly match the listed specifications. Also, this product is tested and calibrated under closely controlled conditions and some minor differences in performance can be expected if those conditions are changed.*

Modutrol IV Order Number Guide: See Table 1.

Dimensions: See Fig. 1.

Table 1. Modutrol IV Order Number Guide.

M	Motor					
	72	4-20 mA or 2-10 Vdc Control <sup>a</sup>				
		6	—	35 lb-in. Non-Spring Return		
		7	25 lb-in. Spring Return	75 lb-in. Non-Spring Return		
		8	60 lb-in. Spring Return	150 lb-in. Non-Spring Return		
		9	—	300 lb-in. Non-Spring Return		
		1	Single-ended shaft		Non-Spring Return	
		2			Normally Closed <sup>b</sup> Spring Return	
		4	Dual-ended shaft		Non-Spring Return	
		5			Normally Closed <sup>b</sup> Spring Return	
		6			Normally Open <sup>c</sup> Spring Return	
		A	0 Auxiliary Switches	Fixed Stroke	Normally Closed <sup>b</sup>	
		B	1 Auxiliary Switch			
		C	2 Auxiliary Switches			
		D	0 Auxiliary Switch	Adjustable Stroke		
		F	2 Auxiliary Switches			
		G	0 Auxiliary Switch	Fixed Stroke	Normally Open <sup>c</sup>	
		L	1 Auxiliary Switch	Adjustable Stroke		
		Q	2 Auxiliary Switches	Fixed Stroke	Normally Closed <sup>b</sup>	
M	61	8	4	A	XXXX	See Catalog for Complete O.S. Number

<sup>a</sup> Adjustable zero and span.

<sup>b</sup> Electrically normally closed. Shaft rotates clockwise (viewed from the power end) with increase in control signal. Motor drives to normally closed position when powered with control wiring not connected.

<sup>c</sup> Electrically normally open. Shaft rotates counterclockwise (viewed from the power end) with increase in control signal. Motor drives to normally open position when powered with control wiring not connected.

## ORDERING INFORMATION

When purchasing replacement and modernization products from your TRADELINE® wholesaler or distributor, refer to the TRADELINE® Catalog or price sheets for complete ordering number.

If you have additional questions, need further information, or would like to comment on our products or services, please write or phone:

1. Your local Home and Building Control Sales Office (check white pages of your phone directory).
2. Home and Building Control Customer Relations

Honeywell, 1885 Douglas Drive North

Minneapolis, Minnesota 55422-4386 (800) 328-5111

Canada—Honeywell Limited/Honeywell Limitée, 35 Dynamic Drive, Scarborough, Ontario M1V 4Z9.

International Sales and Service Offices in all principal cities of the world. Manufacturing in Australia, Canada, Finland, France, Germany, Japan, Mexico, Netherlands, Spain, Taiwan, United Kingdom, U.S.A.

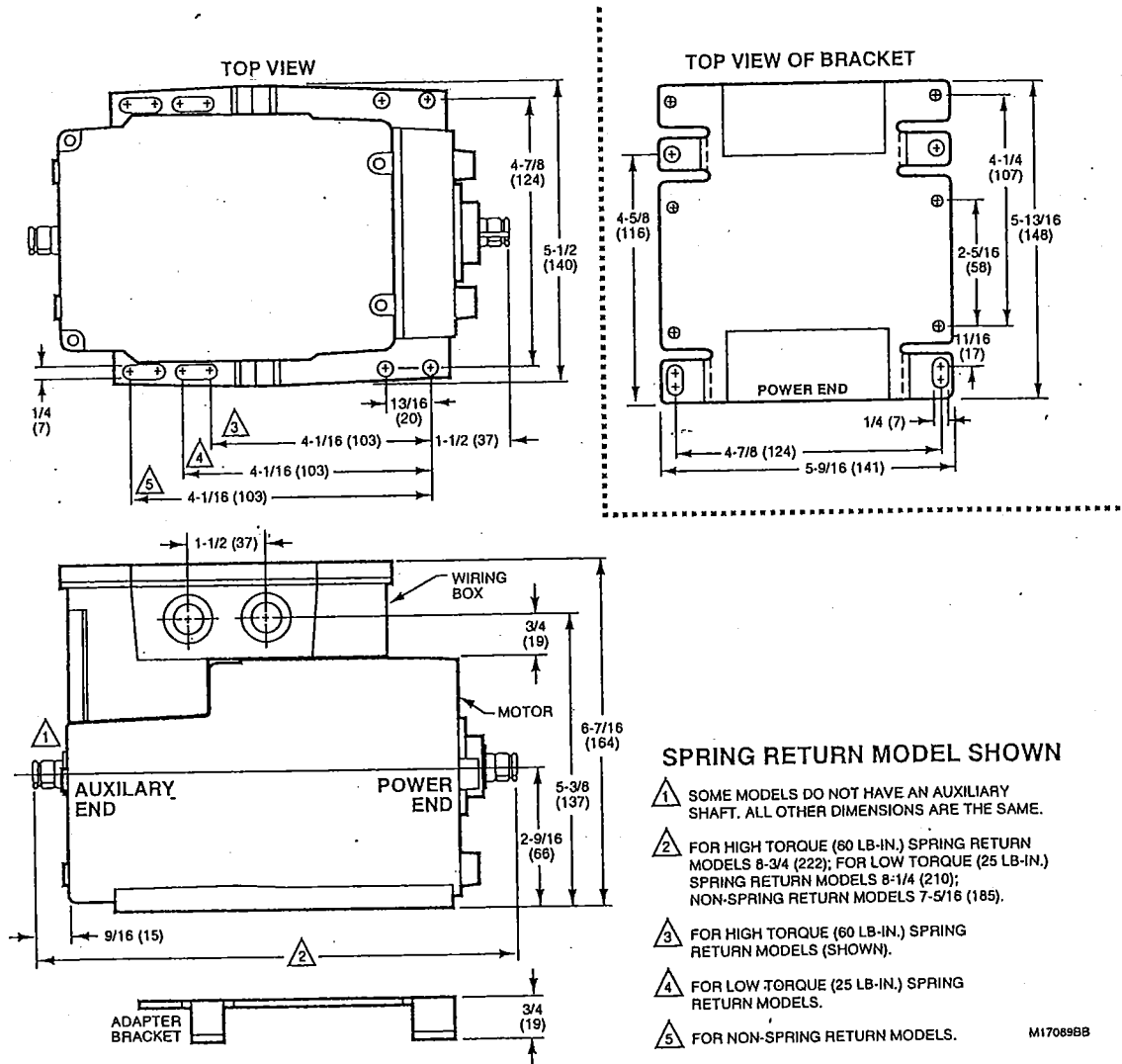


Fig. 1. Series 72 Modutrol IV Motor dimensions in in. (mm).

**Controller:** These motors can be used with any electronic controller that provides a stable noise-free proportional current output as specified in Electrical Ratings, Input Range below.

**Electrical Ratings:**

**Power Consumption:** See Table 2.

**Input Range:**

Current, Nonadjustable: 4 to 20 mA nominal, 25 mA maximum.

Current, Adjustable: 4 to 20 mA adjustable, 50 mA maximum.

Zero/Null (Motor Closed): 0.08 to 18 mA.

Span: 1.8 to 18 mA.

Voltage, Nonadjustable: 2 to 10 Vdc.

**Input Impedance:**

4 to 20 mA Input: 100 ohms.

2 to 10 Vdc Input: 400K ohms.

Table 2. Series 72 Modutrol IV Motor Power Consumption Ratings (at 120 Vac, 50/60 Hz).

Model	Power Consumption	
	Watts	Amps
M7261	19	0.20
M7272	26	0.26
M7274	15	0.71
M7281	23	0.24
M7282	28	0.28
M7284	23	0.24
M7285	28	0.28
M7286	23	1.00
M7294	23	0.24

## SERIES 72 MODUTROL IV™ MOTORS

Auxiliary Switch Ratings (in Amps): See Table 3.

Table 3. Auxiliary Switch Ratings (in Amps).

One Contact Rating <sup>a</sup>	120V	240V
Full Load	7.2	3.6
Locked Rotor	43.2	21.6

<sup>a</sup> 40 VA pilot duty, 120/240 Vac on opposite contact.

**Stroke:** Fixed 90° or 160° models available. Other models available with field adjustable strokes from 90° to 160°. Stroke adjusted by means of cams located in the wiring compartment.

**Timing:** Nominal 30 seconds for 90° stroke and 60 seconds for 160° stroke.

**Dead Weight Load On Shaft:** 200 lb (91 kg) on motor power or auxiliary end; maximum combined load of 300 lb (136 kg).

### Motor Rotation:

**Closed:** Counterclockwise rotation limit as viewed from motor power end.

**Open:** Clockwise rotation limit as viewed from motor power end.

**Mechanically Normally Closed:** Spring return. Normally closed motors rotate to closed position on power loss.

**Mechanically Normally Open:** Spring return. Normally open motors rotate to open position on power loss.

**Electrically Normally Closed:** Both spring return and non-spring motors return to closed position on minimum signal.

**Electrically Normally Open:** Both spring return and non-spring return motors return to open position on minimum signal.

**Ambient Temperature Ratings:** -40 to 150°F (-40 to 66°C).

**Shaft:** 3/8 in. [9.5 mm] square.

### Approvals:

Underwriters Laboratories Inc. Listed: File No. E4436; Guide No. XAPX.

Canadian Standards Association Certified: General listed File No. LR1620; Guide No. 400-E.

### Accessories:

198162AA Internal Transformer 120/208/240 Vac 50/60 Hz primary, 24 Vac secondary.

198162EA Internal Transformer; 120 Vac 50/60 Hz primary, 24 Vac secondary.

198162GA Internal Transformer; 220 Vac 50/60 Hz primary, 24 Vac secondary.

198162JA Internal Transformer; 24 Vac 50/60 Hz primary, 24 Vac secondary (for electrical isolation).

220736A Internal Auxiliary Switch Kit; one switch, can be field-installed on TRADELINE models.

220736B Internal Auxiliary Switch Kit; two switches, can be field-installed on TRADELINE models.

220738A Adapter Bracket raises motor shaft height by 19 mm to match that of previous Modutrol® Motor models.

220741A Screw Terminal Adapter converts the standard quick-connect terminals to screw terminals.

221455A Infinitely Adjustable Crank Arm, can rotate through downward position and clear motor base without requiring an adapter bracket.

4074ERU Weatherproofing Kit provides NEMA 3 rating for Modutrol IV Motors mounted in position other than upright.

4074EZE Bag Assembly with parts that can provide CE compliance.

7617ADW Crank Arm, can rotate through downward position and clear motor base without requiring an adapter bracket.

ES650-117 Explosion-Proof Housing encloses motor for use in explosive atmospheres. Not for use with Q5001 (or any other valve linkages). Order separately from O-Z/Gedney Inc.

To order, contact: O-Z/Gedney, Nelson Enclosures and Controls,

(918) 641-7381 or (918) 641-7374; or write to:

O-Z/Gedney, Nelson Enclosures and Controls  
P.O. Box 471650

Tulsa, OK 74147-1650

(Requires Honeywell 7617DM Coupling.)

Q100 Linkage connects Modutrol® Motor to V51 Butterfly Valve. Requires the 220738A Adapter Bracket.

Q181 Auxiliary Potentiometer for sequence or unison control of 1 to 4 additional modulating (Series 90) motors.

Q5001 Bracket and Linkage Assembly connects Modutrol IV Motor to water or steam valve.

Q605 Damper Linkage connects motor to damper. Includes motor crank arm.

Q607 External Auxiliary Switch controls auxiliary equipment as a function of motor position.

## INSTALLATION

### When Installing this Product...

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check the ratings given in the instructions and on the product to make sure the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is complete, check out product operation as provided in these instructions.



### CAUTION

**Electrical Shock or Equipment Damage Hazard.**  
Can shock individuals or short equipment circuitry.

Disconnect all power supplies before installation.  
Motors with auxiliary switches can have more than one disconnect.



### CAUTION

**Equipment Damage Hazard.**  
Can damage the motor beyond repair.  
Never turn the motor shaft by hand or with a wrench.  
Forcibly turning the motor shaft damages the gear train and stroke limit contacts.

### IMPORTANT

*Always conduct a thorough checkout when installation is complete.*

### Location

Allow enough clearance for accessory installation and motor servicing when selecting a location (see Fig. 1). If located outdoors, use liquid-tight conduit connectors with the junction box to provide NEMA 3 weather protection. If mounted outdoors in a position other than upright, install a 4074ERU Weatherproofing Kit and liquid-tight connectors to provide NEMA 3 protection.



### CAUTION

**Motor Damage Hazard.**  
Deteriorating vapors and acid fumes can damage metal parts.  
Install motor in areas free of acid fumes and other deteriorating vapors.

In excessive salt environments, mounting base and screws should be zinc or cadmium plated, not stainless steel or brass. Use the 220738A Adapter Bracket for mounting on these surfaces.

### Mounting

Use the following guidelines for proper motor mounting:

- Always install motors with the crankshaft horizontal.
- Mounting flanges extending from motor housing base are drilled for 1/4 inch (6.4 mm) machine screws or bolts.
- Non-Spring Return Motors are shipped from the factory in the closed position (at the counterclockwise rotation limit, as viewed from the motor power end).
- Spring Return Motors are shipped from the factory in their normal position.
- Normally closed models are shipped at the counterclockwise rotation limit, as viewed from the motor power end.
- Normally open models are shipped at the clockwise rotation limit, as viewed from the motor power end.

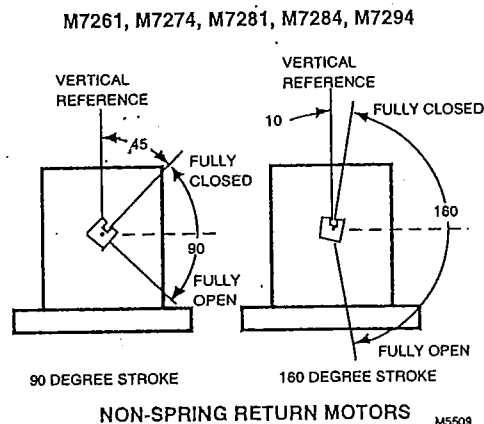
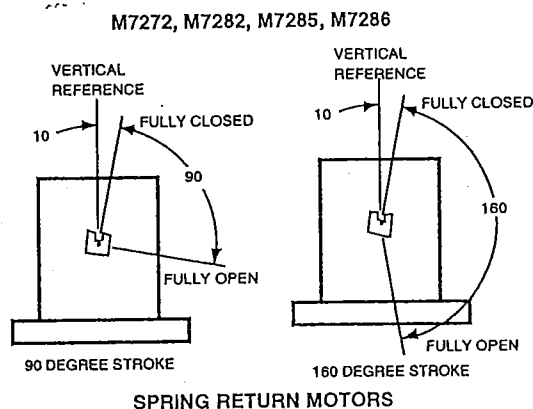


Fig. 2. Motor shaft position at limit of rotation (viewed from motor power end).

## Adapter Bracket

The 220738A Adapter Bracket, positioned between the motor and the equipment, raises motor shaft height by 0.75 in. (19 mm) to match that of previous Modutrol® Motor models.

The following applications require this bracket:

- Q607 External Auxiliary Switch.
- Damper linkage applications requiring added clearance to allow:
  - Crank arm rotation through the downward position.
  - Sufficient damper linkage to reach the motor shaft.
- All valve linkages except the Q5001.

**NOTE:** When the bracket is not used in a replacement application, the damper linkage requires adjustment for the new shaft position.

To mount the motor with the bracket:

1. Mount the bracket to the equipment with existing or standard bolts.
2. Using the provided bolts, mount the motor to the bracket threaded holes. See Fig. 3.

For valve linkage applications (other than the Q5001):

1. Mount the bracket to the linkage.
2. Position the motor on the bracket to align the motor shaft with the linkage.
3. Attach the motor to the bracket with the four bolts provided. See Fig. 4.

## Damper Linkages

The motor does not include a crank arm. Order the crank arm separately (see Accessories in the Specifications section). For detailed instructions on the assembly of specific linkages, refer to the Installation Instructions packed with the linkage.



### CAUTION

Equipment Damage Hazard.

Stalling a motor can damage the drive shaft.

Ensure installation of motors and linkages allows the motor to drive through full stroke without obstruction.

## Valve Linkages

The Q100 Linkage requires a 220738A Adapter Bracket for all valve applications. Applications with the Q5001 Valve Linkage do not require the 220738A Adapter Bracket (see Fig. 4).

For detailed instructions on specific linkage assemblies, refer to the instruction sheet packed with the linkage. In general, check the following points when installing a motor and linkage:

- Adjust valve and louver-type damper linkages so the damper or valve moves through only the maximum required distance while the motor moves through its full stroke.
- With modulating control, maximum damper opening should be no more than 60 degrees. Little additional airflow is provided beyond this point.
- Do not exceed load and torque ratings in any application.

## Junction Box

When used with liquid-tight conduit connectors, the junction box provides NEMA 3 weather protection for the motor. The junction box, standard with replacement motors, encloses the terminals and provides knockouts for wiring conduits. Housing an internal transformer or internal auxiliary switches requires using a junction box.

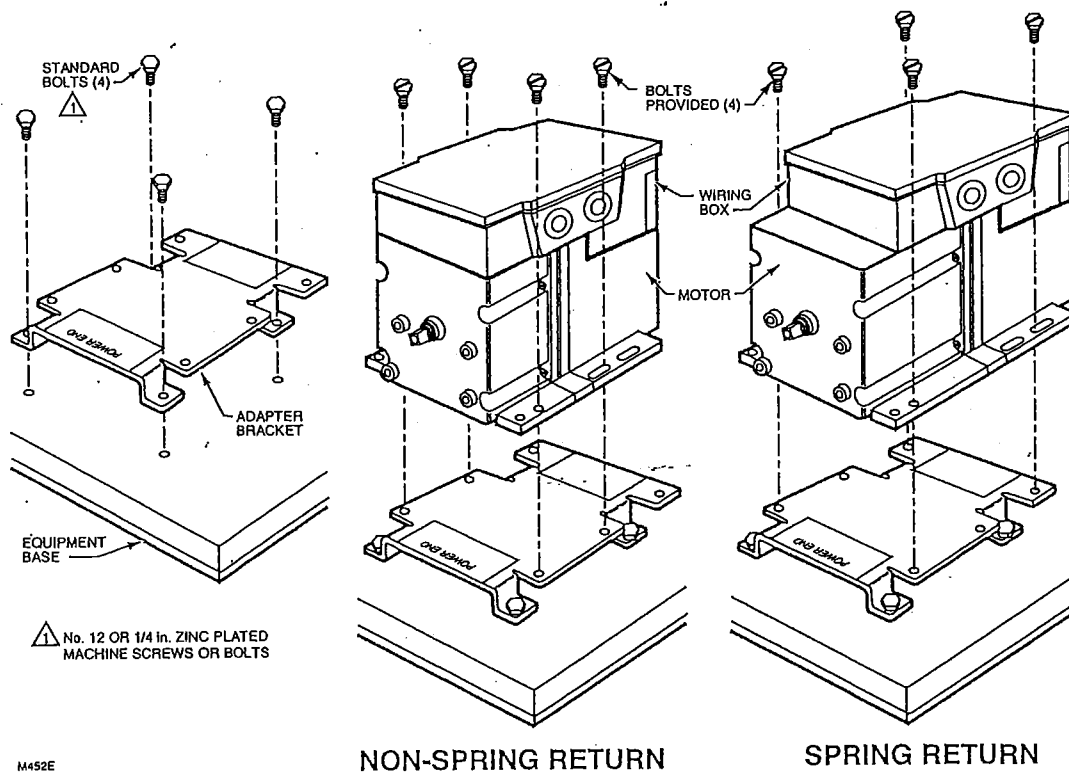


Fig. 3. Mounting the motor with an adapter bracket.

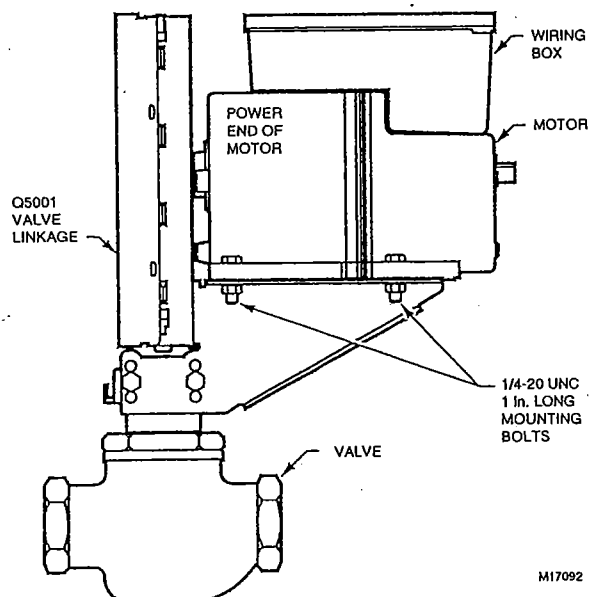


Fig. 4. Mounting the motor on a Q5001 Valve Linkage.



## Wiring

### CAUTION

Electrical Shock or Equipment Damage Hazard.  
Can shock individuals or short equipment circuitry.  
Disconnect all power supplies before installation.  
Motors with auxiliary switches can have more than one disconnect.

#### IMPORTANT

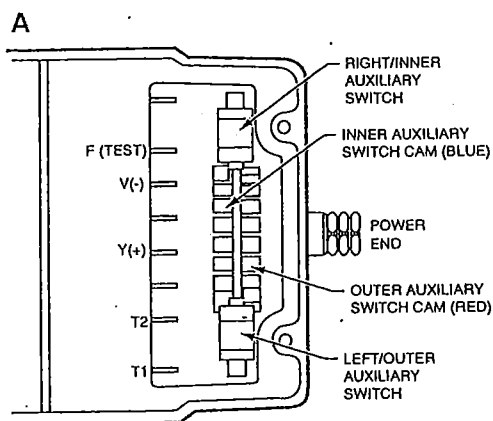
All wiring must agree with applicable codes, ordinances and regulations.

1. Ensure that the voltage and frequency stamped on the motor correspond with the power supply characteristics.
2. When connecting several motors in parallel, ensure that the power supply VA rating is large enough to provide power to all motors used without overloading.

3. Fig. 5 shows that motor terminals are quick-connects located on top of the printed circuit board.
4. To access the wiring compartment:
  - a. Remove the four screws from the junction box top.
  - b. Lift off the cover.
5. Fig. 6 shows the internal wiring schematic.
6. Refer to Fig. 7 and 8 for typical wiring.

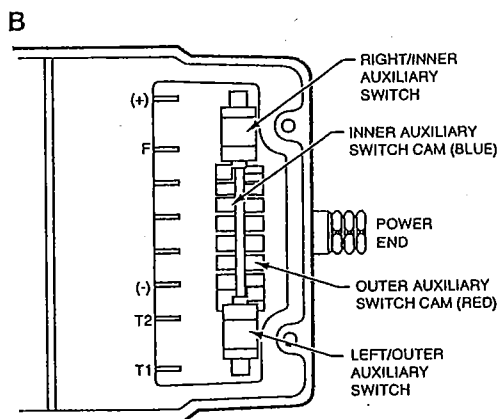
Wire the motor as follows:

1. Remove the wiring box cover by removing the four screws holding the cover to the motor.
2. Wire motor to system using quick-connect terminals in wiring box.
3. Replace wiring box cover.



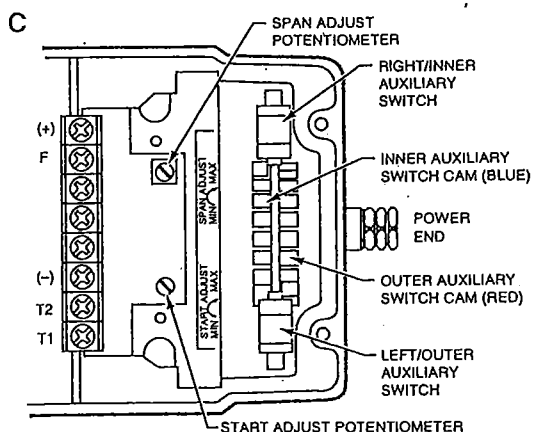
NOTE: FEATURES AVAILABLE ON SOME MODELS ONLY.

2 TO 10 VDC INPUT MOTORS



NOTE: FEATURES AVAILABLE ON SOME MODELS ONLY.

4 TO 20 mA NONADJUSTABLE INPUT MOTORS

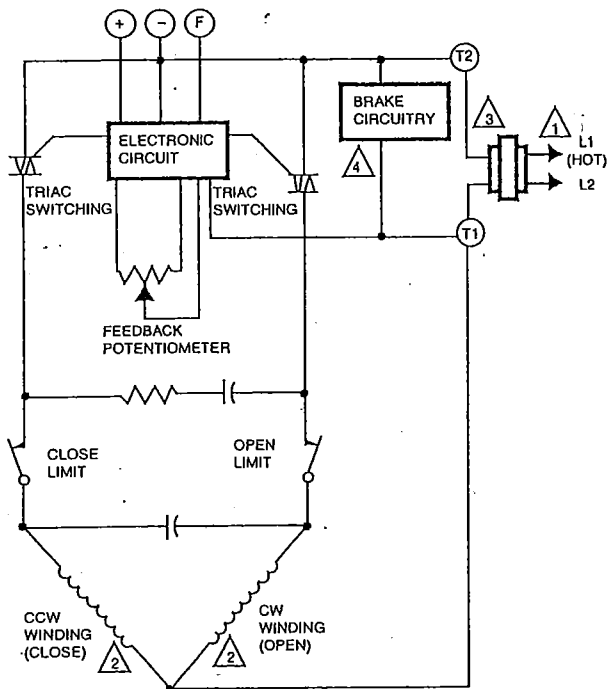


NOTE: FEATURES AVAILABLE ON SOME MODELS ONLY.

4 TO 20 mA ADJUSTABLE INPUT MOTORS

145777

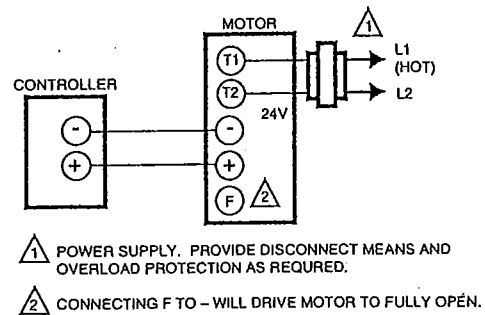
Fig. 5. Terminals and adjustments.



- 1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
- 2 DIRECTION OF MOTOR TRAVEL AS VIEWED FROM POWER END.
- 3 INTERNALLY MOUNTED TRANSFORMER. DO NOT CONNECT POWER SUPPLY TO T1 AND T2.
- 4 BRAKE CIRCUITRY ONLY ON SPRING RETURN MODELS.

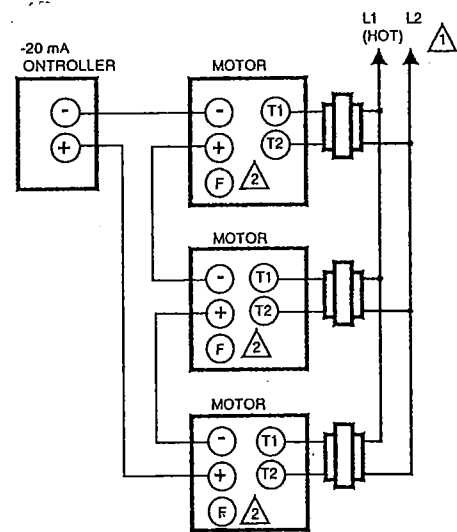
M5511

Fig. 6. Series 72 motor internal wiring schematic.



M5778

Fig. 7. Typical system wiring.



- 1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
- 2 CONNECTING F TO - WILL DRIVE MOTOR TO FULLY OPEN.

M5774

Fig. 8. Driving up to six motors from one 4 to 20 mA controller.

## SETTINGS AND ADJUSTMENTS

### Zero and Span Adjustment for M7284Q and M7285Q Motors (Fig. 5.)

1. Adjust the start potentiometer fully clockwise (maximum zero) and the span potentiometer fully counterclockwise (minimum span).
2. Set the controller current to the value required to drive the motor to the closed position.
3. Turn the start potentiometer slowly counterclockwise until the motor begins to open. This is defined as the start or zero setting.
4. Set the controller current to the value required to drive the motor to the fully open position. The motor will open.
5. Turn the span potentiometer clockwise until the motor starts to close. The difference between the fully open span position current and the zero position current is defined as the operating span.
6. Recheck the start and readjust the span potentiometer P1 if necessary. Turn the start potentiometer clockwise to increase the zero position.
7. Recheck the span and readjust the span potentiometer if necessary. Turn it clockwise to increase the full span position.
8. For sequential operation, as shown in Fig. 9, repeat the above steps for each motor.

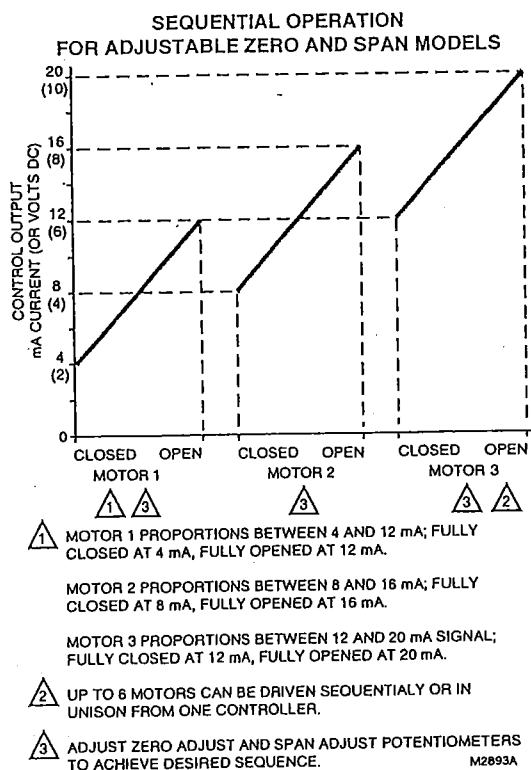


Fig. 9. Sequential operation of motors.

### Auxiliary Switches



#### CAUTION

**Electrical Shock or Equipment Damage Hazard.**  
Can shock individuals or short equipment circuitry.  
Disconnect all power supplies before installation.  
Motors with auxiliary switches can have more than one disconnect.



#### CAUTION

**Equipment Damage Hazard.**  
Can damage the motor beyond repair.  
Never turn the motor shaft by hand or with a wrench.  
Forcibly turning the motor shaft damages the gear train and stroke limit contacts.

Adjustable cams actuate the auxiliary switches. These cams can be set to actuate the switches at any angle within the motor stroke. Select switch differential of 1° or 10°.

Motors with factory added auxiliary switches are shipped in the closed position (fully counterclockwise, as viewed from the motor power end) with auxiliary cams set to actuate switches 30° from the closed position and to provide 1° degree differential. With the motor in the closed (fully counterclockwise) position, the auxiliary switch breaks contacts R-B. See Fig. 10 for auxiliary switch wiring.

TRADELINE Motors are shipped with auxiliary switch cams that permit acceptance of 220736A,B Internal Auxiliary Switch Kits. Refer to form 63-2228 for 220736A,B Installation Instructions.

## Auxiliary Switch Adjustment

### IMPORTANT

When adjusting the auxiliary switch cams use the following procedure:

1. Insert 1/8 in. screwdriver blade into a slot on cam and move the screwdriver top as far as possible in the required direction. See Fig. 10.
2. Repeat step 1 in successive cam slots until the cam is in the required position.

Use the following procedure to obtain the desired auxiliary switch settings:

1. Remove the top cover from the motor to gain access to the motor terminals and auxiliary cams.
2. Disconnect the controller from the motor.
3. Connect a current source to the positive and negative terminals.
4. Drive the motor to the position where the auxiliary equipment is to be switched by increasing or decreasing the current.
5. For a switch differential of 1°, check continuity of auxiliary switch contacts R-B and rotate the cam as follows:
  - a. If the contacts are open, rotate the cam clockwise until the R-B contacts close.
  - b. If the contacts are closed, rotate the cam counterclockwise until the R-B contacts open.

6. For a switch differential of 10° rotate the cam approximately 180° so the slow-rise portion of the cam actuates the switch.
7. Check continuity of the auxiliary switch contacts R-B.
8. Rotate the cam as follows:
  - a. If the contacts are open, rotate the cam counterclockwise until the R-B contacts close.
  - b. If the contacts are closed, rotate the cam clockwise until the R-B contacts open.
  - c. Make final adjustment in the proper direction to obtain contact make or break at the desired position.
9. Check for the proper differential and switching of the auxiliary equipment by driving the motor through the full stroke in both directions.
10. Disconnect power, remove current source, reconnect the controller, and replace the top cover on the motor.

NOTE: Changing the differential from 1° to 10° reverses the switching action. For example, with a 10° differential, switch contacts R-B make and R-W break on a counterclockwise (closed) rotation. With a 1° differential, switch contacts R-W make and R-B break on a counterclockwise (closed) rotation.

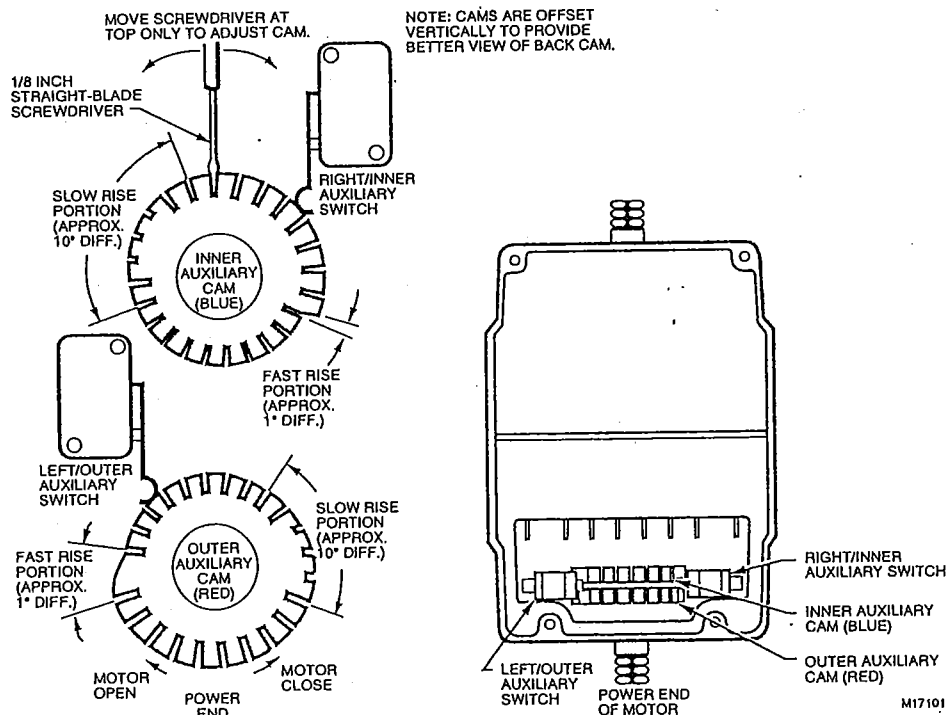


Fig. 10. Auxiliary switch adjustment.

## OPERATION AND CHECKOUT

### Operation

The motor feedback potentiometer and control current input circuit form a bridge circuit. As long as the final control element remains at the position proportional to the input current from the controller, the circuit is balanced, and the motor does not run. When the value of the controlled medium changes, the current from the controller changes, and unbalance is amplified to energize the Triac switching to run the motor in the proper direction to correct the change in the temperature or the pressure. The motor turns the feedback potentiometer to rebalance the circuit and stop the motor.

### Checkout

After installation and linkage adjustment, operate the motor through the controller. Make sure that:

- The motor properly operates the damper or valve.
- The motor responds properly as the input is varied.
- The auxiliary switch, if used, operates at the desired point of motor rotation.

Inspect the motor, linkage, and valve or damper to see that all mechanical connections are correct and secure.

In damper installations, the pushrod should not extend more than a few inches past the ball joints. Check to see that there is adequate clearance for the linkage to move through its stroke without binding or striking other objects.

See controller or system instructions for additional checkout procedures.

### Motor Operation Checkout

Check motor operation as follows:

1. To close the motor, open terminals +, -, and F.
2. To open the motor, connect terminal F to the negative (-) motor terminal.

