ML-410 *Phase 7*
Installation/Operator's Manual

WARNING: For your safety the information in this manual must be followed to minimize the risk of fire or explosion or to prevent property damage, personal injury or death.

— Do not store or use gasoline or other flammable vapor and liquids in the vicinity of this or any other appliance.

— WHAT DO YOU DO IF YOU SMELL GAS

* Do not try to light any appliance.
* Do not touch any electrical switch; do not use any phone in your building.
* Clear the room, building or area of all occupants.
* Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
* If you cannot reach your gas supplier, call the fire department.

— Installation and service must be performed by a qualified installer, service agency or the gas supplier.

AVERTISSEMENT: Assurez-vous de bien suivre les instructions données dans cette notice pour réduire au minimum le risque d'incendie ou d'explosion ou pour éviter tout dommage matériel, toute blessure ou la mort.

— Ne pas entreposer ni utiliser d'essence ni d'autres vapeurs ou liquides inflammables dans le voisinage de cet appareil ou de tout autre appareil.

— QUE FAIRE SI VOUS SENTEZ UNE ODEUR DE GAZ:

* Ne pas tenter d'allumer d'appareil.
* Ne touchez à aucun interrupteur. Ne pas vous servir des téléphones se trouvant dans le bâtiment où vous vous trouvez..
* Évacuez la pièce, le bâtiment ou la zone.
* Appelez immédiatement votre fournisseur de gaz depuis un voisin. Suivez les instructions du fournisseur.
* Si vous ne pouvez rejoindre le fournisseur de gaz, appelez le service des incendies.

— L'installation et l'entretien doivent être assurés par un installateur ou un service d'entretien qualifié ou par le fournisseur de gaz.

American Dryer Corp.®

For replacement parts, contact the distributor from which the dryer was purchased or
American Dryer Corporation
88 Currant Road
Fall River MA 02720-4781
Telephone: (508) 678-9000 / Fax: (508) 678-9447
e-mail: techsupport@amdry.com

022200DMG/tcosta

ADC Part No. 113128

Retain This Manual In A Safe Place For Future Reference

American Dryer Corporation products embody advanced concepts in engineering, design, and safety. If this product is properly maintained, it will provide many years of safe, efficient, and trouble-free operation.

ONLY qualified technicians should service this equipment.

OBSERVE ALL SAFETY PRECAUTIONS displayed on the equipment or specified in the installation/operator's manual included with the dryer.

The following "**FOR YOUR SAFETY**" caution **must be** posted near the dryer in a prominent location.

FOR YOUR SAFETY	POUR VOTRE SÉCURITÉ
Do not store or use gasoline or other flammable vapors or liquids in the vicinity of this or any other appliance.	Ne pas entreposer ni utiliser d'essence ni d'autres vapeurs ou liquides inflammables dans le voisinage de cet appareil ou de yout autre appareil.

We have tried to make this manual as complete as possible and hope you will find it useful. **ADC** reserves the right to make changes from time to time, without notice or obligation, in prices, specifications, colors, and material, and to change or discontinue models.

Important

For your convenience, log the following information:

DATE OF PURCHASE _____ **MODEL NO.** **ML-410**

DISTRIBUTORS NAME _____

Serial Number(s) _____

_____

_____

Replacement parts can be obtained from your distributor or the **ADC** factory. When ordering replacement parts from the factory, you can FAX your order to **ADC** at (508) 678-9447 or telephone your orders directly to the **ADC** Parts Department at (508) 678-9000. Please specify the dryer **model number** and **serial number** in addition to the **description** and **part number**, so that your order is processed accurately and promptly.

"IMPORTANT NOTE TO PURCHASER"

Information must be obtained from your local gas supplier on the instructions to be followed if the user smells gas. These instructions must be posted in a prominent location near the dryer.

IMPORTANT

YOU MUST DISCONNECT and LOCKOUT THE ELECTRIC SUPPLY and THE GAS SUPPLY or THE STEAM SUPPLY BEFORE ANY COVERS or GUARDS ARE REMOVED FROM THE MACHINE TO ALLOW ACCESS FOR CLEANING, ADJUSTING, INSTALLATION, or TESTING OF ANY EQUIPMENT per OSHA (Occupational Safety and Health Administration) **STANDARDS.**

"Caution: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper operation."

«Attention: Lor des opérations d'entretien des commandes étiqueter tous fils avant de les déconnecter. Toute erreur de câblage peut étre une source de danger et de panne.»

CAUTION

DRYERS SHOULD NEVER BE LEFT UNATTENDED WHILE IN OPERATION.

WARNING

CHILDREN SHOULD NOT BE ALLOWED TO PLAY ON OR NEAR THE DRYERS.

CHILDREN SHOULD BE SUPERVISED IF NEAR DRYERS IN OPERATION.

FOR YOUR SAFETY

DO NOT DRY MOP HEADS IN THE DRYER.

DO NOT USE DRYER IN THE PRESENCE OF DRY CLEANING FUMES.

WARNING

UNDER NO CIRCUMSTANCES should the door switch or the heat circuit devices ever be disabled.

WARNING

The dryer must never be operated with any of the back guards, outer tops, or service panels removed. PERSONAL INJURY or FIRE COULD RESULT.

WARNING

DRYER MUST NEVER BE OPERATED WITHOUT THE LINT FILTER (SCREEN) IN PLACE, EVEN IF AN EXTERNAL LINT COLLECTION SYSTEM IS USED.

IMPORTANT

PLEASE OBSERVE ALL SAFETY PRECAUTIONS displayed on the equipment or specified in the installation/operator's manual included with the dryer.

Dryers **must not** be installed or stored in an area where it will be exposed to water or weather.

The wiring diagram for the dryer is located in the front electrical control box area.

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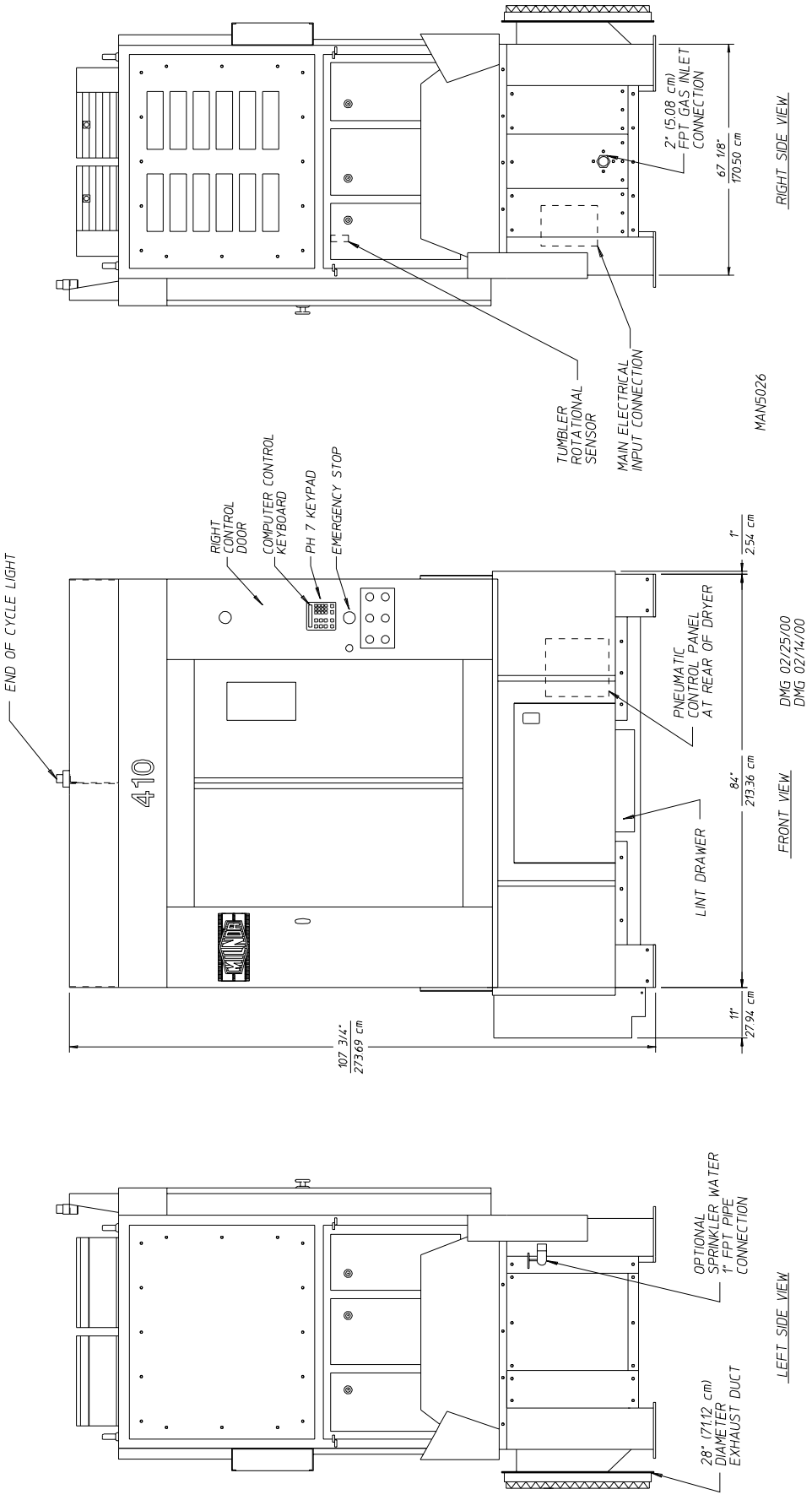
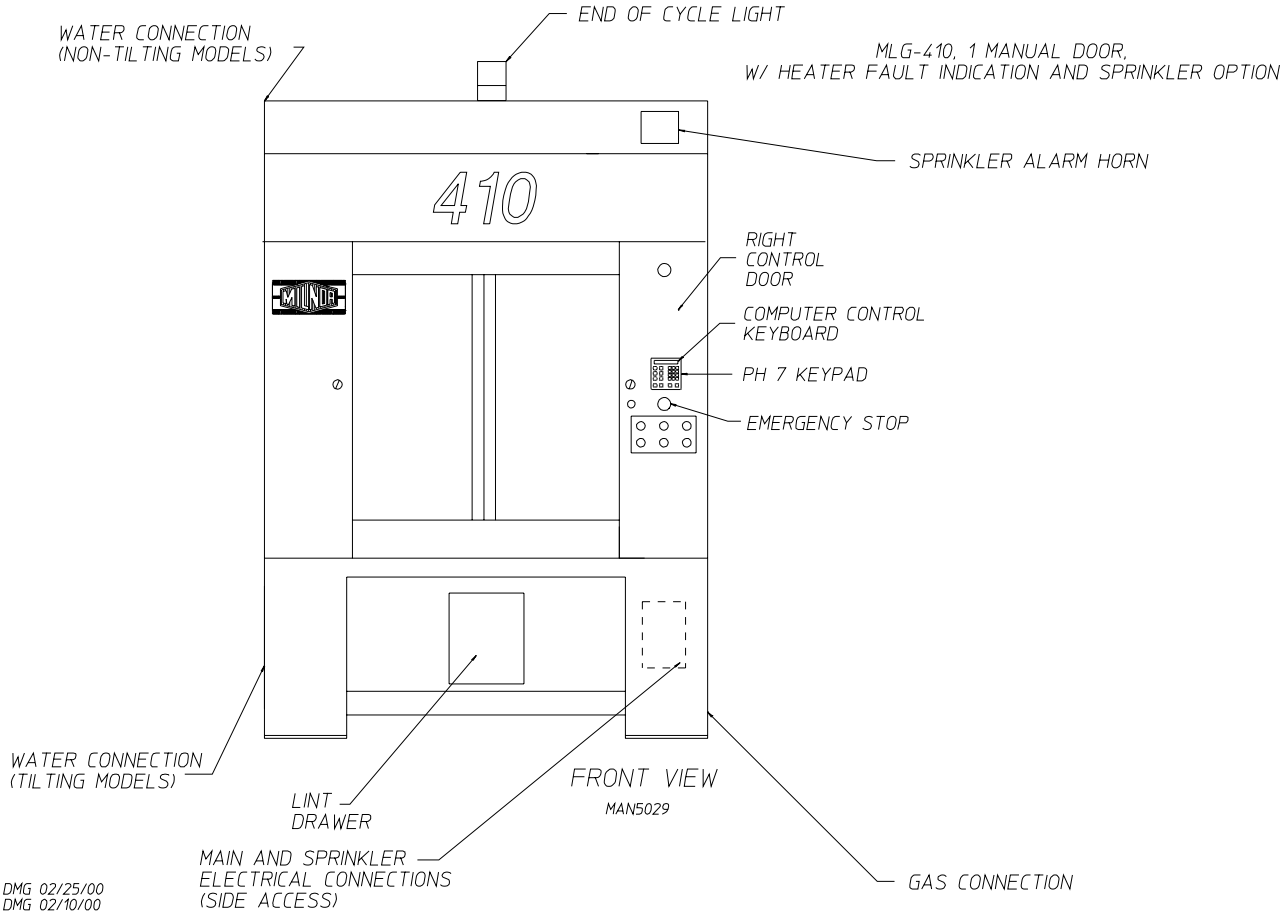
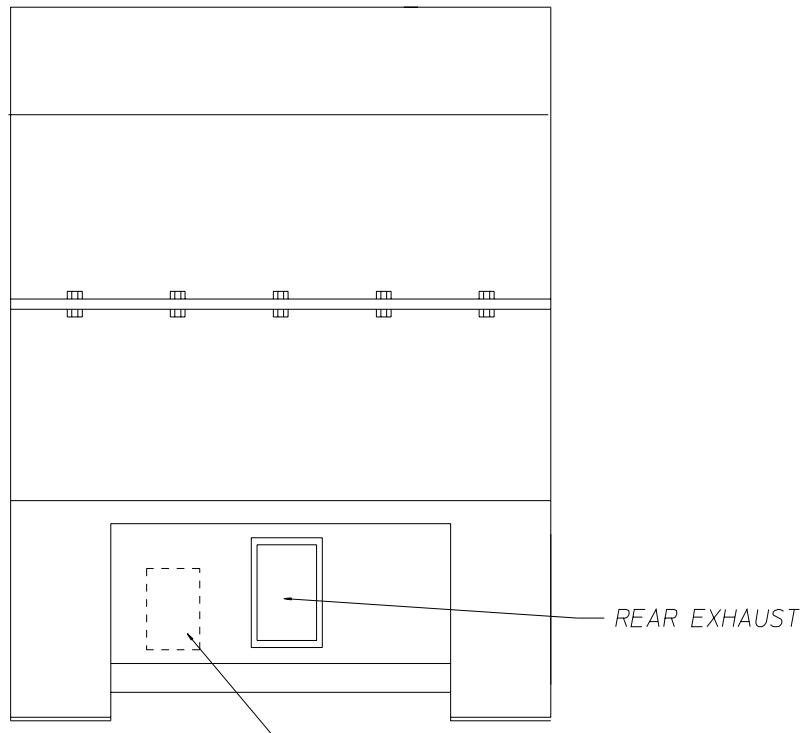
ML-410 Reference Guide





MLG-410, 1 MANUAL DOOR,
W/ HEATER FAULT INDICATION AND SPRINKLER OPTION



INTRODUCTION

ML-410 MACHINE OPERATIONAL SUMMARY

The model ML-410 incorporates one (1) **"EMERGENCY STOP" (E-Stop) BUTTON** located centrally on the Right Front Control Door. This RED MUSHROOM PUSH-BUTTON is **"PUSH TO STOP"** the machine and **"TURN TO RELEASE"** or **"PULL TO RELEASE"** type control device. This button **must be** in the released mode to power the machine. The PHASE 7 MICROPROCESSOR CONTROLLER (Computer) display will light when the **"EMERGENCY STOP" (E-Stop) BUTTON** is in the released mode. To turn **"ON"** the ML-410's control voltage, press the green "ON" push-button located on the Right Front Control Door.