**Honeywell**

Home and Building Control  
Honeywell  
5 Douglas Drive North  
Golden Valley, MN 55422

Home and Building Control  
Honeywell Limited-Honeywell Limitée  
35 Dynamic Drive  
Scarborough, Ontario  
M1V 4Z9

Honeywell Asia Pacific Inc.  
Room 3213-3225  
Sun Hung Kai Centre  
No. 30 Harbour Road  
Wanchai  
Hong Kong

Honeywell Europe S.A.  
3 Avenue du Bourget  
1140 Brussels  
Belgium

Honeywell Latin American  
Region  
480 Sawgrass Corporate Parkway  
Suite 200  
Sunrise FL 33325



## ■ 사양 (Specification)

### ■ 제품구성

HUF 시리즈 (배관경 1/2"에서 DN100까지)

### ■ 외관사이즈

5페이지 참조

### ■ 배관경

1/2" ~ 2" 나사타입 (암나사 - ISO 7-1에 따름)

DN50 ~ DN100

### ■ 최대 입구압

2bar ~ 6bar

### ■ 사용 온도범위

-15 ~ 80℃

### ■ 압력 측정구 접속

RP1/4"

### ■ 용량

7페이지 용량곡선 참조

### ■ 비틀림 및 굽힘 용력

배관연결은 EN161의 규격을 충족한다.

### ■ 실 및 가스켓

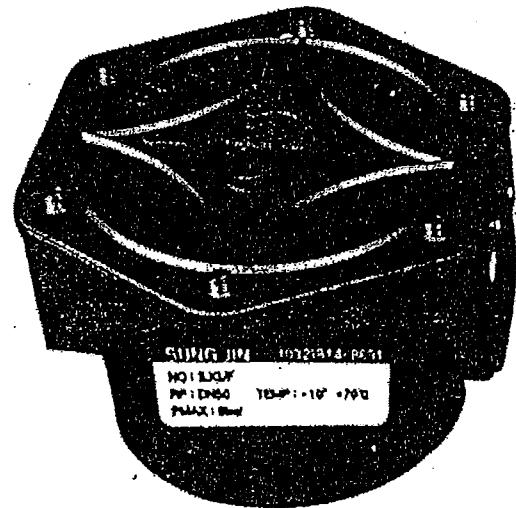
내탄화수소계 NBR 고무 (DIN3535/1)

### ■ 바디재질

알루미늄 합금 다이캐스팅 (UNI 5076/3051)

### ■ 필터

DVGW-G260/1 규격의 가스용 Self-extinguishing 합성섬유



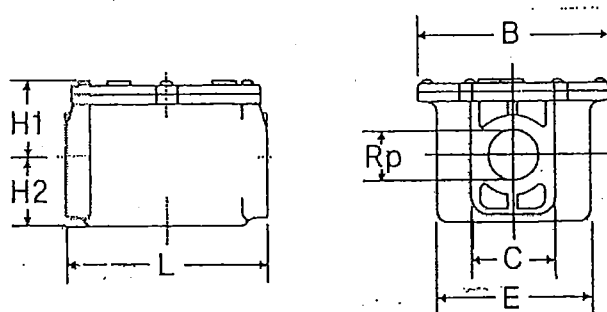
### 적용 (APPLICATION)

모든 가스기기의 연료 가스 및 연소용 가스 공급라인에 적용된다.

사용가능한 가스 : - 제조가스 (Town Gas)  
- 천연가스 (LNG)  
- LPG 가스  
- 공기

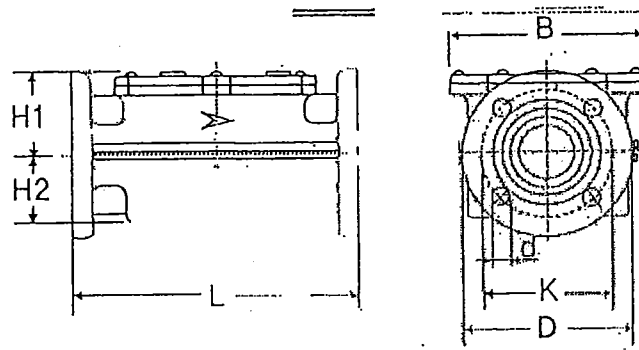
본 필터는 DIN3386의 기준은 충족한다.

### ▼ 외관사이즈 및 배관경 (나사 타입)



Model	Connection (Inch)	Max. Operating Pressure ( bar)	Overall Dimensions (mm)						Weight (kg)
	Rp		L	B	H1	H2	E	C	
SJG-01	1/2	2	121	132	38	51	93	44	0.70
SJG-02	3/4	2	121	132	38	51	93	44	0.68
→ SJG-03	1	2	121	132	38	51	93	44	0.66
SJG-04	1 1/4	2	173	187	52	61	134	61	1.29
SJG-05	1 1/2	2	173	187	52	61	134	61	1.23
SJG-06	2	2	199	218	73	73	162	81	2.08

### ▼ 외관사이즈 및 배관경 (플랜지 타입)



Model	Connection (inch)	Max. Operating Pressure ( bar)	Overall Dimensions (mm)						Weight (kg)
			L	B	H1	H2	D	K	d
SJG-DN 50	DN 50	6	230	196	96	97	160	125	18
SJG-DN 65	DN 65	6	290	210	97	104	170	145	18
SJG-DN 80	DN 80	6	320	244	112	103	200	160	18
SJG-DN100	DN100	6	380	273	134	107	228	180	18

## 설치(INSTALLATION)

### ■ 개요

매뉴얼을 주의 깊게 읽으시기 바랍니다. 본 매뉴얼을 따르지 않았을 경우, 제품의 손상을 유발하거나, 위험한 상황을 초래할 수 있습니다.

본 제품의 설치는 자격을 갖춘 숙련된 기술자에 의해 이루어져야만 합니다.

설치가 완료되었을 때는, 점검을 수행하시기 바랍니다.



### ■ 경고

설치전에 모든 가스공급을 차단하십시오.

배관을 연결하기 직전까지, 제품 입출구의 미개를 제거하지 마십시오.

본 필터는 제품의 화살표기가 가스공급 방향과 일치하게 설치되어야 합니다.

### ■ 설치위치

검사나 청소를 위해 뚜껑을 분리할 수 있는 위치여야 합니다.

카트리지를 교환을 위해, 뚜껑을 분리할 수 있는 위치에 설치되어야 하며, 고온 벽면(또는 물체)에서 30mm이상 떨어져야 합니다.

### ■ 나사타입

작업중 이물질이 필터에 들어가지 않도록 주의하십시오.

본 필터 외관의 화살표 방향과 가스 공급 방향이 반드시 일치하도록 하십시오.

배관 작업시는 ISO-1(BS21, DIN2999)을 따르며, 가공 잔존물이 남지 않도록 잘 가공된 테이퍼진 피팅을 사용하십시오.

배관연결시 배관이나 배관용자재를 너무 많이 깊어 보이지 마십시오. 그렇지 않을 경우, 제품의 변형(뒤틀림)이나 기능상의 결함을 초래할 수 있습니다.

### ■ 플랜지 버전

■ 작업중 이물질이 필터에 들어가지 않도록 주의하십시오.

■ 본 필터 외관의 화살표 방향과 가스 공급 방향이 반드시 일치하도록 하십시오.

■ 연결시 플랜지를 배관선상에 정렬시키고, 가스킷의 손상없이 필터를 위치시킬 수 있도록 적절한 간격을 유지하십시오.

■ 가스킷을 필터와 플랜지 사이에 위치 시키십시오.

이때, 필요하다면, 약간의 구리스(Grease)를 칠하는 것도 좋습니다.

■ 필터를 양측 플랜지의 나사를 조용 고정시키십시오.

## 유지(MAINTENANCE)

필터 전후단 압력손실이 10mbar 이상이 될 경우, 내부의 필터 부품(필터)을 교체하십시오. 적어도 일년에 한 번 이상의 교체가 바람직합니다.

### ■ 필터부품의 교체

필터부품의 교체가 요구될 시에는,

1. 교체전 반드시 가스공급을 차단하십시오.
2. 스크류를 풀의 뚜껑을 분리 하십시오. 이때, 필터 내부에 가스압이 차 있지 않도록 주의하십시오.
3. 카트리지를 분리하고, 하우징 내부를 청소하십시오.
4. 새 카트리지로 교환하십시오.
5. 카트리지를 제품내부에 적절히 설치하십시오. 이때, 내부의 멈치에 완전히 안착시키고, 카트리지의 오목한 부분의 INLET이란 스탬프가 찍힌 부분이 필터의 입구측에 가도록 방향에 주의하십시오.
6. 천천히 입구측 가스밸브를 연 후, 필터 뚜껑에서의 가스 누설 여부를 반드시 점검하십시오.



경고



## ■ 설치후 누설 검사

양질의 가스누설 검사용 스프레이를 이용하여, 배관사  
이 모든 연결부위 및 가스켓 부분에 스프레이를 뿌리시오.  
기기를 작동시킨 후, 거품이 생기는지 검사하시요.

이때, 배관 연결 부에서, 거품이 발견되면, 다시 완전히  
연결하시요.

가스켓 부분의 누설은 통상 연결 나사의 조임에 의해서  
중단되며, 그래도 누설이 계속될 시에는 가스켓을 교체한  
뒤 다시 연결하시요.

## 용량곡선(CAPACITY CURVE)

### ■ 개요

용량곡선을 읽을 때에는, 운전 유량을 적용하시요. 압력  
손실  $\Delta P$ 은 bar 단위의 절대압과 더해져야 합니다. 이는  
온도의 변동(Fluctuation)을 고려하기 때문입니다. 압력  
손실은 10mbar를 넘어서는 안됩니다.

### ■ 계산예

과 가스압(Excess Gas Pressure)  
4bar

### ■ 운전유량

150m<sup>3</sup>/h LNG

### ■ 필터선정

SJG.DN65(플랜지 타입)

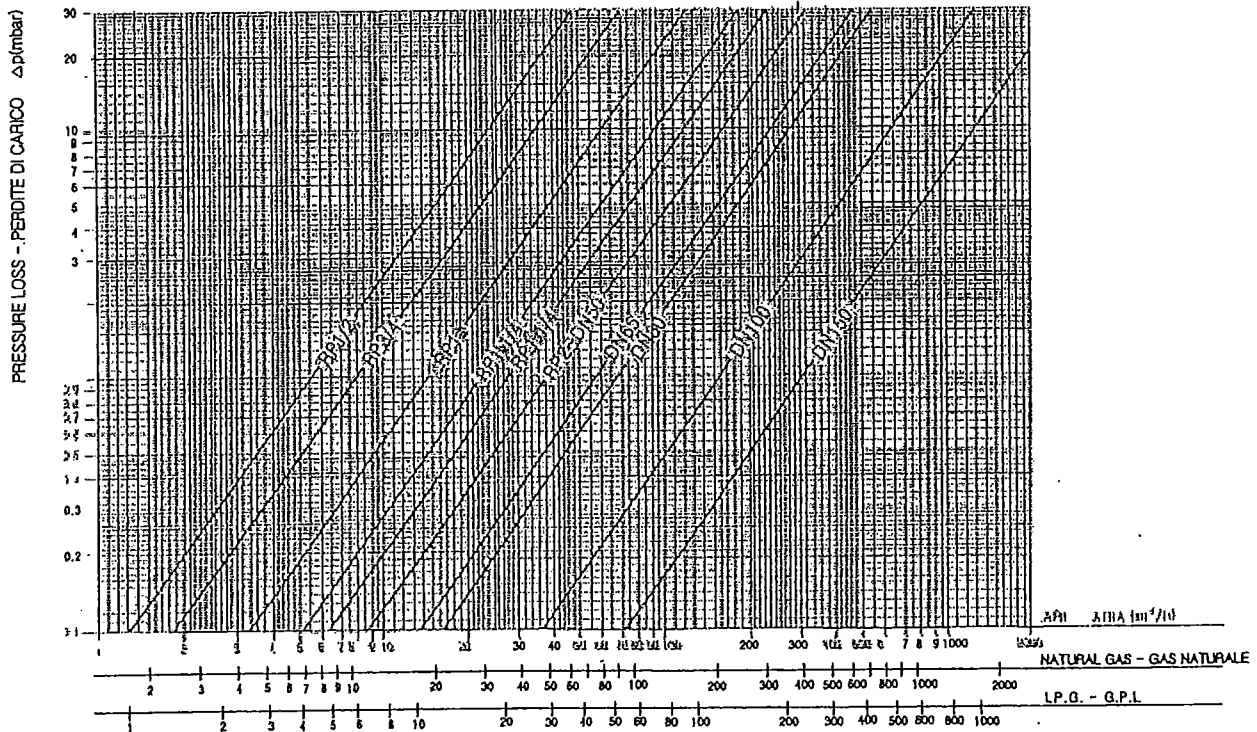
### ■ 압력손실

1.7mbar

### ■ 실제 압력손실

$\Delta P = 5(\text{과압} + 1) \times 1.7\text{mbar} = 8.6\text{mbar}$

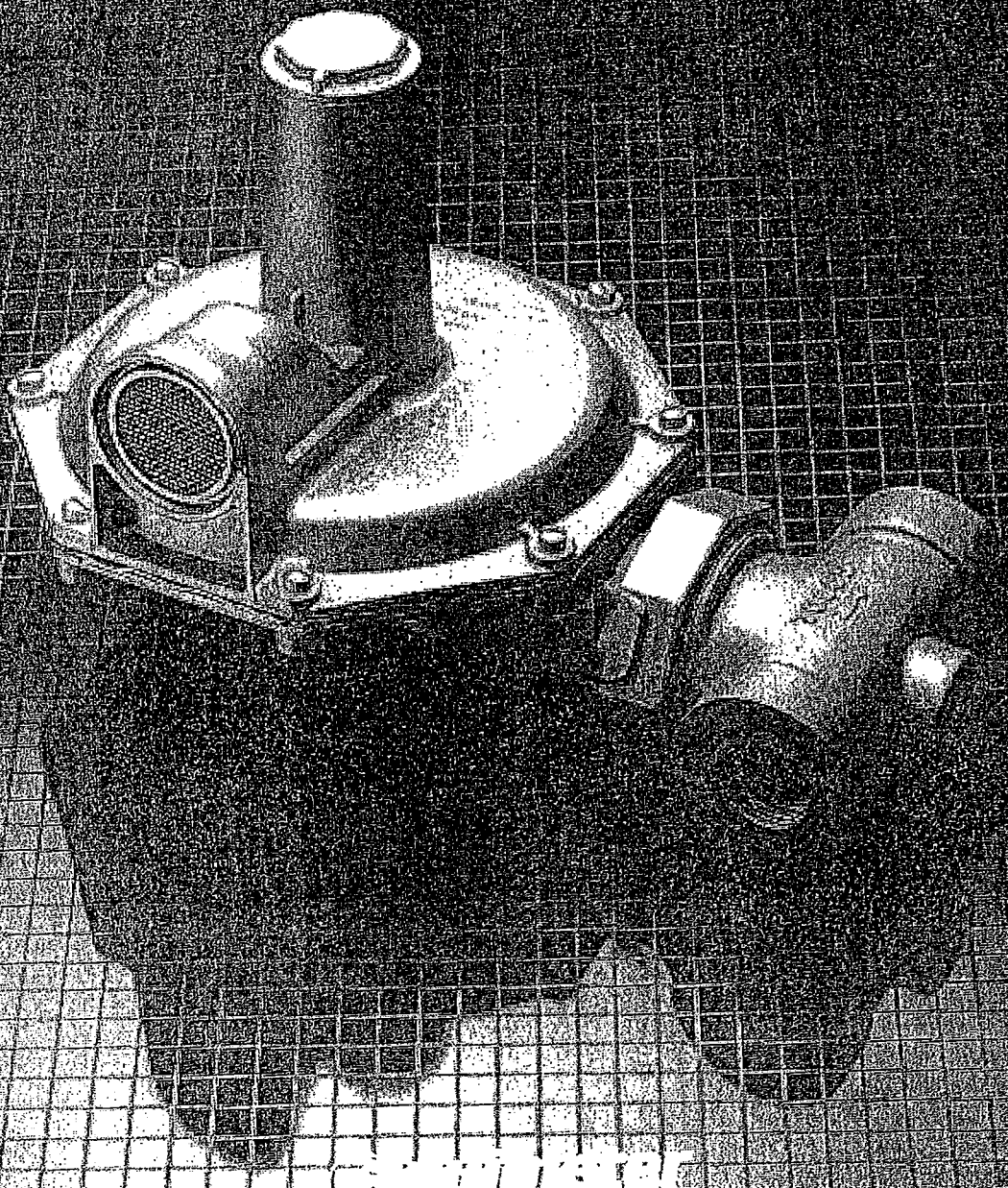
실제 압력손실은 10mbar 이하이므로 적절한 크기  
의 필터가 선정되었습니다.



R-1301  
Rev. 5

# Model 143-80

## Service Regulators



# Model 143-80 Service Regulators

The 143-80 is designed and built for domestic gas service, as well as for commercial and industrial applications; burners, furnaces, ovens, heaters, gas engines, etc. It can also be used for air, LPG, nitrogen, dry CO<sub>2</sub> and other gases.

Simple, rugged construction means dependability. Yet, it provides precise pressure control over an amazing range of pressure and load conditions.

It is simple to install and adjust. The union nut connection makes it easy to locate the regulator in the best installed position, and servicing is easy and convenient.

Equimeter's Model 143-80 Service Regulator...outstanding performance, utility, and dependability at an economical price...

Basic Models	Basic Models	Description	High Pressure Models
	143-80-1 143-80-2	Standard Regulator Regulator with Internal Relief Valve (IRV)	143-80-1HP 143-80-2HP

Spring Ranges	Outlet Pressure Ranges	Spring Color	Spring Part Number
	3 1/2" to 6 1/2" w.c. 5" to 8 1/2" w.c. 6" to 14" w.c. 12" w.c. to 1 psi 1/2 psi to 2 psi 1/2 psi to 3 psi 2 psi to 6 psi	Red Blue Green Orange Black & White Cadmium* Black*	143-62-021-15 143-62-021-16 143-62-021-17 143-62-021-18 143-62-021-22 173-62-021-02 139-16-021-01

\*Only use these springs in high pressure models (143-80-1HP and 143-80-2HP)

Maximum Inlet Pressures—Standard IRV Models and High-Pressure Models	Orifice Sizes	5/8"	1/2"	3/8"	5/16"	1/4"	3/16"	1/8"
	Max Inlet Pressure	10 psi	20 psi	40 psi	40 psi	60 psi	125 psi	125 psi

## Pipe Sizes

### Inlet x Outlet NPT

3/4" x 3/4"  
3/4" x 1"  
3/4" x 1 1/4"  
1" x 1"  
1" x 1 1/4"  
1 1/4" x 1 1/4"

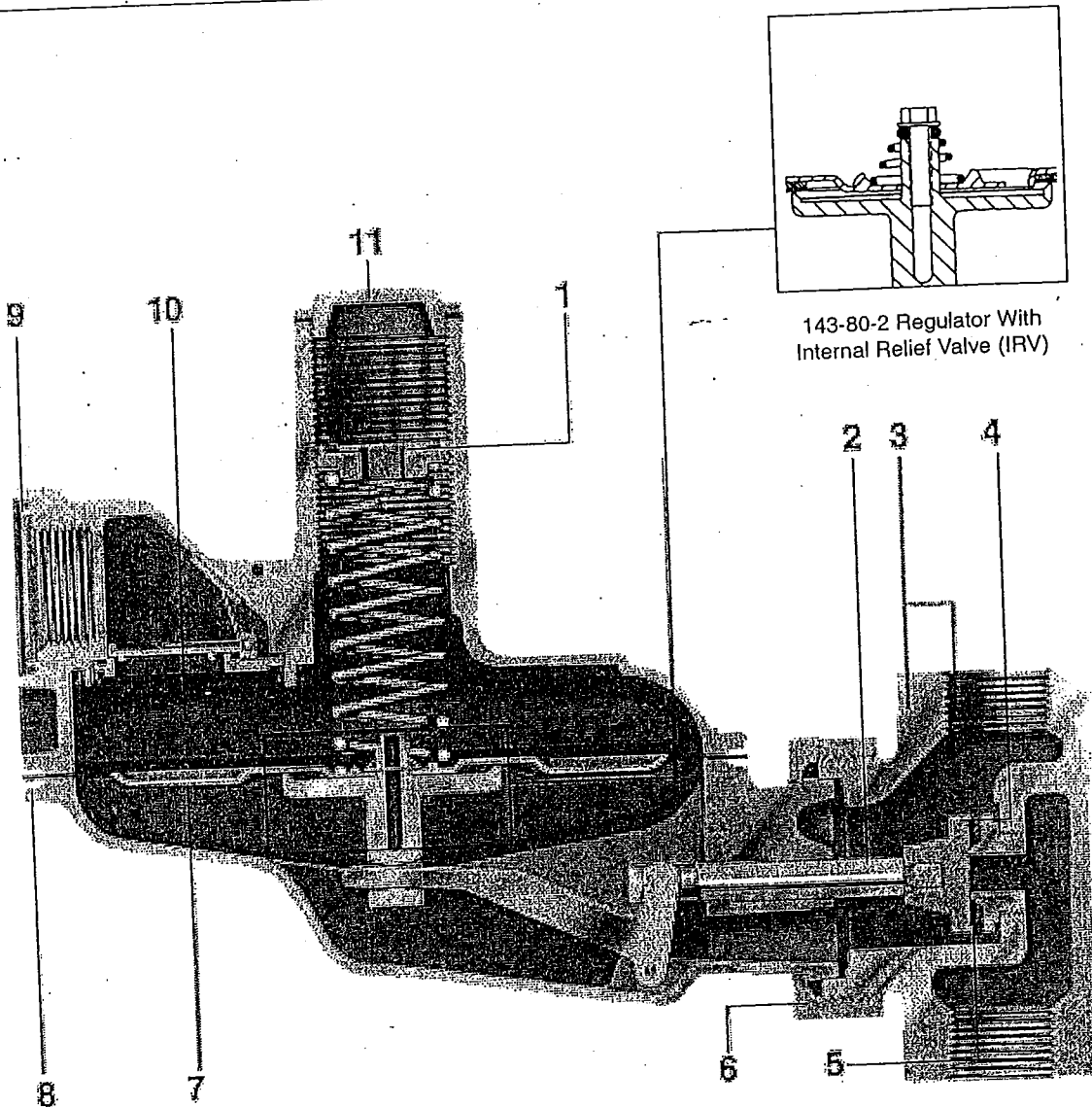
## Temperature Limits

143-80 Service Regulators can be used for temperatures from -20°F. to 150°F.

## Buried Service

143-80 Regulators are not recommended for buried service.

# Construction and Design Features



## 143-80-1 Standard Regulator Construction Features

- |  |  |   |   |
|--|--|---|---|
| 1. Spring Adjustment   | 4. Buna-N Soft Seat<br>Positive tight lock-up                  | 6. Union Nut Connection<br>Full 360° rotation...easy servicing                            | 8. Die Cast Aluminum Alloy Diaphragm Case<br>High strength, light-weight corrosion resistant. |
| 2. Fiberglass Reinforced Nylon Valve Stem<br>Minimum friction, minimum dimensional changes over operating temperature range. | 5. Aluminum Orifices<br>interchangeable between 1/8" thru 1/2" | 7. Buna-N Diaphragm<br>Nylon fabric reinforced<br>Full 26 in. <sup>2</sup> effective area | 9. Vent<br>3/4" or 1" NPT Screened  |
| 3. Cast Iron Body<br>(ASTM A 126 Class B)<br>(Test Connections 1/8" NPT Available on inlet and outlet)                       |  |   | 10. Vent Valve  |
|  |  |   | 11. Seal Cap  |

# Service Regulator Capacity Tables

**Models 143-80-1HP, 143-80-2HP, 143-80-1, 143-80-2**  
Capacity\* In SCFH natural gas (0.6 specific gravity-14.65 psia-60° F.)

Pipe Size (inches)	Inlet Pressure (psig)	Orifice Size (Inches)							
		1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"
3/4" x 3/4"	1/2					340	450	510	530
	1			530	480	500	510	530	530
	2		420	600	560	570	580	600	600
	3		560	700	620	630	650	670	670
	5	250	700	840	720	730	770	790	790
	7 1/2	310	830	950	860	880	900	900	900
	10	370	1200	1220	970	1000	1020	1020	1020
	20	530	1570	1330	1240	1250	1270		
	40	860	1660	1520	1340	1450			
	60	1200	1710						
	80	1500	1900						
	125	1800							
3/4" x 1" 1" x 1"	1/2			530	480	350	460	520	
	1			650	700	550	600	650	
	2		420	890	870	840	880	780	
	3	250	580	1120	1120	1000	920	810	
	5	310	700	1340	1270	1160	950	970	
	7 1/2	370	840	1500	1330	1270	1140	1060	
	10	530	1230	2000	1600	1330	1200	1180	
	20	860	1700	2000	1640	1480	1400		
	40	1200	1900			1900			
	60	1540	2000						
	80	1800	2100						
	125	2100							
3/4" x 1 1/4" 1" x 1 1/4" 1 1/4" x 1 1/4"	1/2			530	480	350	460	520	
	1			650	700	550	600	760	
	2		420	890	870	840	880	1030	
	3	250	580	1120	1180	1030	1200	1050	
	5	310	700	1360	1500	1350	1490	1060	
	7 1/2	370	840	1600	1700	1610	1580	1060	
	10	530	1230	2200	1800	1710	1800	1180	
	20	860	1800	2400	1900	1900	1900		
	40	1200	2100			2000			
	60	1550	2200						
	80	1800	2400						
	125	2250							

based on the following  
maximum variations in outlet pressure:  
RED and BLUE SPRINGS: 1" w.c. droop  
GREEN SPRING: 2" w.c. droop

ORANGE SPRING: 3" w.c. droop  
BLACK/WHITE AND CADMIUM SPRINGS: 1/4 psig droop  
BLACK SPRING: 10% droop

Capacities for 1/2, 1 and 2 psig pressures apply only to RED and BLUE springs. Note carefully these capacities do not apply to the green, orange and black springs.

NOTE: Last figure in each column is the maximum capacity for each orifice at recommended pressure within the optimum performance range.

**Models 143-80-4, 143-80-6 Low Pressure Cut-Off**  
Capacity\* In SCFH natural gas (0.6 specific gravity-14.65 psia-60°F.)

Pipe Size (Inches)	Inlet Pressure (psig)	Outlet Pressures Red Spring* 4 1/2" to 7 1/2" w.c. Blue Spring* 6 1/2" to 9 1/2" w.c.				Outlet Pressures Green Spring* 7 1/2" to 15" w.c.			
		Orifice Size (Inches)				Orifice Size (Inches)			
		7/16"	1/4"	5/16"	1/4"	7/16"	1/4"	5/16"	1/4"
3/4" x 3/4"	1/2	240	180	90		140	120	90	
	1	400	300	200	100	250	200	160	90
	2	580	420	300	140	370	320	240	140
	3	800	750	600	230	580	530	460	220
	5	1050	990	740	380	780	720	700	370
	10	1140	1050	950	460	920	860	800	480
	15		1100	1100	640		900	1000	660
	25			1300	870			1300	910
	40				1160				1160
	60								
3/4" x 1" 1" x 1"	1/2	270	210	90		160	120	90	
	1	430	310	210	100	260	230	160	90
	2	650	420	300	140	410	350	270	140
	3	1100	750	610	230	800	730	470	220
	5	1300	1120	760	380	1220	1090	740	370
	10	1300	1300	960	460	1300	1300	930	480
	15			1300	640			1160	660
	25			1300	870			1300	910
	40				1160				1160
	60								
1 1/4" x 1 1/4"	1/2	270	210	90		160	120	90	
	1	430	310	210	100	260	230	160	90
	2	650	420	300	140	430	350	270	140
	3	1100	750	510	230	870	730	470	220
	5	1300	1120	760	380	1300	1090	740	370
	10	1300	1300	960	460	1300	1300	930	480
	15			1300	640			1160	660
	25			1300	870			1300	910
	40				1160				1160
	60								

NOTE: Last figure in each column is the maximum capacity for each orifice at recommended inlet pressure within the optimum performance range.  
\*RED Spring is Part No. 143-62-021-15, BLUE Spring is Part No. 143-62-021-16, GREEN Spring is Part No. 143-62-021-17.

Note: The above performance data is based on normal testing at 70°F flowing temperature. Changes in performance can occur at extreme low flowing temperatures.

# Internal Relief Valve



The Internal Relief Valve begins to open when outlet pressure exceeds regulator set-point by approximately 7" w.c. At lower pressures, it is closed.

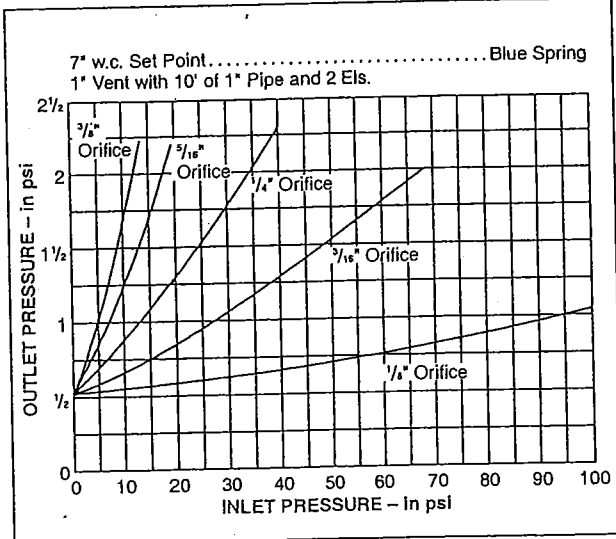
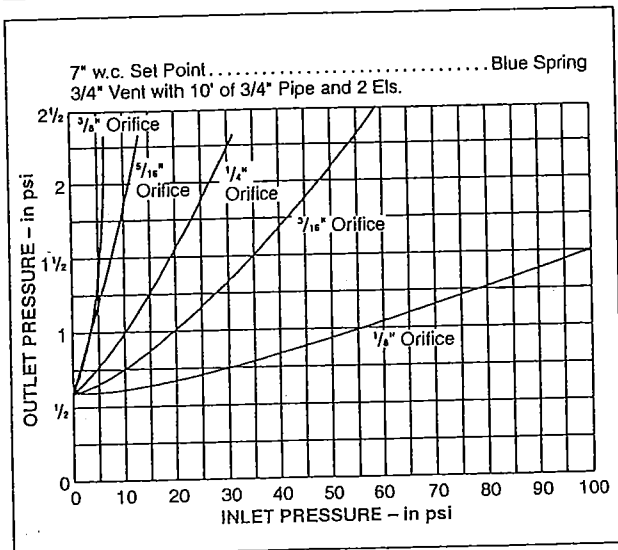
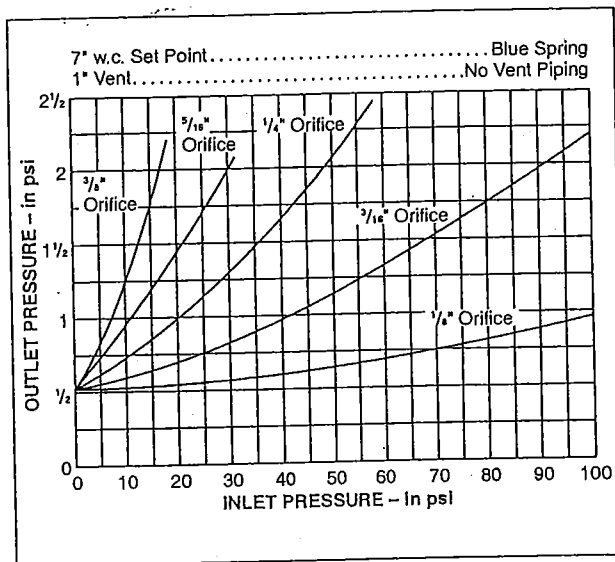
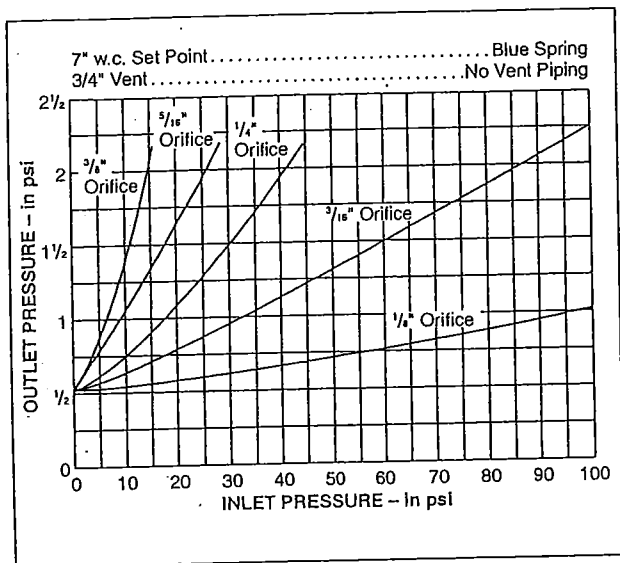
Internal Relief Valves, like all relief valves, must be carefully checked for adequate capacity. IRV's only have full capacity relief capability when the inlet pressure to the regulator is low enough and the regulator orifice is small enough. If either one, or both, are too large, the IRV will not have full capacity relief capability and will not be able to prevent the outlet pressure from exceeding the maximum allowable limit.

The curves below are for checking this condition. They are based on the regulator blocked open to simulate a failure in which the valve goes wide open.

Find the maximum inlet pressure on the horizontal scale. Trace it vertically upwards to the curve for the size orifice used. Trace that point horizontally leftward to the vertical scale and read the outlet pressure. If it is below the maximum allowable outlet pressure for the application, the IRV has full capacity relief capability for a wide open regulator failure.

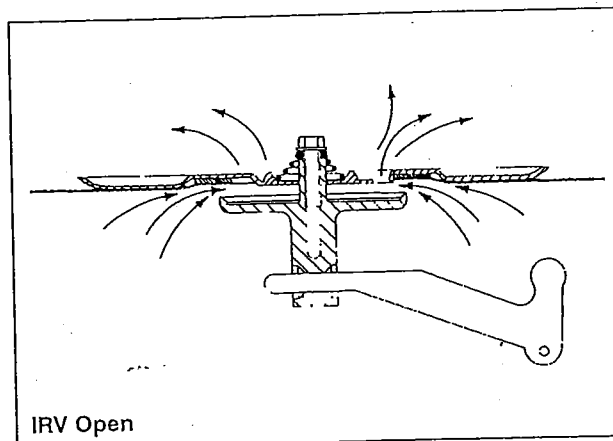
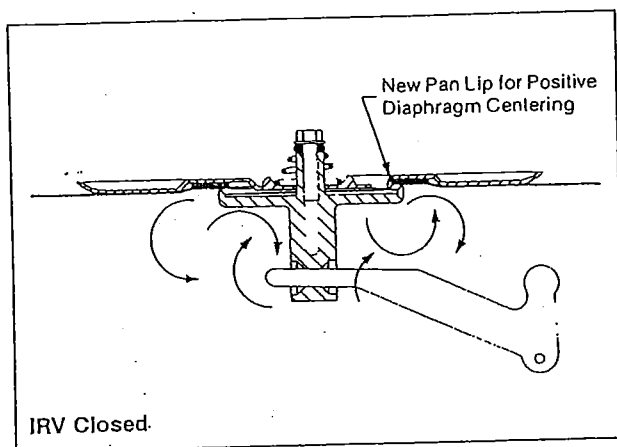
Note that the curves are based upon a 7" w.c. setpoint and a 5" - 8 1/2" (blue) spring. Curves are presented showing the 3/4" and 1" vent configurations, with and without vent piping. The curves based on vent piping assume 10 ft. of vent piping plus two elbows. If additional vent piping is used it must be carefully sized to avoid restricting the capacity of the IRV.

For conditions other than those covered by the curves contact your Equimeter representative.



**Caution:** It is the user's responsibility to assure that a service regulator vents and/or vent lines exhaust to a non-hazardous location away from any potential sources of ignition. Refer to Equimeter Bulletin RM-1301 for more detailed information.

## Operation of the Internal Relief Valve



### Maximum Emergency Pressures

The maximum outlet pressure to which the 143-80 diaphragm case can be subjected under abnormal conditions without causing damage to the regulator internals is set-point +3 psi. If

the outlet pressure exceeds this pressure, the regulator must be removed from service and carefully inspected. Damaged or otherwise unsatisfactory parts must be replaced before returning

the regulator to service.

The maximum outlet pressure that can be safely contained in the 143-80 diaphragm case is 10 psi. Safely contained means "no leakage" and "no bursting".

143-80-1	143-80-2	} ...Maximum Inlet Pressure +50 psi
143-80-21		
143-80-1HP	143-80-2HP	
143-80-4		} ...Maximum Inlet Pressure +10 psi
143-80-6		

### Overpressurization Protection

Protect the downstream piping system and the regulator's low pressure chambers against overpressurization due to the possible regulator malfunction or fail-

ure to achieve complete lockup. The allowable outlet pressure is the lowest of the maximum pressures permitted by federal codes, state codes, Equimeter Bul-

letin RDS-1498, or other applicable standards. The method of protection can be a relief valve, monitor regulator, shutoff device, or similar mechanism.

**Periodic Inspection:** Regulators are pressure control devices with numerous moving parts subject to wear that is dependent upon particular operating conditions. To assure continuous satisfactory operation, a periodic inspection schedule must be adhered to with the frequency of inspection determined by the severity of service and applicable laws and regulations. See bulletin RM-1301 for field service instructions.