The ML-410 has two (2) electronic controllers:

PHASE 7 MICROPROCESSOR CONTROLLER (Computer) ... for drying material

MODICON PLC (Programmable Logic Controller) ... for loading, unloading auto doors, and burner status monitoring

The PHASE 7 MICROPROCESSOR CONTROLLER (Computer) only response to keyboard (touchpad) commands when the ML-410's tumbler (basket) section is level with the loading doors and lint drawer/basket door closed. Likewise, the MODICON 1 PLC (Programmable Logic Controller) responses to load or unload selections when the ML-410 is not drying material.

ML-410 OPERATOR CONTROLS/INDICATORS

The Right Front Control Door incorporates the following operator controls/indicators:

"EMERGENCY STOP" (E-Stop) BUTTON (Push To Stop/Turn or Pull To Release)

JOG (Forward/Reverse Push-Buttons)

UNLOAD/DRY/LOAD (Selector Switch)

TILT FUNCTION (Off - On Selector Switch)

CONTROL POWER (Indicator/Control Power On Push-Button)

CONTROL POWER (Off Push-Button)

"EMERGENCY STOP" (E-Stop) BUTTON (Push To Stop/Turn To Release or Pull To Release)

This red mushroom push-button, located in the center of the Right Front Control Door almost directly under the Phase 7 Microprocessor Controller (computer) is a "Push To Stop" and "Turn To Release" type push-button. This button **must be** in the released mode to power the machine (enable the machine to run).

JOG (Forward/Reverse Push-Buttons)

These two (2) push-buttons, located towards the left side of the Right Front Control Door, are for either loading or unloading the tumbler (basket). "JOG" functions are only enabled when the doors are open.

NOTE: There is a PLC controlled **"DWELL TIME"** between forward jog or reverse jog selection to prevent plug starting the tumbler (basket) drive motor.

LOAD/DRY/UNLOAD (Three [3] Position Selector Switch)
TILT (Off - On) (Two [2] Position Selector Switch)

The "LOAD/DRY/UNLOAD" and "TILT (Off - On)" selector switches work in conjunction with each other. If the "TILT" selector is in the "OFF" position, an "UNLOAD" or "LOAD" selection will open the front horizontal doors, allowing an operator to load or unload the tumbler (basket) in the level position.

NOTE: The ML-410 "JOG" feature will respond in the level position. The Lint Drawer ***must be*** closed for the "JOG" feature to operate.

If the "TILT" selector is in the "ON" position, an "UNLOAD" selection will open the front vertical doors and tilt the tumbler (basket) section towards the front (Rear Up). Likewise, a "LOAD" selection will open the front horizontal doors and tilt the tumbler (basket) section towards the rear (Front Up).

The "DRY" selection will bring the tumbler (basket) section to a level position and close the front horizontal doors. Once **ALL** safe conditions are met (i.e., front doors closed, lint drawer closed, machine level), an operator will be able to select a drying cycle on the Phase 7 Microprocessor Controller's (computer) keyboard (touchpad) located on the Right Front Control Door. Refer to the Phase 7 Operator's Manual for details.

CONTROL POWER (On)

This green lighted operator, located on the Right Front Control Door, is for enabling the dryer's control voltage. This push-button **must be** "ON" for drying or load/unload function to occur.

CONTROL POWER (Off)

This red non-lighted operator, located on the Right Front Control Door, is for disabling the dryer's output control voltage. This push-button is mainly for use as a troubleshooting function.

END OF CYCLE/AIR JET

This amber colored indicator located on the top of the ML-410 has two (2) functions:

1. To indicate that a drying cycle has been completed and that the dried material is ready for attention. Once the dryer is attended (i.e., lint drawer is opened, or the "UNLOAD - DRY - LOAD" selector is turned to either the "UNLOAD" or "LOAD" position and the vertical doors open) the indicator will go off.

2. The Air Jet will be activated at the end of the drying cycle when the "End of Cycle" light has been energized. The Air Jet will remain active for approximately thirty (30) seconds to remove lint which may have accumulated on the Blower Wheel (squirrel cage).

ML-410 MACHINE OPERATION TROUBLESHOOTING INFORMATION

END OF CYCLE/HEATER FAULT INDICATOR

The End of Cycle light located on the top of the ML-410, is triggered by the *End of Cycle Signal* of the Phase 7 Microprocessor Controller (computer) I/O (input/output) board. The "1 second flashing" is accomplished by a "Flasher Module" located on the Main Control Panel in the Right Front Control Cabinet. Refer to the electrical blueprints included with this machine for detailed signal routing.

If this "END OF CYCLE" light fails to display at the end of every cycle;

1. Check the bulb.

2. Check voltage to the bulb (24 VAC).

3. Refer to the ladder diagram and the schematics provided with this machine for detailed signal information for higher level troubleshooting.

JOG (Forward/Reverse Push-Button)

Forward "JOG" is in the clockwise (CW) direction and *Reverse* "JOG" is in the counterclockwise (CCW) direction.

There is a seven (7) second dwell (delay) time between a selection of a different rotation direction. This delay is to prevent plug starting the tumbler drive motor.

If the "JOG" function does not operate in the tilted position;

1. Check that the Main Doors are fully opened.

2. Check that the Overload for the Drive Motor is in the "Start" position.

3. Check that the Overload for the Tumbler (Basket) Motor is in the "Start" position.

4. Check that the Lint Drawer is closed.

5. Refer to the ladder diagram and the schematics provided with this machine for detailed signal information for higher level troubleshooting.

AIR JET

The Air Jet signal is sent from the Phase 7 Microprocessor Controller (computer) at the end of the drying cycle. If the air valve fails to operate;

1. Check the air supply to the dryer (set to 80 PSI [5.512 bars]).

2. Check to see that the Air Jet L.E.D. (light emitting diode) is on at the end of the drying cycle. If the L.E.D. (light emitting diode) is not on it may be an indication of a failed Phase 7 Microprocessor Controller (computer) I/O (input/output) board.

3. If Air Jet L.E.D. (light emitting diode) is on then check the wiring from the Phase 7 Microprocessor Controller (computer) to the air valve.

4. Faulty air valve.

LOAD/DRY/UNLOAD (Selector Switch) and TILT FUNCTION (Off - On Selector Switch)

As mentioned in the machine summary (refer to **page 5**), the "LOAD/DRY/UNLOAD" selector switch and "TILT Off - On" selector switch work in conjunction with each other.

UNLOAD or LOAD LEVEL...*opens the load doors only*

If this selection does not operate;

1. Check that 80 PSI (5.512 bars) of compressed air is supplied to the machine and that the door solenoid is being actuated. The "Door Open" signal is generated by the PLC (Programmable Logic Controller). Refer to the PLC information included in the ladder diagrams and schematics supplied with the machine.

UNLOAD TILTED

This selection causes the front horizontal doors to open. Once the "Door Open" signal is sensed, the PLC enables the "Rear Up" solenoid to tilt the machine. Once the tumbler (basket) section releases the tilt switch, the "JOG" functions become enabled for an operator's selection.

If the tumbler section does not tilt forward;

1. Verify that a "Door Open" signal is being sensed by the PLC.

2. Check that 80 PSI (5.512 bars) of compressed air is supplied to the machine and that the "Rear Up" solenoid is being actuated by the PLC.

Refer to the PLC signal information included in the ladder diagrams and schematics supplied with the machine.

LOAD TILTED

This selection causes the front horizontal doors to open. Once the "Door Open" signal is sensed, the PLC enables the "Front Up" solenoid to tilt the machine. The "JOG" functions then becomes enabled for an operator's selection.

If the tumbler section does not tilt towards the rear;

1. Verify that a "Door Open" signal is being sensed by the PLC (Programmable Logic Controller).

2. Check that 80 PSI (5.512 bars) of compressed air is supplied to the machine and that the "Front Up" solenoid is being actuated by the PLC (Programmable Logic Controller).

Refer to the PLC (Programmable Logic Controller) signal information included in the ladder diagrams and schematics supplied with the machine.

DRY

This selection prepares the machine for a "Material Drying Command" from the Phase 7 Microprocessor Controller (computer).

NOTE: Before a drying cycle can be selected, the tumbler (basket) section ***must be*** in the level position and both the Front Horizontal Doors as well as the Lint Drawer ***must be*** closed.

The PLC (Programmable Logic Controller) senses that the machine is level by the two (2) level switches located on the left side of the base section. One (1) switch is towards the rear of the machine and the other switch is towards the front of the machine.

The PLC senses that the load doors are closed by the two (2) proximity switches located at the top center, of the dryer above the doors. These switches are magnetically actuated by magnets located on the doors.

The PLC senses the Lint Drawer by a push type switch located on the right side of the lint drawer door.

IMPORTANT: THE LINT DRAWER ***MUST BE*** CLOSED BEFORE BRINGING THE MACHINE TO A LEVEL POSITION.

If the tumbler (basket) section does not return to a level position;

1. Verify that a "Door Closed" signal is being sensed by the PLC.

2. Check that 80 PSI (5.512 bars) of compressed air is supplied to the machine and that the "Front Down" or "Rear Down" solenoid is being actuated by the PLC.

3. Verify that the Lint Drawer is in the closed position. This signal can be easily verified since it is a PLC input.

Refer to the PLC signal information included in the ladder diagrams and schematics supplied with the machine.

ONE or BOTH BURNERS **DO NOT** IGNITE

The model MLG-410 dryer has two (2) burner boxes. Each burner box has its own Gas Valve, Spark Ignitor/ Flame-Probe Assembly, and DSI (Direct Spark Ignition) Module.

DSI (Direct Spark Ignition) MODULE

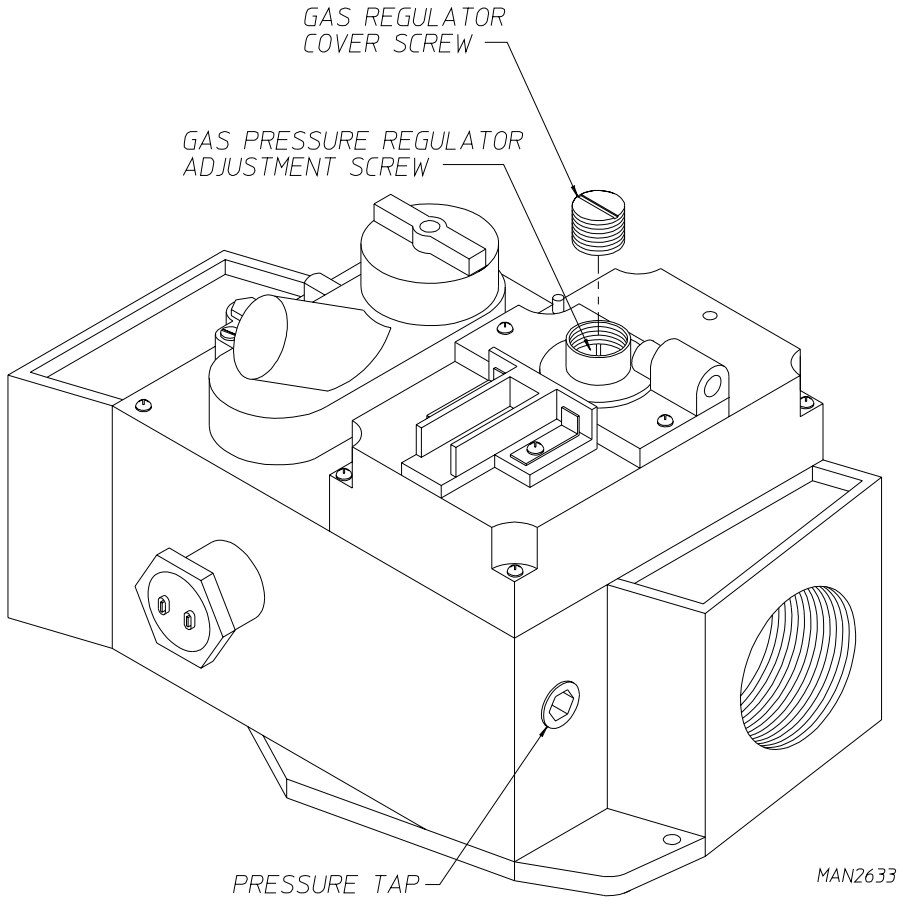
When the dryer calls for heat, and **ALL** dryer safety switches are satisfied, a 24 VAC control signal is supplied to both DSI Modules. The DSI Module L.E.D. (light emitting diode) indicators will light **"red"** for approximately 1.5 seconds of pre-purge, the L.E.D. (light emitting diode) indicators will light **"green."** Each DSI Module will energize its' respective gas valve and provide an 8 second spark to its' Spark Ignitor/Flame-Probe Assembly. The gas in both burner boxes **should ignite**. If ignition does not occur in one or both burners after 8 seconds, the flame will not be sensed by the Spark Ignitor/Flame-Probe Assembly and the DSI Module will go into the "LOCKOUT" mode lighting the L.E.D. (light emitting diode) indicator(s) **"red"** continuously. **THERE ARE NO IGNITION RETRIES BY THE DSI MODULE**. Stop the dryer at this point and restart another drying cycle. It may take several restarts to clear the gas supply piping of air.

NOTE: "BURNER FAULT" ***will occur*** during the initial set up of the machine, indicating that the burners **are not** lighting due to air in the gas line.

GAS PRESSURE

The natural gas pressure supplied to the dryer **must be** between 6-inches (14.92 mb) and 12-inches of W.C. (water column) - 29.9 mb - pressure. If the supply pressure is above 12-inches water column (29.9 mb) than an external regulator **must be** installed to reduce the gas supply pressure to between 6-inches (14.92 mb) and 12-inches of water column (29.9 mb).

Once the flame has been established in both burner boxes, the natural gas outlet manifold pressure measured at each gas valve pressure tap **must be** 3.5-inches W.C. (water column) - 8.7 mb - pressure. Connect a water tube manometer to the 1/8" F.P.T. gas pressure tap on the downstream side of each gas valve. There is a pressure regulator in both gas valves so the manifold pressure *can be* adjusted to 3.5-inches water column (8.7 mb). Unscrew the slotted regulator cover which is located on the top of each gas valve, and turn the regulator adjustment screw located underneath the cover (clockwise [CW] to increase manifold pressure and counterclockwise [CCW] to decrease manifold pressure).



The L.P. (liquid propane) gas pressure measured at each gas valve pressure tap **must be** 11-inches water column (27.4 mb) pressure, when the flame is established in both burner boxes. There is no means to adjust this pressure supplied with the dryer so the downstream L.P. pressure regulator **must be** adjusted to provide the 11-inch water column (27.4 mb) outlet manifold pressure. Connect a water tube manometer to the 1/8" F.P.T. gas pressure tap on the downstream side of each gas valve to measure the manifold pressure.

IMPORTANT INFORMATION

Once the Blower Motor starts, both the FRONT AIRFLOW SWITCH and the REAR AIRFLOW SWITCH must pull in to indicate that there is sufficient airflow through the machine for safe ignition of both the Front Burner and the Rear Burner.

Refer to the system ladder diagram for "HEAT" signal information. **There are several safety devices that *must be* satisfied prior to ignition. Any one of these safety devices can cause NO IGNITION, therefore a "BURNER FAULT"...i.e., FRONT AIRFLOW SWITCH**
REAR AIRFLOW SWITCH
EXHAUST MANUAL RESET HI-LIMIT SWITCH
FRONT BURNER MANUAL RESET HI-LIMIT SWITCH
REAR BURNER MANUAL RESET HI-LIMIT SWITCH
DEFECTIVE ELECTRICAL HEAT CIRCUIT

ONE BURNER **WILL NOT** IGNITE AT THE BEGINNING OF A CYCLE

This condition can be caused by the following:

DEFECTIVE DSI (Direct Spark Ignition) MODULE
DEFECTIVE SPARK IGNITOR/FLAME-PROBE ASSEMBLY
DEFECTIVE GAS VALVE
INSUFFICIENT GAS PRESSURE
DEFECTIVE ELECTRICAL HEAT CIRCUIT

Refer to the ladder diagram and the schematics provided with this machine for reference to the above listed information.