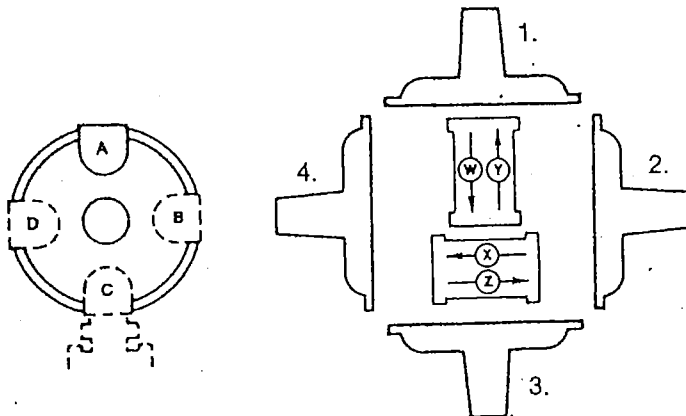


# Mounting Positions



101	102	103	104
105	106	107	108
109	110	111	112

**NOTE:** If desired position is not shown, use these diagrams to specify vent, diaphragm case, and body arrangements. Example: Position 105 would be D-4-Y.



## CAUTION

The diaphragm case vent must be positioned to protect against flooding, drain water, ice formation, traffic, tampering, etc. The vent must be protected against nest building, animals, bees, insects, etc. to prevent vent blockage and minimize the chances of foreign material from collecting in the vent side of the regulator diaphragm.



## Standard Construction:

The following items will be considered standard construction for the 143-80 regulator (options are available at additional charge):

1. Body - no pressure taps
2. Orifice - aluminum
3. Valve & stem assembly - plastic w/Buna-N valve
4. Seal wire - none
5. Vent - 1" side vent
6. Cover cap - plastic
7. Spring ferrule - plastic
8. External nuts and bolts - plated steel
9. Identification - stamped on diaphragm cover (no badge)
10. Paint - AGA gray
11. Packaging - six per carton
12. Position - 105

## Standard Testing:

The following will be considered standard testing for the 143-80 regulator (optional testing at additional charge):

1. Set point adjustment at customer specified:
  - A. Inlet pressure
  - B. Outlet pressure (set point)
  - C. Minimum and maximum rate of flow within 50 to 350 SCFH
2. Lock-up test (will not exceed 1 1/2" w.c. above set point)
3. Leak test
4. Internal relief valve test
  - A. Initial relief at 7" w.c. ±2" above set point
  - B. Reseat at 20% below initial relief pressure (10" w.c., minimum)

## Full Open Capacity:

Use the following formulae for the full open capacity of 143-80 regulators.

$$1. Q = K \sqrt{P_O(P_I - P_O)} \quad \text{..... (for } \frac{P_I}{P_O} \text{ less than 1.894)}$$

$$2. Q = \frac{K P_I}{2} \quad \text{..... (for } \frac{P_I}{P_O} \text{ greater than 1.894)}$$

Q = maximum capacity of the regulator (in SCFH of 0.6 specific gravity natural gas).

K = the "K" factor, the regulator constant (from the table below).

P<sub>I</sub> = absolute inlet pressure (psia).

P<sub>O</sub> = absolute outlet pressure (psia).

ORIFICE	5/16"	1/4"	3/16"	5/16"	1/2"	3/4"	1"
K	820	520	292	206	132	74	33

When sizing relief valves for use with 143-80 regulators, use full open capacity, except for LPCO models.

## Other Gases

143-80 Regulators are mainly used on natural gas. However, they perform equally well on LP gas, nitrogen, dry CO<sub>2</sub>, air and others.

OTHER GASES	CORRECTION FACTOR
Air (Specific Gravity 1.0)	0.77
Propane (Specific Gravity 1.53)	0.63
1350 BTU Propane-Air Mix (1.20)	0.71
Nitrogen (Specific Gravity 0.97)	0.79
Dry Carbon Dioxide (Specific Gravity 1.52)	0.63
For other noncorrosive gases:	0.6
CORRECTION FACTOR =	$\sqrt{\frac{0.6}{\text{Specific Gravity of the Gas}}}$

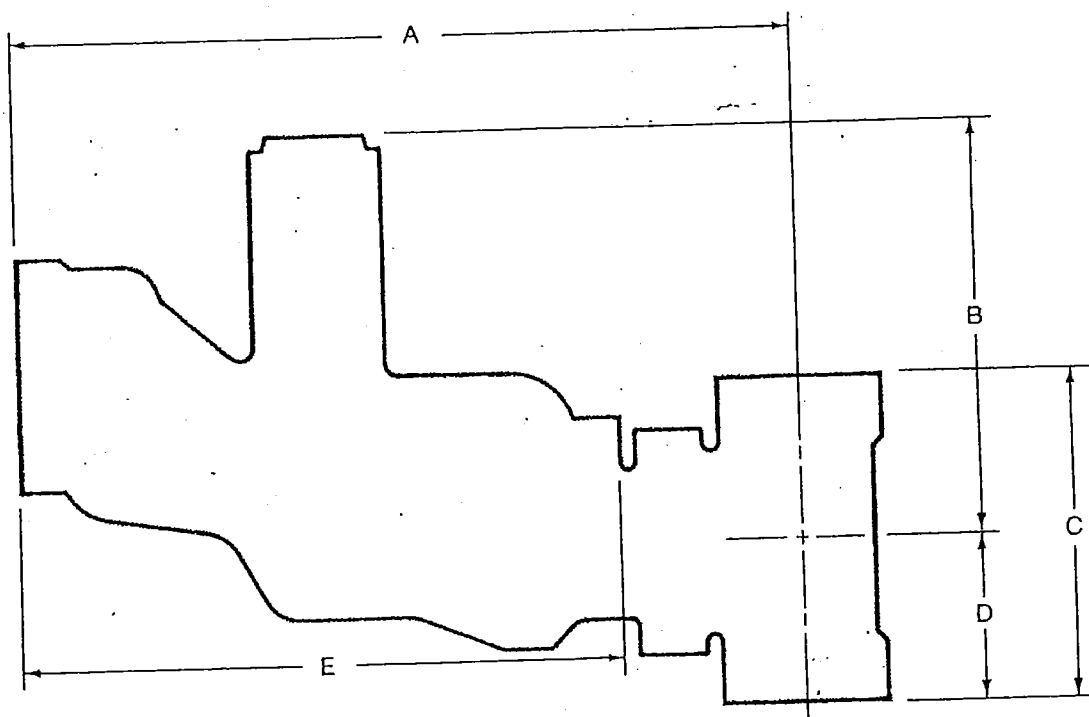
For use with gases not listed above, please contact your Equimeter representative or Industrial Distributor for recommendations.

## How to Order

Specify:

1. Pipe size and model number
2. Mounting position
3. Orifice Size
4. Inlet pressure (also maximum and minimum if available)
5. Outlet Pressure set-point
6. Capacity required (scfh)
7. Type of gas (natural gas, propane, etc.)
8. Spring part number
9. Vent Size

## Dimensions



Regulator	A	B	C	D	E
143-80	9 <sup>3</sup> / <sub>8</sub> "	5 <sup>3</sup> / <sub>4</sub> "	3 <sup>15</sup> / <sub>16</sub> "	1 <sup>31</sup> / <sub>32</sub> "	6 <sup>7</sup> / <sub>8</sub> "

**Caution:** Turn gas on slowly. If an outlet stop valve is used, it should be opened first. Do not overload the diaphragm with a sudden surge of inlet pressure. Monitor the outlet pressure during start-up to prevent an outlet pressure overload. See bulletin RM-1301 for more detailed start-up procedures.

## 143-80 Service Regulator With Low Pressure Cut-Off

This is the low pressure, cut-off version of the 143-80 residential service regulator.

It is a safety device which stops the inlet gas supply if the outlet pressure drops below a certain point.

Hazardous conditions sometimes develop as a result of a loss in service pressure. A good example of this would be flame or pilot outage resulting from a line break, an interruption in the gas supply, or an excessive demand. The low pressure "cut-off" acts as a safety device for the gas service.

The cut-off unit consists of an extra valve which seats against the inlet side of the orifice. As the main valve moves away from its seat to increase flow, in response to a decreasing outlet pressure signal, the cut-off valve moves toward its seat. If the main valve movement becomes excessive, the cut-off valve will take over and go closed. At this point the gas supply is shut off and cannot be resumed until the cut-off unit is manually reset.

Basically, "cut-off" is triggered by an excessive drop in outlet pressure. However, the specific outlet pressure at which "cut-off" occurs also depends on the size of the orifice and the inlet pressure.

As mentioned previously, once the cut-off valve closes, it must be manually opened to put the regulator back into operation. It must also be manually opened when put into ser-

vice initially or when returned to service after being shut down. This is easily done by removing the cover cap and pulling upwards on the diaphragm post extension.

Installation is simple and quick. It is the same as for other standard types of self-contained domestic service regulators.

Adjustment for the outlet pressure set point is accomplished by removing the cover cap and screwing the adjustment ferrule down or up to raise or lower pressure.

The 143-80 regulator with low pressure cut-off can be furnished WITH OR WITHOUT INTERNAL RELIEF. It is used on LP and manufactured gas as well as natural gas. In addition it can also be used on air, CO<sub>2</sub>, nitrogen and other industrial gases.

### Basic LPCO Models

143-80-4	Regulator with Low Pressure Cut-off (LPCO)
143-80-6	Regulator with IRV and LPCO.

Inlet Pressure Range...in. w.c. to 60 psi

Outlet Pressure Range 4 1/2" to 15" w.c.

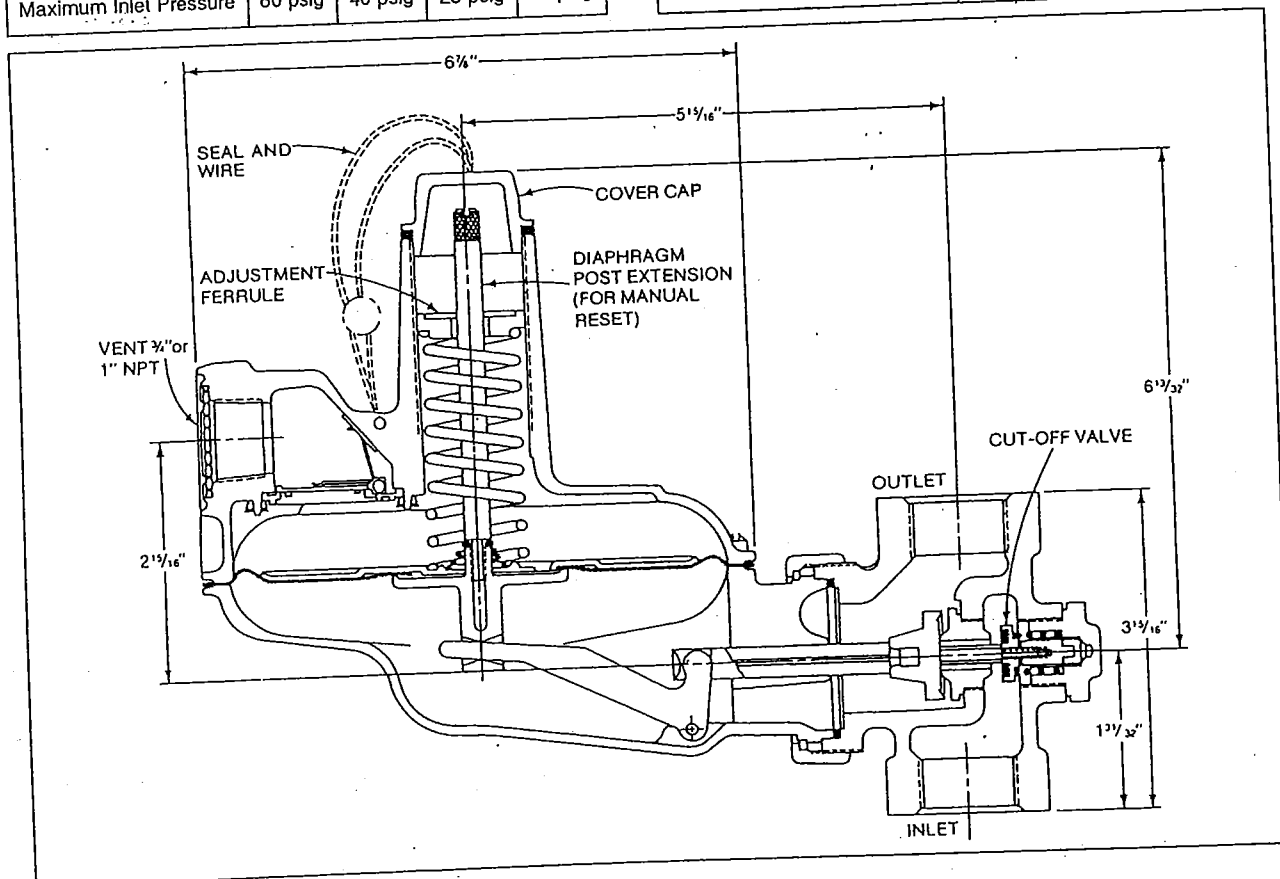
Orifices...aluminum, 1/4" - 3/16" - 3/8" - 7/16"

### Spring Ranges LPCO Models

Outlet Pressure Ranges	Spring Color
4 1/2" to 7 1/2" w.c.	Red Spring
6 1/2" to 9 1/2" w.c.	Blue Spring
7 1/2" to 15" w.c.	Green Spring

### Maximum Inlet Pressure

ORIFICE SIZE	1/4"	5/16"	3/8"	7/16"
Maximum Inlet Pressure	60 psig	40 psig	25 psig	15 psig



## Other Equimeter Gas Pressure Regulators



Equimeter produces a broad product line of Gas Pressure Regulators which are widely used throughout the natural gas industry. These regulators are also suitable for non-corrosive industrial gas applications such as propane, butane, air, nitro-

gen, dry CO<sub>2</sub> etc. For additional detailed information on a particular model, please request the indicated bulletin from the local Equimeter sales office.

### Multi-Purpose Service Regulators

Model 043

Bulletin: R-1300

3/8", 1/2", 3/4", 1" pipe size

Inlet pressures ..... to 125 psi

Outlet pressures ..... 5" w.c. to 2 psi

Capacity to 2000 CFH

Available with 90° body.

Also available with internal relief valve.

Model 143-6

Bulletin: R-1303

3/4", 1", 1 1/4" pipe size

Inlet pressures ..... to 125 psi

Outlet pressures ..... 3 1/2" w.c. to 6 psi

Capacity to 2000 CFH

Available with 90° angle or straight-through body.

Also available: internal relief valve and low pressure cut-off.

### Industrial Service Regulators

Models 243-8, 243-12, 243-8HP

Bulletin: R-1306

1 1/4", 1 1/2" and 2" pipe size

Inlet pressures ..... to 125 psi

Outlet pressures ..... 3 1/2" w.c. to 10 psi

Capacity to 25,000 CFH

Also available: internal relief valve, low pressure cut-off, external control line, back pressure regulator, relief valve, vacuum regulator and vacuum breaker.

### Field Regulators

For intermediate to high pressure applications. Ideal on pipeline taps servicing plants and buildings. Appropriate for double stage reduction ahead of service regulators, and for high pressure burners and compressed air systems.

046

Bulletin: R-1312

3/4", 1" and 1 1/4" pipe size

Inlet pressures ..... to 1000 psi

Outlet pressures ..... 3 to 200 psi

Capacity to 40,000 SCFH

Also available: monitor and pressure loaded versions and internal relief valve.

141-A

Bulletin: R-1311

2" pipe size

Inlet pressures ..... to 1500 psi

Outlet pressures ..... .5 to 400 psi

Capacity to 55,000 SCFH

### Pilot Loaded Regulators

For intermediate and high-pressure applications requiring precise pressure reduction with minimal droop. Ideal for standard and high-capacity flows on burners, driers, dehydrators and compressor lines. Appropriate for fixed factor billing.

243-RPC

Bulletin: R-1343

1 1/4", 1 1/2" and 2" pipe size

Inlet pressures . . . to 150 psi

Outlet pressures  
..... 3 1/2" w.c. to 35 psi

Capacity to 76,000 SCFH

1100

Bulletin: R-1341

Pipe size: 2"

(screwed or flanged)

Inlet pressures . . . to 400 psi

Outlet pressures  
..... 3" w.c. to 100 psi

Capacity to 414,000 SCFH

1200

Bulletin: R-1342

Pipe size: 2" (flanged)

Inlet pressures

..... to 1200 psi

Outlet pressures

..... 20 to 600 psi

Capacity to 789,000 SCFH

Equimeter also produces Industrial and Combustion Regulators; High Pressure, High Capacity Regulators; and Safety Relief Valves. Detailed information available on request.



# Direct Acting or Piloted Aluminum Body Solenoid Valves 3/8" to 3" NPT

NC M NC M  
NO M NO M  
2/2  
SERIES  
8040  
8215

## Features

- Lightweight, low-cost valves for air service.
- Ideal for low pressure applications.
- Provides high flow, Cv up to 138 (Kv 118).
- Air and vacuum service.

## Construction

Valve Parts in Contact with Fluids	
Body	Aluminum
Seals, Diaphragms, Disc	NBR
Disc-Holder	PA (10.1 and 11.6 watt Normally Open only)
Core Guide	CA
Core Tube	305 Stainless Steel
Rider Rings	PTFE
Core and Plugnut	430F Stainless Steel
Springs	302 Stainless Steel
Shading Coil	Copper

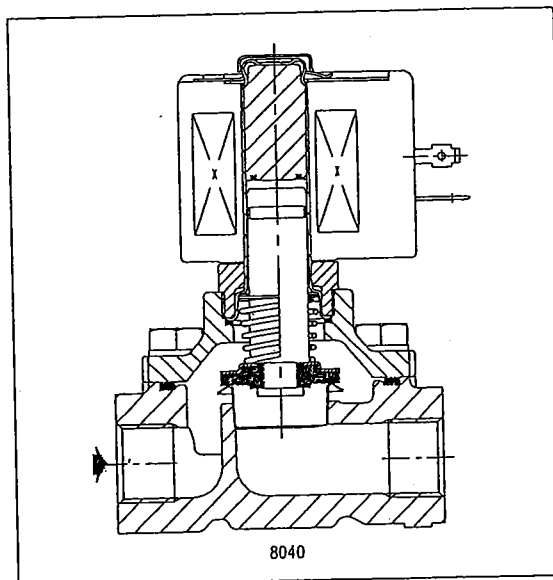
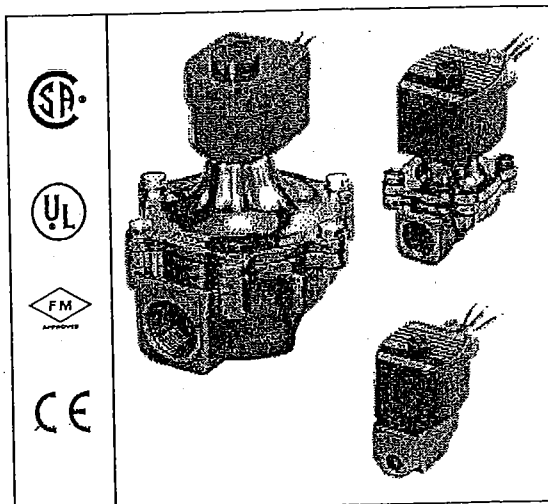
## Electrical

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.			
	DC Watts	AC			General Purpose		Explosionproof	
		Watts	VA Holding	VA Inrush				
F	-	6.1	16	40	238210	-	238214	-
F	11.6	10.1	25	70	238610	238710	238614	238714
B	14.9	-	-	-	-	62691	-	-
F	-	15.4	27	160	99257	-	99257	-
F	-	28.2	50	385	206409	-	206409	-

Standard Voltages: 24, 120, 240, 480 volts AC, 60 Hz (or 110, 220 volts AC, 50 Hz), 6, 12, 24, 120, 240 volts DC. Must be specified when ordering.  
Other voltages available when required.

## Solenoid Enclosures

Standard: Red-Hat II - Watertight, Types 1, 2, 3, 3S, 4, and 4X; Red-Hat - Type I.  
Optional: Red-Hat II - Explosionproof and Watertight, Types 3, 3S, 4, 4X, 6, 6P, 7, and 9; Red-Hat - Explosionproof and Raintight, Types 3, 7, and 9. (Except EF8215A40 and EF8215A90, which are suitable for Types 3 and 7 (C and D) only and have a T2B temperature rating code.) To order, add prefix "EF" to catalog number.  
See Optional Features Section for other available options.



## Nominal Ambient Temperature Ranges:

Red-Hat II/  
Red-Hat AC: 32°F to 125°F (0°C to 52°C)  
Red-Hat II DC: 32°F to 104°F (0°C to 40°C)  
Red-Hat DC: 32°F to 77°F (0°C to 25°C)  
(104°F/40°C occasionally)

Refer to Engineering Section for details.

## Approvals:

CSA certified. UL listed, as indicated. FM approved (Normally Closed only, except Catalog Numbers 8215A90 and 8215A40). Red-Hat II meets applicable CE directives.  
Refer to Engineering Section for details.

SERIES  
8040  
8215

**ASCO®**

# Specifications (English units)

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)			Max. Fluid Temp. °F		Aluminum Body			Watt Rating/ Class of Coil Insulation ②		
			Min.	Max. AC	Max. DC	AC	DC	Catalog Number	Constr. Ref. No	UL ③ Listing	AC	DC	
				Air-Fuel Gas	Air-Fuel Gas								
NORMALLY CLOSED (Closed when de-energized)													
1/8	5/16	1.0	0	15	-	125	-	8040H6	11	○	6.1/F	-	
1/4	5/16	1.1	0	15	-	125	-	8040H7	11	○	6.1/F	-	
3/8	5/16	1.2	0	15	-	125	-	8040H8	11	○	6.1/F	-	
3/8	3/4	3.4	0	50	25	125	104	8215G10	2	○	10.1/F	11.6/F	
3/8	3/4	3.5	5	125	125	125	104	8215G1 ④	1	○	6.1/F	11.6/F	
1/2	3/4	5.4	0	2	-	125	-	8040G22	13A	○	10.1/F	-	
1/2	3/4	4.4	0	50	25	125	104	8215G20	2	○	10.1/F	11.6/F	
1/2	3/4	4.8	5	125	125	125	104	8215G2 ④	1	○	6.1/F	11.6/F	
3/4	3/4	9.5	0	2	-	125	-	8040G23	13B	○	10.1/F	-	
3/4	3/4	5.1	0	50	25	125	104	8215G30	4	○	10.1/F	11.6/F	
3/4	3/4	5.1	5	125	125	125	104	8215G3 ④	3	○	6.1/F	11.6/F	
1	1 5/8	21	0	25	25	125	77	8215B50 ④	6	○	15.4/F	14.9/B	
1 1/4	1 5/8	32	0	25	25	125	77	8215B60 ④	6	○	15.4/F	14.9/B	
1 1/2	1 5/8	35	0	25	25	125	77	8215B70 ④	6	○	15.4/F	14.9/B	
2	2 3/32	60	0	25	15	125	77	8215B80 ④	7	○	15.4/F	14.9/B	
2 1/2	3	117	0	5	-	125	-	8215A90	8	○	28.2/F	-	
3	3	138	0	5	-	125	-	8215A40	8	○	28.2/F	-	
NORMALLY OPEN (Open when de-energized)													
3/8	3/4	3.2	0	125	125	125	104	8215G13	9	●	10.1/F	11.6/F	
1/2	3/4	4	0	125	125	125	104	8215G23	9	●	10.1/F	11.6/F	
3/4	3/4	4.6	0	125	125	125	104	8215G33	10	●	10.1/F	11.6/F	
1	1 5/8	22	0	25	15	125	77	8215C53	12	●	15.4/F	14.9/B	
1 1/4	1 5/8	33	0	25	15	125	77	8215C63	12	●	15.4/F	14.9/B	
1 1/2	1 5/8	37	0	25	15	125	77	8215C73	13	●	15.4/F	14.9/B	
2	2 3/32	58	0	25	15	125	77	8215C83	14	●	15.4/F	14.9/B	
2 1/2	3	117	0	5	-	125	-	8215B93 ④	15	●	28.2/F	-	
Notes: ① Do not use for Fuel Gas. ② On 50 hertz service, the watt rating for the 6.1/F solenoid is 8.1 watts. ③ FM Approved Process Control Valves. See Engineering Section (Approvals) for details. ④ Type 1 enclosure only. ⑤ ○ = Safety Shutoff Valve; ● = General Purpose Valve. Refer to Engineering Section (Approvals) for details.													

SERIES  
040  
8215

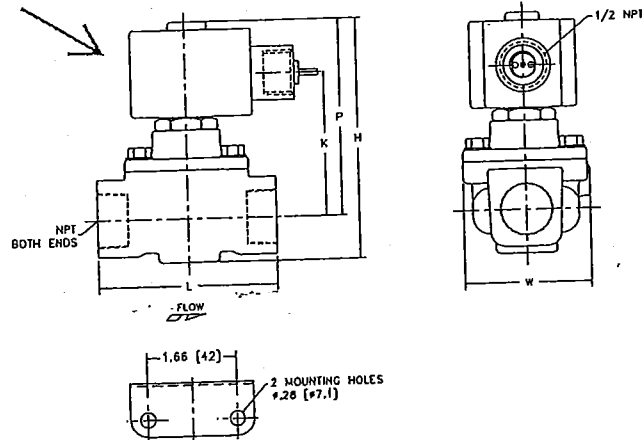
ASCO®

Dimensions: inches (mm)

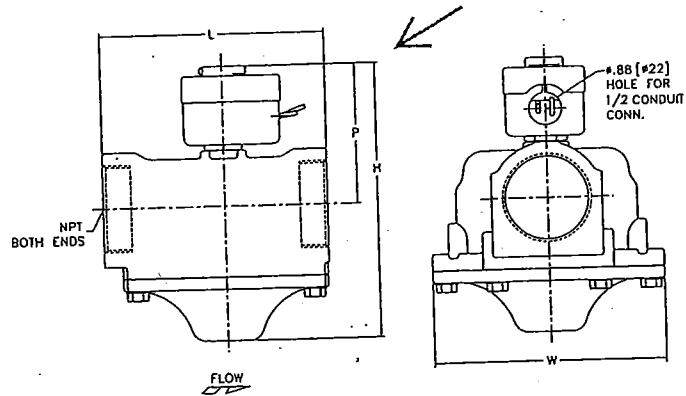
Constr. Ref. No.		H	K	L	P	W
1	Ins.	3.42	2.00	2.75	2.87	2.46
	mm	87	51	70	73	63
2	Ins.	4.02	2.49	2.75	3.46	2.46
	mm	102	63	70	88	63
3	Ins.	3.87	2.19	3.31	3.05	2.33
	mm	98	56	84	77	59
4	Ins.	4.46	2.68	3.31	3.64	2.33
	mm	113	68	84	92	59
6 Ø	Ins.	6.84	x	5.00	5.59	5.38
	mm	174	x	127	142	137
7 Ø	Ins.	7.47	x	6.09	5.94	6.31
	mm	190	x	155	151	160
8 Ø	Ins.	10.25	x	7.79	7.91	7.94
	mm	260	x	198	201	202
9	Ins.	4.42	2.72	2.75	3.86	2.36
	mm	112	69	70	98	60
10	Ins.	4.86	2.72	3.31	4.04	2.36
	mm	123	69	84	103	60
11	Ins.	2.74	1.44	2.00	2.30	1.69
	mm	69	36	51	58	43
12	Ins.	6.84	x	5.00	3.63	5.38
	mm	174	x	127	92	137
13	Ins.	6.84	x	5.00	3.56	5.38
	mm	174	x	127	90	137
13A	Ins.	4.05	2.46	2.75	3.44	2.42
	mm	103	63	70	87	62
13B	Ins.	4.49	2.65	3.31	3.63	2.39
	mm	114	67	84	92	61
14 Ø	Ins.	7.44	x	6.09	3.81	6.31
	mm	189	x	155	97	160
15 Ø	Ins.	10.25	x	7.80	5.22	7.94
	mm	260	x	198	133	202

IMPORTANT: Valves may be mounted in any position except all DC constructions and those marked Ø, which must be mounted with the solenoid vertical and upright. Constructions marked Ø must be mounted with the solenoid vertical and upright or horizontal only.

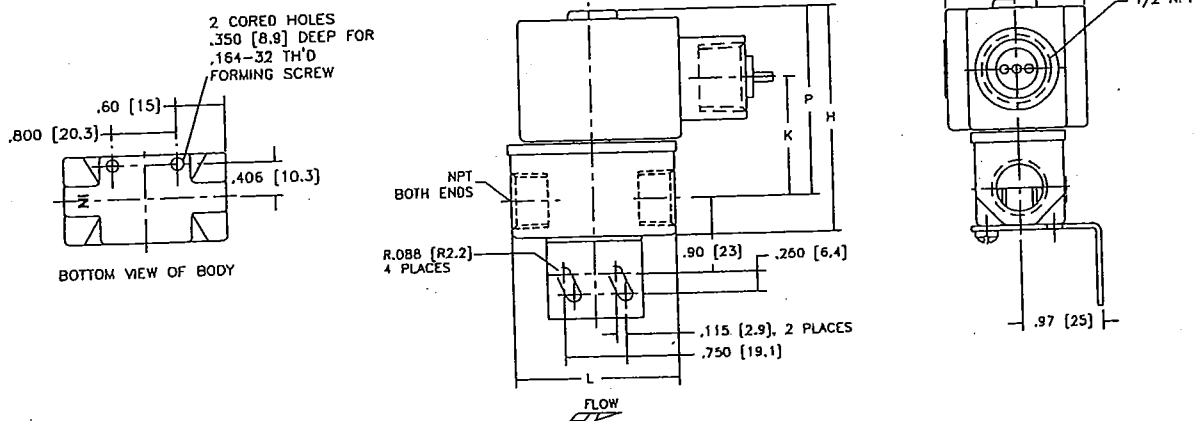
Constr. Refs. 1-4, 9, 10, 13a, 13b



Constr. Refs. 6, 7, 8, 12-15



Constr. Refs. 11



# **m** Gas Appliance Pressure Regulators

## Lever Acting Design

325-3\*, 325-5A\* & 325-7  
3/8", 1/2", 3/4", 1", 1 1/4" & 1 1/2"



\*design certified  
(325-3 & 325-5A)

### Maximum Inlet Pressure

CSA Certified 325-3 & 325-5A..... $\begin{cases} 2 \text{ psi (140 mbar)} \\ 5 \text{ psi (345 mbar)} \end{cases}$   
Maxitrol-tested: all models.....10 psi (690 mbar)

### With 12A09 or 12A39:

Max. inlet pressure (LP).....2 psi (140 mbar)  
Max. inlet pressure (natural).....5 psi (345 mbar)

### Emergency Exposure Limits

All models (inlet side only).....65 psi (4.5 bar)

### Ambient Temperature Limits

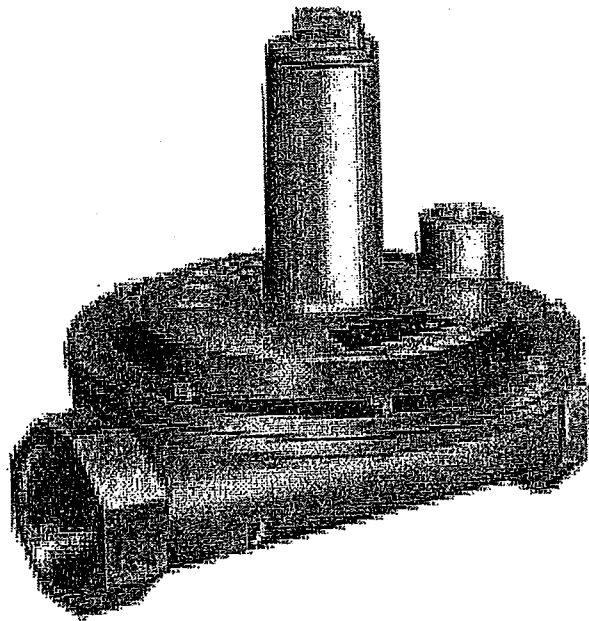
All models.....-40° to 205°F (-40° to 96°C)  
DVGW.....32° to 140°F (0° to 60°C)  
EN.....5° to 176°F (-15° to 80°C)

### Venting

325-3 model.....1/8" NPT  
325-5A model.....3/8" NPT  
325-7 model.....1/2" NPT

**Gases:** natural, manufactured, mixed, liquefied  
petroleum, or LP gas-air mixture.

**Note:** All Maxitrol gas appliance regulators must be  
installed and operated in accordance with Maxitrol's  
'Safety Warning' bulletin.



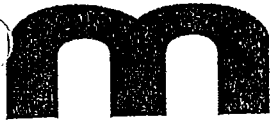
**325 Series**

The 325 Series is suitable for multi-poise mounting.  
But when using the vent limiting device, the  
regulator (325-3, 325-5A) must be mounted in a  
horizontal upright position for best  
performance. Install the regulator properly  
with gas flowing as indicated by the arrow  
on the casting (also see the Safety Warning  
Instructions bulletin).

*Upright*

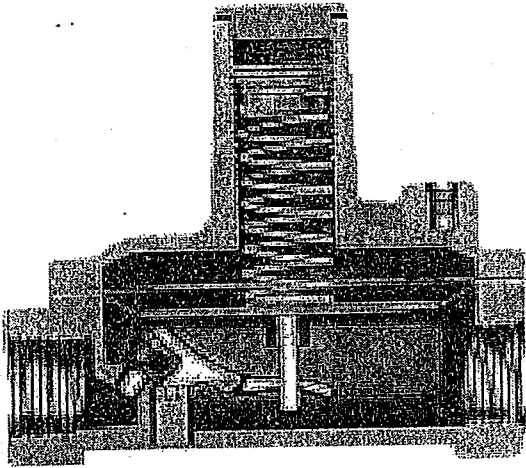
**MAXITROL<sup>®</sup>**  **company**





## Lever Acting Design

### 325 series



#### 325-3\*, 325-5A\* & 325-7

##### FEATURES:

- Designed for multi-poise mounting...
- Self-aligning valve with lever action for dead end lockup...
- Durable, corrosion-resistant construction...
- High performance type for pounds to inches reduction...
- Available in six pipe sizes from 3/8" to 1-1/2"...

##### BENEFITS:

- Ease of installation...
- Longer life, less maintenance...
- Can be used as a single stage regulator or a first-stage on two-stage system...
- May be used for both 2 psi and 5 psi flexible tubing house piping systems...
- Precise regulation from pilot flows to full regulator capacity...
- Meets many utility specifications.

The 325 Series is a pounds to inches regulator, meeting utility specifications, for use on residential, commercial, and industrial applications where adequate inlet pressures are available.

They are a high performance type and can be used as a single stage regulator - reducing pounds pressure to normal burner pressure. They can also be used as a line regulator on equipment already fitted with an appliance regulator.

The 325-3 and 325-5A models are CSA certified and widely accepted with 2 psig and 5 psig house piping systems. In fact, the entire concept (using semi-rigid copper or flexible stainless steel tubing) would not have been possible without the development of the compact 325 series regulators.

The 325-7, designed especially for the growing segment of electronic ignition equipment, permits the utilization of greater capacities without sacrificing performance. All 325 Series models are also certified through DVGW to European EN 88.

To deliver positive dead-end lock up, the 325 Series feature a high leverage valve linkage assembly. Lockup pressure can vary with the speed of the solenoid valve and its location. The regulators are capable of precise regulating control from full flow down to pilot flows.

As an optional accessory, the 325-3 and 325-5A offer automatic vent limiting devices. The 12A09 and 12A39 vent limiters eliminate the need to run

vent piping to a safe area - in the event of a diaphragm rupture, gas escapement is limited to within the ANSI standards level.

The 325 Series regulators are Maxitrol-tested for inlet pressures up to 10 psi (CSA certified for 2 psi and 5 psi), and withstand emergency exposure inlet pressure up to 65 psi. With the 12A09 or 12A39 installed, maximum inlet pressure is 2 psi (LP) and 5 psi (natural). Inlet pressures exceeding 2 psi (LP), or 5 psi (natural) require a vent line.

The self-aligning valve is made of nitrile rubber. Housings are durable aluminum die castings and all internal parts are carefully selected and corrosion resistant. The diaphragms are of high quality supported synthetic rubber compounds.

The 325 Series regulators are suitable for multi-poise mounting. But when using the vent limiting device, the regulator (325-3, 325-5A) must be mounted in a horizontal upright position for best performance. Install the regulator properly with gas flowing as indicated by the arrow on the casting.

These regulators provide no downstream over-pressure protection in the event of failure. At supply pressures in excess of 2 psi they should not be used unless downstream appliance controls are rated for supply pressure or protected by some other means. Consult Maxitrol Company for additional assistance.