ONE BURNER **WILL NOT** IGNITE DURING A DRYING CYCLE

This condition can be caused by the following:

DEFECTIVE DSI (Direct Spark Ignition) MODULE
DEFECTIVE SPARK IGNITOR/FLAME-PROBE ASSEMBLY
DEFECTIVE GAS VALVE
DEFECTIVE ELECTRICAL HEAT CIRCUIT
LOSS OF GAS PRESSURE

Refer to the ladder diagram and the schematics provided with this machine for reference to the above listed information.

CONTROL POWER (Indicator/Control Power On Push-Button)

This **"GREEN LIGHTED"** Push-Button is for enabling the 24 VAC control voltage to the control circuits of the machine. This push-button indicator **must be** "ON" for the system to load or dry material.

Refer to the ladder diagram included with this ML-410 for the function of this push-button in the 24 VAC control voltage latching control circuit.

CONTROL POWER (Off Push-Button)

This **"RED NON-LIGHTED"** Push-Button is for disabling the 24 VAC control voltage to the control circuits of the machine.

Refer to the ladder diagram included with this ML-410 for the function of this push-button in the 24 VAC control voltage latching control circuit.

SYSTEM LADDER DIAGRAM

The SYSTEM LADDER DIAGRAM is an overview on the electrical connections of the ML-410. This diagram is for signal flow information and is a tool to direct an individual in the correct direction for troubleshooting this machine.

The ML-410 system is divided into a number of "electrical" sections which are as follows:

1. Right Front Control Panel

   The RIGHT FRONT CONTROL PANEL is located in the Right Front Control Cabinet of the ML-410. This panel is the heart of the drying system, where **ALL** control signals interface to or from this panel. The signals that interface to this panel are too many to list here, however, they are **ALL** identified on TB1 of its' schematic diagram.

2. Right Base Electrical Enclosure

   The RIGHT BASE ELECTRICAL ENCLOSURE is located towards the front of the right base section. An industrial multi-pin connector is used to connect the base section control signals to the tumbler (basket) section's main control panel. This electrical enclosure is labeled **CAUTION, HIGH VOLTAGE IS PRESENT IN THIS ENCLOSURE** and incorporates the following electrical devices:

   The MAIN ELECTRICAL POWER to the machine

   The ELECTRICAL CONNECTION for the "OPTIONAL" SPRINKLER CIRCUIT POWER

   The THERMAL/MAGNETIC OVERLOAD and CONTACTOR for the BLOWER MOTOR

3. Right Base Interface Junction Box

   The RIGHT BASE INTERFACE JUNCTION BOX is located towards the rear of the right base section and is used as a central location to interface the base section electrical components to the TILTING tumbler (basket) section. An industrial multi-pin connector is used to connect the base section control signals to the tumbler (basket) section's main control panel. The control signals incorporated in the Right Base Interface Junction Box are:

   SOLENOID CONTROL

   Front Up/Front Down
   Rear Up/Rear Down
   Open Front Door
   Supply Air Enable
   Air Jet

   LINT DRAWER/STATUS

   TUMBLER TEMPERATURE and HI-LIMIT INFORMATION

   TUMBLER LEVEL SENSE

   Front Level Switch
   Rear Level Switch

OPTIONAL SPRINKLER CONTROL SIGNALS

4. Left Hand Control Cabinet

   The thermal magnetic overload and reversing contactor for the tumbler (basket) motor!

   The OPTIONAL SPRINKLER CIRCUIT main control panel will be located in the left front electrical enclosure. If a SPRINKLER OPTION is included with the ML-410, this panel will include an **"AUTOMATIC 'EMERGENCY STOP' (E-Stop)"** feature. *This feature requires the Sprinkler Circuit be functional for the dryer to be powered.*

NOTE: There **will be** a dedicated electrical connection in the Right Electrical Junction Box for the Sprinkler Circuit.

SECTION I
IMPORTANT INFORMATION

A. RECEIVING and HANDLING

The dryer is shipped in a protective stretch wrap cover with protective cardboard corners and top cover (or optional box) as a means of preventing damage in transit. Upon delivery, the dryer and/or packaging, and wooden skid **should be** visually inspected for shipping damage. If any damage whatsoever is noticed, inspect further before delivering carrier leaves.

Dryers damaged in shipment:

1. **ALL** dryers **should be** inspected upon receipt and before they are signed for.

2. If there is suspected damage or actual damage, the trucker's receipt **should be** so noted.

3. If the dryer is damaged beyond repair, it **should be** refused. Those dryers which were not damaged in a damaged shipment **should be** accepted, but the number received and the number refused **must be** noted on the receipt.

4. If you determine that the dryer was damaged after the trucker has left your location, you should call the delivering carrier's freight terminal immediately and file a claim. The freight company considers this concealed damage. This type of freight claim is very difficult to get paid and becomes extremely difficult when more than a day or two passes after the freight was delivered. It is your responsibility to file freight claims. Dryer/parts damaged in transit **cannot** be claimed under warranty.

5. Freight claims are the responsibility of the consignee, and **ALL** claims **must be** filed at the receiving end. **ADC** assumes no responsibility for freight claims or damages.

6. If you need assistance in handling the situation, please contact the **ADC** Traffic Manager at (508) 678-9000.

IMPORTANT: The dryer ***must be*** transported and handled in an upright position at **ALL** times.

B. SAFETY PRECAUTIONS

WARNING: For your safety, the information in this manual ***must be*** followed to minimize the risk of fire or explosion or to prevent property damage, personal injury, or loss of life.

WARNING: The dryer *must never be* operated with any of the back guards, outer tops, or service panels removed. PERSONAL INJURY or FIRE COULD RESULT.

1. **DO NOT** store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

2. Purchaser/user should consult the local gas supplier for proper instructions to be followed in the event the user smells gas. The instructions **should be** posted in a prominent location.

3. WHAT TO DO IF YOU SMELL GAS...

    a. **DO NOT** try to light any appliance.

    b. **DO NOT** touch any electrical switch.

    c. **DO NOT** use any phone in your building.

    d. Clear the room, building, or area of **ALL** occupants.

    e. Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.

    f. If you **cannot** reach your gas supplier, call the fire department.

4. Installation and service **must be** performed by a qualified installer, service agency, or gas supplier.

5. Dryer(s) **must be** exhausted to the outdoors.

6. Although **ADC** produces a very versatile machine, there are some articles that, due to fabric composition or cleaning method, **should not be** dried in it.

WARNING: Dry only water-washed fabrics. ***DO NOT*** dry articles spotted or washed in dry cleaning solvents, a combustible detergent, or "all purpose" cleaner. **EXPLOSION COULD RESULT**.

WARNING: ***DO NOT*** dry rags or articles coated or contaminated with gasoline, kerosene, oil, paint, or wax. **EXPLOSION COULD RESULT**.

WARNING: ***DO NOT*** dry mop heads. Contamination by wax or flammable solvents will create a fire hazard.

WARNING: ***DO NOT*** use heat for drying articles that contain plastic, foam, sponge rubber, or similarly textured rubberlike materials. Drying in a heated tumbler (basket) may damage plastics or rubber and also may be a fire hazard.

7. A program **should be** established for the inspection and cleaning of lint in the burner area, exhaust duct work, and area around the back of the dryer. The frequency of inspection and cleaning can best be determined from experience at each location.

WARNING: The collection of lint in the burner area and exhaust duct work can create a potential fire hazard.

8. For personal safety, the dryer **must be** electrically grounded in accordance with local codes and/or the National Electrical Code ANSI/NFPA NO. 70-LATEST EDITION or in Canada, the Canadian Electrical Codes Parts 1 & 2 CSA C22.1-1990 or LATEST EDITION.

NOTE: Failure to do so will VOID THE WARRANTY.

9. **UNDER NO CIRCUMSTANCES** should the dryer door switches, lint drawer switch, heat safety circuit, or tilt switches ever be disabled.

WARNING: PERSONAL INJURY or FIRE COULD RESULT.

10. This dryer is not to be used in the presence of dry cleaning solvents or fumes.

11. Remove articles from the dryer as soon as the drying cycle has been completed.

WARNING: Articles left in the dryer after the drying and cooling cycles have been completed can create a fire hazard.

12. **READ and FOLLOW ALL CAUTION and DIRECTION LABELS ATTACHED TO THE DRYER.**

WARNING: YOU MUST DISCONNECT and LOCKOUT THE ELECTRIC SUPPLY and THE GAS SUPPLY or THE STEAM SUPPLY BEFORE ANY COVERS or GUARDS ARE REMOVED FROM THE MACHINE TO ALLOW ACCESS FOR CLEANING, ADJUSTING, INSTALLATION, or TESTING OF ANY EQUIPMENT per OSHA (Occupational Safety and Health Administration) **STANDARDS.**

SECTION II

SPECIFICATIONS and DIMENSIONS

A. SPECIFICATIONS (Gas and Steam Models)

Maximum Capacity (Dry Weight)			410 lbs.		**186.4 kg**	
Minimum Capacity (Dry Weight)			250 lbs.		**113.65 kg**	
Tumbler (Basket) Diameter			68-3/4"		**174.6 cm**	
Tumbler (Basket) Depth			66-3/8"		**168.6 cm**	
Tumbler (Basket) Volume			143 cu. ft.		**4.05 cu.m.**	
Drive Motor			7-1/2 HP		**5.6 kw**	
Blower Motor (Gas/Steam)			25 HP		**18.7 kw**	
Door Opening			40" Wide x 50" High		**101.6 cm x 127 cm**	
Door Still Height - Level			39-3/4"		**101 cm**	
Compressed Air			80 PSI		**5.51 bars**	
Compressed Air Connection			3/8" F.P.T.		**----**	
Gas*	Voltage Available		208-460v 3ø 3, 4w 50/60 Hz			
	Heat Input		1,600,000 btu/hr		**403,200 kcal/hr**	
	Approx. Weight (Uncrated)		7,500 lbs.		**3,409 kg**	
	Airflow		9,200 cfm		**261 cmm**	
	Inlet Pipe Size		2" F.P.T.		**5.08 cm**	
Steam*	Voltage Available		208-460v 3ø 3, 4w 50/60 Hz			
	Approx. Weight (Uncrated)		8,000 lbs.		**3,636 kg**	
	Airflow		12,000 cfm		**340 cmm**	
	Steam Consumption		Normal Load			
	1,815 lbs/hr	**825 kg/hr**	55			
	Operating Steam Pressure		Steam Supply		Steam Return	
	125 PSI max	**8.79 kg/sq cm**	**2"**	**5.08 cm**	1-1/4"	**3.18 cm**

Shaded areas are stated in metric equivalents

* Dryers **must be** provided with a clean, dry, regulated 80 PSI +/- 10 psi (5.512 bars +/- 0.68 bars) air supply (equivalent volume = 9 cfh [0.26 cmh]).

NOTE: ADC reserves the right to make changes in specifications at any time, without notice or obligation.

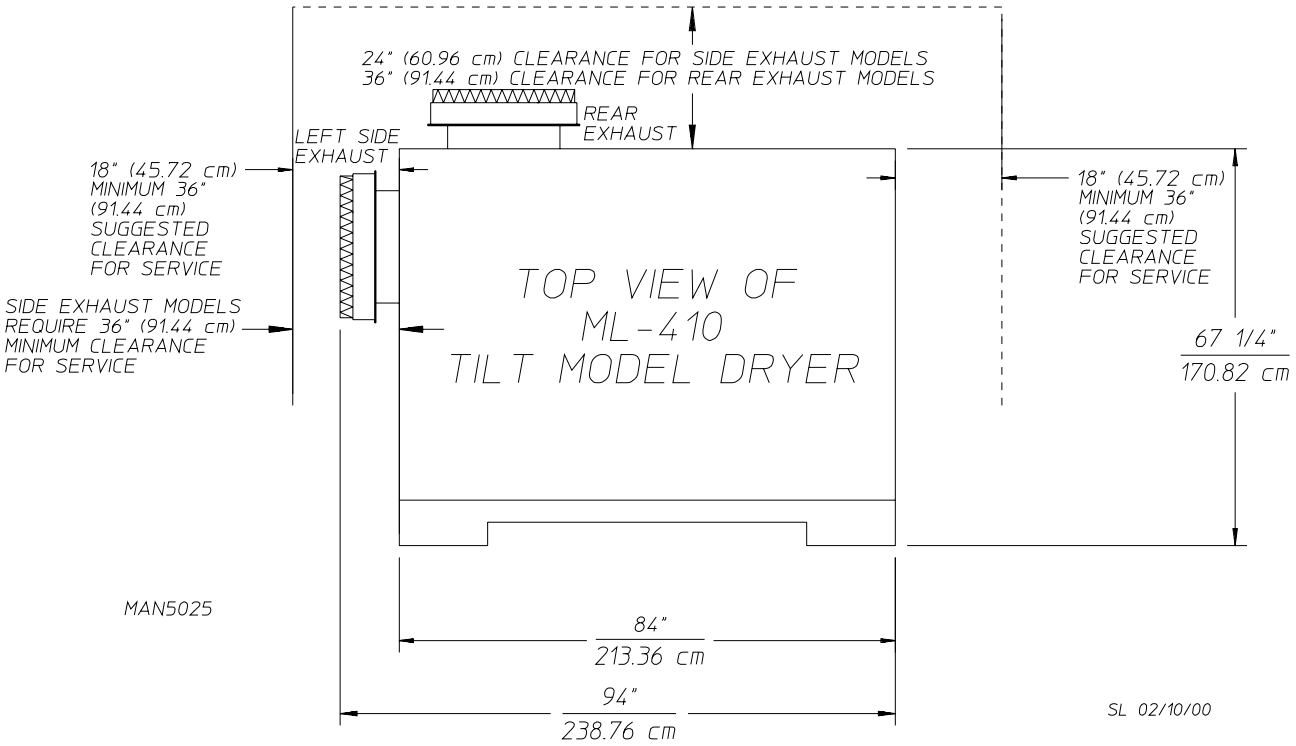
B. DIMENSIONS

ML-410 TILTING CLEARANCE ALLOWANCES			
MLG-410	1 DOOR/FORWARD TILT	142-inches	**360.68 cm**
	1 DOOR/2-WAY TILT	142-inches	**360.68 cm**
	2 DOOR/REAR TILT	142-inches	**360.68 cm**
MLG-410	1 DOOR/FORWARD TILT	150-inches	**381 cm**
	1 DOOR/2-WAY TILT	150-inches	**381 cm**
	2 DOOR/2-WAY TILT	150-inches	**381 cm**