*\* CSA design certified*

# Capacities and Pressure Drop

PRESSURE DROP - 0.64 sp gr gas expressed in CFH (m<sup>3</sup>/h)

Model Number	7.0" w.c. (17 mbar)	1/2 psi (34 mbar)	3/4 psi (52 mbar)	1 psi (69 mbar)	2 psi (138 mbar)
325-3	145 (4.0)	204 (5.8)	250 (7.0)	289 (8.2)	-
325-5A	338 (9.6)	476 (13.5)	583 (16.5)	673 (19.1)	-
325-7	690 (19.5)	972 (27.6)	1191 (33.8)	1375 (39.0)	1975 (55.9)

CAPACITIES - based on 1" w.c. pressure drop, from set point\*. 0.64 sp gr gas expressed in CFH (m<sup>3</sup>/h).

Model Number	Outlet Pressure Set Point	Operating Inlet Pressure					
		1/2 psi (34 mbar)	3/4 psi (52 mbar)	1 psi (69 mbar)	2 psi (138 mbar)	5 psi (345 mbar)	10 psi (690 mbar)
325-3*	4.0" w.c.	160 (4.5)	190 (5.4)	220 (6.2)	220 (6.2)	300 (8.5)	320 (9.1)
	7.0" w.c.	120 (3.4)	150 (4.2)	180 (5.1)	220 (6.2)	290 (8.2)	320 (9.1)
	10.0" w.c.	100 (2.8)	120 (3.4)	150 (4.2)	220 (6.2)	280 (7.9)	320 (9.1)
325-5A*	4.0" w.c.	300 (8.5)	340 (9.6)	416 (11.8)	500 (14.2)	600 (17.0)	680 (19.3)
	7.0" w.c.	245 (6.9)	315 (8.9)	340 (9.6)	480 (13.6)	600 (17.0)	680 (19.3)
	10.0" w.c.	225 (6.4)	270 (7.6)	312 (8.8)	430 (12.2)	560 (15.9)	680 (19.3)
325-7	4.0" w.c.	670 (19.0)	900 (25.5)	1050 (29.7)	1450 (41.1)	1750 (49.6)	2000 (56.6)
	7.0" w.c.	590 (16.7)	760 (21.5)	900 (25.5)	1250 (35.4)	1750 (49.6)	2000 (56.6)
	10.0" w.c.	470 (13.3)	650 (18.4)	800 (22.7)	1250 (35.4)	1750 (49.6)	2000 (56.6)

\*NOTE: CSA maximum approved capacity for 325-3 is 150 CFH (4.2 m<sup>3</sup>/h). 300 CFH (8.5 m<sup>3</sup>/h) for the 325-5.  
Approval based on use as an appliance regulator. \* Set points (in CFH): 325-3 = 50, 325-5A = 150, 325-7 = 500.

## Sizing Instructions

Occasionally 325 Series regulators are used on 2 psig piping systems - oftentimes the 2 psig residential systems are sized with a 1-1/2 psi pressure drop through the copper or stainless steel tubing. This means there will be 2 psi at the inlet of the regulator under no flow conditions, and 1/2 psi at the regulator inlet under maximum flow conditions.

To select a 325 series appliance regulator of ample flow - one must know:

1. Available inlet pressure (maximum static/minimum operating)
2. Desired outlet pressure.
3. Required maximum flow rate.
4. Pipe size.

Example: To select a 325 series regulator of ample capacity to handle flow...

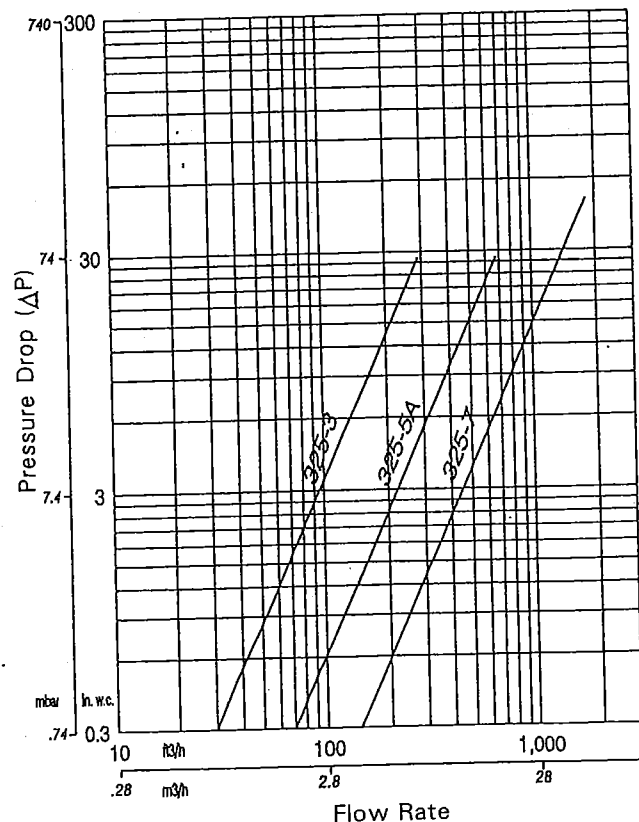
### KNOWN:

Desired flow rate 145 CFH; pipe size 1/2"; operating inlet pressure 2 psi; outlet pressure 7" w.c.; lockup required.

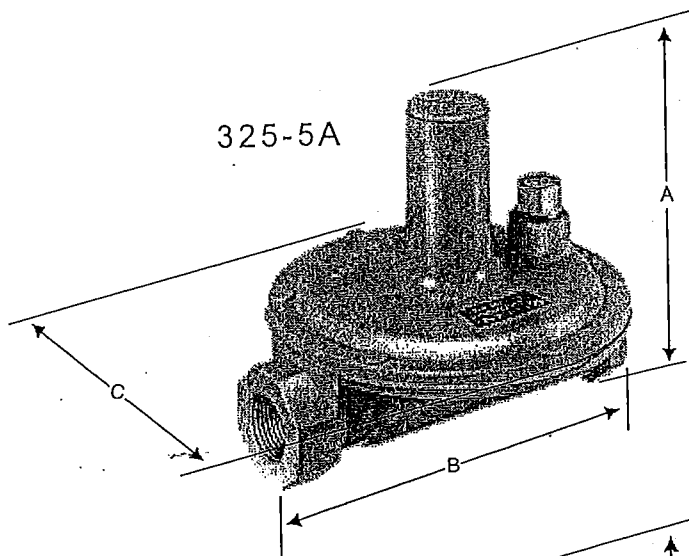
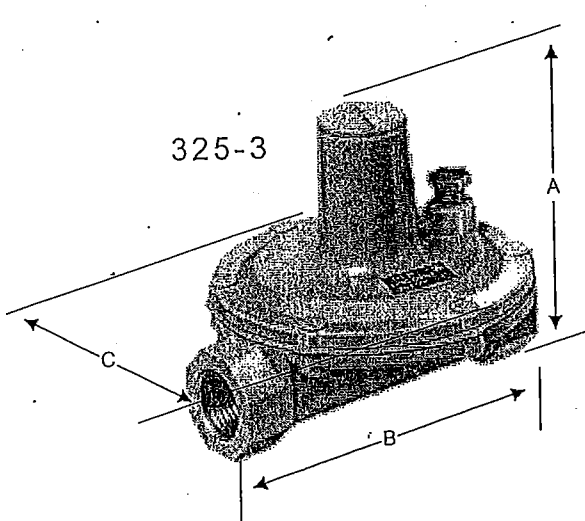
### SOLUTION:

Check pressure drop chart above - the 325-3's pressure drop at a flow rate of 145 CFH is 7" w.c. - well below the available differential of 1.75 psi. The 325-3 (1/2") used with a 4" to 12" spring, set at 7", is the correct regulator to use for this application.

## Pressure Drop Chart



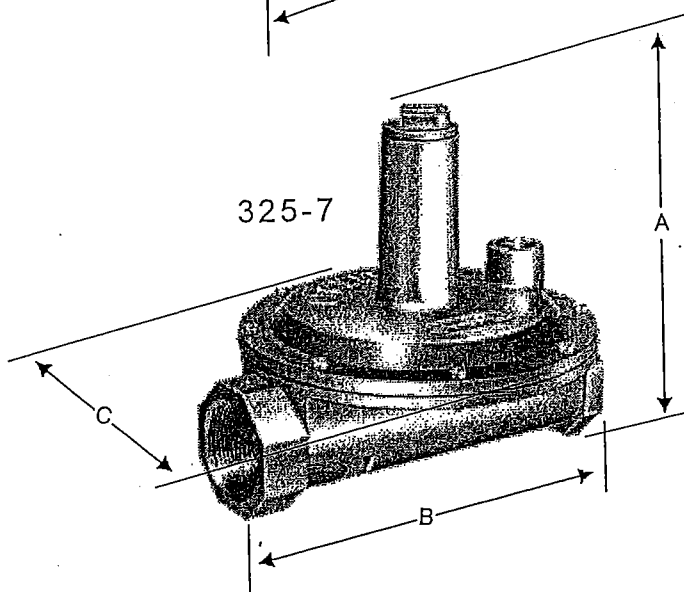
# Dimensions and Spring Ranges



**DIMENSIONS - inches (millimeters)**

Model Number	Pipe Size*	Swing Radius	Call-Outs		
			A	B	C
325-3	3/8 x 3/8 1/2 x 1/2	3 (76)	3 1/2 (89)	4 1/4 (108)	3 7/8 (98)
325-5A	1/2 x 1/2 3/4 x 3/4 1 x 1	4 7/8 (124)	5 1/4 (133)	5 7/8 (149)	5 7/16 (138)
325-7	1 1/4 x 1 1/4 1 1/2 x 1 1/2	6 1/8 (156)	7 1/4 (184)	8 (203)	7 (178)

\* standard models NPT, "M" models available with BSP threads



**SPRING SELECTION CHART - inches w.c. (mbar) unless noted**

Model Number	Standard Spring	CSA Certified				Other Springs Available			
		2 psi (138 mbar)		5 psi (345 mbar)					
325-3	4 to 12 (10 to 30)	5 - 9 (12.5 - 22.5)	7 - 11 (17 - 27)	6 - 10 (15 - 25)	7 - 11 (17 - 27)	2 - 6 (5 - 15)	10 - 22 (25 - 55)	15 - 30 (37 - 75)	1 - 2 psi (69 - 139)
325-5A	4 to 12 (10 to 30)	5 - 9 (12.5 - 22.5)	7 - 11 (17 - 27)	6 - 10 (15 - 25)	7 - 11 (17 - 27)	2 - 6 (5 - 15)	10 - 22 (25 - 55)	15 - 30 (37 - 75)	1 - 2 psi (69 - 139)
325-7	4 to 12 (10 to 30)	-	-	-	-	2 - 5 (5 - 12)	10 - 22 (25 - 55)	15 - 30 (37 - 75)	20 - 42 (50 - 104)

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www.maxitrol.com

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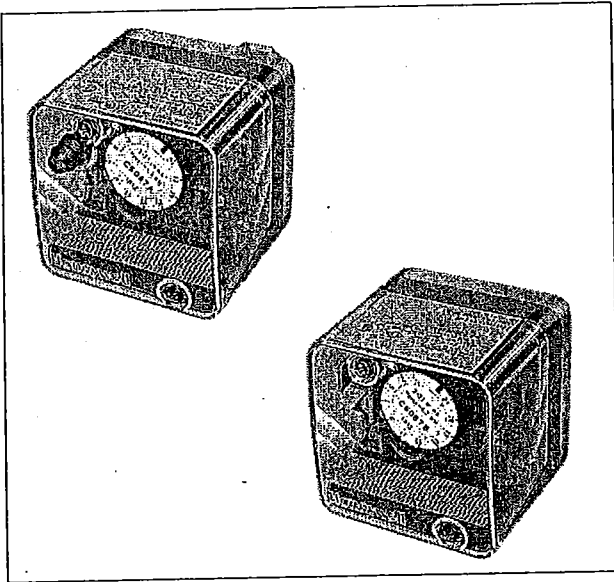


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## C6097A,B Pressure Switches

PRODUCT DATA



### APPLICATION

The C6097 Pressure Switches are safety devices used in positive-pressure or differential-pressure systems to sense gas or air pressure changes.

### FEATURES

- For use with natural gas, liquid propane (LP) gas, or air.
- Diaphragm-actuated safety-limit switch.
- Switch can be wired to turn on alarm.
- C6097A models break control circuit at setpoint on pressure fall.
- C6097B models break control circuit at setpoint on pressure rise.
- Lockout with manual reset and recycle options.
- Lockout models have external manual reset button.
- Removable transparent cover protects scaleplate and adjusting knob.
- Pipe tapings allow selection of positive pressure, differential pressure (air only) or venting connections (NPT mount only).
- 1/4 in. NPT or flange mount models for direct mounting to Honeywell Integrated Valve Train.
- Optional switch position indicator lamp available.
- IP54 enclosure standard.
- Ranges: 0.4 to 5 in. wc, 3 to 21 in. wc, 12 to 60 in. wc or 1.5 to 7 psi.
- Surge orifice.

### Contents

Application .....	1
Features .....	1
Specifications .....	2
Ordering Information .....	2
Installation .....	4
Wiring .....	5
Settings and Adjustments .....	5
Operation and Checkout .....	6



## SPECIFICATIONS

### Models:

C6097A Pressure Switch: Breaks a circuit when pressure falls to scale setting. See Table 1.

C6097B Pressure Switch: Breaks a circuit when pressure rises to scale setting. See Table 1.

Table 2 shows switch ratings and Table 3 shows alternate electrical ratings when used with Honeywell Flame Safeguard Programmers.

Minimum Ambient Temperature: -40°F (-40°C).

Maximum Ambient Temperature: 140°F (60°C).

### Connections (Depending on Model):

1/4-18 NPT tapping for main or high-pressure connection.  
1/8-27 NPT tapping for vent or low-pressure connection (air only).

Flange mount for connection to Honeywell Integrated Valve Train (internal vent only, no external connections).

### Scale Range:

0.4 to 5 in. wc (0.10 kPa to 1.25 kPa).  
3 to 21 in. wc (0.75 to 5.23 kPa).  
12 to 60 in. wc (3.0 kPa to 15 kPa).  
1.5 to 7 psi (10.3 kPa to 48 kPa).

### Approvals:

Underwriters Laboratories Inc. listed.  
Canadian Standards Association listed.  
Factory Mutual: Approved.  
Industrial Risk Insurers: Acceptable.  
CSD-1 AFB: Acceptable.

### Accessories:

32003041-001 C6097 Cover for manual reset models.  
32003040-001 C6097, Cover for recycle models.  
32003039-001 Position Indication Lamp Kit.

Dimensions: See Fig. 1 and 2.

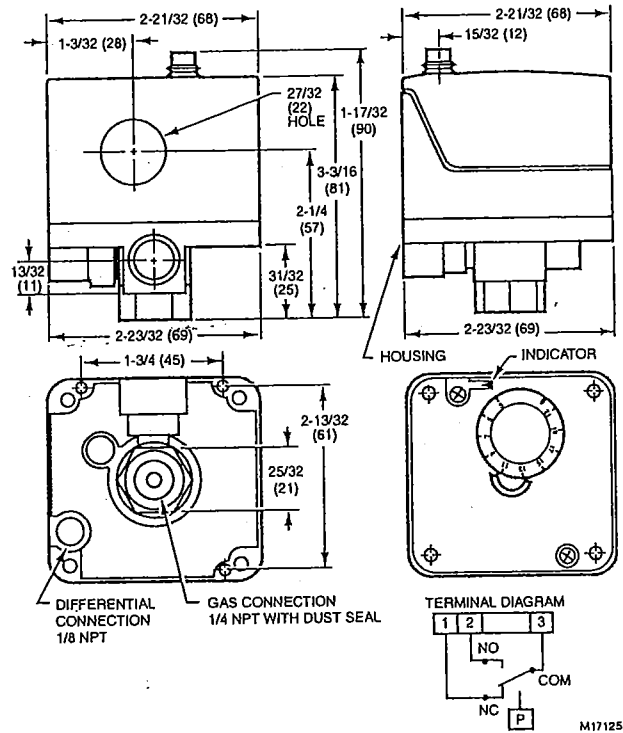


Fig. 1. C6097 1/4 in. NPT Mount dimensions in in. (mm).

## ORDERING INFORMATION

When purchasing replacement and modernization products from your TRADELINE® wholesaler or distributor, refer to the TRADELINE® Catalog or price sheets for complete ordering number.

If you have additional questions, need further information, or would like to comment on our products or services, please write or phone:

1. Your local Home and Building Control Sales Office (check white pages of your phone directory).
2. Home and Building Control Customer Relations  
Honeywell, 1885 Douglas Drive North  
Minneapolis, Minnesota 55422-4386 (800) 328-5111

Canada—Honeywell Limited/Honeywell Limitée, 35 Dynamic Drive, Scarborough, Ontario M1V 4Z9.  
International Sales and Service Offices in all principal cities of the world. Manufacturing in Australia, Canada, Finland, France, Germany, Japan, Mexico, Netherlands, Spain, Taiwan, United Kingdom, U.S.A.

Table 1. Pressure Switch Model Selection.

Model	Operating Pressure Range	Manual Reset Differential		Non-Manual Reset Differential		Differential Type	Maximum Rated Pressure (continuous) (psi)	Manual Reset	Media <sup>a</sup>	Switch Action at Setpoint	Comments
		Maximum at Minimum Setpoint	Maximum at Maximum Setpoint	Nominal	Maximum						
C6097A1004	0.4 to 5 in. wc	—	—	0.16 in. wc	0.24 in. wc	Additive	2.9	No	Air/Gas	Breaks N.O. to C. connection on pressure fall.	1/4 in. NPT Mount
C6097A1012	3 to 21 in. wc	2.4 in. wc	4.2 in. wc	—	—		5.0	Yes	Air/Gas		1/4 in. NPT Mount
C6097A1020	3 to 21 in. wc	2.4 in. wc	4.2 in. wc	—	—		5.0	Yes	Air/Gas		Flange Mount
C6097A1038	12 to 60 in. wc	10 in. wc	12 in. wc	—	—		5.0	Yes	Air/Gas		1/4 in. NPT Mount
C6097A1046	12 to 60 in. wc	10 in. wc	12 in. wc	—	—		5.0	Yes	Air/Gas		Flange Mount
C6097A1053	3 to 21 in. wc	—	—	0.24 in. wc	0.48 in. wc		5.0	No	Air/Gas		1/4 in. NPT Mount
C6097A1061	3 to 21 in. wc	—	—	0.24 in. wc	0.48 in. wc		5.0	No	Air/Gas		Flange Mount
C6097A1079	12 to 60 in. wc	—	—	1.1 in. wc	2.4 in. wc		5.0	No	Air/Gas		1/4 in. NPT Mount
C6097A1087	12 to 60 in. wc	—	—	1.1 in. wc	2.4 in. wc		5.0	No	Air/Gas		Flange Mount
C6097A1095	0.4 to 5 in. wc	0.6 in. wc	1.0 in. wc	—	—		2.9	Yes	Air/Gas		1/4 in. NPT Mount
C6097A1103	1.5 to 7 psi	1.1 psi	1.4 psi	—	—		9.3	Yes	Air/Gas		Flange Mount
C6097A1111	1.5 to 7 psi	1.1 psi	1.4 psi	—	—		9.3	Yes	Air/Gas		1/4 in. NPT Mount
C6097A1129	1.5 to 7 psi	—	—	0.1 psi	0.3		9.3	No	Air/Gas		Flange Mount
C6097A1137	1.5 to 7 psi	—	—	0.1 psi	0.3		9.3	No	Air/Gas		1/4 in. NPT Mount
C6097A1210	0.4 to 5 in. wc	—	—	0.16 in. wc	0.24 in. wc		2.9	No	Air/Gas		Flange Mount
C6097A1228	0.4 to 5 in. wc	—	—	—	—		2.9	Yes	Air/Gas		Flange Mount
C6097B1002	12 to 60 in. wc	10 in. wc	12 in. wc	—	—	Subtractive	5.0	Yes	Air/Gas	Breaks N.C. to C. connection on pressure rise.	1/4 in. NPT Mount
C6097B1010	12 to 60 in. wc	10 in. wc	12 in. wc	—	—		5.0	Yes	Air/Gas		Flange Mount
C6097B1028	3 to 21 in. wc	2.4 in. wc	4.2 in. wc	—	—		5.0	Yes	Air/Gas		1/4 in. NPT Mount
C6097B1036	3 to 21 in. wc	2.4 in. wc	4.2 in. wc	—	—		5.0	Yes	Air/Gas		Flange Mount
C6097B1044	1.5 to 7 psi	1.1 psi	1.4 psi	—	—		9.3	Yes	Air/Gas		Flange Mount
C6097B1051	1.5 to 7 psi	1.1 psi	1.4 psi	—	—		9.3	Yes	Air/Gas		1/4 in. NPT Mount
C6097B1069	3 to 21 in. wc	—	—	0.24 in. wc	0.48 in. wc		5.0	No	Air/Gas		Flange Mount
C6097B1077	12 to 60 in. wc	—	—	1.1 in. wc	2.4 in. wc		5.0	No	Air/Gas		Flange Mount
C6097B1085	12 to 60 in. wc	—	—	1.1 in. wc	2.4 in. wc		5.0	No	Air/Gas		1/4 in. NPT Mount
C6097B1093	1.5 to 7 psi	—	—	0.1 psi	0.3 psi		9.3	No	Air/Gas		Flange Mount
C6097B1101	1.5 to 7 psi	—	—	0.1 psi	0.3 psi		9.3	No	Air/Gas		1/4 in. NPT Mount
C6097B1119	3 to 21 in. wc	—	—	0.24 in. wc	0.48 in. wc		5.0	No	Air/Gas		1/4 in. NPT Mount

<sup>a</sup> Acceptable media: Natural gas, liquid propane (LP) gas, and air.

Table 2. Switch Ratings (Amperes).

120/240 Vac, 50/60 Hz		
Inductive	Full Load	3.0
	Locked Rotor	18.0
Resistive		5.0

Table 3. Alternate Electrical Ratings when used with Honeywell Flame Safeguard Programmers.

Device	Rating
Ignition Transformer	540 VA
Pilot Valve	50 VA
Main Valve	400 VA with 2-1/2 times inrush.

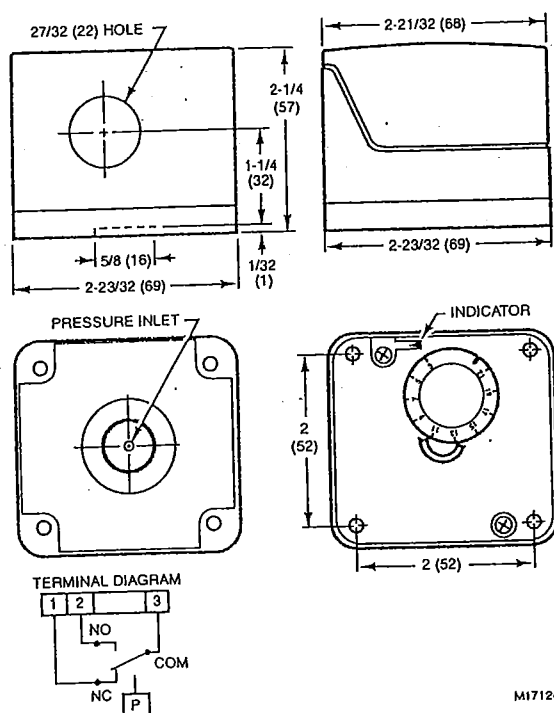


Fig. 2. C6097 Flange Mount dimensions in in. (mm).

## INSTALLATION

### ⚠ WARNING

Explosion or Fire Hazard.  
Can cause severe personal injury, death or property damage.  
Observe all safety requirements each time a control is installed on a burner.

### When Installing this Product...

1. Read these instructions carefully. Failure to follow them can damage the product or cause a hazardous condition.
2. Check the ratings given in the instructions and on the product to make sure that the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is completed, check out product operation as provided in these instructions.

### ⚠ WARNING

Electrical Shock Hazard.  
Can cause serious personal injury or death.  
Disconnect power supply before beginning installation.  
More than one disconnection can be involved.

## Mounting

NOTE: On flange models, remove the label holding the O-ring in place and make sure O-ring seal is in place before mounting the pressure switch on the valve.

The C6097 models allow NPT or flange (directly to valve) mounting. The NPT models have a hexagonal fitting with a 1/4 in. NPT tapping, which is the high pressure connection, in differential applications. The bleed fitting is 1/8 in. NPT tapped. In differential pressure control applications using air only, connect the lower pressure to the bleed fitting. See Fig. 1 and Table 1. In applications using combustible gases, vent the bleed tapping according to applicable standard code or jurisdictional authority.

C6097 models with flange mount can be fitted directly to Honeywell Integrated Valve Train (model specific). See Fig. 2 and Table 1. The flange mount models vent internally, with no external tap.

Mount the C6097A,B in any position.

## Leak Check

After installation, perform a leak check on the pressure switch:

1. Turn on main gas. Make sure gas has reached the pressure switch (e.g., high gas pressure switch)
2. Check installation for gas leaks using a gas leak detector or a soap solution.

## WIRING

### WARNING

Electrical Shock Hazard.  
Can cause serious personal injury or death.  
Disconnect power supply before beginning installation.  
More than one disconnection can be involved.

Make sure that all wiring agrees with all applicable local codes, ordinances and regulations. An opening is provided to accommodate rigid conduit or armored cable for line voltage operation (see Fig. 3 and 4). Do not overload the switch contacts (see Switch Ratings in the Specifications section). The switching schematic is shown in Fig. 5.

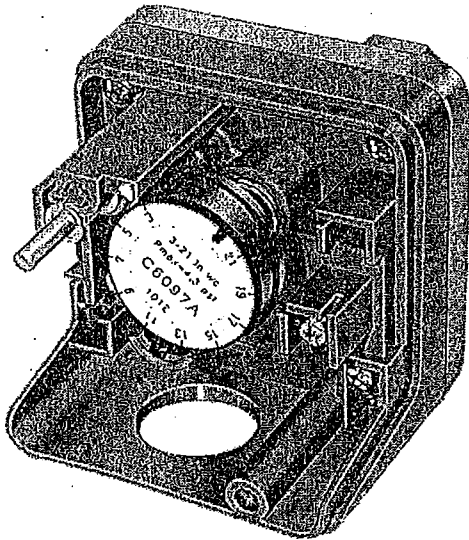


Fig. 3. C6097 (manual reset switch model) with cover removed.

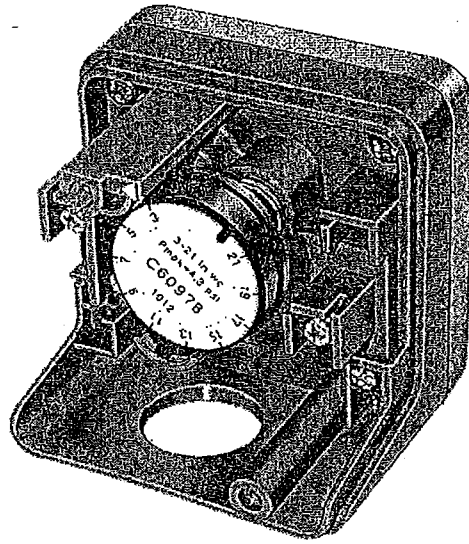


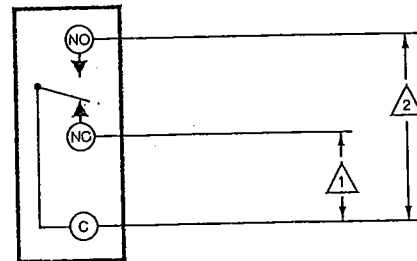


Fig. 4. C6097 (recycle model) with cover removed.

## SETTINGS AND ADJUSTMENTS

### Pressure Setpoint Adjustment

To adjust the pressure setting, turn the setpoint adjustment dial (Fig. 3, 4 and 5) clockwise  to increase the pressure setting and counterclockwise  to decrease the pressure setting.



1 C6097A BREAKS C-NO, MAKES C-NC ON PRESSURE FALL. MANUAL RESET MODELS LOCK OUT.

2 C6097B BREAKS C-NC, MAKES C-NO ON PRESSURE RISE AND LOCKS OUT.

M17123

Fig. 5. C6097 schematic.



## OPERATION AND CHECKOUT

### Operation

The manual reset C6097A diaphragm actuates the snap-acting switch to break a control circuit and lock out when pressure falls to the scale setting. The recycle C6097A models recycle automatically when the control circuit returns to scale setting plus differential.

The manual reset C6097B diaphragm actuates the snap-acting switch that breaks a control circuit and locks out when the pressure rises to the scale setting. The recycle C6097B models recycle automatically when the control pressure falls to the scale setting minus differential.

### Manual Resetting

The C6097A manual reset models lock out when pressure falls to the scale setting and require manual resetting after the pressure rises to scale setting plus differential to resume normal operation.

The C6097B manual reset models lock out when pressure rises to the scale setting and require manual resetting after the pressure falls to scale setting minus the differential to resume normal operation.

To reset, once normal operating pressure is restored, push the reset button in as far as it goes, then release.

#### IMPORTANT

*Lockout models cannot be made to recycle automatically by permanently holding in the reset lever.*

### Checkout

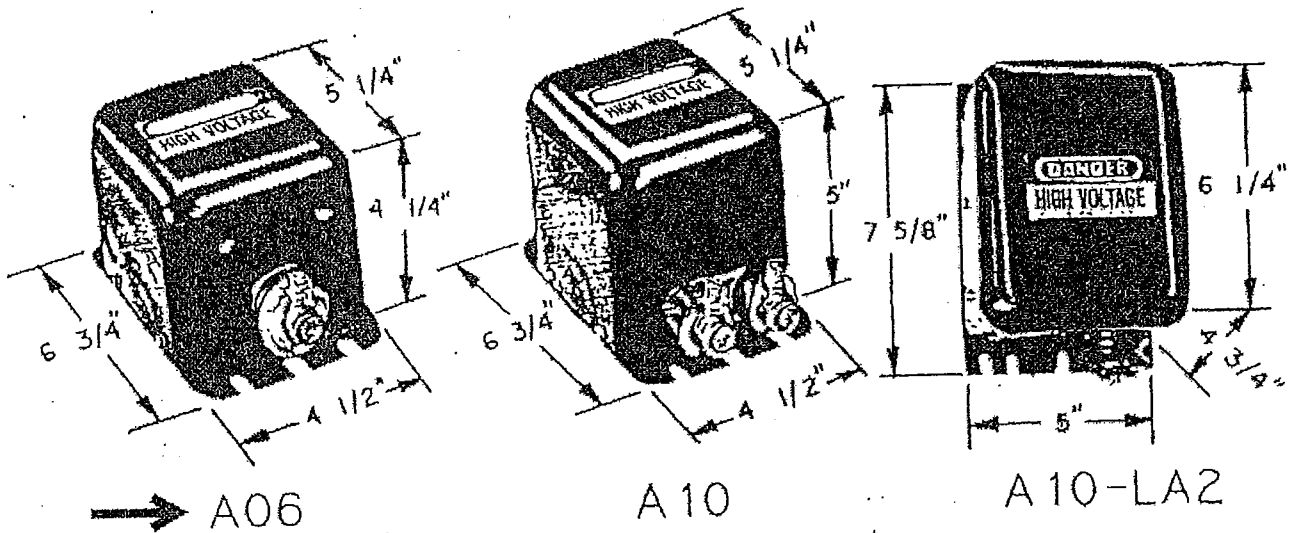
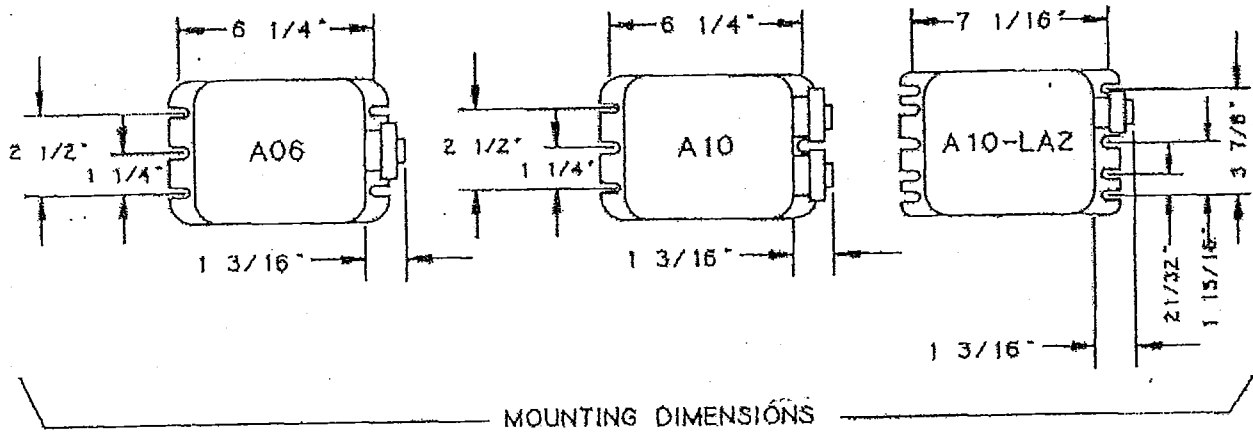
#### C6097 Gas Fuel Application

1. Set cutoff pressure.
2. Open main supply line. Depress reset lever on lockout models until switch makes control circuit.
3. Set controller and limit switch to call for heat.
4. For C6097A: Close the manual gas shutoff valve. C6097 should open control circuit when pressure reaches cutoff point.  
For C6097B: Open the manual gas shutoff valve, wait a few minutes for the pressure to rise; then lower the scale setting until the switch breaks control circuit and locks out.
5. For C6097A: Open the shutoff valve, return the pressure switch to its original setting and press the reset button (if necessary).  
For C6097B: raise setting to normal and press reset button (if necessary).
6. Allow system to operate through at least one complete cycle to make sure all components are functioning properly.

#### C6097A Air Application

1. Set cutoff pressure.
2. Turn on fan.
3. Block fan inlet or filter area. Switch should break control circuit when pressure drops to cutoff point. Manual reset models lock out.
4. Remove obstruction. Press reset lever (manual reset models) and allow system to operate through at least one complete cycle to be sure all components are functioning properly.

SPEC - IGN TRANS



\* FROM HIGH VOLTAGE TERMINAL TO CASE GROUND.

IGNITION TRANSFORMERS	A06	A10	A10-LA2
PRIMARY VOLTAGE	115V. 60HZ.	115V. 60HZ.	115V. 60HZ.
SECONDARY VOLTAGE	1 - 6000V. - TAP*	2 - 5000V. - TAPS*	1 - 10000V. - TAP*
POWER CONSUMPTION	175VA.	250VA.	250VA.
MAXIMUM TEMPERATURE	120°F	120°F	120°F
MAXIMUM SPARK GAP	1/16"	1/16"	1/8"
DIMENSIONS	6 3/4HX4 1/2WX4 1/4D	6 3/4HX4 1/2WX 5D	7 5/8HX 5WX4 3/4D



PROTECTION CONTROLS, INC.

NOTE:  
IGNITION SYSTEMS SHALL NOT BE  
USED IN LIEU OF COMBUSTION  
SAFEGUARDS.

INSTALLATION, OPERATION AND  
MAINTENANCE SHALL CONFORM  
WITH NATIONAL FIRE PROTECTION  
ASSOCIATION STANDARDS, NATIONAL  
AND LOCAL CODES, AND AUTHORITIES  
HAVING JURISDICTION. ANY MODIFI-  
CATION VOIDS APPROVALS.