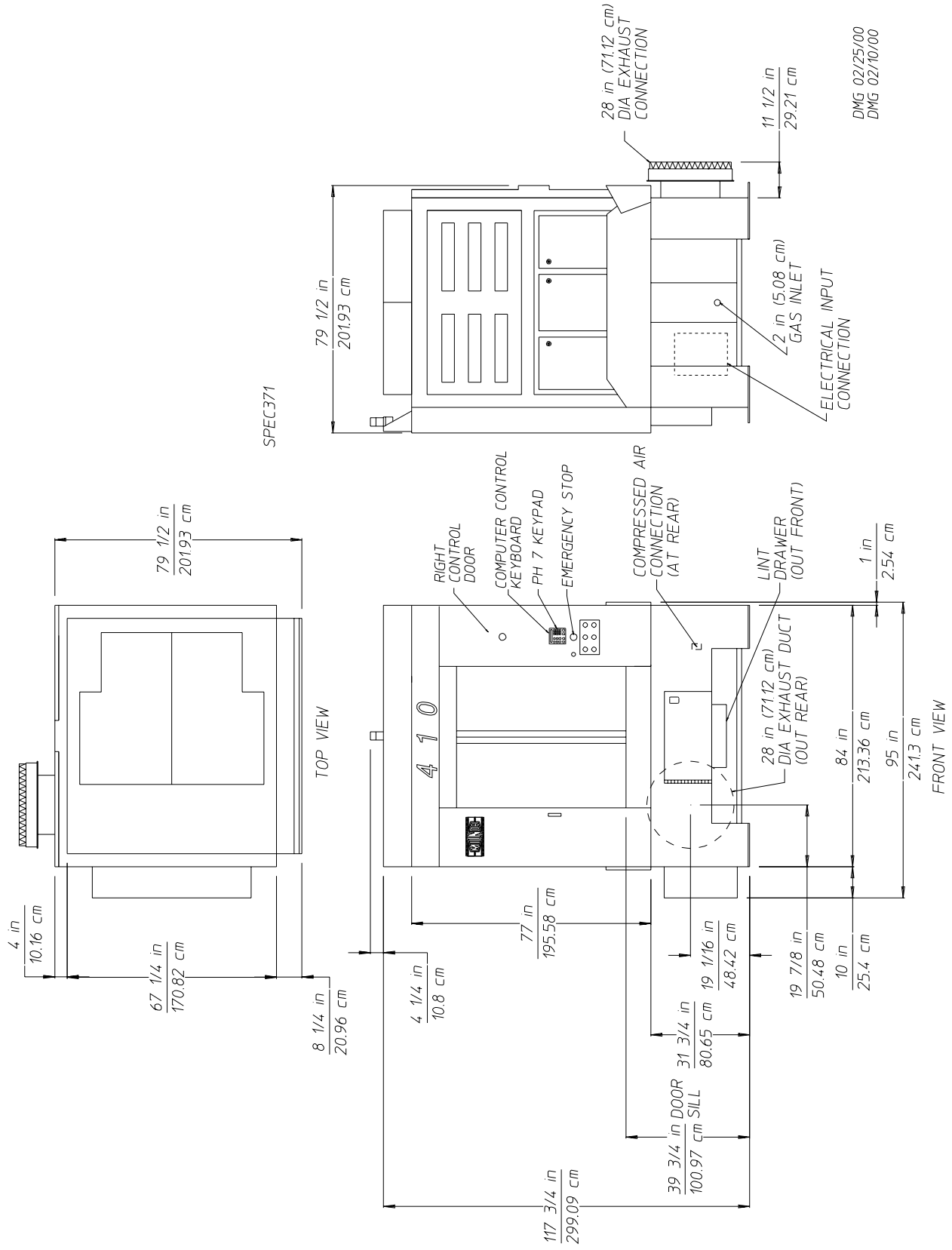
Shaded areas are stated in metric equivalents

WARNING: Dryer ***should be*** located where a minimum length of exhaust duct **will be** necessary.

TOP CLEARANCE MUST BE A MINIMUM OF 24" (60.96 cm) FROM THE HIGHEST POINT OF THE MACHINE

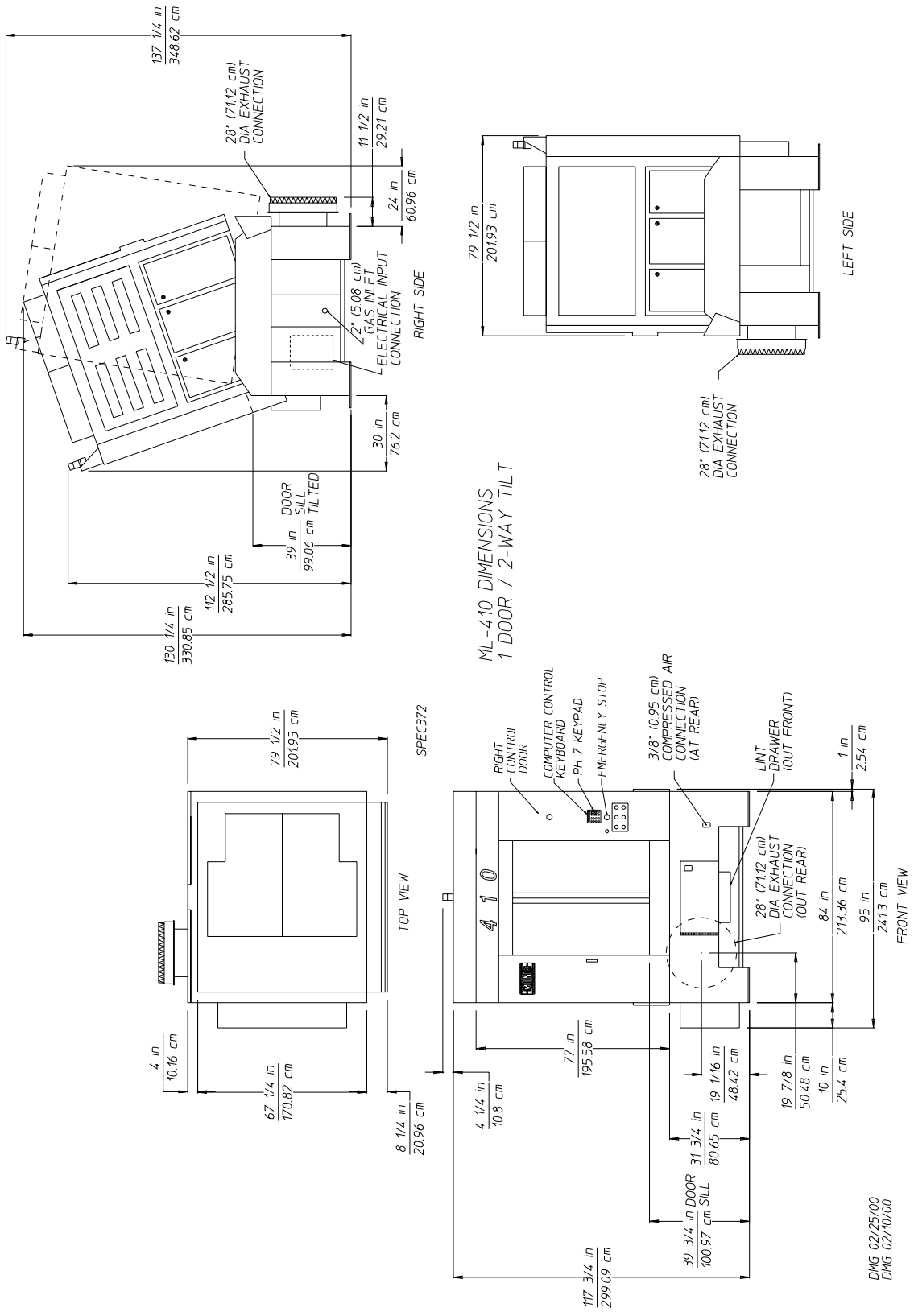


ML-410 1 Door/2-Way Tilt



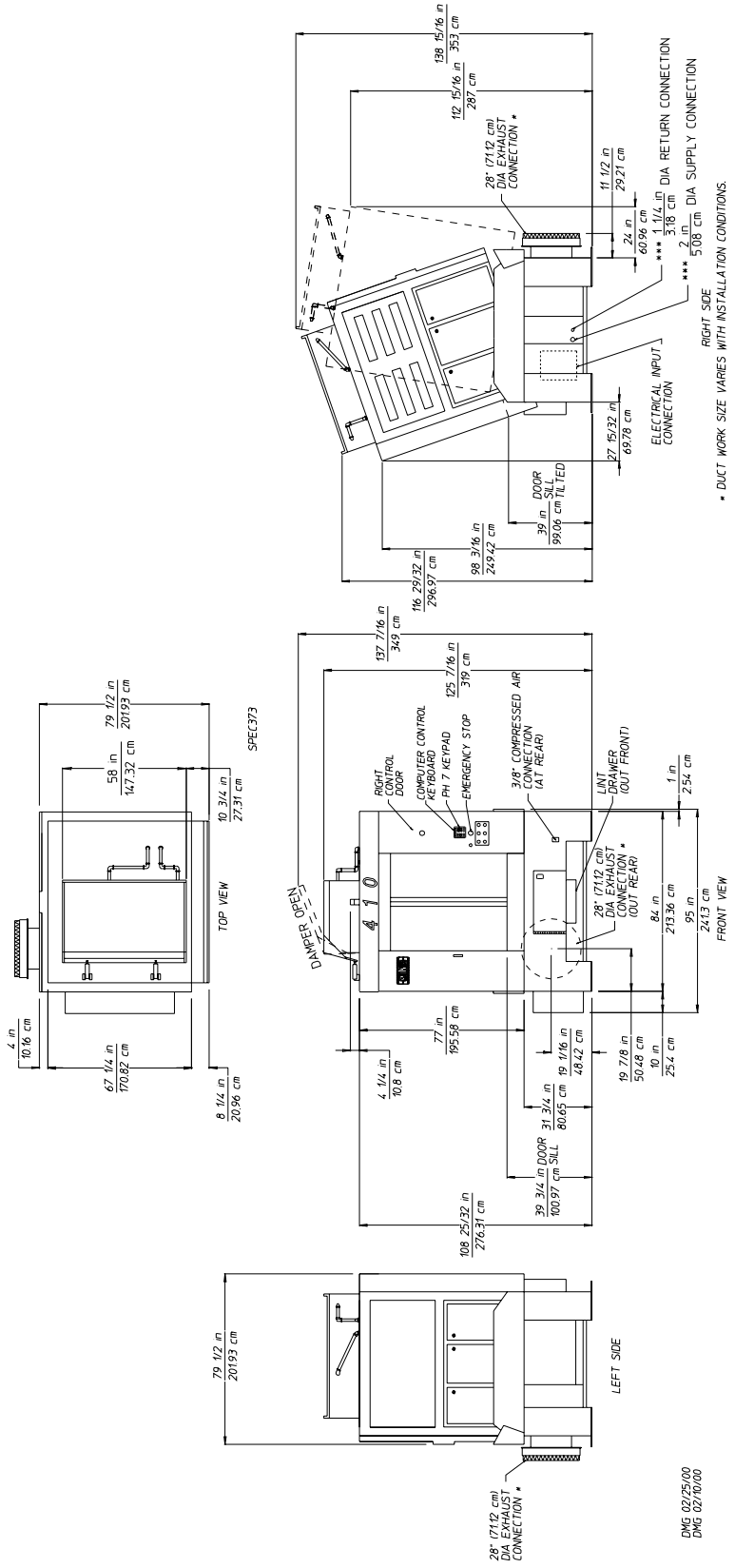
NOTE: **ADC** reserves the right to make changes in specifications at any time, without notice or obligation.

ML-410 1 Door/2-Way Tilt



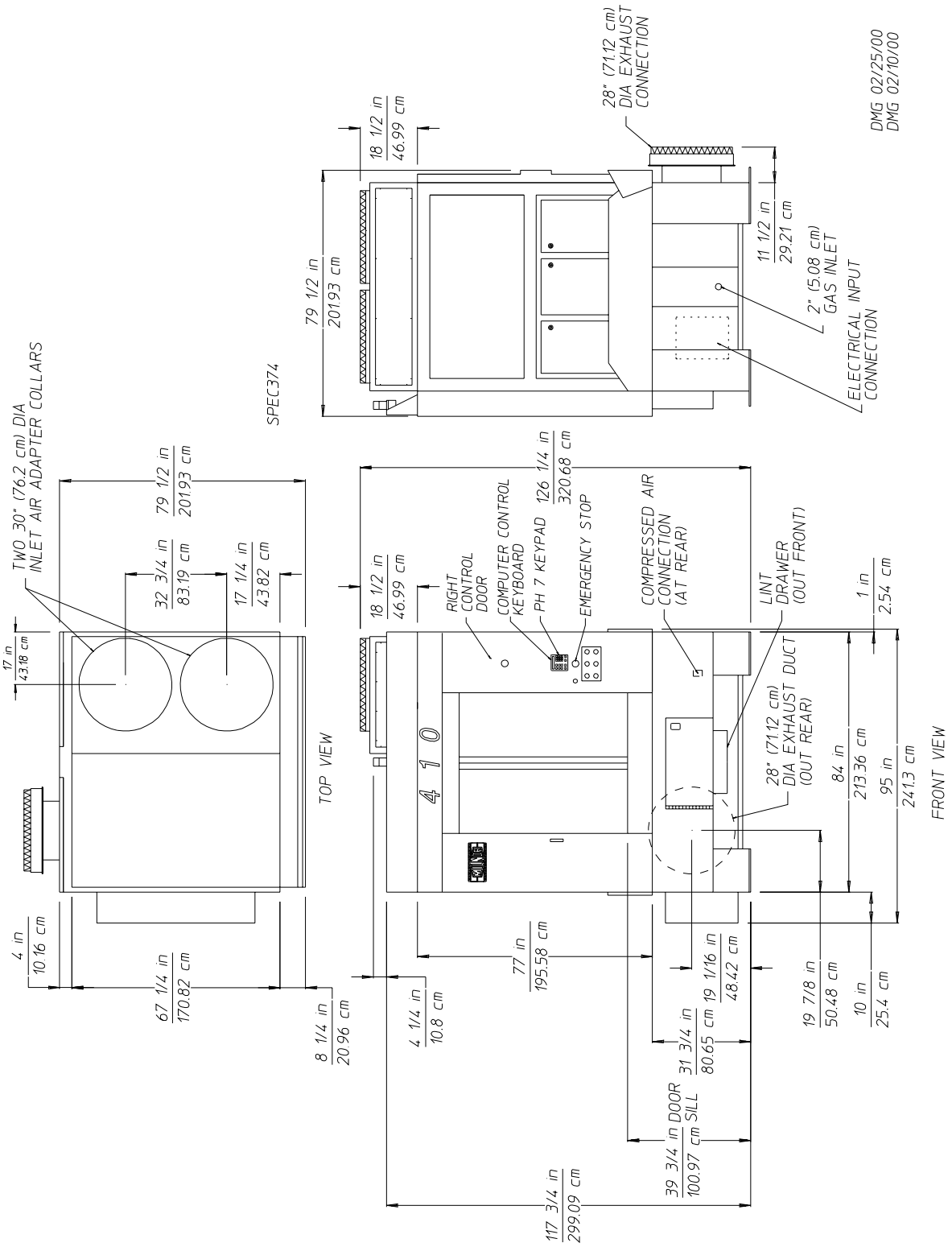
NOTE: ADC reserves the right to make changes in specifications at any time, without notice or obligation.

MLS-410 1 Door/2-Way Tilt



NOTE: ADC reserves the right to make changes in specifications at any time, without notice or obligation.

ML-410 1 Door/2-Way Tilt with Inlet Air Adapter



NOTE: ADC reserves the right to make changes in specifications at any time, without notice or obligation.

SECTION III
INSTALLATION PROCEDURES

Installation in a proper location **should be** performed by competent technicians in accordance with local and state codes. In the absence of these codes, the installation **must conform** to applicable American National Standards: National Fuel Gas Code ANSI.Z223.1-LATEST EDITION and/or National Electrical Code ANSI/ NFPA NO. 70-LATEST EDITION, or in Canada, the Canadian Electrical Codes Parts 1 & 2 CSA C22.1-1990 or LATEST EDITION.