PROTECTION CONTROLS, INC.  
SKOKIE, ILLINOIS

PROTECTOFIER

FORM 7256

WIRINGDIAGRAMS

FORM 7256-AH DRAWING X-340

FORM 7256-BH DRAWING X-341

FORM 7256-BNRH DRAWING X-342

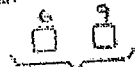
FORM 7256-BT-\*NRH DRAWING X-343

# **PROTECTOFIER**

## **AUTO/MANUAL OPERATION**

55100A FLAME-PAK  
 ACF { C - CHECK RELAY  
 F - FLAME RELAY

**SINGLE BURNER  
 PROTECTOFIER**  
 (FORM 7256-BH)



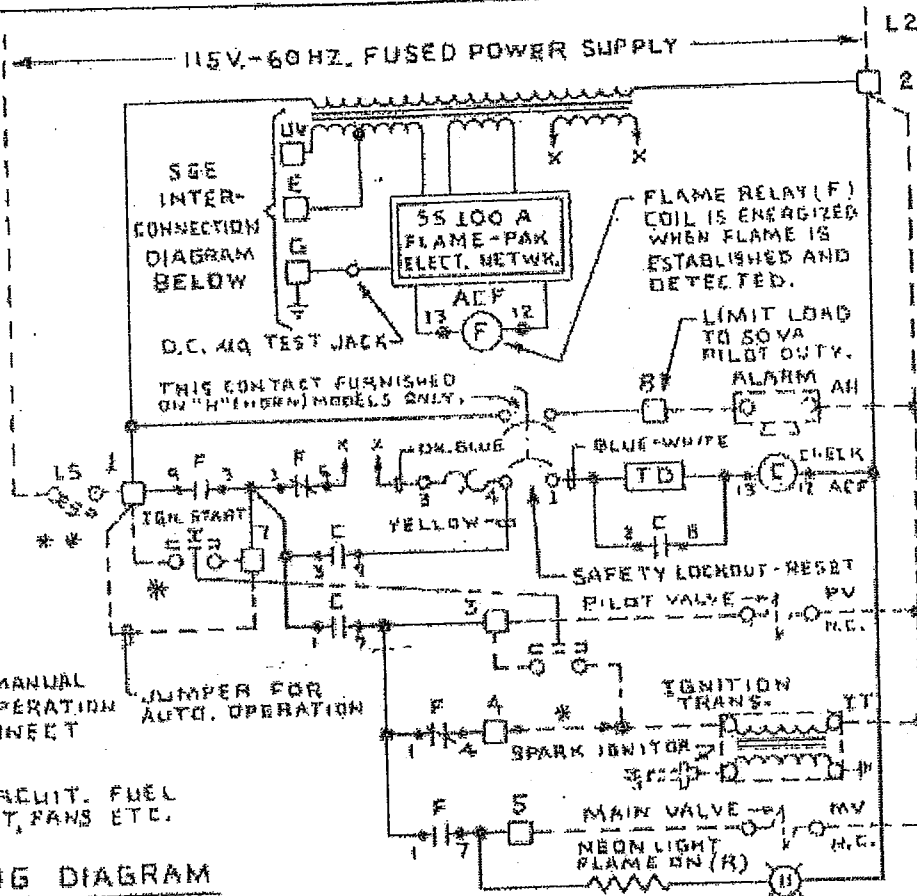
NO CONNECTION

— INTERNAL WIRING,  
 --- EXTERNAL WIRING.

\* PUSHBUTTON SHOWN FOR MANUAL  
 START, FOR AUTOMATIC OPERATION  
 OMIT PUSHBUTTON AND CONNECT  
 JUMPERS AS INDICATED.

\*\* SAFETY INTLK. SERIES CIRCUIT. FUEL  
 AND AIR PRESS. SWS. VENT, FANS ETC.  
 AS REQUIRED.

## **WIRING DIAGRAM**



## **NOTES:**

FLAME WIRE TO BE NO. 14 TYPE TW  
 600V. INSULATED WIRE OR EQUAL.  
 FLAME WIRE MUST NOT BE IN SAME  
 CONDUITS WITH POWER WIRING.

IGNITION CABLE MUST BE RUN IN  
 SEPARATE CONDUIT TO SPARK ELECTRODE.  
 (DO NOT MIX WITH 115 V. WIRING.)

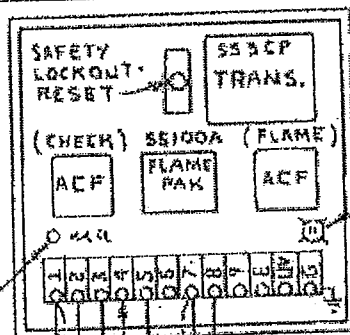
INSTALLATION, OPERATION AND MAINTENANCE SHALL  
 CONFORM WITH NATIONAL FIRE PROTECTION ASSOCIATION  
 STANDARDS, NATIONAL AND LOCAL CODES AND  
 AUTHORITIES HAVING JURISDICTION. ANY  
 MODIFICATION VOIDS APPROVALS.

115V, -60HZ.  
 FUSED POWER SUPPLY

## **NOTES:**

OPEN TYPE CONTROL SHOWN.  
 LETTER SUFFIX "E" AFTER FORM  
 NUMBER INDICATES ENCLOSED MODEL.  
 LETTER SUFFIX "H" IN FORM NUMBER  
 INDICATES PROTECTOFIER PROVIDED  
 WITH CONTACT FOR FLAME FAILURE  
 ALARM (SHOWN). STANDARD TRIAL FOR  
 IGNITION PERIOD IS 15 SEC. SUFFIX "S"  
 FOLLOWING LETTER "B" INDICATES  
 5 SEC. TRIAL FOR IGNITION PERIOD.

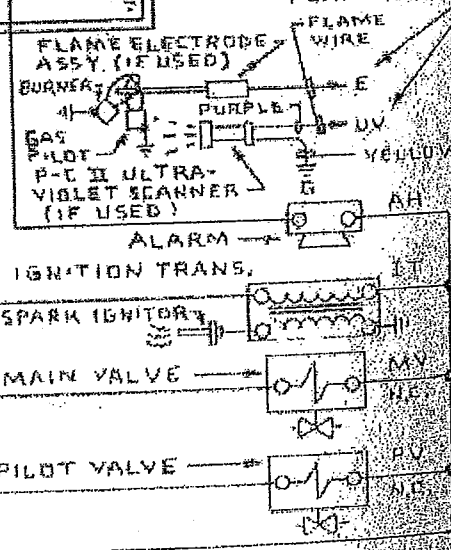
## **INTERCONNECTION DIAGRAM**



## **SINGLE BURNER PROTECTOFIER** (FORM 7256-BH)

NEON LIGHT  
 FLAME ON (R)

OPERATING  
 SIGNAL FROM  
 P-C II OR  
 FLAME ADD.



**PROTECTION CONTROLS, INC.**  
 SKOKIE, ILLINOIS

**WIRING DIAGRAM FOR:  
 PROTECTOFIER FORM 7256-BH**

JOB NO.	DRAWN BY	DATE	DRAWN NO.
TR	W/P	1-26-88	X-341

REO 04/17/10 1-26-88

PROTECTION CONTROLS INC.  
Skokie, Illinois

PROTECTOFIER  
Form 7256 BH  
(Drawing X-341)

Single Burner Supervision, Automatic or Manual Pushbutton Ignition,  
Plug-in Type SS100A FLAME PAK, Plug-in Type Control Relays.

OPERATING SEQUENCE

AUTOMATIC IGNITION

Provide wire jumper between terminal 1 and terminal 7 on PROTECTOFIER  
connect ignition transformer to PROTECTOFIER terminal 4.

Power on PROTECTOFIER terminal 1 and 2 provide power to electronic  
network (thru safety and cycling limit switch circuits).

- 1 - "ACF" CHECK relay "C" is energized thru N.C. contacts of "ACF"  
FLAME relay "F", SAFETY LOCKOUT switch circuit and component check  
"TD" circuit.
- 2 - Ignition transformer is energized from terminal 4 (thru N.C. contact  
of FLAME relay "F") to provide electric spark ignition to the pilot.  
Pilot solenoid valve is energized from terminal 3.
- 3 - With pilot flame established "ACF" FLAME relay "F" is energized.
  - a) FLAME relay "F" contacts transfer.
    - 1) N.C. "F" contact in safe-start checking and SAFETY LOCKOUT  
circuit opens.
    - 2) N.C. "F" contact in ignition transformer circuit opens to  
de-energize the ignition transformer.
    - 3) N.O. "F" contact in main valve circuit closes to energize  
main valve. Neon indicator light on PROTECTOFIER chassis  
will glow to indicate flame is established.

MANUAL PUSHBUTTON IGNITION

No jumper required between terminal 1 and terminal 7 on PROTECTOFIER.  
Use momentary type pushbutton with two normally open contacts. Connect  
one set of normally open contacts between terminal 1 and 7. Connect  
other set of normally open contacts between terminal 3 and ignition  
transformer primary.

Power on PROTECTOFIER terminal 1 (thru safety and cycling limit switch  
circuits).

- 1 - Press and hold START button.

- a) "ACF" CHECK relay "C" is energized thru N.C. contacts of "ACF"  
FLAME relay "F", SAFETY LOCKOUT switch circuit and component  
check "TD" circuit.
  - b) Ignition transformer is energized thru contact of START button  
to provide spark ignition to the pilot. Pilot solenoid valve  
is energized from terminal 3.
- 2 - With pilot flame established "ACF" FLAME relay "F" is energized.

a) FLAME relay "F" contacts transfer.

- 1) N.C. "F" contact in safe-start checking and SAFETY LOCKOUT circuit opens.
- 2) N.O. "F" contact between terminal 1 and terminal 7 closes providing holding circuit around START pushbutton contact.
- 3) N.O. "F" contact in main valve circuit closes to energize main valve. Neon indicator light on PROTECTOFIER chassis will glow to indicate flame is established.

3 - Release START button. Ignition transformer is de-energized.

Failure to establish pilot flame during limited ignition trial cycle will cause SAFETY LOCKOUT switch contacts to open circuit to CHECK relay "C" coil. CHECK relay "C" is de-energized, pilot valve is de-energized and electric ignition is stopped. With no flame signal, main valve remains de-energized.

SAFETY LOCKOUT requires manual reset.

Flame failure during operation shuts off fuel supply by de-energizing fuel valves. Automatic ignition model will automatically make one attempt to relight. Manual pushbutton start model requires manual pushbutton start to relight.

Power interruption to PROTECTOFIER terminal 1 de-energizes relays and fuel valves. Resumption of power on automatic ignition model will cause PROTECTOFIER to go thru another safe-start check and relight cycle. Manual pushbutton start model requires manual pushbutton start to relight.

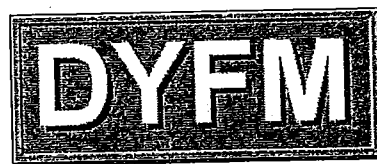
Failure of CHECK relay "C" to prove safe-start check will prevent opening of fuel valves and also prevent ignition.

N.O. CHECK relay contact in safe-start check circuit closes when CHECK relay "C" is energized jumpering component check "TD" circuit.

Suffix letter "H" in Form number indicates Alarm circuit option is provided. Alarm circuit will be energized when SAFETY LOCK-OUT switch trips on failure to light pilot. Alarm load to be limited to 50VA maximum. Suffix letter "E" in Form number indicates PROTECTOFIER is enclosed type.

8/28/74

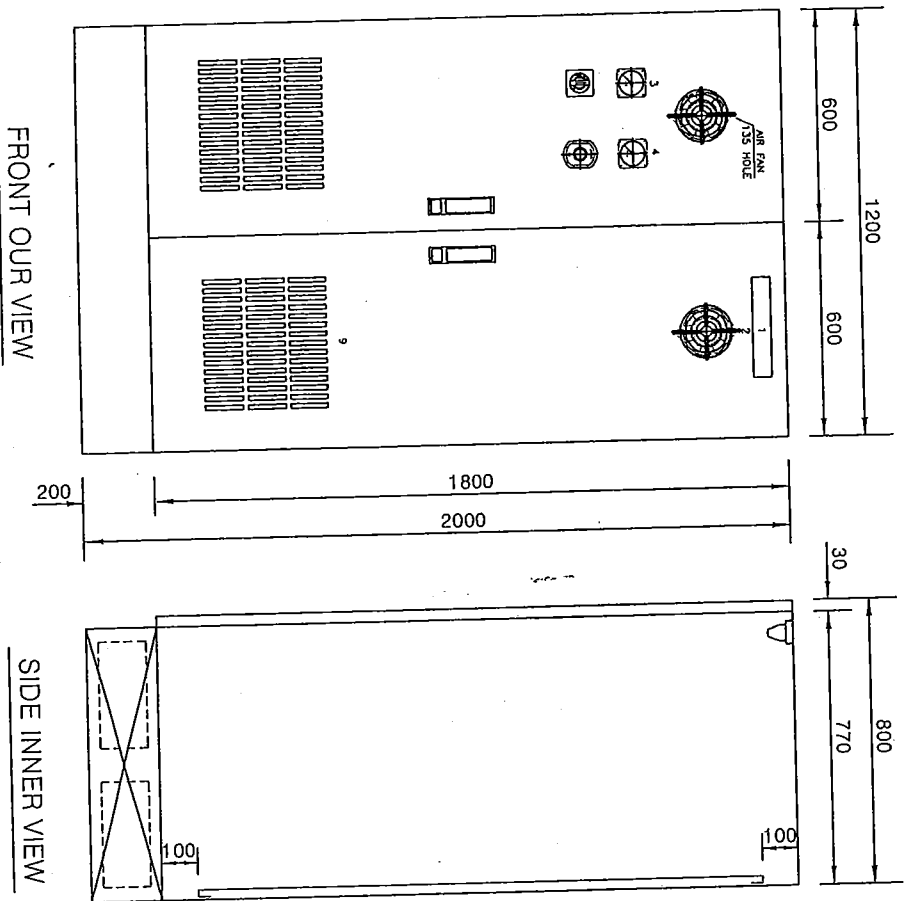
# OVEN ELECTRIC CONTROL PANEL



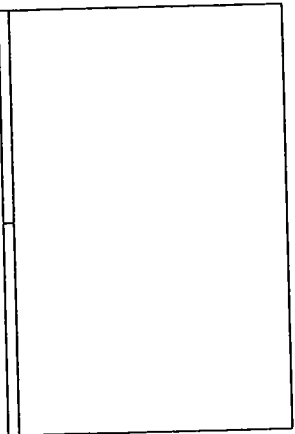
**DONGYANG DYNAMICS**

Operator should read this manual before start-up system to prevent accident or injury person.

13020803YCD ON GMD



TOP OUR VIEW



• NOTE •

1. LEGEND

No.	LOGO	DESCRIPTION
1	-	NAME PLATE
2	-FAN	VENTILATION FAN
3	-V1	VOLT-METER
4	-A1	AMP-METER
5	-DP	DISPLAY
6	-PCL	POWER LAMP W/RED
7	-KET	POWER KET SWITCH "OFF - ON"
8	-EM	EMERGENCY
9	-	VENTILATION
10	-	-
11	-	-
12	-	-
13	-	-
14	-	-
15	-	-
16	-	-
17	-	-
18	-	-
19	-	-

2. PAINT COLOR : MUNSSELL No. 5 Y 7/1-METAL

3. CUBICLE : INDOOR, SELF MOUNTING, IP41

4. THICKNESS

FRAME : 2.3t

FRONT DOOR : 2.3t

REAR : 2.3t BASE : 5t

5. CUTTING HOLE

2 : 1.35 Hole

3, 4 : 56Hole (80X80)

5 : 292 x 227

6-8 : 30 Hole

YANG FOOD MACHINERY CO.,LTD

FINISH	DATE	QUANTITY	MATE.	DRAWING NAME
FILE NO	08.08.11	DESIGN	Y.S.CHOI	SCALE
			n/s	DRAWING NO

POTATO CHIP  
DYE0802031



1020803AD ON GMD

NO.	TITLE	DRAWING NO.	REMARKS	NO.	TITLE	DRAWING NO.	REMARKS
1	COVER	DYE080200		19	SCHEMATIC DIAGRAM (12/ )	DYE080216	
2	DRAWING INDEX	DYE080201		20	SCHEMATIC DIAGRAM (13/ )	DYE080217	
3	B/M LIST FOR INVERTER PANEL	DYE080202		21	SCHEMATIC DIAGRAM (14/ )	DYE080218	
4	LAYOUT DIAGRAM (OUT VIEW1)	DYE0802031		22	SCHEMATIC DIAGRAM (15/ )	DYE080219	
5	LAYOUT DIAGRAM (OUT VIEW2)	DYE0802032		23	SCHEMATIC DIAGRAM (16/ )	DYE080220	
6	LAYOUT DIAGRAM (INNER VIEW)	DYE0802033		24	SCHEMATIC DIAGRAM (17/ )	DYE080221	
7	SINGLE LINE DIAGRAM	DYE080204		25	SCHEMATIC DIAGRAM (18/ )	DYE080222	
8	3 - LINE DIAGRAM (01/ )	DYE080205		26	RELAY ARRANGE DIAGRAM(1/2)	DYE0802231	
9	3 - LINE DIAGRAM (02/ )	DYE080206		27	RELAY ARRANGE DIAGRAM(2/2)	DYE0802232	
10	3 - LINE DIAGRAM (03/ )	DYE080207		28	TERMINAL DIAGRAM (19/ )	DYE080224	
11	3 - LINE DIAGRAM (04/ )	DYE080208		29	TERMINAL DIAGRAM (20/ )	DYE080225	
12	SCHEMATIC DIAGRAM (05/ )	DYE080209		30	TERMINAL DIAGRAM (21/ )	DYE080226	
13	SCHEMATIC DIAGRAM (06/ )	DYE080210					
14	SCHEMATIC DIAGRAM (07/ )	DYE080211					
15	SCHEMATIC DIAGRAM (08/ )	DYE080212					
16	SCHEMATIC DIAGRAM (09/ )	DYE080213					
17	SCHEMATIC DIAGRAM (10/ )	DYE080214					
18	SCHEMATIC DIAGRAM (11/ )	DYE080215					

YANG FOOD MACHINERY CO.,LTD

FINISH	DATE	QUANTITY	MATE.	DRAWING NAME	POTATO CHIP
	08.08.11	DESIGN	Y.S.CHOI	SCALE	n/s
FILE NO				DRAWING NO	DYE080201

2020803AD ON GWD

ITEM NO.	DESIGN	SPECIFICATION	MODEL	QTY	MAKER	REMARKS
1	-INV1, INV4, INV6	INVERTER UNIT 3PH, AC460V, 60Hz, 12A, rated, for 5.5kw	VI12855	3	DANFOSS	
2	-INV2	INVERTER UNIT 3PH, AC460V, 60Hz, 2.1A, rated, for 0.75kw	VI12807	1	DANFOSS	
3	-INV3, INV4	INVERTER UNIT 3PH, AC460V, 60Hz, 16A, rated, for 7.5kw	VI12875	2	DANFOSS	
4	-INV7	INVERTER UNIT 3PH, AC460V, 60Hz, 7A, rated, for 3kw	VI12830	1	SHUNDER	
5	-Q0	MCCB 3POLE, 60Hz, 250AF/200AT	ECC250N	1	SHUNDER	
6	-Q1, Q5, Q6	MOTOR PROTECTOR 3POLE, 60Hz, 30AF/14AT	GV2ME16	3	SHUNDER	
7	-Q2, Q7 ~ Q10, Q14, Q15	MOTOR PROTECTOR 3POLE, 60Hz, 30AF/1.8AT	GV2ME07	7	SHUNDER	
8	-Q3, Q4	MOTOR PROTECTOR 3POLE, 60Hz, 30AF/1.8AT	GV2ME20	2	SHUNDER	
9	-MC7 ~ MC10, MC12	MAGNETIC SWITCH 3PH, AC110V, 60Hz, 9A rated, for 0.75kW	LC1D066+LB97007	6	TELEMECANIC	
10	-MC14, MC15	MAGNETIC CONTACTOR 3PH, AC110V, 60Hz, 9A rated, for 0.75kW	LC1D066+LD-N20	2	TELEMECANIC	
11	-FAN1, FAN2	COOLING FAN 1PH, 220V, 60Hz	UF-15P23	2	FUJITECH	
12	-FL	FLUORESCENT LAMP W/LS 1PH, 220V, 10W	-	2	-	
13	-V1	VOLT-METER 380V, 80x80	WB-V1	1	KYONG BO	
14	-A1	AMPERE-METER 200A, 80x80, 300%	WB-A1	1	KYONG BO	
15	-F1~F6	DIASED FUZED W/HOLDER 660V, 4A	-	6	SIBA	
16	-R1~R140	MINATURE RELAY DC24V, 4x4x, 5A	SZR-MY4-N1	140	LG	
17	-CT1	CURRENT TRANSFORMER 200/5A, 5VA	UR-1	1	KYONG BO	
18	-POW	POWER SUPPLY DC24V, 6A, 300VA	PMU-700S	1	HWA SHIN	
19	-DP	TOUCH SCREEN 10.4inch, 25W, 640x480	1769-L32E	1	LG	
20	-PLC	CPU POWER	1769-P44	1	AB	
21	-	ANALOG-INPUT, 6CH, RT	1769-IT6	1	AB	
22	-	INPUT, 32POINT, SOURCE SINK INPUT	1769-IQ32	1	AB	
23	-	ANALOG-OUTPUT, 8CH, 4~20mA	1769-OF8C	2	AB	
24	-	OUTPUT, 32POINT, Rated 2A, TR OUT	1769-OB32	2	AB	
25	-	PILOT LAMP 1PH, 220V, 60Hz, 30W	KH-S04	1	KUN HUNG	
26	-PL1	KEY SWITCH 1x1b, 2POSITION, 30W	KH-S030-2	1	KUN HUNG	
27	-KEY	EMERGENCY PUSH BUTTON 1PH, 220V, 60Hz, 30W, LOCK TYPE	KH-3071EB	1	KUN HUNG	
28	-PB1	INOUT POWER TERMINAL 200A, 3P	AB1 VN7035N	3	SHUNDER	
29	-X0	OUTPUT POWER TERMINAL 30A, 1P	AB1 VV435U	64	SHUNDER	
30	-X1, X2, X3	CONTROL TERMINAL 10A, 1P	AB1 VV235U	290	SHUNDER	
31	-X31, X41 ~ X44	POWER CABLE UL, BLOCK, 0 AWG 50mm2	-	1	-	
32	-CABLE1	POWER CABLE UL, BLOCK, 12 AWG 4mm2	-	1	-	
33	-CABLE2	POWER CABLE UL, BLOCK, 16 AWG 1.5mm2	-	1	-	
34	-CABLE3	CONTROL CABLE UL, YELLOW, 18AWG	-	1	-	
35	-CABLE4					
36						
37						

YANG FOOD MACHINERY CO.,LTD

FINISH

DATE

08.08.11

QUANTITY

DESIGN

Y.S.CHOI

SCALE

n/s

DRAWING NAME

DRAWING NO

POTATO CHIP

DYE080202

## \* NOTE \*

## 1. LEGEND

No.	LOGO	DESCRIPTION
1	-	NAME PLATE
2	-FAN	VENTILATION FAN
3	-V1	VOLT-METER
4	-A1	AMP-METER
5	-DP	DISPLAY
6	-PL1	POWER LAMP W/RED
7	-KET1	POWER KET SWITCH "OFF - ON"
8	-EM	EMERGENCY
9	-	VENTILATION
10	-	-
11	-	-
12	-	-
13	-	-
14	-	-
15	-	-
16	-	-
17	-	-
18	-	-
19	-	-

2. PAINT COLOR : MUNSSELL No. 5 Y 7/1-METAL

3. CUBICLE : INDOOR, SELF MOUNTING, IP41

4. THICKNESS

FRAME : 2.3t

FRONT DOOR : 2.3t

REAR : 2.3t BASE : 5t

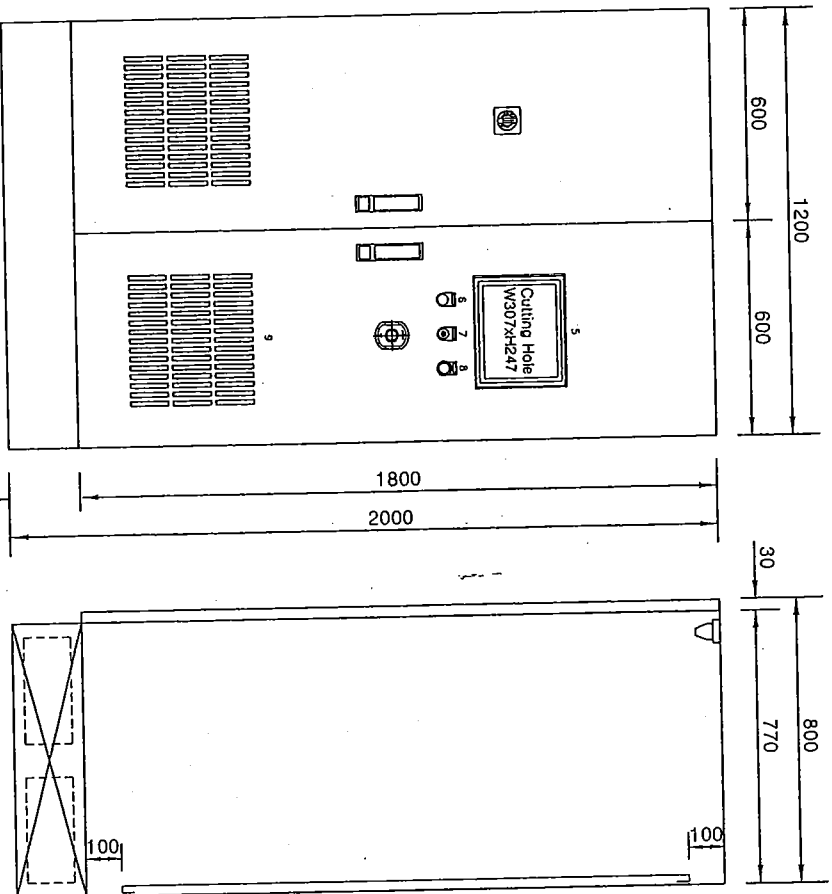
5. CUTTING HOLE

2 : 135 Hole

3, 4 : 66Hole (80x80)

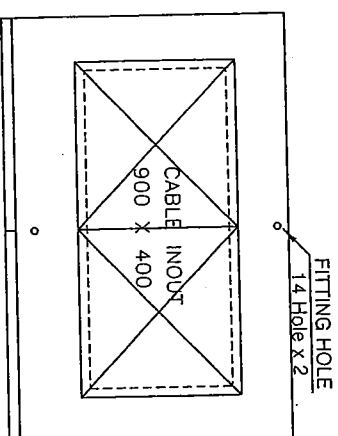
5 : 292 x 227

6~8 : 30 Hole



FRONT OUR VIEW

SIDE INNER VIEW



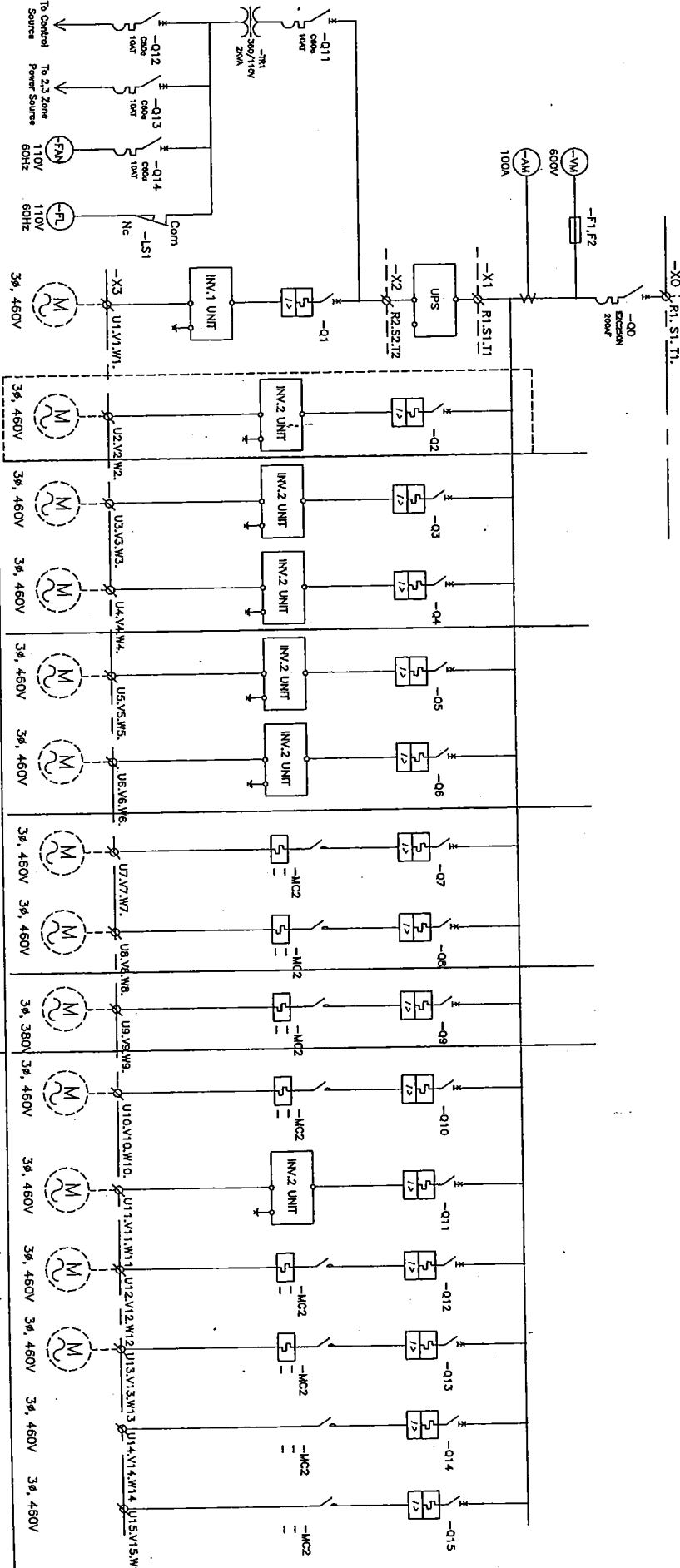
BASE INNER VIEW

TOP OUR VIEW

FINISH	DATE	QUANTITY	DESIGN	MATE.	DRAWING NAME
	08.08.11		Y.S.CHOI		POTATO CHIP
FILE NO			SCALE	n/s	DRAWING NO
					DYE0802032

P020803AD ON GMD

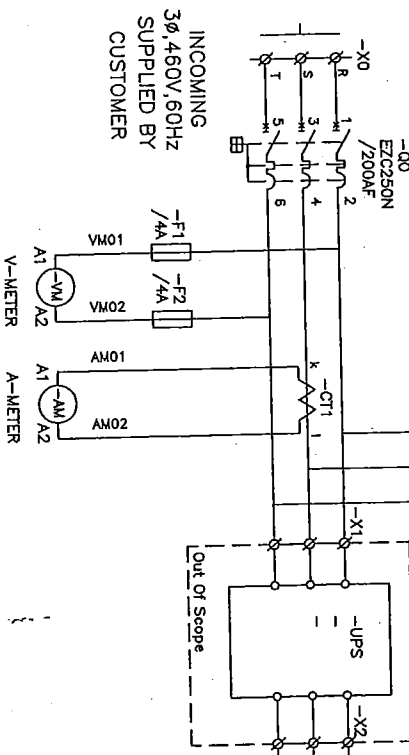
3ø, 60Hz, 460V  
SCOPE OF SUPPLY



FEEDER NAME	IGF (Indirect)										DGF (Direct)			
	Mesh Discharge	#2 Circulation	#3 Circulation	Combustion #2Exhaust	Combustion #3Exhaust	#2 Oven Exhaust	#3 Oven Exhaust	Hood	Pre-Heater Exhaust Fan	Pre-Heater Oven Fan	Oven Exhaust Fan	Exhaust Oven Fan	#2 Gun Burner	#3 Gun Burner
MOTOR CAPACITY (KW)	5.5	0.75	7.5	7.5	5.5	5.5	0.75	0.75	0.75	2.55	3.7	1.5	0.4	0.4
MCCB & PROTECTOR	GV2ME16	GV2ME07	GV2ME20	GV2ME16	GV2ME16	GV2ME07	GV2ME07	GV2ME07	GV2ME07	GV2ME10	GV2ME14	GV2ME08	GV2ME07	GV2ME07
VWF OR CONTACTOR	VL12855	VL12807	VL12875	VL12875	VL12855	VL12855	VL12855	VL12855	VL12855	VL12830	VL12830	VL12830	VL12830	VL12830
CONTACTOR LC1D-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EOCR LR97D	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RETURNING CURRENT [A]	1.4	1.8	16	16	11	11	1.8	1.8	1.8	1.8	4.8	7.6	3.4	1.4

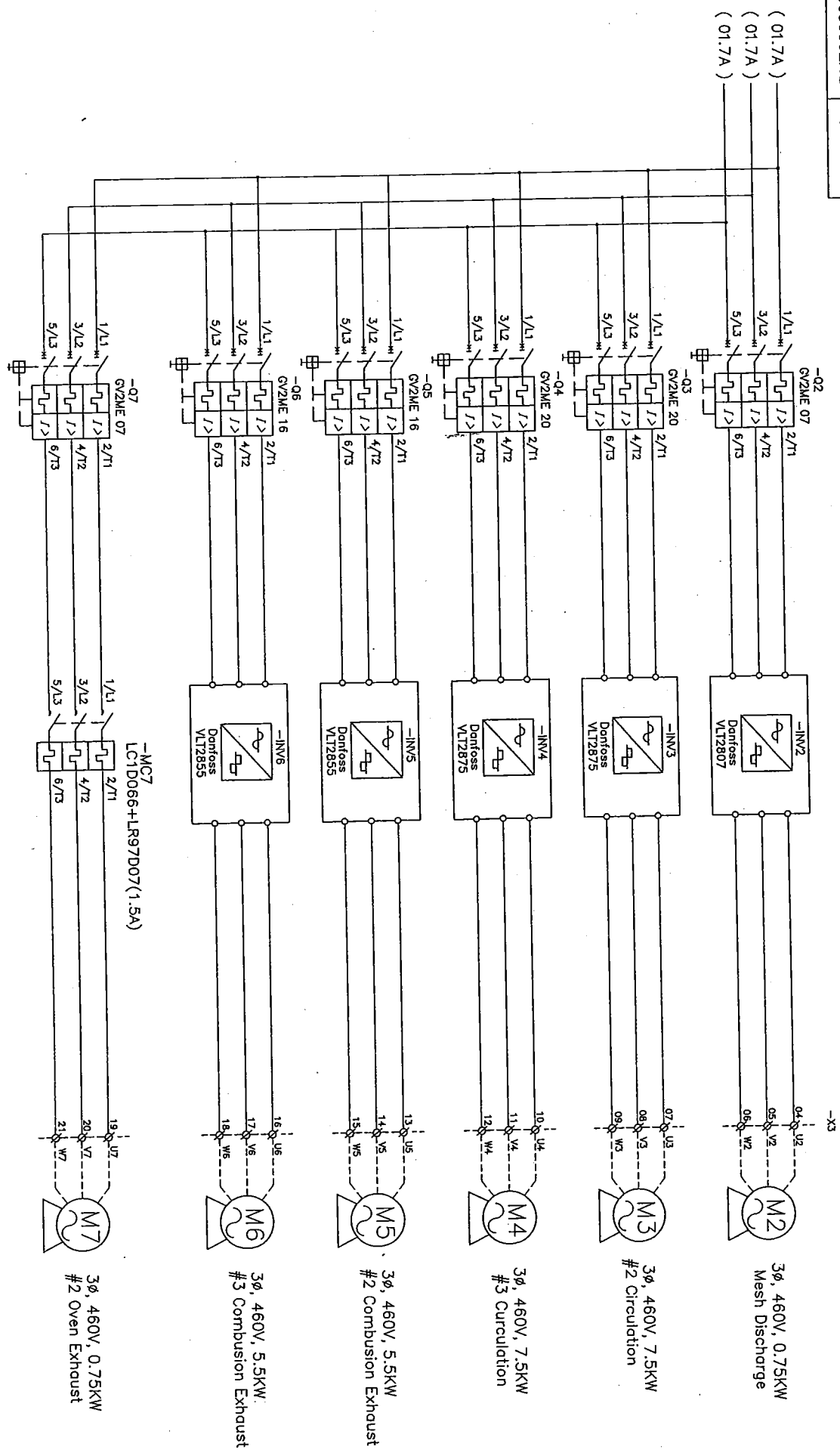
YANG FOOD MACHINERY CO.,LTD

FINISH	DATE	QUANTITY	MATE.	DRAWING NAME	POTATO CHIP
FILE NO	08.08.11	DESIGN	Y.S. CHOI	SCALE	DYE080204
				n/s	



JUN 20 2011				POTATO CHIP			
YANG FOOD MACHINERY CO.,LTD				DYE080205			
FINISH.	DATE	08.08.11	QUANTITY		MATE.		DRAWING NAME
FILE NO			DESIGN	Y.S.CHOI	SCALE	n/s	DRAWING NO