A. REASSEMBLY OF DRYER

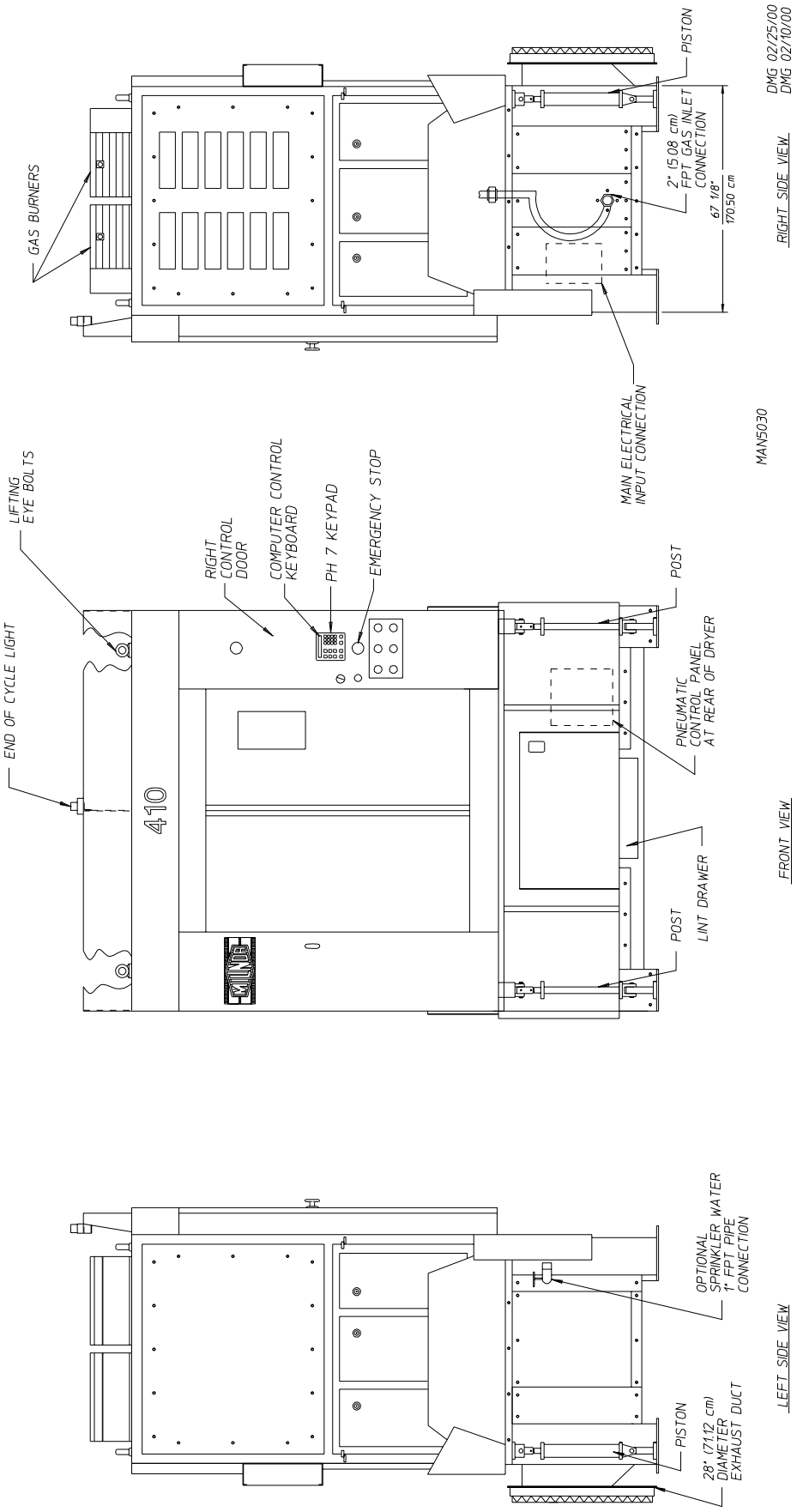
IMPORTANT: Always keep the tumbler (basket) section in an upright position when moving and/or transporting.

The ML-410 dryer is shipped in two (2) pieces with the tumbler (basket) section separate from the base section. The tumbler (basket) section will have to be lifted/hoisted onto the base section. Use cables through the eye bolts on top of the tumbler (basket) section, or use a forklift for the lifting process.

The ML-410 tilting dryer is made with many loading and unloading options. Please refer to the reassembly instructions on the following pages for your particular style of dryer.

If a steam dryer is shipped in two (2) pieces, the steam coil may have been removed from the top of the tumbler (basket) section and shipped with the base section. If this is the case, carefully lift the steam coil on to the top of the tumbler (basket) section with the steam pipe connections facing towards the right side of the dryer and bolt the coil to the top of the dryer with the 1/4" hardware supplied. There are three (3) panels that cover the front, right side, and rear of the steam coil. Fasten these into position also. Reconnect the steam pipe and condensate pipe unions to the coil. These pipes run down to the flex hoses in the base section.

MLG-410 1 Door/Forward Tilt with Sprinkler



1. Reassembly for the MLG-410 1 Door/Forward Tilt with Sprinkler Gas Model Dryer...

   Lift the tumbler (basket) section onto the base...

   a. Forward tilting dryers have two (2) tilting pistons located in the rear corners of the dryer base and two (2) piston posts located in the front corners of the dryer base. On the top of the tilting pistons and tilting posts are clevis block. Use the eight (8) 1/2" x 1-1/4" hex head bolts and lock washers (supplied with the dryer) to secure each clevis block to the bottom of the tumbler (basket) section.

      Refer to **Tilting Piston Reconnection View** on **page 26.**
      Refer to **Tilting Post Reconnection View** on **page 26.**

   b. The gas line is disconnected at the union when the dryer is shipped in two (2) pieces. This gas line union is located in the right side of the dryer base. Insert the gas line union half way through the hole on the bottom of the tumbler (basket) section. Connect the two (2) union halves and retighten.

IMPORTANT: THE FLEX HOSE ***MUST NOT BE*** KINKED.

2. There are two (2) electrical reconnections:

   a. A plug and cable is located in the right side of the base. This **must be** lifted up and reconnected into the mating socket located at the bottom of the right tumbler section.

   b. The tumbler section power cable **must be** lifted up from the base and reconnected into the junction box next to the tumbler drive motor in the left side of the tumbler section.

      Make sure both reconnected cables have enough slack in them to allow the dryer to tilt freely in both directions.

IMPORTANT: THE RECONNECTED ELECTRICAL CABLES ***MUST HAVE*** ENOUGH SLACK IN THEM TO ALLOW THE DRYER TO TILT *FREELY* IN BOTH DIRECTIONS.

   c. Reattach The Tilt Guard Panel...

      1) Use the 1/4-20 x 3/8" hex head bolts and lock washers (supplied with the dryer) to secure the top of the front tilt guard into the bottom of the front of the tumbler (basket) section.

      2) Use the 1/4-20 x 3/8" hex head bolts and lock washers (supplied with the dryer) to secure the top of the rear tilt guard to the bottom of the rear of the tumbler (basket) section.

      3) Use the 1/4-20 self-tapping screws (supplied with the dryer) to secure the right side tilt guards and left side tilt guards.

      4) Reconnect the spring and claw assembly which connects the rear tilt guard to each side tilt guard.

      5) Reconnect both chains to the back panel...the spring keeps the rear guard close to the dryers' back as the dryer is tilted forward or backwards. (Refer to **Tilt Guard Reconnection View** on **page 26.**)

e. Secure the 28-inch (71.12 cm) diameter exhaust duct transition piece to the dryers' rectangular exhaust duct with the 1/4-20 self-tapping screws (supplied with the dryer).

   The exhaust duct exits from the rear of the base.

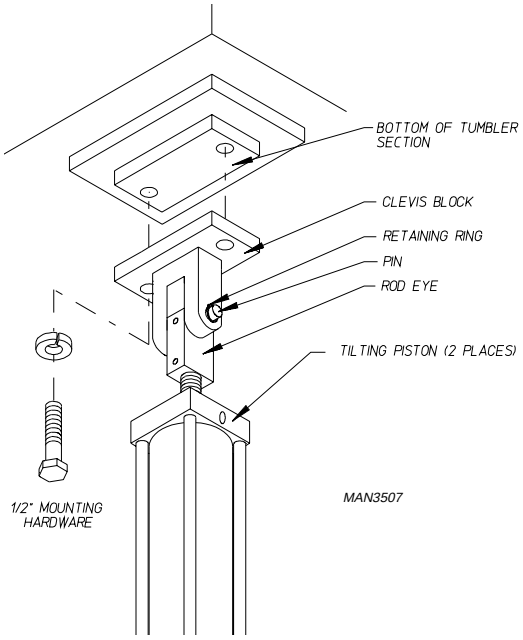
f. On dryers equipped with automatic (piston operated) load doors, reconnect the two (2) poly-flo air lines that run from the dryer base up to the door pistons.

g. On dryers equipped with a sprinkler option, a separate power supply **must be** connected to the sprinkler circuit located in the right base electrical box.

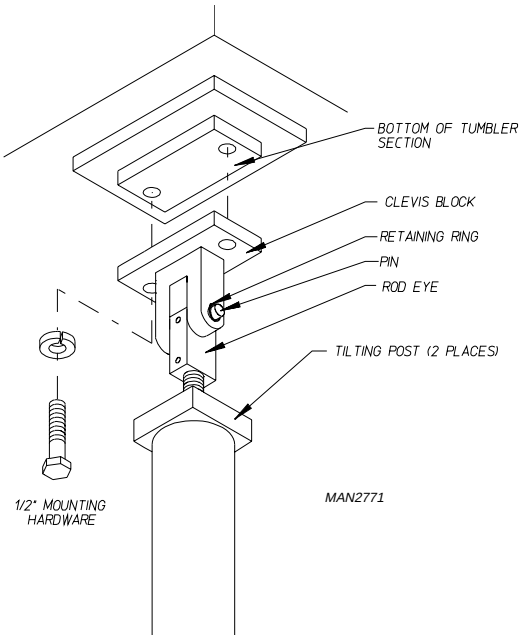
   1) The optional sprinkler water connection is located in the left side of the dryer base. A 1-inch M.P.T. water supply line will be connected to the 1-inch F.P.T. pipe connection of the dryer.

MLG-410 1 Door/Forward Tilt with Sprinkler

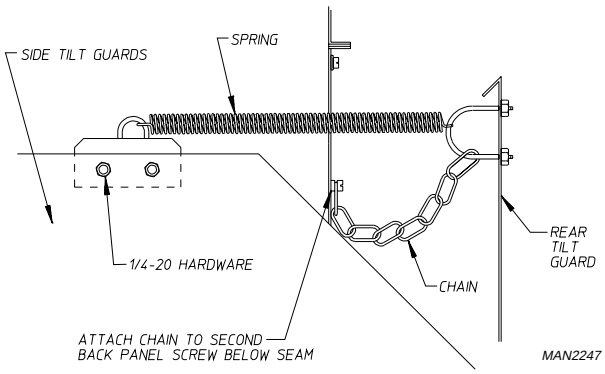
TILTING PISTON RECONNECTION VIEW



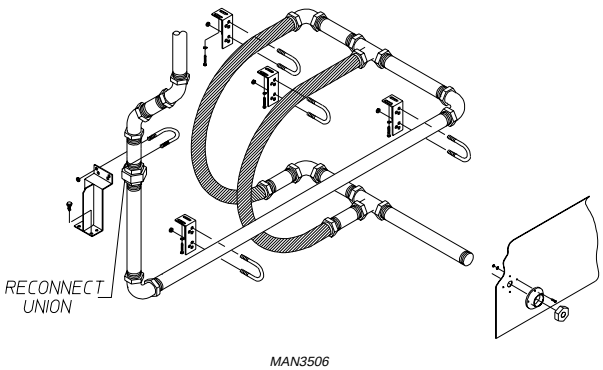
TILTING POST RECONNECTION VIEW



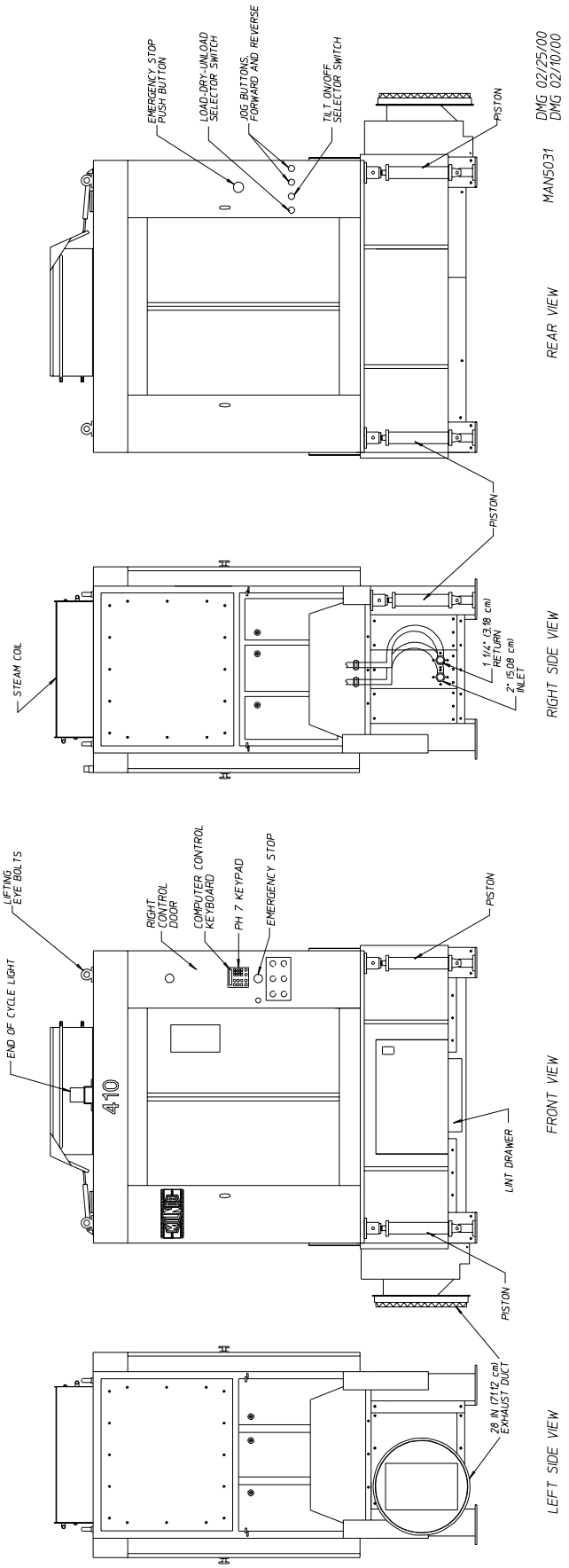
TILT GUARD RECONNECTION VIEW



GAS FLEX HOSE RECONNECTION VIEW



MLS-410 2 Door/2-Way Tilt



1. Reassembly for the MLS-410 2 Door/2-Way Tilt Steam Model Dryer...

   Lift the tumbler (basket) section onto the base.

   a. 2-Way tilting dryers have four (4) tilting pistons, one (1) located in each corner of the dryer base. On the top of each tilting piston is a clevis blocks. Use the four (4) 1/2 x 1-1/4" hex head bolts and lock washers (supplied with the dryer) to secure each clevis block to the bottom of the tumbler (basket) section.

      Refer to **Tilting Piston Reconnection View** on **page 29.**

   b. Both the 2-inch (5.08 cm) steam supply line and the 1-1/4" (3.18 cm) condensate return line unions are disconnected when the dryer is shipped in two (2) pieces. The steam supply lines are located in the right hand side of the dryer base. Insert both union halves up through the holes in the bottom of the tumbler (basket) section. Connect the two (2) union halves and retighten.

IMPORTANT: THE FLEX HOSE ***MUST NOT BE*** KINKED.

   Refer to **Steam Flex Hose Union Reconnection View** on **page 29**.

   c. The air lines are disconnected when the dryer is shipped in two (2) pieces. The air lines are located in the right side of the dryer base. Insert the air lines through the hole on the bottom of the tumbler (basket) section. Reconnect the 1/4" brass poly connector.

   d. There are three (3) electrical reconnections...

      1) The plug and cable connections are located in the right hand side of the dryer base. These **must be** lifted up and reconnected into the mating sockets located at the bottom right hand side of the tumbler (basket) section.

      2) The drive motor power cable **must be** lifted up and reconnected into the drive motor in the right hand side of the tumbler (basket) section.

IMPORTANT: THE RECONNECTED ELECTRICAL CABLES ***MUST HAVE*** ENOUGH SLACK IN THEM TO ALLOW THE DRYER TO TILT *FREELY* IN BOTH DIRECTIONS.

   e. Reattach The Tilt Guard Panel...

      1) Use the 1/4-20 x 3/8" hex head bolts and lock washers (supplied with the dryer) to secure the top of the front tilt guard into the bottom of the front of the tumbler (basket) section.

      2) Use the 1/4-20 x 3/8" hex head bolts and lock washers (supplied with the dryer) to secure the top of the rear tilt guard to the bottom of the rear of the tumbler (basket) section.

      3) Use the 1/4-20 self-tapping screws (supplied with the dryer) to secure the right side tilt guards and left side tilt guards.

   Refer to **Tilt Guard Panel Reconnection View** on **page 29**.

f. Secure the 28-inch (71.12 cm) diameter exhaust duct transition piece to the dryers' rectangular exhaust duct with the 1/4-20 self-tapping screws (supplied with the dryer).

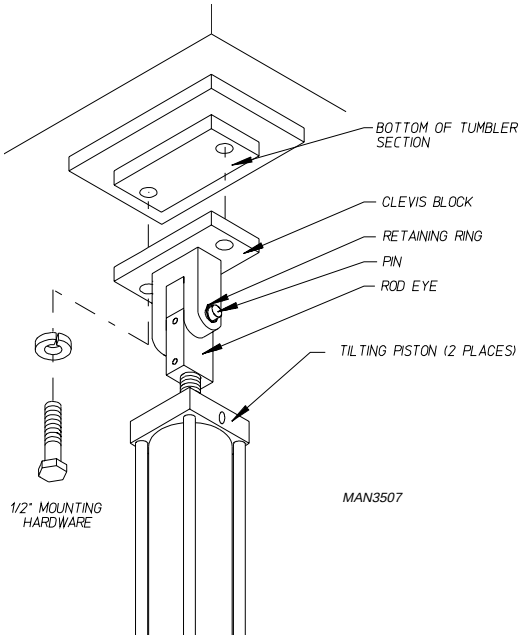
   The exhaust duct exits from the rear of the base.

g. On dryers equipped with automatic (piston operated) load doors, reconnect the four (4) poly-flo air lines that run from the dryer base up to the door pistons in the front and the rear of the dryer.

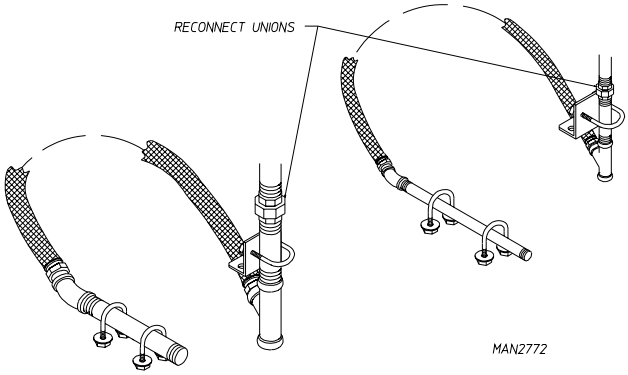
h. Reconnect the 1/4" poly-flo air lines which run from the dryer base up to the steam damper solenoid valve (located on top of the dryer).

MLS-410 2 Door/2-Way Tilt

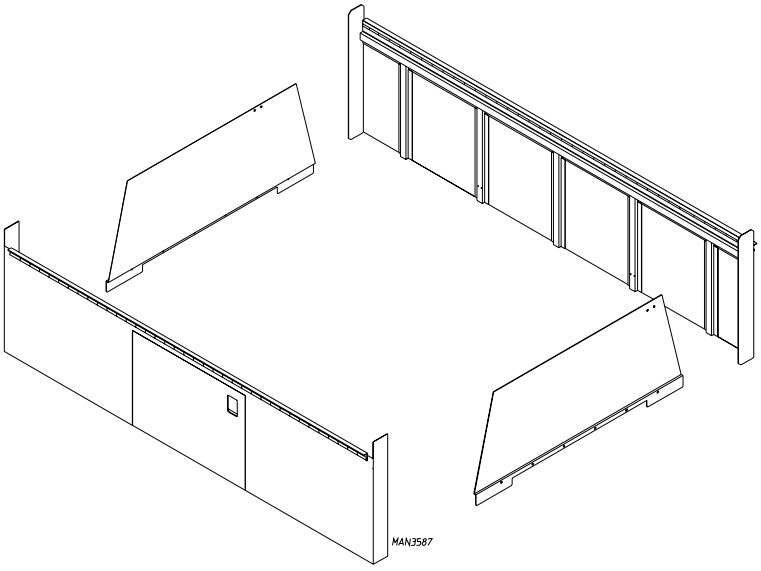
TILTING PISTON RECONNECTION VIEW



STEAM FLEX HOSE UNION RECONNECTION VIEW



TILTING GUARD PANEL RECONNECTION VIEW



B. FRESH AIR SUPPLY REQUIREMENTS

When the dryer is operating, it draws in room air, heats it, passes this air through the tumbler (basket), and exhausts it out of the building. Therefore, the room air **must be** continually replenished from the outdoors. If the make-up air is inadequate, drying time and efficiency will be adversely affected. Ignition problems and sail switch "fluttering" problems may result, as well as premature motor failure from overheating.

Air supply (make-up air) **must be** given careful consideration to assure proper performance of each dryer. An unrestricted source of air is necessary for each dryer. An airflow of 9,200 cfm (cubic feet per minute) - 260.52 cmm (cubic meters per minute) - **must be** supplied to each gas dryer and 12,000 cfm (cubic feet per minute) - 339.80 cmm **must be** supplied to each steam dryer. As a general rule, an unrestricted air entrance from the outdoors (atmosphere) of a minimum of 12 square feet (1.15 square meters) is required for each gas dryer and a minimum of 14 square feet (1.30 square meters) is required for each steam dryer.

To compensate for the use of registers or louvers used over the openings, this make-up air area **must be** increased by approximately thirty-three percent (33%). Make-up air openings **should not be** located in an area directly near where exhaust vents exit the building.

It is not necessary to have a separate make-up air opening for each dryer. Common make-up air openings are acceptable. However, they **must be** set up in such a manner that the make-up air is distributed equally to **ALL** the dryers.

Allowances **must be** made for remote or constricting passageways or where dryers are located at excessive altitudes or predominantly low pressure areas.

IMPORTANT: Make-up air ***must be*** provided from a source free of dry cleaning solvents fumes. Make-up air that is contaminated by dry cleaning solvent fumes will result in irreparable damage to the motors and other dryer components.

NOTE: Component failure due to dry cleaning solvent fumes will VOID THE WARRANTY.

1. Optional Inlet Air Adapter

   The MLG-410 dryer may be built with the inlet air adapter option. This option allows **ALL** of the dryers' inlet air to be ducted from the outdoors directly to the dryer.

   This option consists of a sheet metal box located on top of the dryer with two (2) 30-inch (76.2 cm) diameter duct collars on top. (Refer to the **illustration** on **page 22** for the location and dimensions of the inlet air adapter.)

   Use two (2) 30-inch (76.2 cm) diameter flexible hoses to connect the 30-inch (76.2 cm) collars to the outdoors. Allow enough slack in the flexible hoses so that the dryer can tilt, without restriction.

C. EXHAUST REQUIREMENTS

NOTE: For 1 Door ML-410 dryer models, the 28-inch (71.12 cm) diameter exhaust duct exits from the rear of the base. For 2 Door ML-410 dryer models, the 28-inch (71.12 cm) diameter exhaust duct exits from the left side of the base.

NOTE: For 1 Door/2-Way Tilt ML-410 dryer models, keep the exhaust ducting at least 36-inches (91.44 cm) away from the back of the dryer so that the dryer ***WILL NOT*** hit the ducting when the dryer tilts to the rear.

1. General Exhaust Duct Work Information

Exhaust duct work **should be** designed and installed by a qualified professional. Improperly sized duct work will create excessive back pressure which results in slow drying, increased use of energy, overheating of the dryer, and shutdown of the burner by the airflow (sail) switches, burner hi-limits, or tumbler (basket) hi-heat thermostats.

CAUTION: DRYER ***MUST BE*** EXHAUSTED TO THE OUTDOORS.

CAUTION: IMPROPERLY SIZED or INSTALLED EXHAUST DUCT WORK CAN CREATE A POTENTIAL FIRE HAZARD.

NOTE: When a dryer is exhausted separately, it is recommended that a back draft damper be installed.

NOTE: When dryers are exhausted into a multiple (common) exhaust line, each dryer ***must be*** supplied with a back draft damper.

The duct work **should be** laid out in such a way that the duct work travels as directly as possible to the outdoors with as few turns as possible. Single or independent dryer venting is recommended.

The shape of the duct work is not critical so long as the minimum cross-sectional area is provided. It is suggested that the use of 90º turns in ducting be avoided; use 30º and/or 45º angles instead. The radius of the elbow should preferably be 1-1/2 times the diameter of the duct.

The dryer comes with a 28-inch (71.12 cm) diameter exhaust duct connection. The plant's exhaust duct **must be** at least 28-inches (71 cm) in diameter or for a rectangular duct have a cross-sectional area of 616 square inches (3,959 sq.cm.). The duct work from the dryer to the outside exhaust outlet **should not exceed** 30 feet (9.14 meters). The shape of the duct work is not critical so long as the minimum cross-sectional area is provided. It is suggested that the use of 90º turns be avoided; use 45º angles instead. The radius of the elbows should preferably be 1-1/2 times the width or diameter of the duct. Excluding tumbler (basket)/dryer elbow connections or elbows used for outside protection from the weather, no more than two (2) elbows **should be** used in the exhaust duct run. If more than two (2) elbows are used, the cross-sectional area of the duct work **must be** increased.

ALL duct work **should be** smooth inside with no projections from sheet metal screws or other obstructions which will collect lint. When adding ducts, the duct to be added should overlap the duct to which it is to be connected. **ALL** duct work joints **must be** taped to prevent moisture and lint from escaping into the building. Inspection doors **should be** installed at strategic points in the exhaust duct work for periodic inspection and clean-out of lint from the duct work.

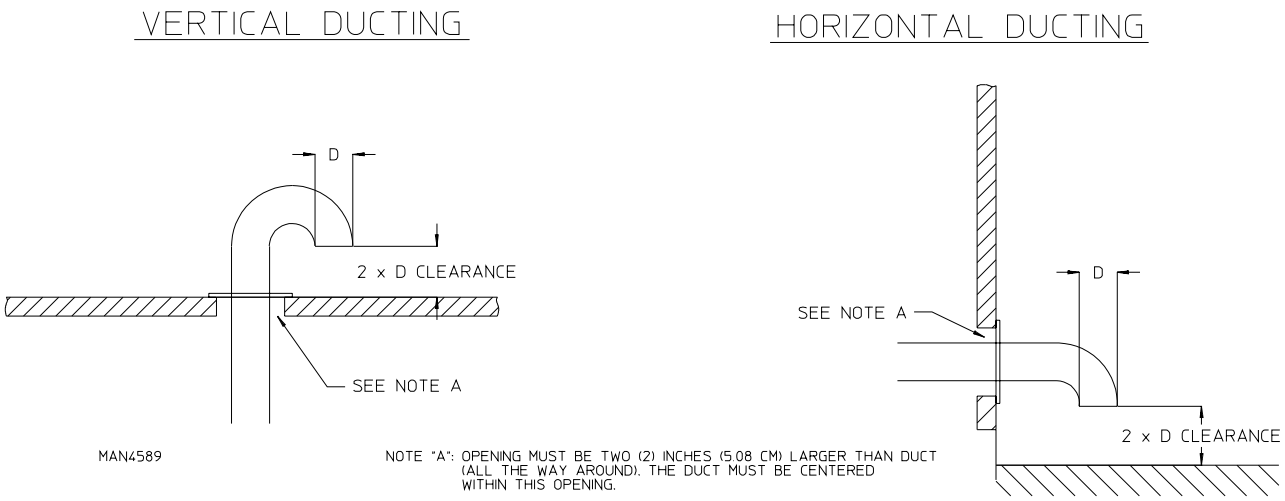
IMPORTANT: Exhaust back pressure measured by a Magnehelic in the exhaust duct ***should not exceed*** 0.5 inches of water column (1.24 mb).

NOTE: Where the exhaust passes through a wall, ceiling, or roof made of combustible materials, the opening ***must be*** 2-inches (5.08 cm) larger (all the way around) than the duct. The duct ***must be*** centered within this opening.

a. Outside Duct Work Protection

1) To protect the outside end of horizontal duct work from the weather, a 90º elbow turned downward **should be** installed where the exhaust exits the building. If the duct work travels vertically up through the roof, it **should be** protected from the weather by using a 180º turn to point the opening downward. In either case, allow at least twice the diameter of the duct between the duct opening and the nearest obstruction.

IMPORTANT: ***DO NOT*** use screens or caps on the outside of opening of exhaust duct work.



D. COMPRESSED AIR SUPPLY SYSTEM

The compressed air system of the ML-410 Tilting dryer consists of a number of pneumatic pistons located throughout the dryer. The pneumatics are actuated by solenoid and flow control valves that are under computer control. The pneumatic pistons are used to:

- Tilt the Dryer For Loading and Unloading.
- Open and Close The Load and Unload Doors (for ML-410 dryer models equipped with Automatic Doors)
- Operate The Steam Coil Damper (for MLS-410 Steam Heated Models Only)
- Air Jet is used to clean lint from the blower fan (impellor)

1. Filter/Regulator Assembly

The compressed air supply to the dryer is connected into the 3/8" F.T.P. fitting of the filter/regulator assembly which is located at the bottom rear of the right side of the base.

The filter/regulator assembly performs two (2) essential functions. The filter removes most solids and liquid particles from the compressed air stream and traps them in its bowl where this waste can be readily removed through the drain valve at the bottom of the bowl.

The filter bowl **should be** cleaned monthly.

The regulator will remain a nearly constant outlet air pressure so that the dryer's pneumatics will function normally despite upstream air pressure variations. After the compressed air is connected into the filter/ regulator assembly, adjust the regulator knob so that the gauge needle reads 80 PSI (5.512 bars).

2. Tilting-Piston Solenoid Valves

A two-way-tilt dryer has two (2) of these solenoid valves...one to control the front set of tilting pistons and a second to control the rear set of tilting pistons. A one-way-tilt dryer has only one (1) pair of solenoid valves.

Each valve has five (5) 3/8" F.T.P. ports and two (2) electric solenoid operators, one (1) on each side of the valve.

To tilt the dryer forward, a 24 volt signal is applied to the rear pistons solenoid connector "12" and no voltage is applied to the solenoid connector "14". The internal spool in the valve will move and 80 PSI (5.512 bars) of air will enter the bottom port of the rear tilting pistons, extending the rear tilting piston rods and tilting the dryer forward for unloading. The top piston ports are bled to the atmosphere.