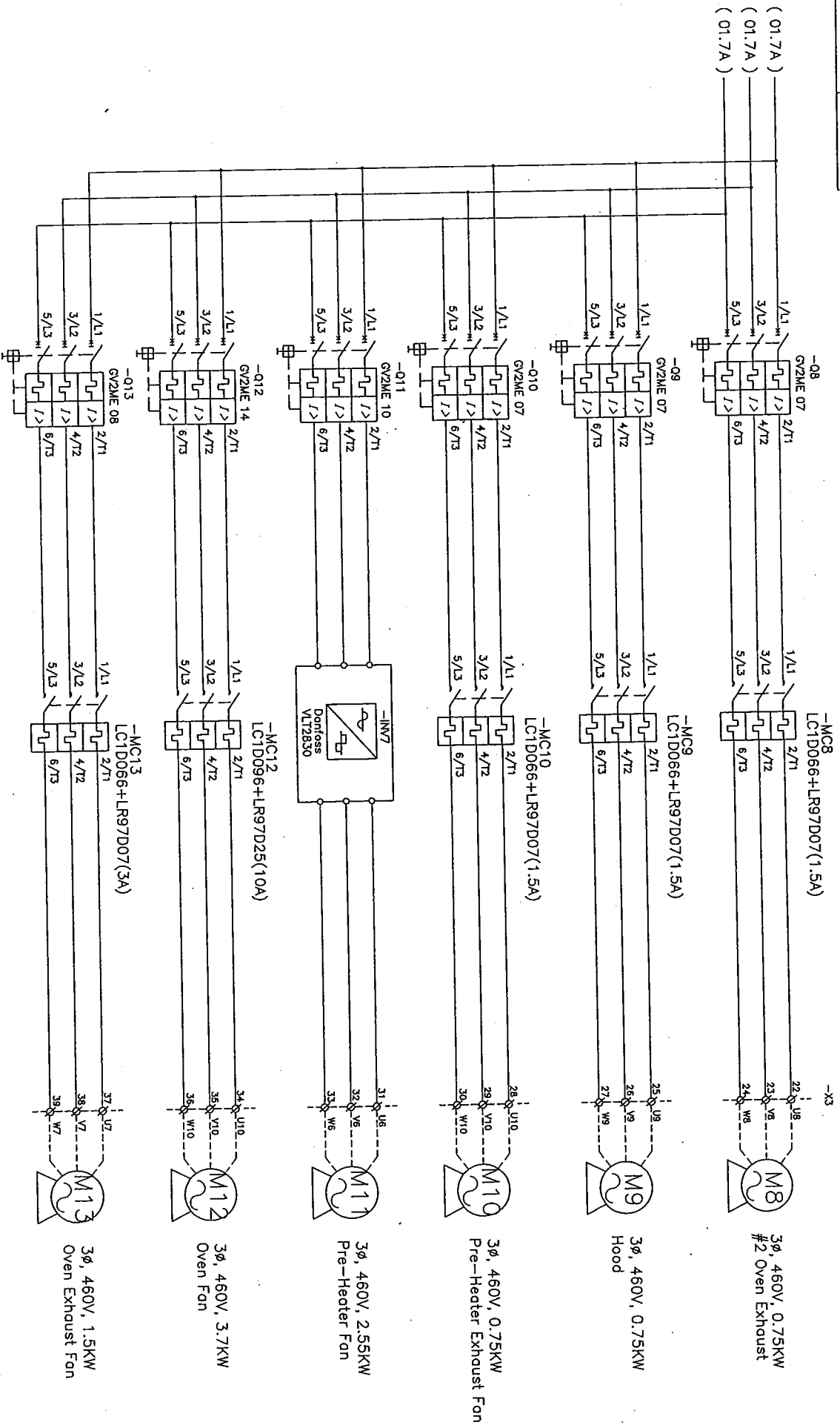
9020803AD ON GMD



YANG FOOD MACHINERY CO.,LTD

FINISH	DATE	QUANTITY	MATE.	DRAWING NAME	POTATO CHIP
FILE NO	08.08.11	DESIGN	Y.S.CHOI	SCALE	DYE080206
			n/s	DRAWING NO	

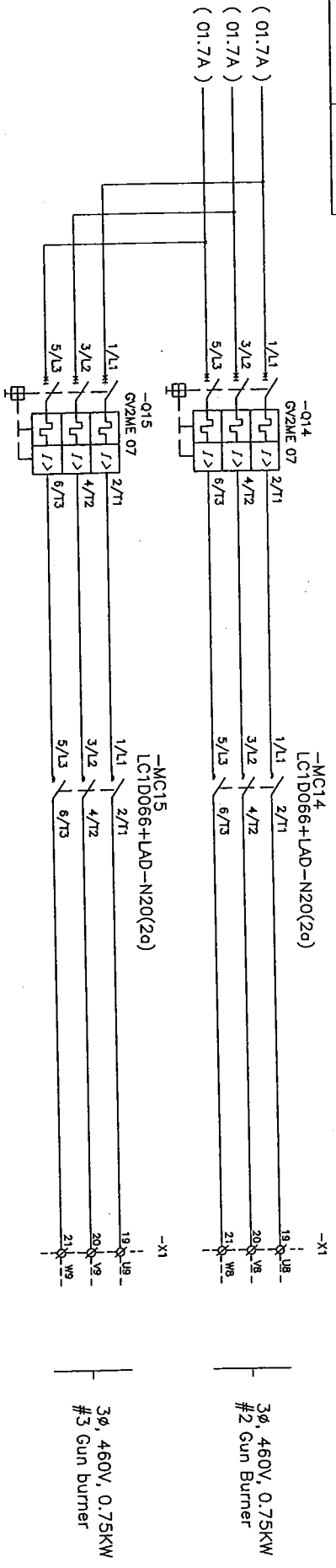
L020803AYD ON GMD



YANG FOOD MACHINERY CO.,LTD

FINISH	DATE	QUANTITY	DESIGN	MATE.	SCALE	DRAWING NAME	POTATO CHIP
	08.08.11				n/s		DYE080207

8020803A/D ON GMD



G YANG FOOD MACHINERY CO.,LTD

FINISH	DATE	QUANTITY	MATE.	DRAWING NAME	POTATO CHIP
FILE NC	08.08.11	DESIGN	Y.S.CHOI	SCALE	n/s
				DRAWING NO	DYE080208

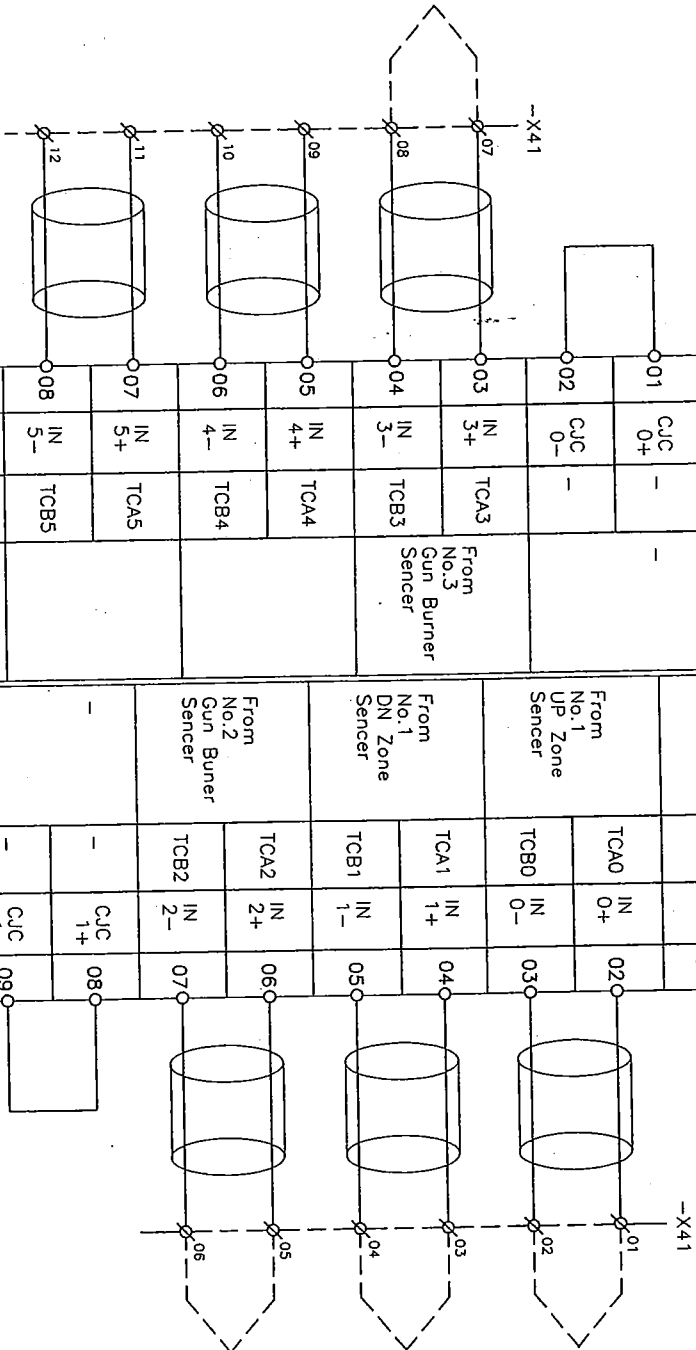


6020903AD

ON GMD

## 1769-IT6

No	Add	Tag	Mark	Mark	Tag	Add	No
01	CJC 0+	-	-	-	-	Nc	01
02	CJC 0-	-	-	From No.1 UP Zone Sencer	TCA0	IN 0+	02
03	IN 3+	TCA3	From No.3 Gun Burner Sencer	TCB0	IN 0-	03	03
04	IN 3-	TCB3	From No.1 DN Zone Sencer	TCA1	IN 1+	04	04
05	IN 4+	TCA4	From No.2 Gun Burner Sencer	TCB1	IN 1-	05	05
06	IN 4-	TCB4		TCA2	IN 2+	06	06
07	IN 5+	TCA5		TCB2	IN 2-	07	07
08	IN 5-	TCB5		-	CJC 1+	08	08
09	Nc	-	-	-	CJC 1-	09	09



YANG FOOD MACHINERY CO.,LTD

FINISH

DATE

08.08.11

QUANTITY

DESIGN

MATE.

SCALE

n/s

DRAWING NAME

POTATO CHIP

DYE080209

( 01.7D )

P24

N24

1769-1Q32

No	Add	Tag	Mark	Mark	Tag	Add	No
01	IN	X001	Chain Fault	E.M Stop	X000	IN	01
02	IN	X003	Gas Low PS	Gas Leak PS	X002	IN	02
03	IN	X005	Pre Heater Exhaust Fan PS	Gas High PS	X004	IN	03
04	IN	X007	Oven Fan PS	Pre Heater Fan PS	X006	IN	04
05	IN	X009	#2 Zone Low Fire L/S	-	OVDC	DC COM	05
06	IN	X008	#2 Zone Door Fire L/S	Oven Exhaust Fan PS	X008	IN	06
07	IN	X00D	#3 Zone Low Fire L/S	#2 Zone High Fire L/S	X00A	IN	07
08	IN	X00F		#3 Zone High Fire L/S	X00C	IN	08
09	DC COM	OVDC	-	#3 Zone Door Fire L/S	X00E	IN	09

1769-1Q32

No	Add	Tag	Mark	Mark	Tag	Add	No
01	IN	X011	#1 Damper Open L/S	Chain Encoder	X010	IN	01
02	IN	X013	#2 Damper Open L/S	#1 Damper Close L/S	X012	IN	02
03	IN	X015	#3 Damper Open L/S	#2 Damper Close L/S	X014	IN	03
04	IN	X017		#3 Damper Close L/S	X016	IN	04
05	IN	X019		-	OVDC	DC COM	05
06	IN	X01B			X018	IN	06
07	IN	X01D			X01A	IN	07
08	IN	X01F			X01C	IN	08
09	DC COM	OVDC	-		X01E	IN	09

( 01.7D )

( 01.7d )

P24

# 1769-1Q32

No	Add	Tag	Mark	Mark	Tag	Add	No
01	IN	X021	Mesh Discharge Fault	Choin Oven Fault	X020	IN	0
02	IN	X023	#3 Zone Curculation Fault	#2 Zone Curculation Fault	X022	IN	2
03	IN	X025	#3 Zone Combustion Exhaust Fault	#2 Zone Combustion Exhaust Fault	X024	IN	4
04	IN	X027	#3 Zone Oven Exhaust Fault	#2 Zone Oven Exhaust Fault	X026	IN	6
05	IN	X029	Pre Heater Exhaust Fan Fault	-	OVDC COM	DC COM	05
06	IN	X028	Oven Fault	Hood Fault	X028	IN	8
07	IN	X020	#2 Gun Burner Fault	Pre Heater Fan Fault	X02A	IN	10
08	IN	X02F		Exhaust Oven Fan Fault	X02C	IN	12
09	DC COM	OVDC -		#3 Gun Burner Fault	X02E	IN	14

# 1769-1Q32

No	Add	Tag	Mark	Mark	Tag	Add	No
01	IN	X031			X030	IN	16
02	IN	X033			X032	IN	18
03	IN	X035			X034	IN	20
04	IN	X037			X036	IN	22
05	IN	X039			OVDC COM	DC COM	05
06	IN	X038			X038	IN	24
07	IN	X030			X03A	IN	26
08	IN	X03F			X03C	IN	28
09	DC COM	OVDC -			X03E	IN	30

N24

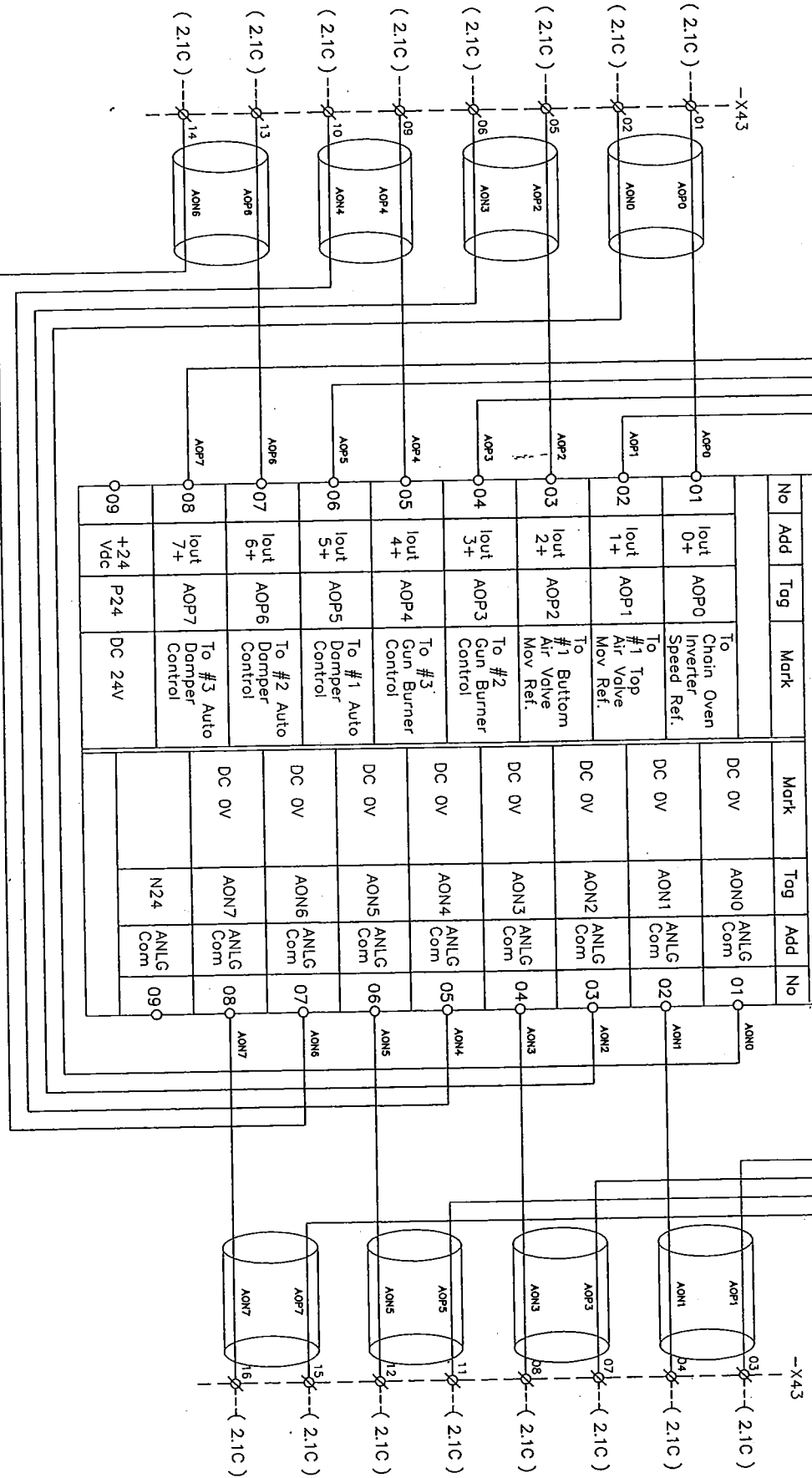
( 01.7d )

DU P 3 YANG FOOD MACHINERY CO.,LTD

FINISH	DATE	QUANTITY	MATE.	DRAWING NAME	POTATO CHIP
	08.08.11				
FILE NO	DESIGN	Y.S. CHOI	SCALE	DRAWING NO	DYE080211
			n/s		

1769-0F8C

No	Add	Tag	Mark	Mark	Tag	Add	No
01	lout 0+	AOP0	To Chain Oven Inverter Speed Ref.	DC 0V	AON0	ANLG Com	01
02	lout 1+	AOP1	To #1 Top Air Valve Mov Ref.	DC 0V	AON1	ANLG Com	02
03	lout 2+	AOP2	To #1 Bottom Air Valve Mov Ref.	DC 0V	AON2	ANLG Com	03
04	lout 3+	AOP3	To #2 Gun Burner Control	DC 0V	AON3	ANLG Com	04
05	lout 4+	AOP4	To #3 Gun Burner Control	DC 0V	AON4	ANLG Com	05
06	lout 5+	AOP5	To #1 Auto Damper Control	DC 0V	AON5	ANLG Com	06
07	lout 6+	AOP6	To #2 Auto Damper Control	DC 0V	AON6	ANLG Com	07
08	lout 7+	AOP7	To #3 Auto Damper Control	DC 0V	AON7	ANLG Com	08
09	+24 Vdc	P24	DC 24V		N24	ANLG Com	09



3120803AD ON GMD

( 01.7C )

( 10.4A )

R110

1769-OB32

No	Add	Tog	Mark	Mark	Tog	Add	No
01	Out 0	Y000	Chain Oven Run	-	R110	Vdc In	01
02	Out 2	Y002	#2 Zone Circulation Run	Mesh Discharge Run	Y001	Out 1	02
03	Out 4	Y004	#2 Zone Combustion Exhaust Run	#3 Zone Circulation Run	Y003	Out 3	03
04	Out 6	Y006	#2 Zone Oven Exhaust Run	#3 Zone Combustion Exhaust Run	Y005	Out 5	04
05	Out 8	Y008	Hood Run	#3 Zone Exhaust Run	Y007	Out 7	05
06	Out 10	Y00A	Pre Heater Fan Run	Pre Heater Exhaust Run	Y009	Out 9	06
07	Out 12	Y00C	Exhaust Oven Fan Run	Oven Fan Run	Y00B	Out 11	07
08	Out 14	Y00E	#3 Zone Burner Run	#2 Zone Burner Run	Y00D	Out 13	08
09	Vdc COM	T110	-	VWF Reset	Y00F	Out 15	09

1769-OB32

No	Add	Tog	Mark	Mark	Tog	Add	No
01	Out 0	Y010	VWF Reset		R110	Vdc In	01
02	Out 2	Y012			Y011	Out 1	02
03	Out 4	Y014			Y013	Out 3	03
04	Out 6	Y016			Y015	Out 5	04
05	Out 8	Y018			Y017	Out 7	05
06	Out 10	Y01A			Y019	Out 9	06
07	Out 12	Y01C			Y01B	Out 11	07
08	Out 14	Y01E			Y01D	Out 13	08
09	Vdc COM	T110			Y01F	Out 15	09

T110

( 01.7D )

( 10.4F )

3 YANG FOOD MACHINERY CO.,LTD

FINISH

DATE

08.08.11

QUANTITY

DESIGN

MATE.

SCALE

n/s

DRAWING NAME

POTATO CHIP

DYE080213

4120603AD ON GMD

( 09.4A )

( 11.0A )

R110

# 1769-OB32

No	Add	Tag	Mark	Mark	Tag	Add	No
01	0	Y020	Top #1-01 On	-	R110	Vdc In	01
02	2	Y022	Top #1-03 On	Top #1-02 On	Y021	Out 1	02
03	4	Y024	Top #1-05 On	Top #1-04 On	Y023	Out 3	03
04	6	Y026	Top #1-07 On	Top #1-06 On	Y025	Out 5	04
05	8	Y028	Top #1-09 On	Top #1-08 On	Y027	Out 7	05
06	10	Y02A	Button #1-02 On	Button #1-01 On	Y029	Out 9	06
07	12	Y02C	Button #1-04 On	Button #1-03 On	Y02B	Out 11	07
08	14	Y02E	Button #1-06 On	Button #1-05 On	Y02D	Out 13	08
09	Vdc COM	T110	-	Button #1-07 On	Y02F	Out 15	09

# 1769-OB32

No	Add	Tag	Mark	Mark	Tag	Add	No
01	0	Y030	Button #1-08 On	-	R110	Vdc In	01
02	2	Y032	Button #1-10 On	Button #1-09 On	Y031	Out 1	02
03	4	Y034	Button #1-12 On	Button #1-11 On	Y033	Out 3	03
04	6	Y036	Button #1-14 On	Button #1-13 On	Y035	Out 5	04
05	8	Y038	Pre Heater 2 On	Pre Heater 1 On	Y037	Out 7	05
06	10	Y03A	Pre Heater 4 On	Pre Heater 3 On	Y039	Out 9	06
07	12	Y03C	Pre Heater 6 On	Pre Heater 5 On	Y03B	Out 11	07
08	14	Y03E	Pre Heater 8 On	Pre Heater 7 On	Y03D	Out 13	08
09	Vdc COM	T110	-	Pre Heater 8 On	Y03F	Out 15	09

T110

( 09.4F )

( 11.0E )

YANG FOOD MACHINERY CO.,LTD

FINISH

DATE

08.08.11

QUANTITY

MATE.

DRAWING NAME

POTATO CHIP

FILE NO

DESIGN

SCALE

n/s

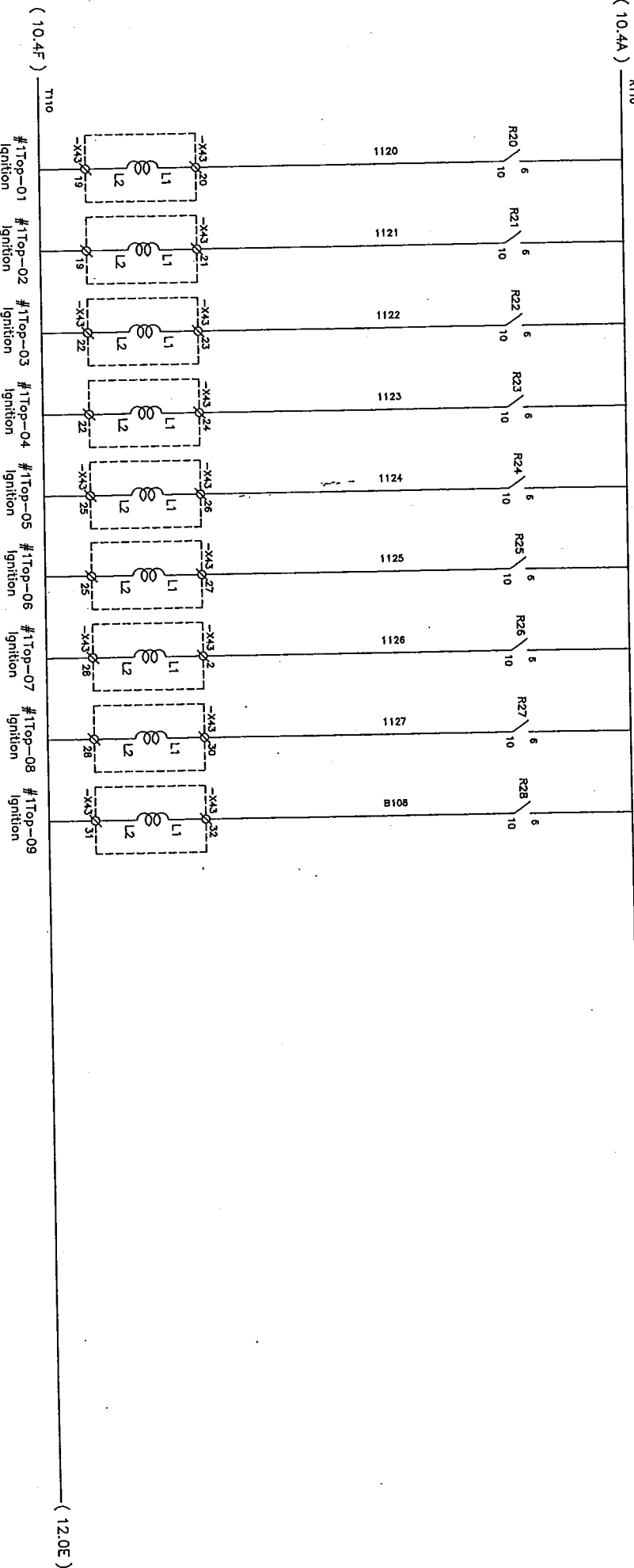
DRAWING NO

DYE080214

5120803AD ON GMD

NOTE  
#1. \*1 : BE INSTALLED IN LOCAL CONTROL BOX  
#2. \*2 : BE SUPPLIED BY CUSTOMER

1PH, AC110V, 60Hz  
R110 (10.4A) (12.0A)



YANG FOOD MACHINERY CO.,LTD

FINISH	DATE	QUANTITY	MATE.	DRAWING NAME
FILE NO	08.08.11			POTATO CHIP
DESIGN	SCALE	DRAWING NO		
Y.S.CHOI	n/s			DYE080215

9120803AD ON GMD

NOTE

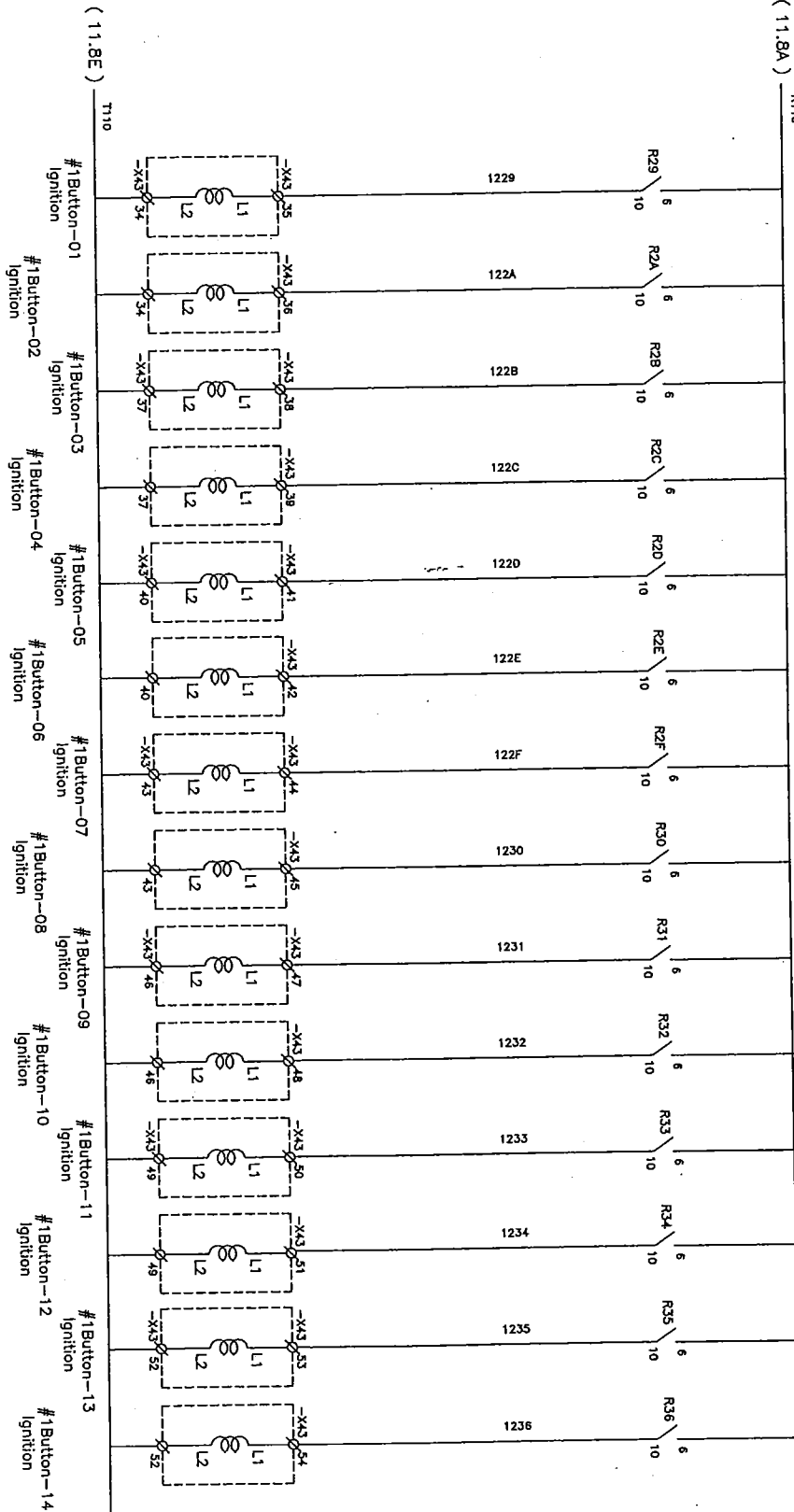
#1. \*1 : BE INSTALLED IN LOCAL CONTROL BOX

#2. \*2 : BE SUPPLIED BY CUSTOMER

1PH, AC110V, 50Hz

( 11.8A )

( 13.0A )



( 11.8E )

( 13.0E )

DYG YANG FOOD MACHINERY CO.,LTD

FINISH

DATE

08.08.11

QUANTITY

MATE.

DRAWING NAME

POTATO CHIP

FILE NO

DESIGN

Y.S.CHOI

SCALE

n/s

DRAWING NO

DYE080216



L120803A/D ON GMD

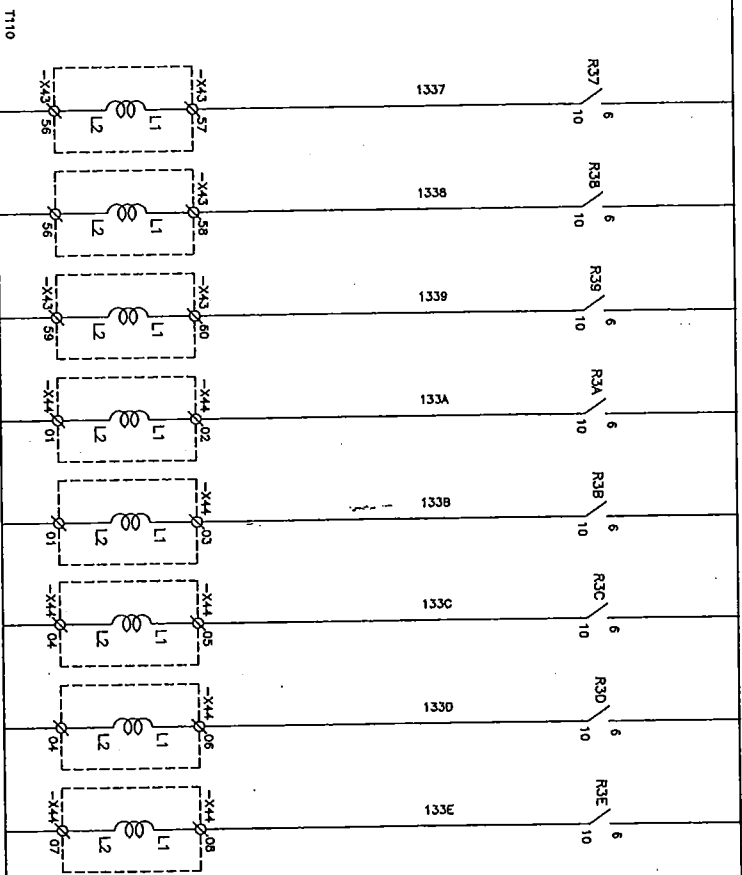
NOTE  
#1. \* : BE INSTALLED IN LOCAL CONTROL BOX  
#2. \* : BE SUPPLIED BY CUSTOMER

1PH, AC110V, 60Hz  
R110

( 12.8A )

( 14.0A )

( 12.8E )



( 14.0E )

YANG FOOD MACHINERY CO.,LTD

FINISH	DATE	QUANTITY	MATE.	DRAWING NAME
	08.08.11			POTATO CHIP
FILE NO	DESIGN	Y.S.CHOI	SCALE	DRAWING NO
			n/s	DYE080217

8120803AXD ON GMD

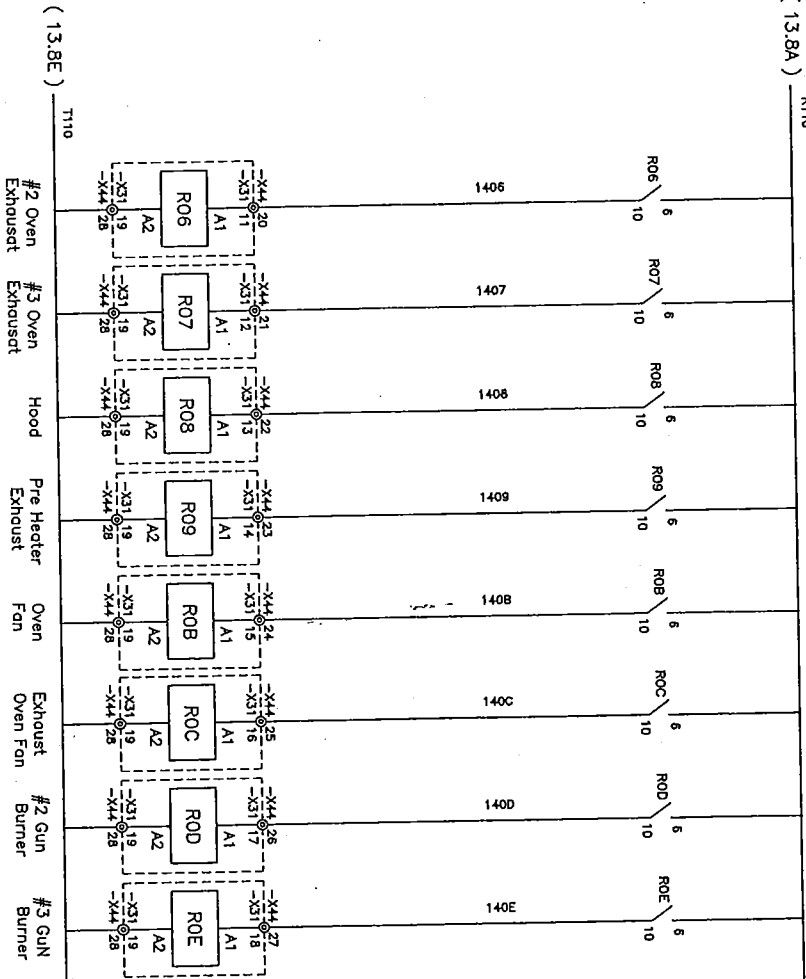
NOTE

#1. \* : BE INSTALLED IN LOCAL CONTROL BOX  
#2. \* : BE SUPPLIED BY CUSTOMER

1PH, AC110V, 60Hz

(13.8A)

(15.0A)



IG YANG FOOD MACHINERY CO.,LTD

FINISH

DATE

08.08.11

QUANTITY

MATE.

n/s

DRAWING NAME

POTATO CHIP

FILE NO

DESIGN

SCALE

n/s

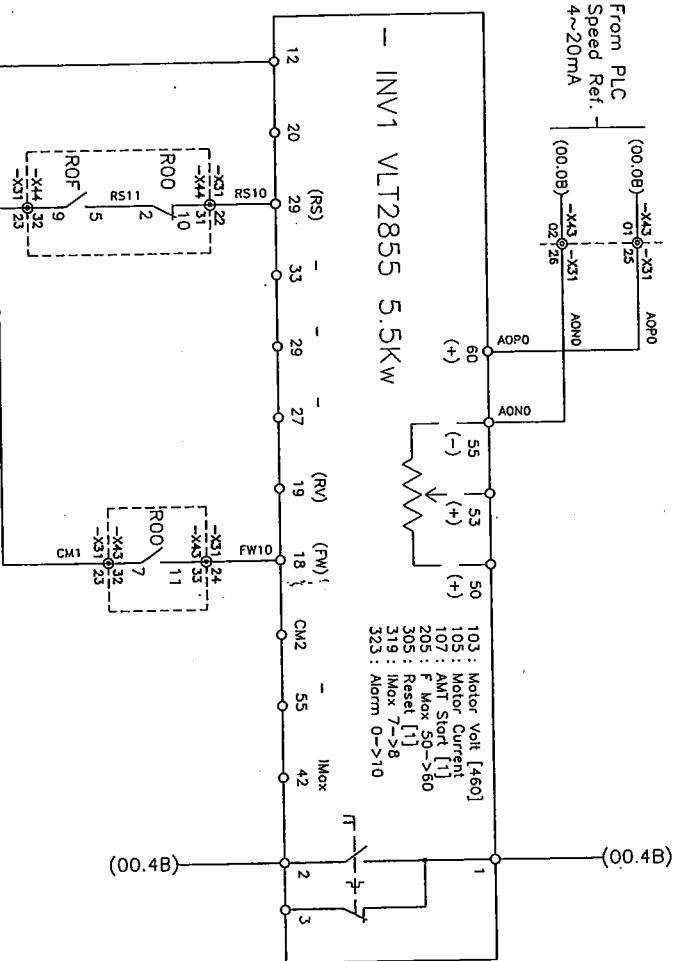
DRAWING NO

DYE080218

6120803AD ON GMD

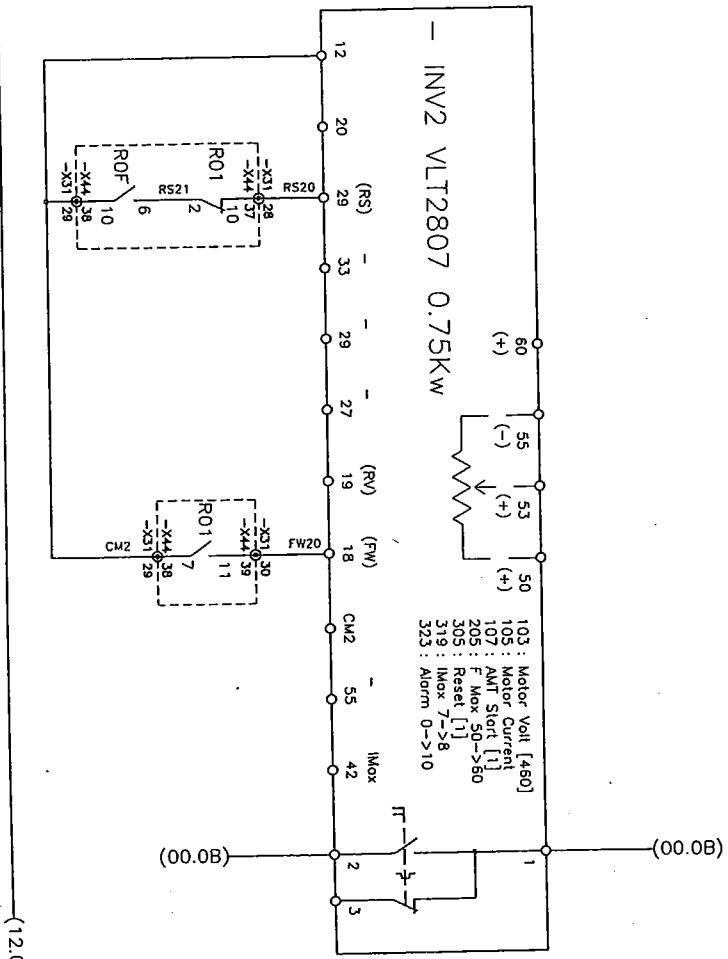
(01.7C) R110  
1φ, AC110V, 60Hz

(12.0.