To level the dryer, the voltage signals are reversed. No voltage is applied to the "12" solenoid, and 24 volts is applied to the "14" solenoid. The valve spool will now move so that 80 PSI (5.512 bars) of air is applied at the top piston ports, while the bottom piston ports are bled to the atmosphere. The piston rod will now retract leveling the dryer. On rear tilt dryers, the front tilting piston solenoid valve acts in the same manner.

The tilting piston valves are 4-way/5 port/3 position valves. If no voltage is applied to both the "12" and "14" solenoids, **ALL** five (5) valve ports are blocked. This means that, if the dryer is tilting or leveling and power to the dryer is shut off, the pistons will lock in position, holding the dryer in a partially tilted position.

The tilting piston valves and flow control valves are located on the pneumatic plate in the rear of the dryers' base.

3. ***OPTIONAL*** Automatic (Piston Operated) Load/Unload Doors

If the dryer is equipped with the AUTOMATIC DOOR OPTION, then the loading doors are operated by two (2) pneumatic pistons located above the load doors. On two (2) door models, the unloading doors on the back of the dryer will also be controlled by two (2) pistons, located above the unload doors.

The 24 volt solenoid valve operators controlling the door pistons are located on the pneumatic plate in the rear of the dryer's base. These solenoid valves are configured so that if power to the dryer is shut off, the door piston's ports are bled to the atmosphere so that the doors can be opened and closed by hand.

4. ***OPTIONAL*** Sprinkler Valve

The sprinkler water flow is controlled by a pneumatically operated water valve, which is located in the left side of the base. This water valve is controlled by a 3 port/2 position, 24 volt - double solenoid valve which is located at the top of the dryer's pneumatic plate. If no voltage is applied to both solenoids then **ALL** three (3) ports are blocked. This means that if the sprinkler is activated and power to the dryer is then shut off, the sprinkler will stay on, until the manual water valve is closed or until the dryer's internal temperature drops below the sprinkler set point temperature and the sprinkler reset button is physically pushed.

E. ELECTRICAL INFORMATION

1. Electrical Requirements

It is your responsibility to have **ALL** electrical connections made by a properly licensed and competent electrician to assure that the electrical installation is adequate and conforms with local and state regulations or codes. In the absence of such codes, **ALL** electrical connections, material, and workmanship **must conform** to the applicable requirements of the National Electrical Code ANSI/NFPA NO. 70-LATEST EDITION, or in Canada, the Canadian Electrical Codes Parts 1 & 2 CSA C22.1-1990 or LATEST EDITION.

IMPORTANT: Failure to comply with these codes or ordinances, and/or the requirements stipulated in this manual can result in personal injury or component failure.

NOTE: Component failure due to improper installation will VOID THE WARRANTY.

It is required that a separate circuit serving each tumbler (basket) be provided. The dryer **must be** connected with copper wire only. ***DO NOT use aluminum wire which could cause a fire hazard.***

NOTE: The use of aluminum wire will VOID THE WARRANTY.

2. Electrical Service Specifications

MLG-410 (Gas)
MLS-410 (Steam)

25 HP (**ADC** Part No. 181006) Blower Motor
7-1/2 HP (**ADC** Part No. 181017) Drive

ELECTRICAL SERVICE SPECIFICATIONS (PER DRYER)

IMPORTANT: 208 VAC AND 230 VAC **ARE NOT THE SAME. When ordering, *specify exact voltage.***

NOTE: A. Fuse ratings are dual-element, time-delay, current limiting, class RK1 or RK5 **ONLY**.
B. Circuit breakers are thermal magnetic (industrial) type **ONLY**. For others, calculate/verify correct breaker size according to appliance amp draw rating and type of breaker used.
C. Circuit breakers for 3Ø dryers **must be** 3-pole type.

SERVICE VOLTAGE	PHASE	WIRE SERVICE	APPROX. AMP DRAW	MINIMUM WIRE SIZE	FUSING Dual Element Time Delay	CIRCUIT BREAKER
208	3ø	3/4	81	#3	100	110
230	3ø	3	78	#3	100	110
380	3ø	3/4	49	#6	60	90
416	3ø	3/4	44	#6	60	90
460/480	3ø	3/4	40	#8	60	80

IMPORTANT: THE DRYER *MUST BE* CONNECTED TO THE ELECTRIC SUPPLY SHOWN ON THE DATA LABEL THAT IS AFFIXED TO THE REAR OF THE RIGHT HAND ELECTRICAL ENCLOSURE.

WARNING: 208 VAC and 230 VAC ARE NOT THE SAME. Any damage done to the dryer components due to improper voltage connections will automatically VOID THE WARRANTY.

NOTE: ADC reserves the right to make changes in specifications at any time, without notice or obligation.

3. Electrical Connections

NOTE: A wiring diagram is included with each dryer and is located in the blueprint pocket inside the left side control cabinet.

The main electrical input connections to the dryer are the 3-phase (3ø) power leads (L1, L2, and L3), GROUND, *and in the case of 4 wire service, the Neutral*. These electrical connections are made at the power distribution block located in the base front electrical enclosure.

If the dryer has an optional sprinkler circuit then a separate single-phase (1ø) source **must be** supplied to the sprinkler circuit at the name plate voltage. These connections are made at the power distribution block located in the base front electrical enclosure.

The main electrical 3-phase (3ø) connections (L1, L2, and L3) and the optional single-phase (1ø) connection **must be** provided and installed in accordance with state and local codes. In the absence of these codes, grounding **must conform** to applicable requirements of the National Electrical Code ANSI/NFPA NO. 70-LATEST EDITION, or in Canada, the installation **must conform** to applicable Canadian Standards: Canadian Electrical Codes Parts 1 & 2 CSA C22.1-1990 or LATEST EDITION. In **ALL** cases, a strain relief **must be** used where the wire(s) enter the dryer electrical service (relay) box.

NOTE: A CIRCUIT SERVING EACH DRYER *MUST BE* PROVIDED.

4. Main Grounding

Grounding (earth) connections **must be** provided and installed in accordance with state and local codes. In the absence of these codes, grounding **must conform** to applicable requirements of the National Electrical Code ANSI/NFPA NO. 70-LATEST EDITION, or in Canada, the installation **must conform** to applicable Canada Standards: Canadian Electrical Codes Parts 1 & 2 CSA C22.1-1990 or LATEST EDITION. The ground connection may be to a proven earth ground at the location service panel.

NOTE: A grounding connection (terminal lug) is provided in the dryer in the Base Electrical Junction Box.

For added personal safety, when possible, it is suggested that a separate ground wire (sized per local codes) be connected from the ground connection of the dryer to a cold water pipe. **DO NOT** ground to a gas or hot water pipe. The grounded cold water pipe **must have** metal to metal connections **ALL** the way to electrical ground. If there are any non-metallic interruptions, such as a meter, pump, plastic, rubber, or other insulating connectors, they **must be** jumped out with no. 4 copper wire and securely clamped to bare metal at both ends.

IMPORTANT: For personal safety and proper operation, the dryer ***must be*** grounded. For proper operation of the microprocessor (computer), an earth (zero) ground is required.

NOTE: Grounding via metallic electrical conduit (pipe) **is not** recommended.

F. GAS INFORMATION

It is your responsibility to have **ALL** plumbing connections made by a qualified professional to assure that the gas plumbing installation is adequate and conforms with local and state regulations or codes. In the absence of such codes, **ALL** plumbing connections, materials, and workmanship **must conform** to the applicable requirements of the National Fuel Code ANSI Z223.1-LATEST EDITION or in Canada, CAN/CGA-B149.1-M91 (Natural Gas) or CAN.CGA-B149.2-M91 (L.P. Gas) or LATEST EDITION (for General Installation and Gas Plumbing), as well as local codes and ordinances and **must be** done by qualified professional.

IMPORTANT: Failure to comply with these codes or ordinances, and/or the requirements stipulated in this manual, can result in personal injury and improper operation of the dryer.

The dryer and its individual shut-off valves **must be** disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 1/2 psig (3.5 kPa). The dryer **must be** isolated from the gas supply piping system by closing its individual manual shut-off valve during any pressure test of the gas supply system at test pressures equal to or less than 1/2 psig (3.5 kPa).

IMPORTANT: Failure to isolate or disconnect the dryer from gas supply as noted can cause irreparable damage to the gas valve which will VOID THE WARRANTY.

WARNING: FIRE or EXPLOSION COULD RESULT.

1. Gas Supply

The gas dryer installation **must meet** the American National Standard...National Fuel Gas Code ANSI Z223.1-LATEST EDITION, or in Canada, CAN/CGA-B149.1-M91 (Natural Gas) or CAN/CGA-B149.2-M91 (L.P. Gas) or LATEST EDITION (for General Installation and Gas Plumbing), as well as local codes and ordinances and **must be** done by a qualified professional.

NOTE: Undersized gas piping will result in ignition problems, slow drying, increased use of energy, and can create a safety hazard.

The dryer **must be** connected to the type of heat/gas indicated on the dryer label affixed behind the right control box door. **If this information does not agree with the type of gas available, DO NOT operate the dryer.** Contact the distributor who sold the dryer or the **ADC** factory.

IMPORTANT: Any burner changes or conversions ***must be*** made by a qualified professional.

The input ratings shown on the dryer data label are for elevations up to 2,000 feet (609.6 meters), unless elevation requirements of over 2,000 feet (609.6 meters) were specified at the time the dryer order was placed with the factory. The adjustment or conversion of dryers in the field for elevations over 2,000 feet (609.6 meters) are made by changing each burner orifice. If this conversion is necessary, contact the distributor who sold the dryer or contact the **ADC** factory.

2. Technical Gas Data

a. Gas Specifications

	Type of Gas			
	Natural		Liquid Propane	
Manifold Pressure*	3.5 inches W.C.	**8.7 mb**	10.5 inches W.C.	**26.1 mb**
Inline Pressure	6.0 inches W.C.	**14.9 mb**	10.5 inches W.C.	**26.1 mb**

Shaded areas are stated in metric equivalents

* Measured at gas valve pressure taps when the gas valves are on.

Refer to the **illustration** on **page 12**.

b. Gas Connections

Run a 2" (5.08 cm) gas pipe from the main gas header to the dryer. There is a 2" (5.08 cm) gas pipe connection at the bottom of the dryer base.

Inlet Connection ---------- one (1) 2-inch F.P.T.

Btu/hr input (per dryer) --- 1,600,000 btu/hr - 403,200 kcal/hr

1) Natural Gas

Pressure regulation is controlled by both gas valve's internal regulators. Incoming supply pressure **must be** consistently between a minimum of 6.0 inches water column (W.C.) - 14.92 mb - and a maximum of 10.5 inches water column (W.C.) - 26.1 mb.

2) Liquid Propane (L.P.) Gas

Dryers made for use with liquid propane (L.P.) gas have both of their gas valve's internal pressure regulators open so that the gas pressure **must be** regulated upstream of the dryer. The pressure is measured at each gas valve pressure tap and **must be** a consistent 10.5 inches water column (W.C.) - 26.1 mb. There is no regulator or regulation provided in an L.P. gas dryer. The water column **must be** regulated at the source (L.P. tank) or external regulator/regulation **must be** added to each dryer.

3. Piping /Connections

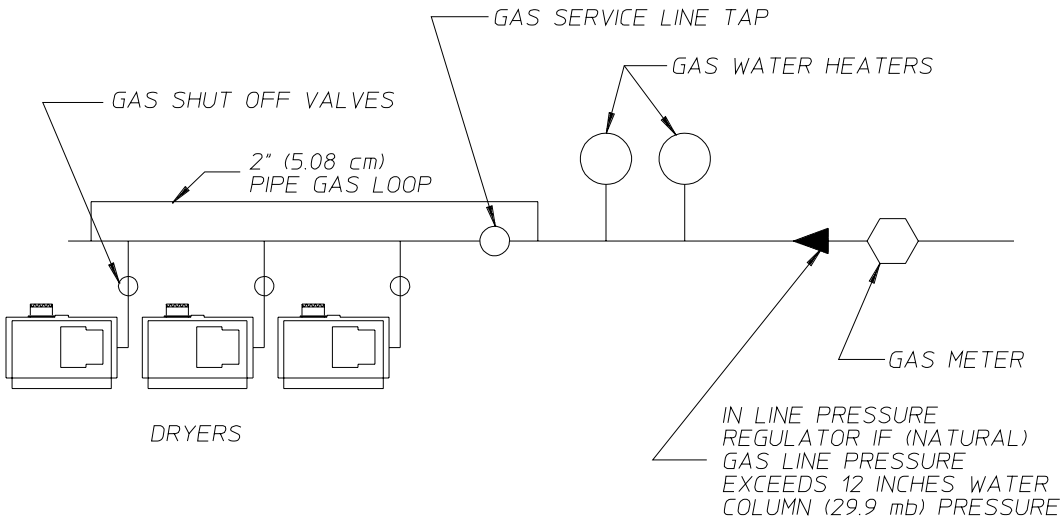
ALL components/materials **must conform** to National Fuel Gas Code ANSI Z223.1-LATEST EDITION specifications. It is important that gas pressure regulators meet applicable pressure requirements and that gas meters be rated for the total amount of **ALL** the appliance BTU's being supplied.

The dryer is provided with a 2-inch N.P.T. inlet pipe connection located at the right side of the base of the dryer. For ease of servicing, the gas supply line of each dryer **must have** it's own shut-off valve.

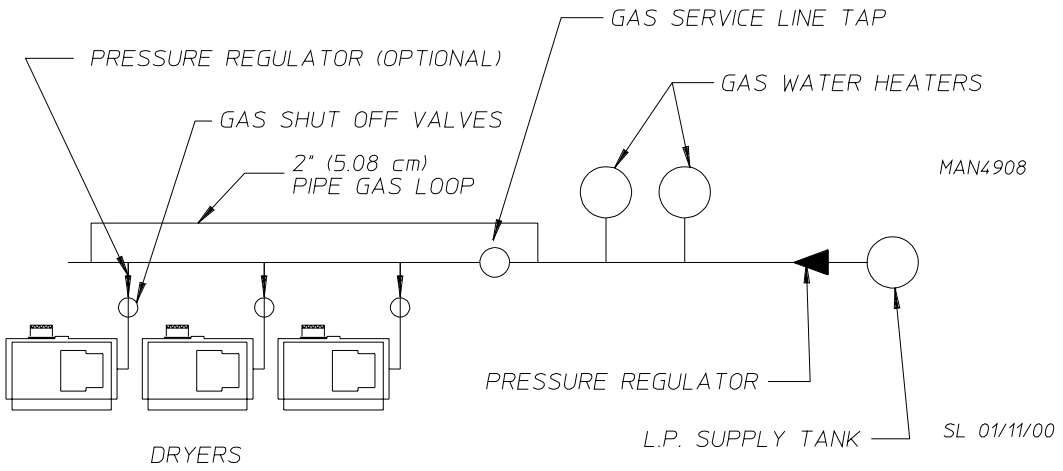
The size of the main gas supply line (header) will vary depending on the distance this line travels from the gas meter or, in the case of L.P. (liquid propane) gas, the supply tank, other gas operated appliances on the same line, etc. Specific information regarding supply line size **should be** determined by the gas supplier.

NOTE: Undersized gas supply piping can create a low or inconsistent pressure which will result in erratic operation of the burner ignition system.

TYPICAL NATURAL GAS INSTALLATION



TYPICAL L.P. GAS INSTALLATION



Consistent gas pressure is essential at **ALL** gas connections. It is recommended that a 2-inch (5.08 cm) pipe gas loop be installed in the supply line serving a bank of dryers. An in-line pressure regulator **must be** installed in the gas supply line (header) if the (natural) gas pressure exceeds 12.0 inches of water column (29.9 mb) pressure.

NOTE: A water column test pressure of 3.5 inches (8.7 mb) for natural gas and 10.5 inches (26.1 mb) for L.P. (liquid propane) dryers is required at the gas valve pressure tap of each dryer for proper and safe operation.