(01.7D) T110

Chain Oven



Mesh Discharge

(12.C

-R00

TER NO.	ADDR.
0	9.5 -
1	9.1 .1D
2	10.6 .1B
3	10.2 .1B
4	11.7 -
5	11.3 -
6	12.8 .2D
7	12.4 -

SZR-MY4-N1

-R04

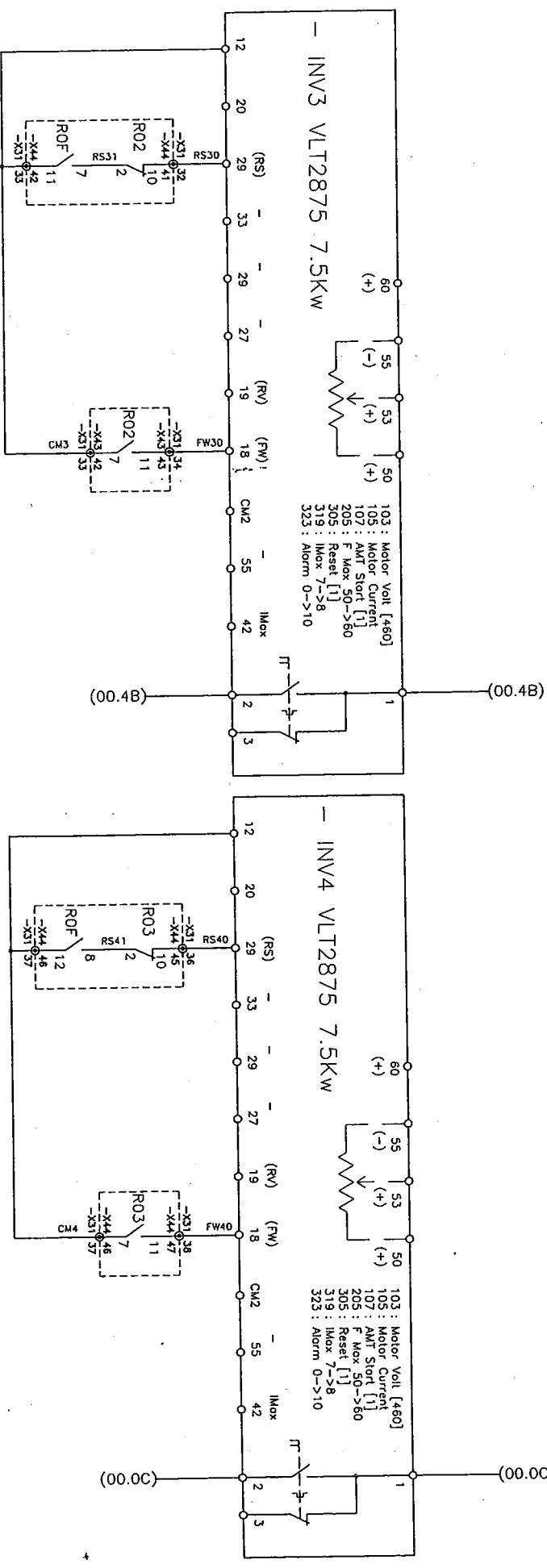
TER NO.	ADDR.
0	9.5 -
1	9.1 .5D
2	10.6 -
3	10.2 -
4	11.7 -
5	11.3 -
6	12.8 .7D
7	12.4 -

SZR-MY4-N1

IG YANG FOOD MACHINERY CO.,LTD

FINISH	DATE	QUANTITY	DESIGN	MATE.	DRAWING NAME	POTATO CHIP
	08.08.11		Y.S.CHOI	n/s	DRAWING NO	DYE080219

(01.7C) R110 10, AC110V, 60Hz (12.0A)



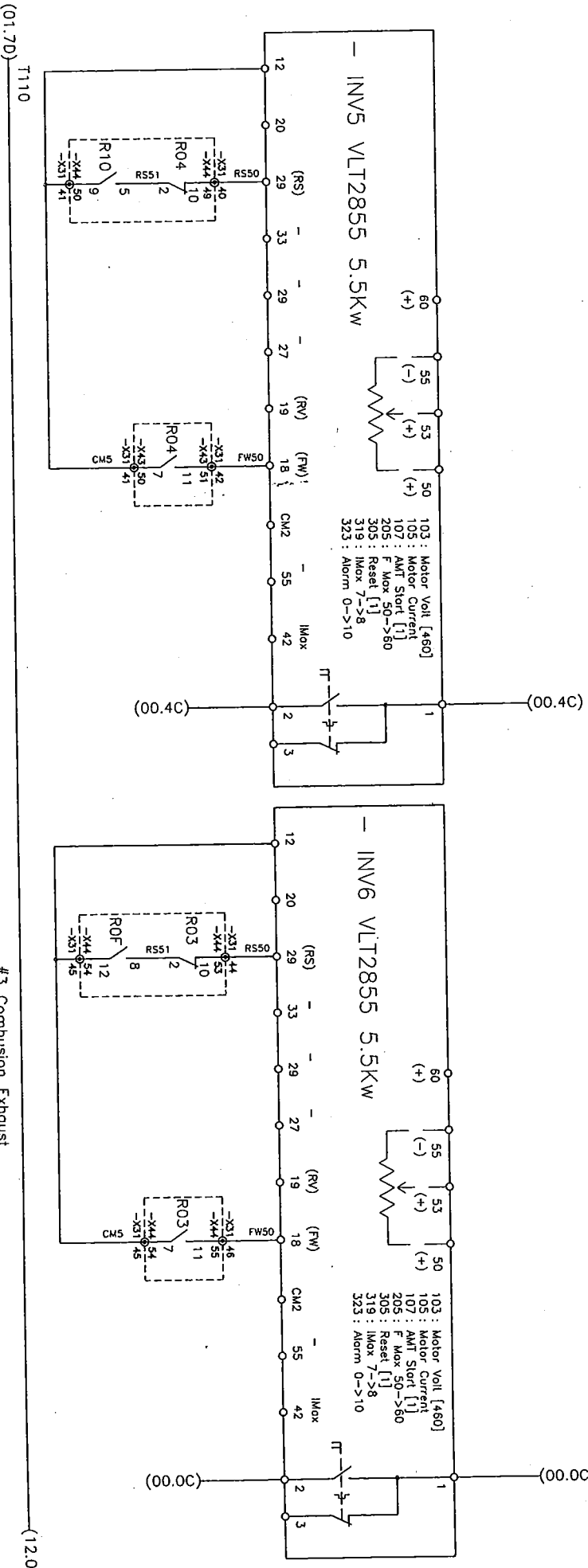
(01.7D) T110 #2 Circulation (12.0)

-R00		-R04	
TER NO.	ADDR.	TER NO.	ADDR.
0	9.5	0	9.5
b	9.1	b	9.1
0	10.6	0	10.6
b	10.2	b	10.2
0	11.7	0	11.7
b	11.3	b	11.3
0	12.8	0	12.8
b	12.4	b	12.4

SZR-MY4-N1

01.7C) \_\_\_\_\_  
1 $\phi$ , AC110V, 60Hz

—(12.0A



TER NO.	ADDR.
9. 5	-
9. 1	.10
10. 6	.18
10. 2	.18
11. 7	-
11. 3	-
12. 8	.20
12. 4	-

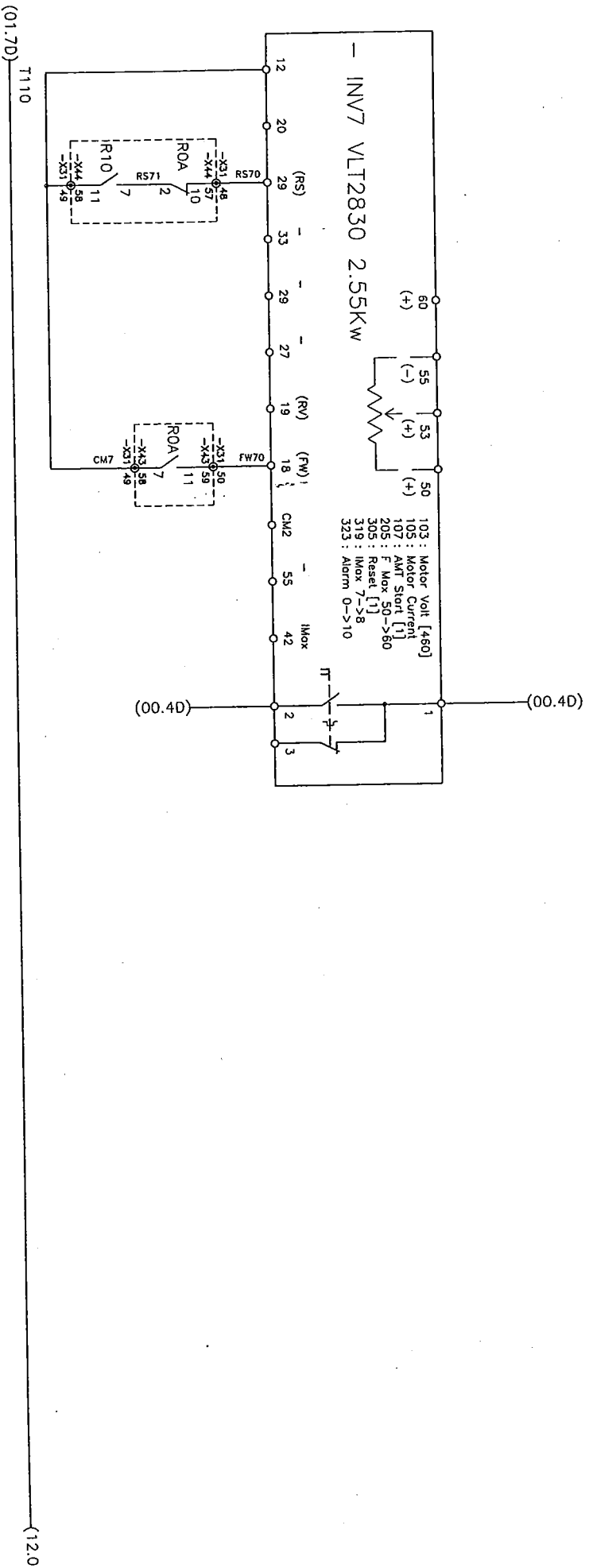
SZR-MY4-N1

TER NO.	ADDR.
9. 5	-
9. 1	.5D
10. 6	-
10. 2	-
11. 7	-
11. 3	-
12. 8	.7D
12. 4	-

SZR-MY4-N1

FINISH		DATE	08.08.11	QUANTITY		MATE.		DRAWING NAME	POTATO CHIP
FILE NO		DESIGN	Y.S.CHOI	SCALE	n/s	DRAWING NO			DYE080221

—(12.0k



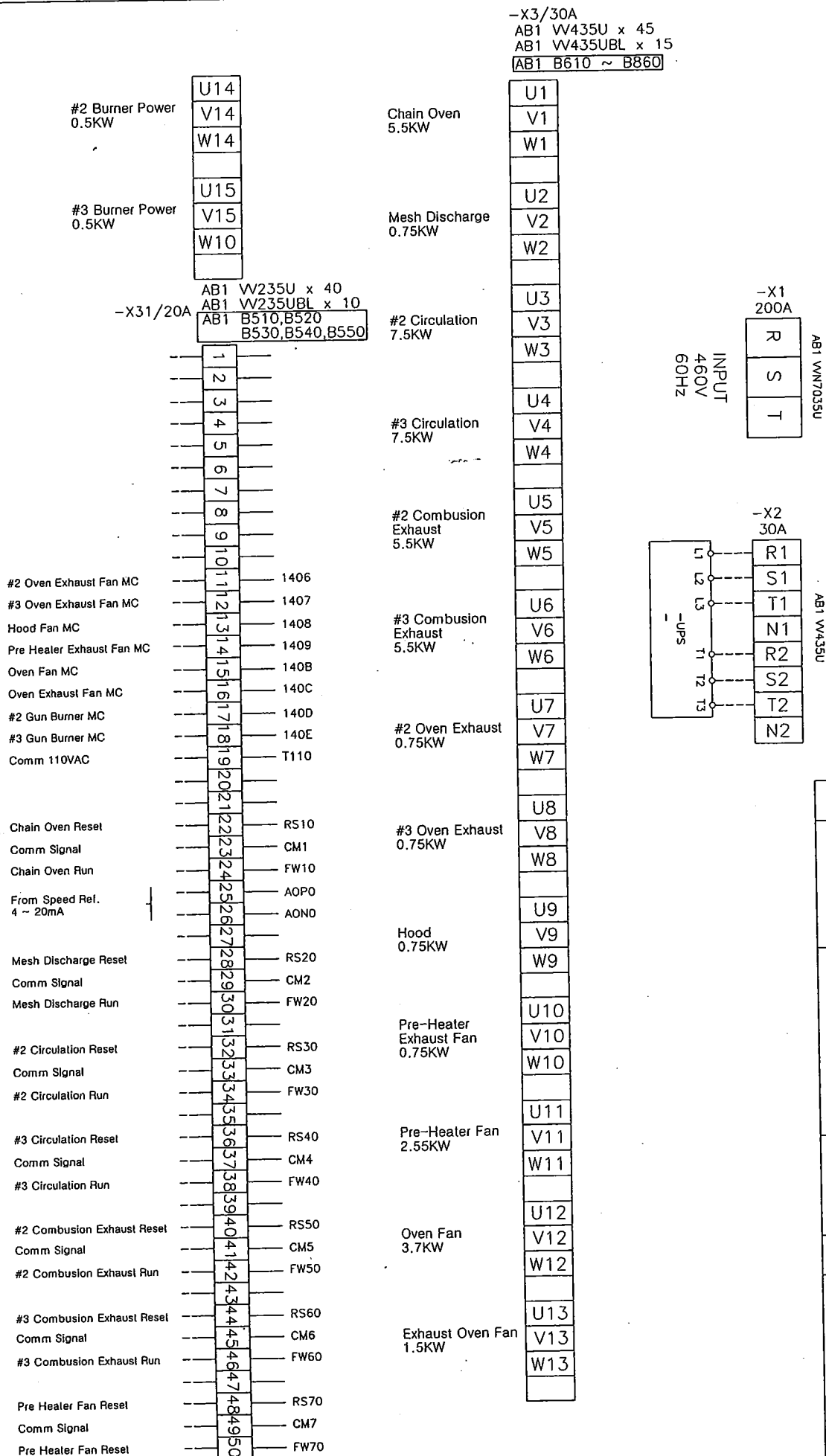
TER NO.	ADDR.
9. 5	-
9. 1	.1D
10. 6	.1B
10. 2	.1B
11. 7	-
11. 3	-
12. 8	.2D
12. 4	-

SZR-MY4-N1

TER NO.	ADDR.
o 9. 5	-
b 9. 1	.5D
o 10. 6	-
b 10. 2	-
o 11. 7	-
b 11. 3	-
o 12. 8	.7D
b 12. 4	-

SZĚ-MY4-N1

FINISH	DATE	QUANTITY	MATE.	DRAWING NAME	POTATO CHIP
FILE NO	08.08.11	DESIGN	SCALE	DRAWING NO	
		Y.S.CHOI	n/s		07E080224



42220903AD	ON GMD	NO.	PART NO.	DESCRIPTION	MATERIAL	QTY	DIMENSION	REMARK
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5220803AD ON GMD

-X41

AB1 W235U x 24  
AB1 W235UBL x 6  
[AB1 B510.B520.B530]

From TC	1	TC40	Com 24Vc
#1 Top Sencer	2	TC80	#2 Low Fire L/S
From TC	3	TC41	#2 High Fire L/S
#1 Down Sencer	4	TC81	Com 24Vc
From TC	5	TC42	-
#2 Gun Burner	6	TC82	-
From TC	7	TC43	Com 24Vc
#3 Gun Burner	8	TC83	-
-	9	TC44	Chain Encoder
Spore	10	TC84	Com 24Vc
-	11	TC45	#1 Dampfer Open
Spore	12	TC85	#1 Dampfer Close
-	13	-	Com 24Vc
Emergency	14	X000	#2 Dampfer Open
Com 24Vc	15	P24	#2 Dampfer Close
-	16	X001	Com 24Vc
Gas Leak Ps	17	X002	#3 Dampfer Open
Com 24Vc	18	P24	#3 Dampfer Close
Gas Low Ps	19	X003	Com 24Vc
Gas High Ps	20	X004	-
Com 24Vc	21	P24	-
Pre Ht Exh Fan Ps	22	X005	Com 24Vc
Pre Ht Fan Ps	23	X006	-
Com 24Vc	24	P24	-
Oven Fan Ps	25	X007	Com 24Vc
Oven Exh Fan Ps	26	X008	-
Com 24Vc	27	P24	-
#2 Low Fire L/S	28	X009	Com 24Vc
#2 High Fire L/S	29	X00A	-
Com 24Vc	30	P24	-

-X41

AB1 W235U x 20  
AB1 W235UBL x 10  
[AB1 B540.B550.B560]

Com 24Vc	31	P24	Com 24Vc
-	32	X00B	-
Chain Oven Fout	33	X00C	Chain Oven Fout
Com 24Vc	34	P24	Com 24Vc
Mesh Discharge	35	X00D	Mesh Discharge
Fout	36	X00E	Fout
#2 Curcution Fout	37	P24	#2 Curcution Fout
Com 24Vc	38	X00F	Com 24Vc
#3 Curcution Fout	39	X010	#3 Curcution Fout
#2 Combustion	40	P24	#2 Combustion
Exhaust Fout	41	X011	Exhaust Fout
Com 24Vc	42	X012	Com 24Vc
#3 Combustion	43	P24	#3 Combustion
Exhaust Fout	44	X013	Exhaust Fout
#2 Oven Exhaust	45	X014	#2 Oven Exhaust
Fout	46	P24	Fout
Com 24Vc	47	X015	Com 24Vc
#3 Oven Exhaust	48	X016	#3 Oven Exhaust
Fout	49	P24	Fout
Oven Fan Fout	50	X017	Oven Fan Fout
Exhaust Fan Fout	51	X018	Exhaust Fan Fout
Com 24Vc	52	P24	Com 24Vc
#2 Burnr Fout	53	X019	#2 Burnr Fout
#3 Burnr Fout	54	X01A	#3 Burnr Fout
Com 24Vc	55	P24	Com 24Vc
-	56	X01B	-
-	57	X01C	-
Com 24Vc	58	P24	Com 24Vc
-	59	X01D	-
-	60	X01E	-

-X42

AB1 W235U x 20  
AB1 W235UBL x 10  
[AB1 B510.B520.B530]

Com 24Vc	1	P24	Com 24Vc
-	2	X01F	-
X020	3	X020	X020
Com 24Vc	4	P24	Com 24Vc
X021	5	X021	X021
X022	6	X022	X022
P24	7	P24	P24
X023	8	X023	X023
X024	9	X024	X024
P24	10	P24	P24
X025	11	X025	X025
X026	12	X026	X026
P24	13	P24	P24
X027	14	X027	X027
X028	15	X028	X028
P24	16	P24	P24
X029	17	X029	X029
X02A	18	X02A	X02A
P24	19	P24	P24
X02B	20	X02B	X02B
X02C	21	X02C	X02C
P24	22	P24	P24
X02D	23	X02D	X02D
X02E	24	X02E	X02E
P24	25	P24	P24
X02F	26	X02F	X02F
X030	27	X030	X030
P24	28	P24	P24
X031	29	X031	X031
X032	30	X032	X032

-X42

AB1 W235U x 23  
AB1 W235UBL x 7  
[AB1 B540.B550.B560]

P24	31	P24	P24
X033	32	X033	X033
X034	33	X034	X034
P24	34	P24	P24
X035	35	X035	X035
X036	36	X036	X036
P24	37	P24	P24
X037	38	X037	X037
X038	39	X038	X038
P24	40	P24	P24
X039	41	X039	X039
X03A	42	X03A	X03A
P24	43	P24	P24
X03B	44	X03B	X03B
X03C	45	X03C	X03C
P24	46	P24	P24
X03D	47	X03D	X03D
X03E	48	X03E	X03E
P24	49	P24	P24
X03F	50	X03F	X03F
-	51	-	-
-	52	-	-
-	53	-	-
-	54	-	-
-	55	-	-
-	56	-	-
-	57	-	-
-	58	-	-
-	59	-	-
-	60	-	-

DU S YANG FOOD MACHINERY CO.,LTD

FINISH	DATE	QUANTITY	MATE.	DRAWING NAME	POTATO CHIP
FILE NO	08.08.11	DESIGN	SCALE	DRAWING NO	DYE080225
		Y.S.CHOI	n/s		



920803AD ON GMD

-X43

AB1 W235U x 18  
AB1 W235UBL x 12  
[AB1 B510.B520.B530]

To Chain Oven	1	AOP0	Comm AC110V	31	T110
Inv' Speed Ref.	2	AON0	#1-09 Top IG	32	1128
To #1 Top Air	3	AOP1	Comm AC110V	33	1110
Valve Motrol Ref.	4	AON1	#1-01 Bottom IG	34	1229
To #1 Bottom Air	5	AOP2	#1-02 Bottom IG	35	122A
Valve Motrol Ref.	6	AON2	Comm AC110V	36	1110
To #2 Burner	7	AOP3	#1-03 Bottom IG	37	1228
Thermal Ref.	8	AON3	#1-04 Bottom IG	38	122C
To #3 Burner	9	AOP4	Comm AC110V	39	1110
Thermal Ref.	10	AON4	#1-05 Bottom IG	40	122D
To #1 Auto	11	AOP5	#1-06 Bottom IG	41	122E
Damper Ref.	12	AON5	Comm AC110V	42	1110
To #2 Auto	13	AOP6	#1-07 Bottom IG	43	122F
Damper Ref.	14	AON6	Comm AC110V	44	1230
To #3 Auto	15	AOP7	#1-08 Bottom IG	45	1110
Damper Ref.	16	AON7	#1-09 Bottom IG	46	1231
	17		#1-10 Bottom IG	47	1231
	18		Comm AC110V	48	1231
	19		#1-11 Bottom IG	49	1233
Comm AC110V	20		#1-12 Bottom IG	50	1234
#1-01 Top IG	21		Comm AC110V	51	1235
#1-02 Top IG	22		#1-13 Bottom IG	52	1236
Comm AC110V	23		#1-14 Bottom IG	53	1236
#1-03 Top IG	24		Comm AC110V	54	1236
#1-04 Top IG	25		Comm AC110V	55	1236
Comm AC110V	26		#1-01 Pre Ht IG	56	1110
#1-05 Top IG	27		#1-02 Pre Ht IG	57	1337
#1-06 Top IG	28		Comm AC110V	58	1338
Comm AC110V	29		#1-03 Pre Ht IG	59	1339
#1-07 Top IG	30			60	1339
#1-08 Top IG					

-X43

AB1 W235U x 20  
AB1 W235UBL x 10  
[AB1 B540.B550.B560]

	31	T110
	32	1128
	33	1110
	34	1229
	35	122A
	36	1110
	37	1228
	38	122C
	39	1110
	40	122D
	41	122E
	42	1110
	43	122F
	44	1230
	45	1110
	46	1231
	47	1231
	48	1231
	49	1233
	50	1234
	51	1235
	52	1236
	53	1236
	54	1236
	55	1236
	56	1236
	57	1236
	58	1236
	59	1236
	60	1236

-X44

AB1 W235U x 26  
AB1 W235UBL x 4  
[AB1 B510.B520.B530]

	1	T110
	2	133A
	3	133B
	4	133C
	5	133D
	6	133E
	7	133E
	8	133E
	9	133E
	10	133E
	11	133E
	12	133E
	13	133E
	14	133E
	15	133E
	16	133E
	17	133E
	18	133E
	19	133E
	20	133E
	21	133E
	22	133E
	23	133E
	24	133E
	25	133E
	26	133E
	27	133E
	28	133E
	29	133E
	30	133E

-X44

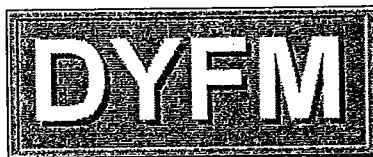
AB1 W235U x 23  
AB1 W235UBL x 7  
[AB1 B540.B550.B560]

Chain Oven Reset	31	RS10
Comm Signal	32	CM1
Chain Oven Run	33	FW10
	34	
	35	
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YANG FOOD MACHINERY CO.,LTD

FINISH	DATE	QUANTITY	MATE.	DRAWING NAME	POTATO CHIP
	08.08.11				
FILE NO	DESIGN	Y.S.CHOI	SCALE	DRAWING NO	DYE080226
			n/s		

# OIL SPRAY UNIT



**DONGYANG DYNAMICS**

Operator should read this manual before start-up system to prevent accident or injury person.

## GENERAL DESCRIPTION

The "Oil spray unit" has been designed to be incorporated into a process line for coating a cracker product with Palm Oil or similar product at an application temperature of 50 °C.

The machine uses a centrifugal atomizing distribution system with high speed rotary sprayers. The quantity of oil that is distributed can be adjusted. Excess oil is collected in a tank, filtered and then put back into the circuit.

The machine includes a conveyor with a stainless steel structure (1) and a stainless steel wire-mesh belt (2). The extremes of the machine are fitted with snub rollers (3) to provide smooth transfers of product on and off line. The pick-up arm can be lifted by lever (4) to permit discharge of the baked product.

The wire mesh is wound around roller (5) that is in turn powered by a gear motor.

Oil is sprayed on the product by a set of upper and lower atomizers (6) each with its own directly connected motor. Hydraulic unit (7) circulates the oil and handles recuperation, filtration, refill and discharge.

The wire-mesh belt includes cleaning brush (8), tensioning (9) and tracking devices (10).

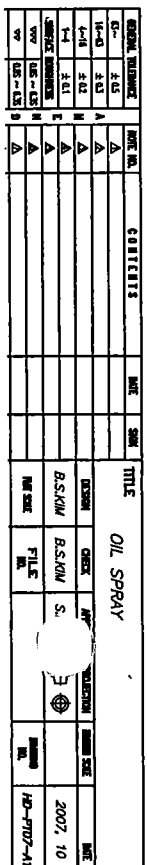
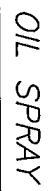
Upper aspiration unit (11) picks up air from the machine intake and transfers it to the discharge end. This creates an air barrier which, together with upper covers (12), prevents oil from exiting from the machine.

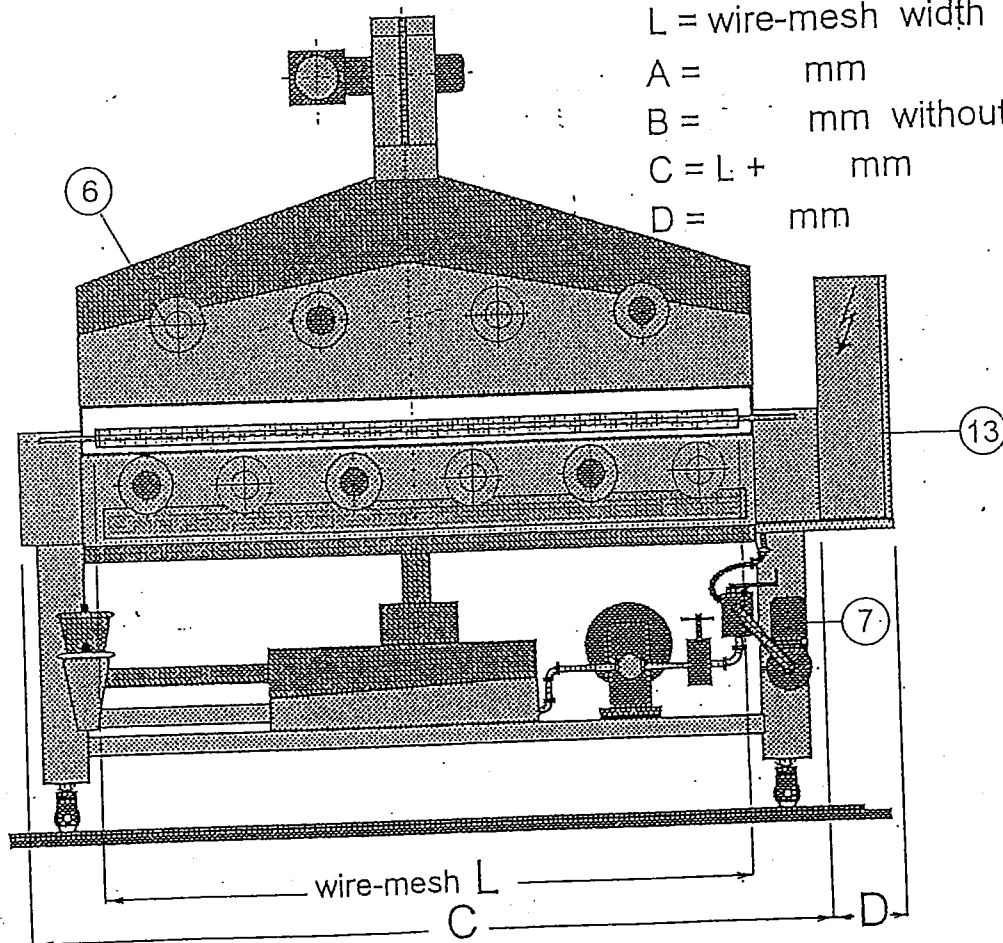
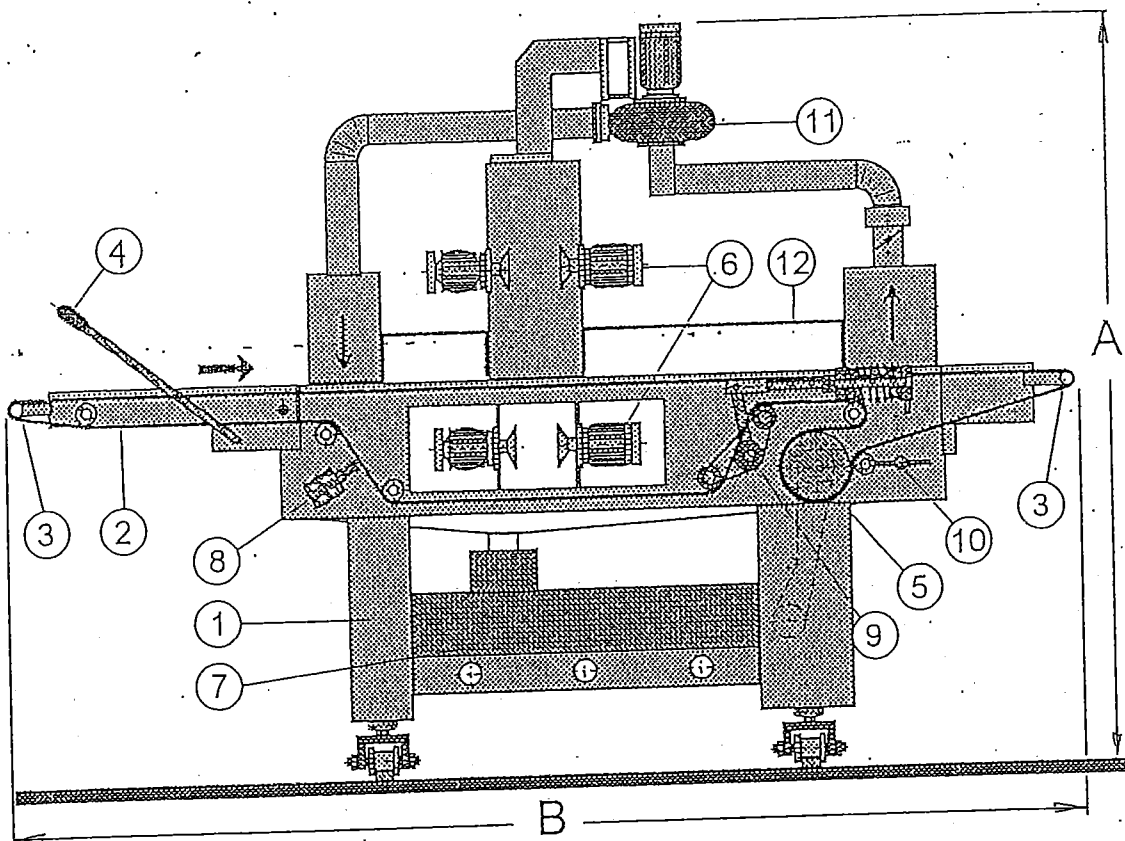
The machine is equipped with electric board (13) that carries the main operating, safety and alarm controls and devices.

When fluid is passed through piping to the centre of a rotating disc, centrifugal forces thus created will atomise the fluid to a greater or lesser extent depending upon the rotational speed of the disc.

The large bore oil feed pipes ensure free passage of the fluid direct from the tank to the centre of the disc. Careful pipework design ensures an even flow of fluid to each disc, thus giving an excellent all over even spray distribution for the vast majority of fluid. Tank design and pump is carefully considered in order to ensure the fluid is passed to the disc in its optimum condition.

Machine is designed to optimise the spray pattern which can be produced. This means that discs are mounted above and below the product to be sprayed in order to ensure 100% coverage.





L = wire-mesh width

A = mm

B = mm without extension

C = L + mm

D = mm

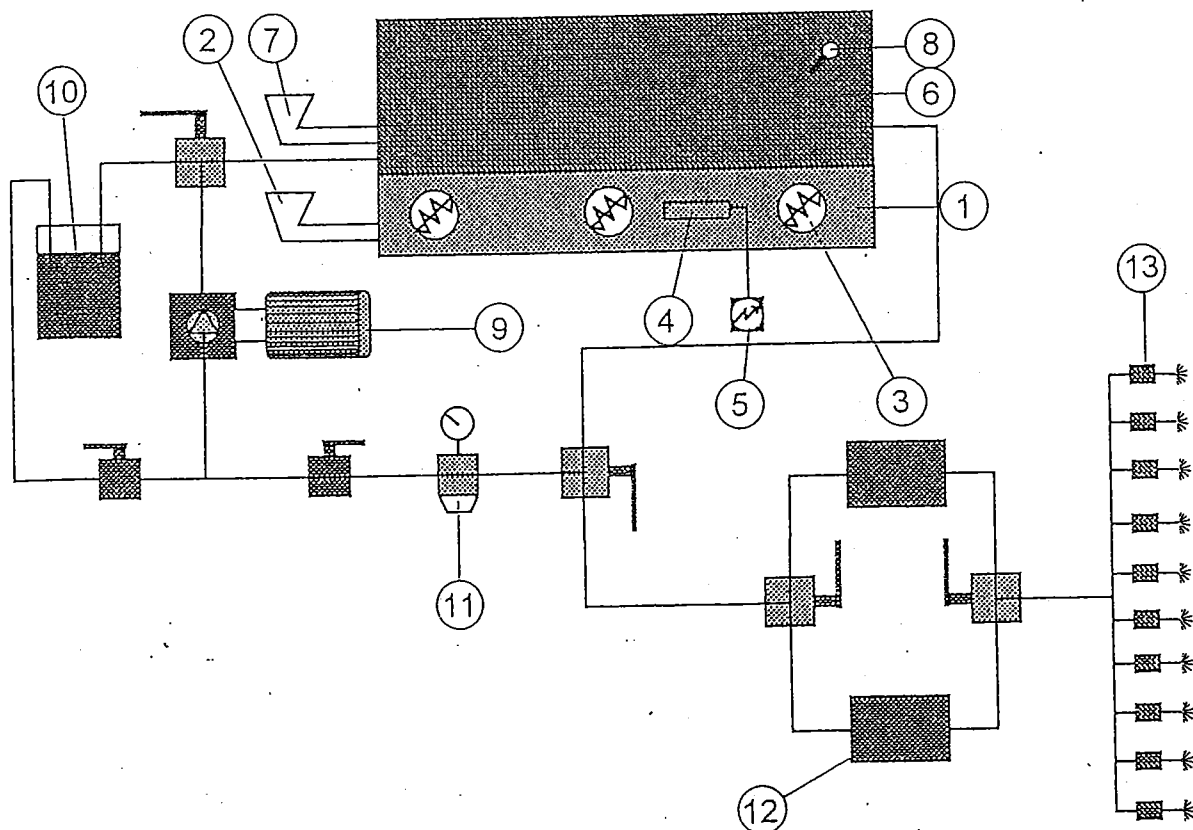
## HYDRAULIC UNIT

The oil to be sprayed on the product is processed in a hydraulic unit mounted on-board the machine.

Its main components include:

- 1 - tank for water used to heat the oil
- 2 - manual water refill opening
- 3 - heating coils
- 4 - water temperature sensor
- 5 - thermostat
- 6 - oil tank
- 7 - manual oil refill opening
- 8 - oil level gauge
- 9 - oil circulation pump
- 10 - oil pick-up and discharge tank
- 11 - pressure regulator with 0-10 bar pressure gauge
- 12 - filters
- 13 - set of atomizers

The circuit comes complete with manual valves, rigid and flexible pipes, connections, reduction fittings, etc.



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## GENERAL DESCRIPTION

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The machine uses a centrifugal atomizing distribution system with high speed rotary sprayers. The quantity of oil that is distributed can be adjusted. Excess oil is collected in a tank, filtered and then put back into the circuit.

The machine includes a conveyor with a stainless steel structure (1) and a stainless steel wire-mesh belt (2). The extremes of the machine are fitted with snub rollers (3) to provide smooth transfers of product on and off line. The pick-up arm can be lifted by lever (4) to permit discharge of the baked product.

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Oil is sprayed on the product by a set of upper and lower atomizers (6) each with its own directly connected motor. Hydraulic unit (7) circulates the oil and handles recuperation, filtration, refill and discharge.

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Machine is designed to optimise the spray pattern which can be produced. This means that discs are mounted above and below the product to be sprayed in order to ensure 100% coverage.

---

## INSTALLATION

Installation does not require a specialist. Supervision by at least one expert fitter is sufficient. Workers must wear safety gloves.

- Before starting to assemble the machine make sure there is a first aid box equipped with first aid materials in a nearby and accessible place.
- Condensate and wash water drain pits must have already been provided prior to installing the machine. Make sure their positions do not interfere with the legs of the machine.
- Check the floor load-bearing capacity where the machine will be installed.
- The machine is in a single piece and is positioned when work is well along. Make sure there is sufficient room for handling and manipulating it.
- Tracing must be done with reference to the oven drive unit.
- The machine can be pushed out from the processing line for easy cleaning. We recommend leaving at least 1800 mm. on one side and at least 1000 mm on the other side.
- Fasten the rails to the floor; check their parallelism and coplanarity.
- Push the machine so that its wheels mesh with the rails. Push the machine into position in the production line. Then fasten its mechanical stops.
- Use the bolts that fasten the wheels to lift or lower the machine so that its wire mesh is at the same height as those of adjacent machines.
- Do not rest the tools on the belt.
- The machine is not designed to work in an explosive atmosphere. It is forbidden to have it work in such an environment.
- Paths and connections of electrical cable trays, conduit, tubes, etc. to the machine must be compatible with the use it is put to. These must not, for example, be fastened to movable guards.

## ELECTRIC SYSTEM

This includes connections from control boards to the various machines that these monitor and control.

Connections are inside galvanized cable trays or light threaded galvanized metal conduit. Connections are made to the user using flexible sheathes or threaded connections.

If these components cannot be mounted on the machine there must be a path on posts supporting the cable trays.

Cables are the flame-proof type. For 380V users they have the following characteristics: isolation degree 4, flexible, minimum area 1.5 mm<sup>2</sup>. For 24/110V users: isolation degree 2, minimum area 1 mm<sup>2</sup>.

Cables and internal wires are numbered. Cables have their own numbering system. Wires are numbered according to the wiring diagram.

All movable guards have safety microswitches with alarm signals.

NOTE: when laying cables remember that the machine can be moved 1800 mm. out from the production line.



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## OPERATION

Supervisors and machinery operators should be instructed and trained in at least the following:

- Machinery safety procedures, including emergency procedures.
- The correct and safe way of operating machinery.
- Knowledge and understanding of the dangers they face.
- Understanding the purpose and function of the safeguards which protect them.
- Reporting faults immediately, including guard defects.
- Wearing and care of protective clothing and equipment.
- Need for good housekeeping.
- Statutory requirements.

## SAFETY PROCEDURES

- Make sure that all the machine safety systems are in efficient working condition (emergency stop devices - earth connections - guard microswitches - optical and acoustic alarm systems)
- Before starting the machine ensure the immediate area around and on the machine is clear of unnecessary equipments.
- Never operate the machine with guards removed or insecurely fitted.
- Whilst the machine is in operation do not make any adjustments which are not part of the normal running procedures.
- Always ensure that operators are conversant with the machines functions and are fully aware of the position and purpose of control switches and emergency-stop buttons.
- Always isolate the machine at the mains before making adjustments to moving parts or electrical circuits.
- Never allow loose items of clothing to come in contact with the machine.
- Always ensure that only qualified personnel make adjustments to electrical circuits.
- Before starting the machine ensure all terminal box and trunking leads are securely fitted.

SAFETY DEVICES CAN BE PURPOSELY EXCLUDED DURING MACHINE ASSEMBLY, START-UP AND TESTING.

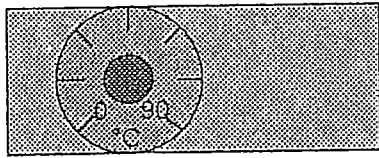
IN THIS CASE THE OPERATOR MUST BE INSTRUCTED AND INFORMED REGARDING RESIDUAL DANGERS AND MUST WORK IN TOTAL SECURITY TO PREVENT HARM TO HIMSELF AND TO OTHERS.

ALL SAFETY DEVICES MUST BE IMMEDIATELY RESTORED TO FULL OPERATIONAL EFFICIENCY WHEN THESE PROCEDURES ARE TERMINATED AND WHEN IT IS NO LONGER NECESSARY TO HAVE FREQUENT ACCESS TO THE DANGER ZONE.

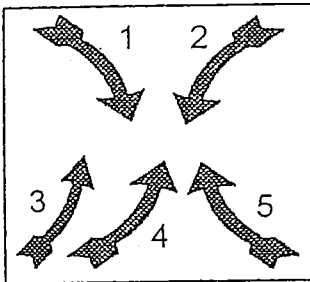
THE MANUFACTURER IS NOT RESPONSIBLE FOR HARM TO PERSONS OR PROPERTY CAUSED BY TAMPERING WITH GUARDS AND SAFETY DEVICES.

## PRELIMINARY OPERATIONS

- Check the oil level and the amount of grease in all those components that require lubrication.
- Check that there are no foreign bodies on the conveyer.
- Check that each motor has a thermal disk if it is controlled by an inverter or a thermal cutout for other types of control.
- Clean all grease and oil off surfaces that come in contact with the product to be processed.
- Manually fill the water tank through its filler opening.
- Fill the oil tank, taking oil from the storage tank using the pump (DIAGRAM B). Check the oil level.
- Close movable and fixed guards.



- Set the water heating temperature on thermoregulator fixed on the tank side. At the beginning set 70°C; in production change according to the results.



- Check that motors rotate in the proper direction.  
The right rotation of atomizers is illustrated on a label.

- Move the cleaning brush to where it contacts the mesh.  
Loosen the screws that fasten the brush support plate. This plate has slots that permit it to be moved.
- Check no-load absorption by all motors.

DIAGRAM A - NORMAL OPERATION

Two-way valve "B" closed

Three-way valve "D" in position 1-2.

Three-way valve "A" in position 2-3.

Two-way valve "C" open

Three-way valve "D" in position 1-3.

Three-way valve "A" in position 1-3.

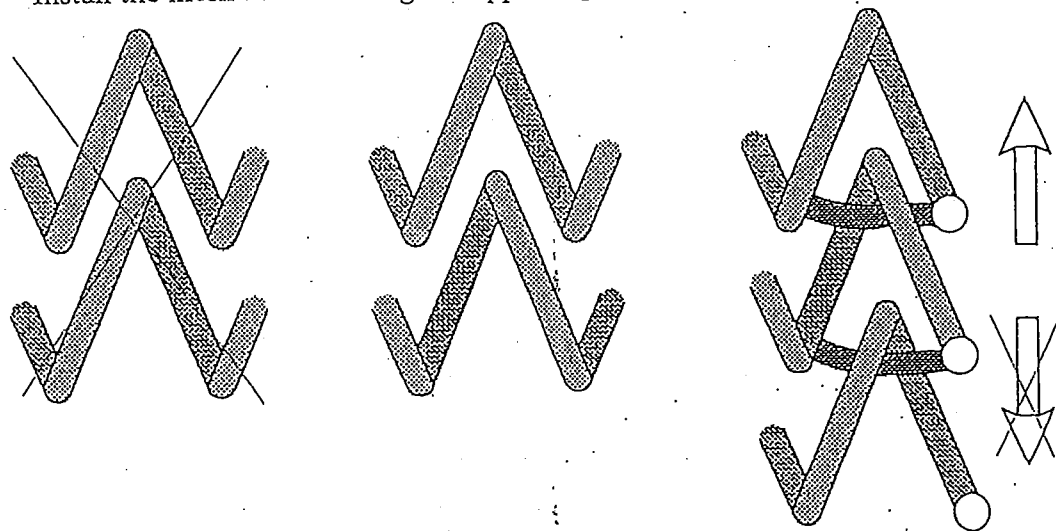
Two-way valve "C" closed.

[illegible]

## REPAIRS

The wire-mesh, if damaged/distorted, can be replaced by section; it is not necessary to replace the wire-mesh as a whole. When replacing a section and making a joint it is important that a full pitch and multiples of full pitches are replaced; failure to do so will cause the belt to ride above the pins where the incorrect joint has been made, with the subsequent possibility of the belt tracking off and causing damage.

- Uncrate the wire-mesh carefully to avoid damage to the mesh.
- Check the new belt for spirals that have been turned during shipment. Any turned spirals should be turned back into position or removed before tightening the mesh or permanent damage may result.
- Tighten the mesh to have as little slack as possible and remove the excess.
- Join only spirals of right hand to left hand; joining two spirals of the same hand will cause the mesh and/or sprockets to jump to one side each time this joint passes over the sprockets causing permanent irreparable damage to the mesh.
- Be sure the mesh is installed with the proper direction of travel.
- Do not install the mesh until the conveyor has been checked for catch points where the mesh might get caught.
- Install the mesh after levelling of supporting bed or rollers.



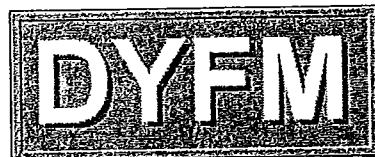
Slat belts are easy to replace: just remove the coupling pins, pulling them out from the hinge and replacing worn slats, fastening them with new pins.

Pay attention to the direction of belt movement because slat meshes have a preferential direction for movement. Generally they move with the female joint facing forward.

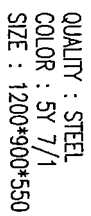
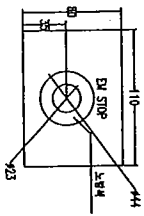
THE MANUFACTURER IS NOT RESPONSIBLE FOR MACHINE EFFICIENCY AND SAFETY WHEN NON-ORIGINAL SPARE PARTS ARE USED.

ELECTRIC CONTROL PANEL

OIL SPRAY



DONGYANG DYNAMICS



Object No.	0
Revision No.	0

PART LIST

DWG NO	NAME	MODEL	MAKER
01	MCCB1	MCCB	LG
02	MCCB2	MCCB	LG
03	MG1	MG S/W	LG
04	MG2,3	MG S/W	LG
05	CP1	CP	Honeywell
06	INV1,4,5,6	INVERTER	DAE YANG
07	INV2,3	INVERTER	DAE YANG
08	F1,F2	FUSE	DAE YANG
09	RELAY	RELAY	DAE YANG
10	BZ	Buzzer	DAE YANG
11	TEMPERATURE	TEMPERATURE	DAE YANG
12	PL	PL	DAE YANG
13	PBL	PBL	DAE YANG
14	SS	SS	DAE YANG
15	METER	SPEED-METER	DAE YANG
16	EOCR1,2	EOCR	DAE YANG
17			
18			
19			
20			

REVISONS

01

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NO.

PART NO.

DESCRIPTION

MATERIAL

Q'TY

DIMENSION

REMARK

APPRO BY

SCALE

DATE

PROJECT

01L SPRAY M/C

REF. NO

DWG NO

Sheet No. of

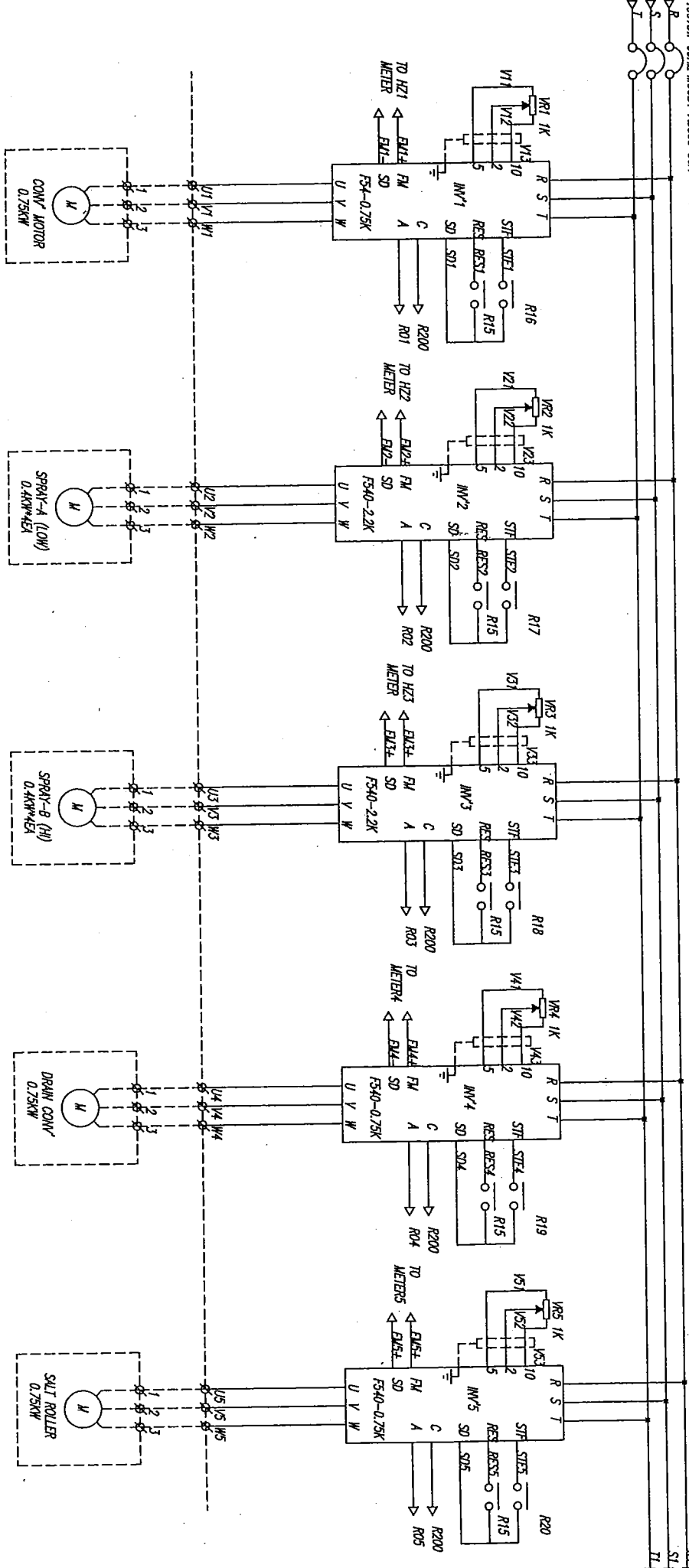
Revision No. 0

PRO

DAE YANG

FOOD MACHINERY CO., LTD

460/3W 60HZ MCCB1 ABSS3 SGA



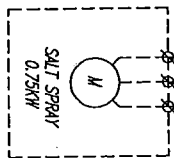
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CHKD				BY		SCALE		NONE		-		-		-	
DISN				BY		PROJECT N		-		-		-		-	
DRWN				BY		DATE		2006. 04. 10.		-		-		-	
REF. NO				-		-		TITLE		OIL SPRAY M/C		-		-	
DWG NO				DYE-003		-		-		-		-		-	
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REVISIONS

8016053AD ON DWG

460/3W 60HZ MCCB1 ABSS3 SGA





MATERIAL	Q'TY	DIMENSION	REMARK
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PROJECT	-
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TITLE. OIL SPRAY M/C

1

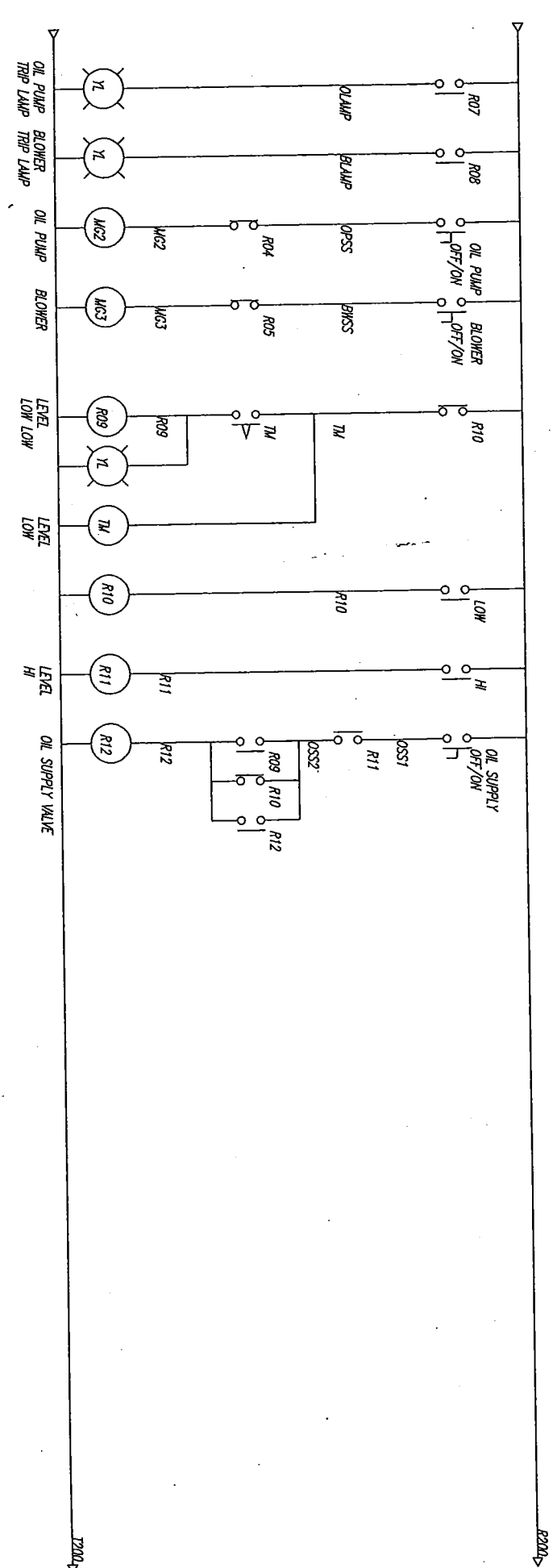
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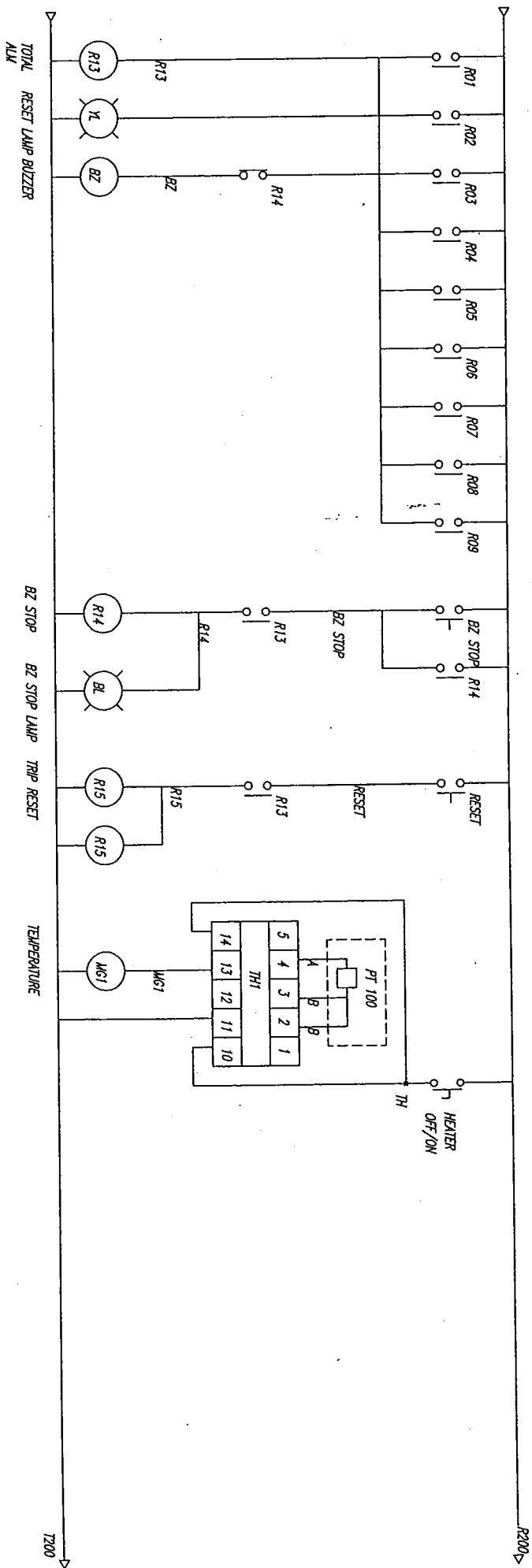
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	-	mm	-

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FOOD MACHINERY CO. LTD	DWG NO	of
	DYE-005	
		Revision No.
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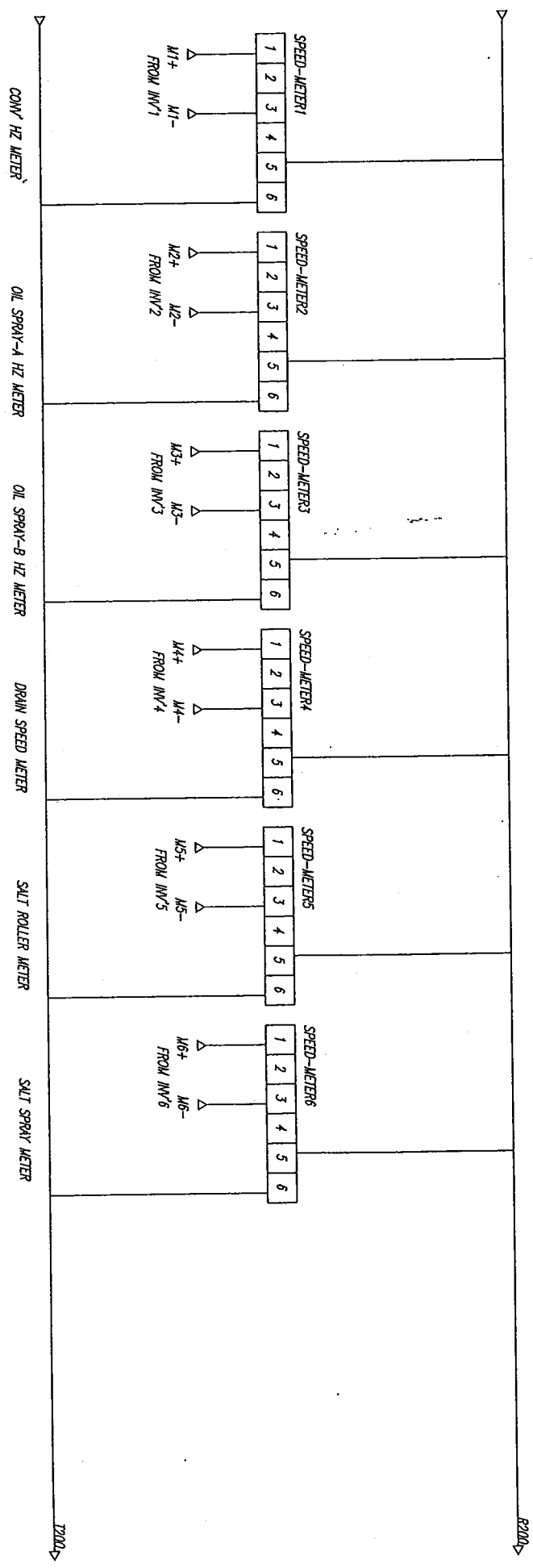
PRO \*



REVISIONS											



NO.		PART NO.		DESCRIPTION		MATERIAL		Q'TY		DIMENSION		REMARK	
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CHKD	BY	-	-	SCALE	NONE	TITLE	OIL SPRAY M/C	REF. NO	-	Sheet No.	of	0	0
DISN	BY	B. C. DAM	PROJECT 'N	-	-	DWG NO	DYE-007	Revision No.	0	0	0	0	0
DRWN	BY	B. C. DAM	DATE	2006. 04. 10.	-								

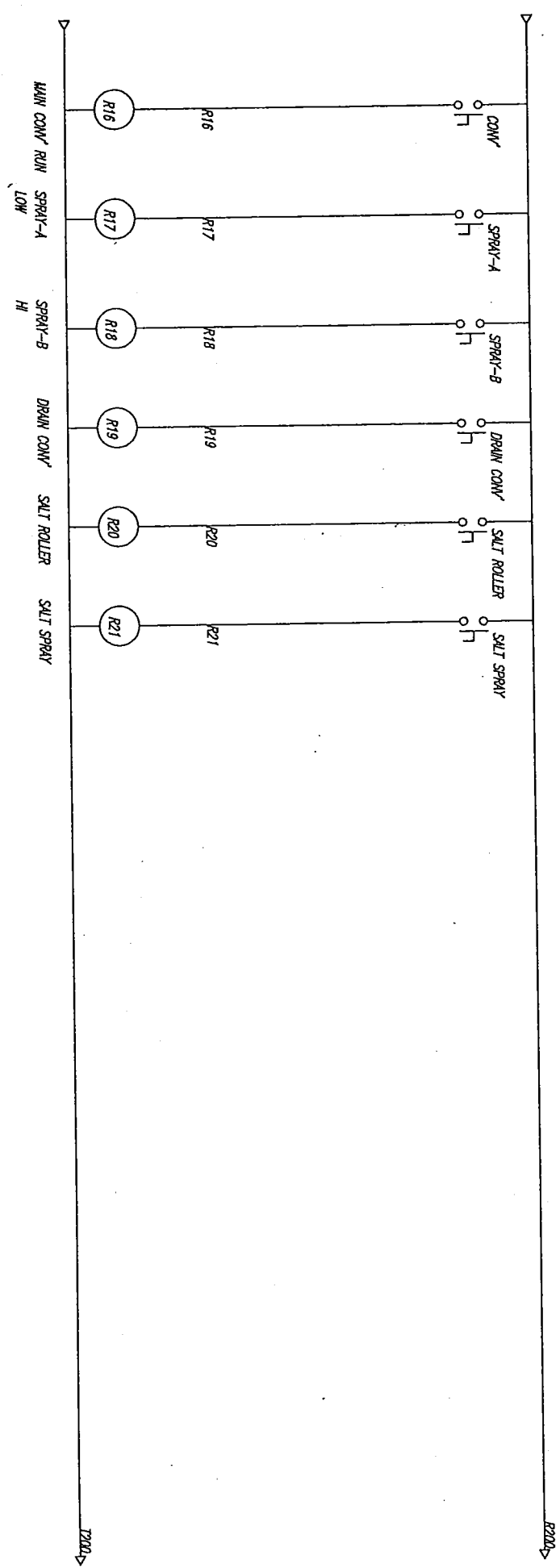


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CHND	BY	-	-	SCALE	NONE	TITLE		OIL SPRAY M/C					
DISN	BY	B. C. DAM	PROJECT N	-	-								
DRWN	BY	B. C. DAM	DATE	2006. 04. 10.									
REF. NO		-		SHEET NO.		of							
DWG NO		DYE-008		Revision No.		0							

**DD DONG YANG**  
FOOD MACHINERY CO. LTD

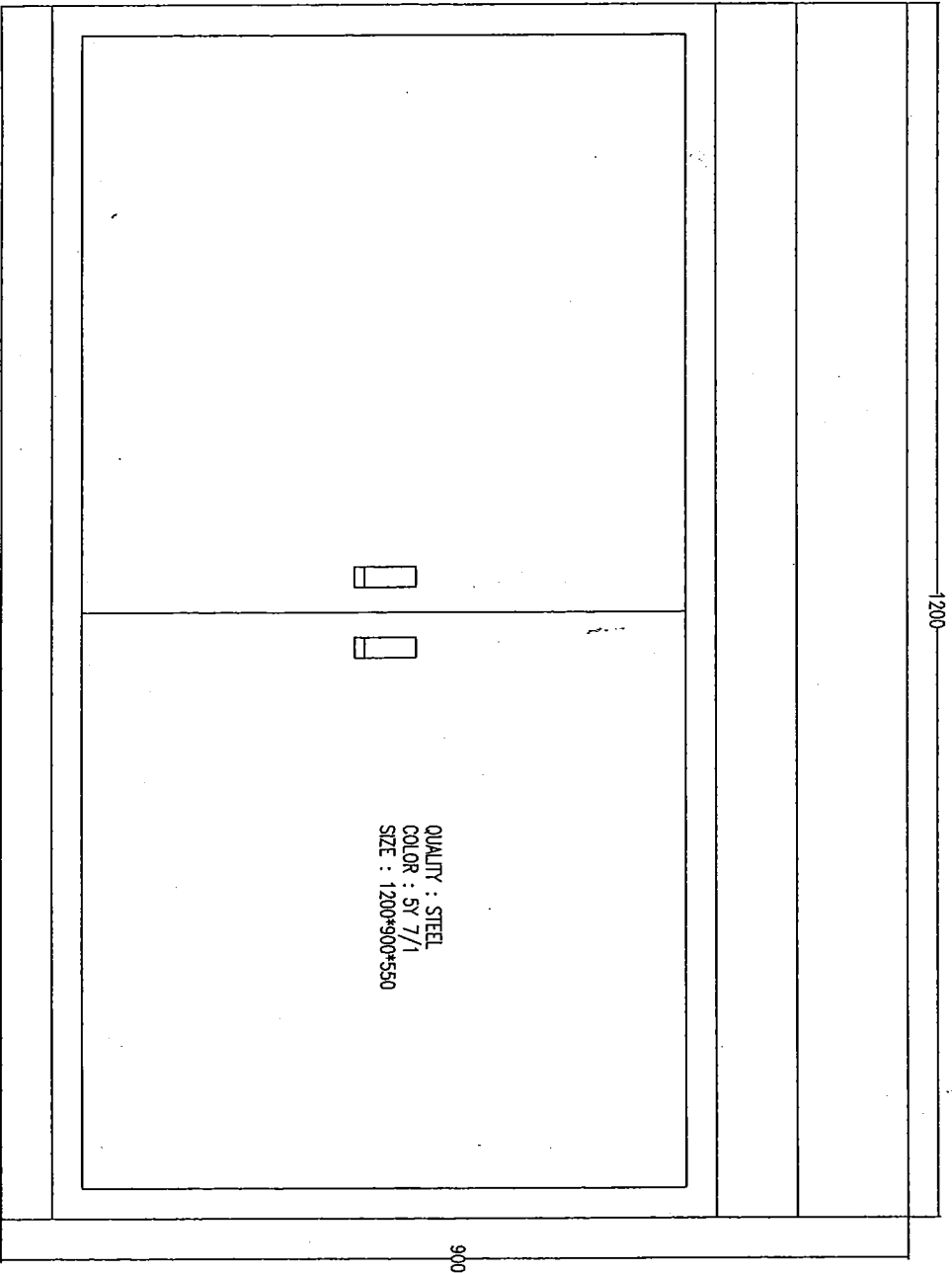
PRC

REVISIONS

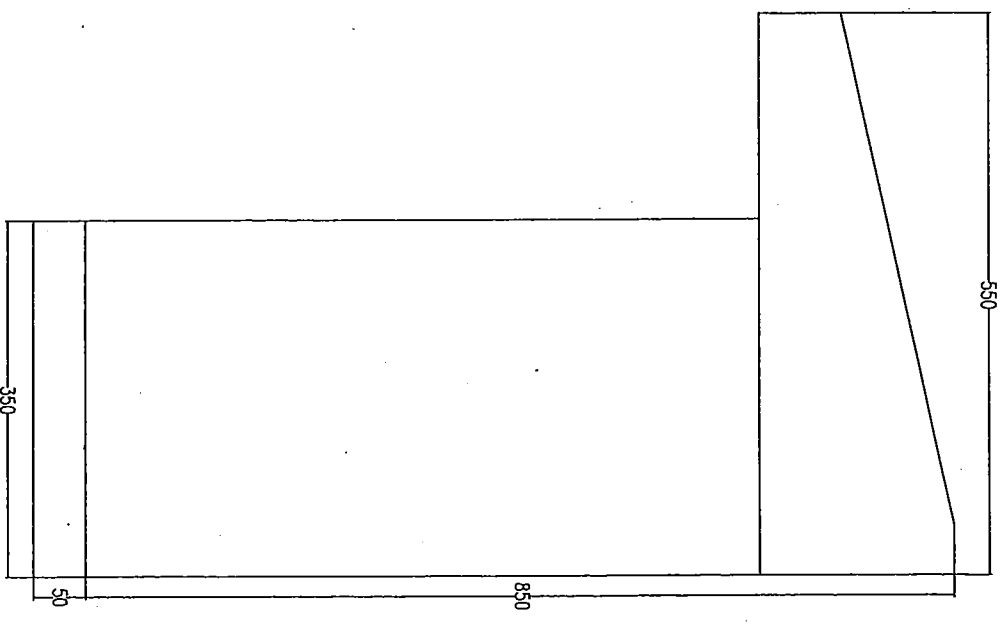


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APPO	BY	-		UNIT		mm		PROJECT	-						
CHKD	BY	-		SCALE		NONE									
DISN	BY	B. C. DAM		PROJECT'N		-									
DRWN	BY	B. C. DAM		DATE		2006. 04. 10.									
<div> <div>PRC</div> <div> <div>DC</div> <div>DOZONG YANG</div> <div>FOOD MACHINERY CO., LTD</div> </div> </div>								REF. NO	-	DWG NO	DYE-009	Sheet No.	of	Revision No.	0

REVISIONS



QUALITY : STEEL  
 COLOR : SY 7/1  
 SIZE : 1200\*900\*550



REVISIONS

NO.

PART NO.

DESCRIPTION

APPO	BY	-	UNIT	mm
CHKD	BY	-	SCALE	NONE
DISN	BY	B. C. DAI	PROJECT N	-
DATE	2006. 04. 10.			

DD

DONG YANG

FOOD MACHINERY CO. LTD

REF. NO

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SHEET NO.

1

TITLE

OIL SPRAY M/C

MATERIAL

-

QTY

-

DIMENSION

-

REMARK

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