A 1/8-inch N.P.T. plugged tap, accessible for a test gauge connection, **must be** installed in the main gas supply line immediately upstream of each dryer.

IMPORTANT: Pipe joint compounds that resist the action of natural gas and L.P. gas ***must be*** used.

IMPORTANT: Test **ALL** connections for leaks by brushing on a soapy water solution (liquid detergent works well).

WARNING: NEVER TEST FOR LEAKS WITH A FLAME!!!

ALL components/materials **must conform** to National Fuel Gas Code Specifications ANSI Z223.1-LATEST EDITION, or in Canada, CAN/CGA-B149.1-M91 (Natural Gas) or CAN/CGA-B149.2-M91 (L.P. Gas) or LATEST EDITION (for General Installation and Gas Plumbing), as well as local codes and ordinances and **must be** done by a qualified professional. It is important that gas pressure regulators meet applicable pressure requirements, and that gas meters be rated for the total amount of **ALL** the appliance BTU's being supplied.

IMPORTANT: The dryer and its individual shut-off valve ***must be*** disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 1/2 psig (3.5 kPa).

NOTE: The dryer ***must be*** isolated from the gas supply piping system by closing its individual manual shut-off valve during any pressure test of the gas supply system at test pressures equal to or less than 1/2 psig (3.5 kPa).

G. STEAM INFORMATION

It is your responsibility to have **ALL** plumbing connections made by a qualified professional to assure that the steam plumbing installation is adequate and conforms with local and state regulations or codes.

IMPORTANT: Failure to comply with the requirements stipulated in this manual can result in component failure which will VOID THE WARRANTY.

NOTE: The MLS-410 is manufactured with a pneumatic (piston) damper system which requires an external supply of air (80 PSI +/- 10 PSI [5.512 bars +/- 0.61 bars]).

Operating Steam Pressure - High Pressure		

1. Steam Coil PH Level

   The normal PH level for copper type steam coils **must be** maintained between a value of 8.5 to 9.5. For steel type steam coils the PH level **must be** maintained between a value of 9.5 to 10.5. These limits are set to limit the acid attack of the steam coils.

IMPORTANT: Coil failure due to improper PH level will VOID THE WARRANTY.

2. Steam Requirements - High Pressure

   Inlet------ 2" supply line connection
   Return --- 1-1/4" return line connection

3. Installation Instructions

   To insure an adequate supply of steam is provided, be sure that the steam lines and steam return lines are sized and laid out as stipulated in this manual. Inadequate steam lines and steam return lines or improper steam plumbing will result in poor performance and can cause component failure. Clean, dry steam **must be** provided to the dryer.

IMPORTANT: Steam coil failure due to water hammer by wet steam will VOID THE WARRANTY.

a. The presence of condensate in the steam supply will cause water hammer and subsequent heat exchanger (steam coil failure). The steam supply connection into the main supply line **must be** made with a minimum 10-inch (25.4 cm) riser. This will prevent any condensate from draining towards the dryer.

b. The steam supply piping to the dryer ***must include*** a 12-inch (30.48 cm) rise along with a drip trap and check valve. This will prevent any condensate from entering the steam coil.

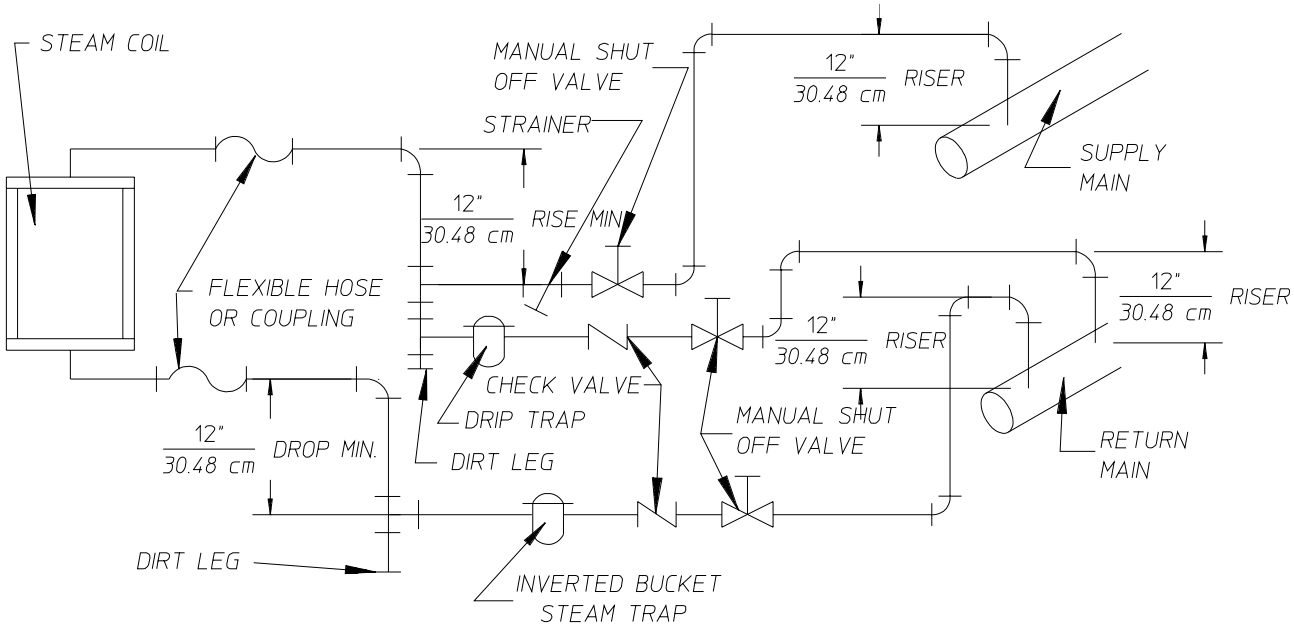
c. Flexible hoses or couplings **must be** used. The dryer vibrates slightly when it runs and this will cause the steam coil connections to crack if they are hard piped to the supply and return mains.

d. Shut-off valves for each dryer **should be** installed in the supply line, return line, and drip trap return line. This will allow the dryer to be isolated from the supply main and the return main if the dryer needs maintenance work.

e. Install an inverted bucket steam trap which will pass 2,700 lbs/hr (1224.69 kg/hr) at 125 psi (8.6 bars) and a check valve at least 12-inches (30.48 cm) below the steam coil as close to the coil as possible.

f. The supply line and the return line **should be** insulated. This will save energy and provide for the safety of the operator and maintenance personnel.

g. Water pockets in the supply line, caused by low points, will provide wet steam to the coil possibly causing steam coil damage. **ALL** horizontal runs of steam supply piping **should be** pitched 1/4-inch (0.64 cm) for every 1 foot (0.30 meters) back towards the steam supply header causing the condensate in the line to drain the header. Install a bypass trap in any low point to eliminate wet steam.



STEAM DAMPER SYSTEM

4. Steam Damper Air System Connections

The MLS-410 is manufactured with a pneumatic (piston) damper system which requires an external supply of compressed air. The connection is made at the left hand side on top of the dryer.

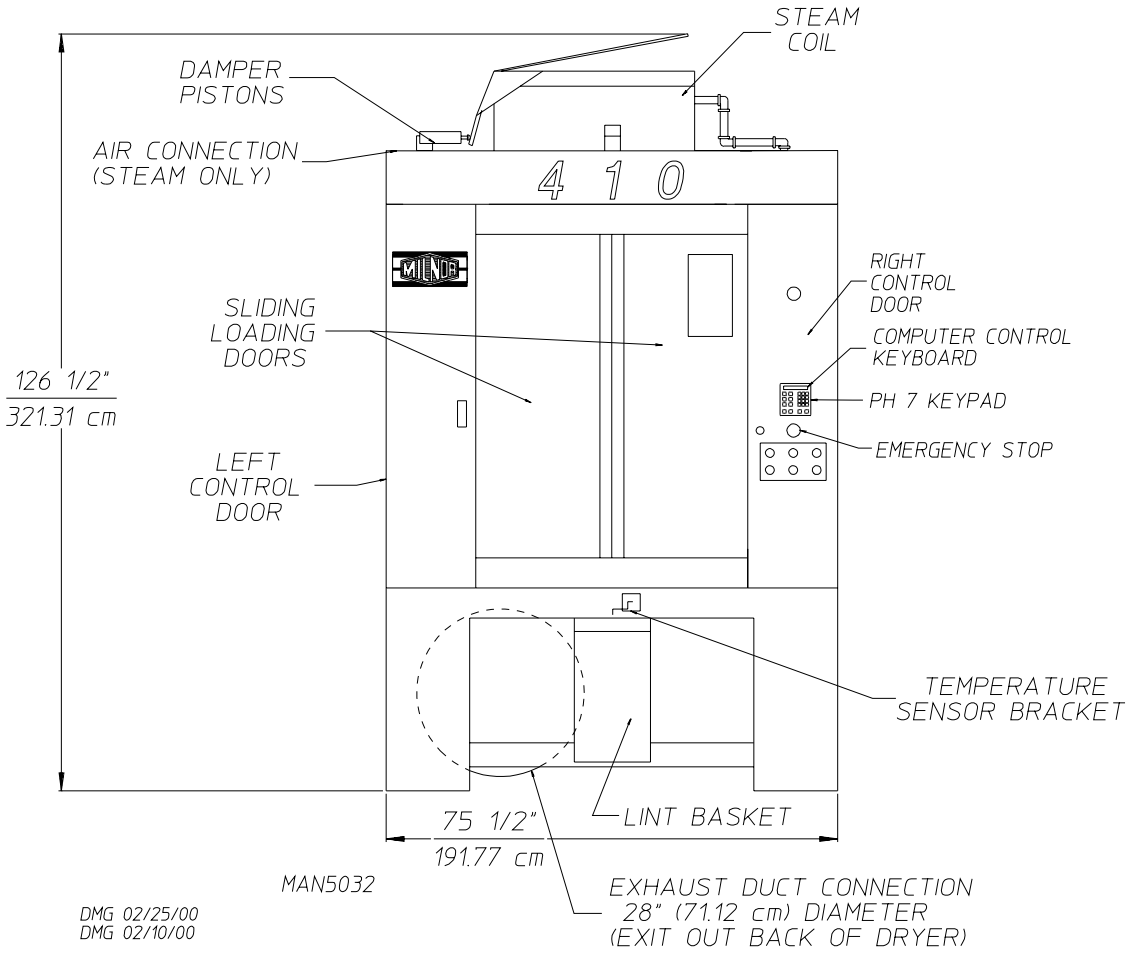
a. Air Requirements

Compressed Air Supply	Air Pressure	
Normal	80 PSI	**5.51 bars**
Minimum Supply	70 PSI	**4.82 bars**
Maximum Supply	90 PSI	**6.20 bars**

Shaded areas are stated in metric equivalents

b. Air Connections

Air connection to system --- 1/8-inch N.P.T.



c. No air regulation is provided with a standard ML-410 dryer. External regulation of 80 PSI (5.512 bars) **must be** provided. It is suggested that a filter/regulator assembly (with gauge) be added to the compressed air line just before the dryer connection. This is necessary to insure that correct and clean air pressure is achieved. The filter/regulator assembly (with gauge) is provided on dryers with the AUTOMATIC DOOR, TILTING, or SPRINKLER CIRCUIT OPTION.

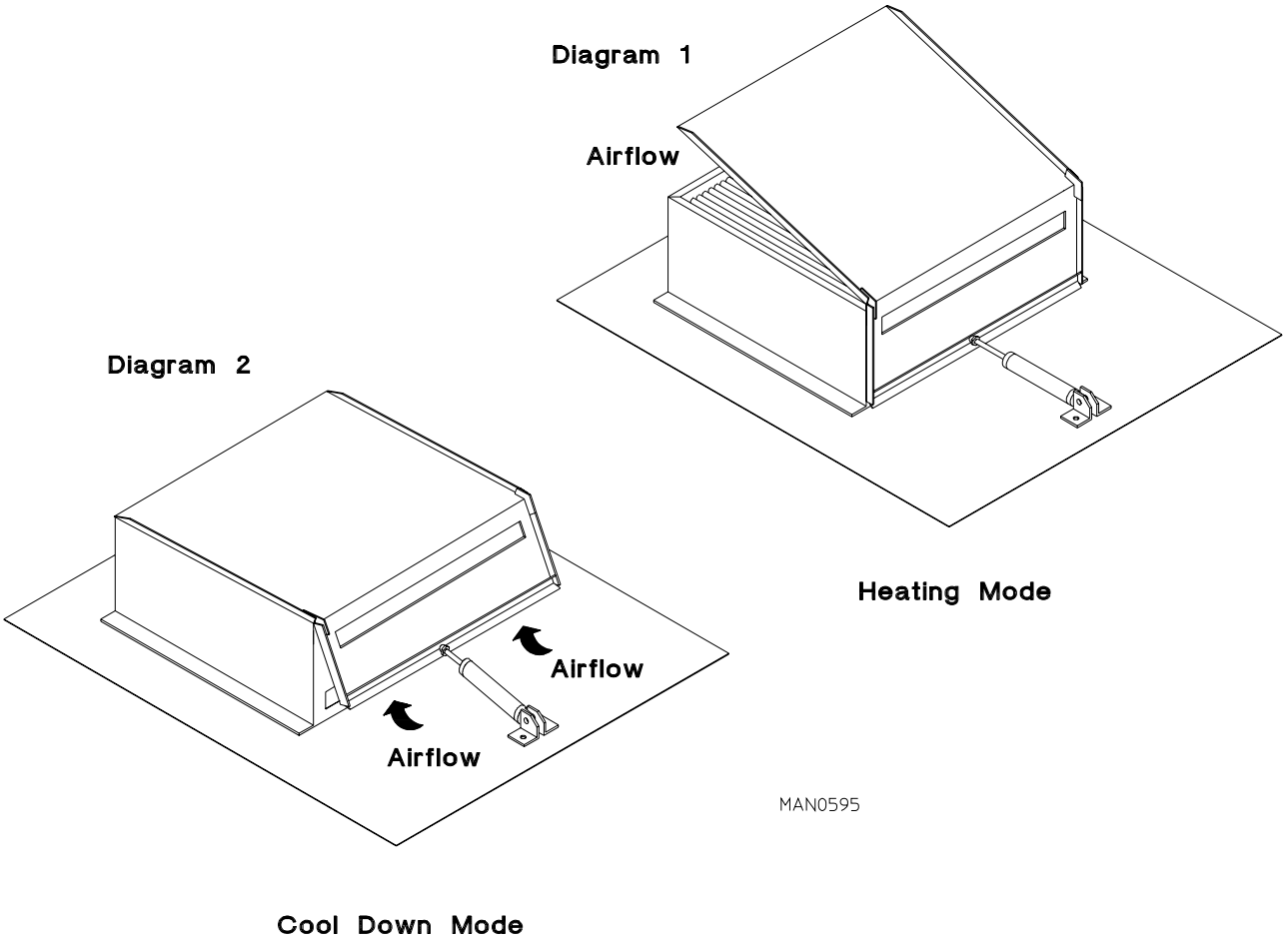
5. Steam Damper System Operation

The MLS-410 steam damper system shown in the illustration below, allows the coil to stay constantly charged eliminating repeated expansion and contraction. When the damper is opened, the air immediately passes through the already hot coil, providing instant heat to start the drying process. When the damper is closed, ambient air is drawn directly into the tumbler (basket), allowing a rapid cool down.

Diagram 1 shows the damper in the heating (open) mode, allowing heat into the tumbler (basket/drum).

Diagram 2 shows the damper in the cool down (closed) mode, pulling ambient air directly into the tumbler (basket/drum) without passing through the coils.

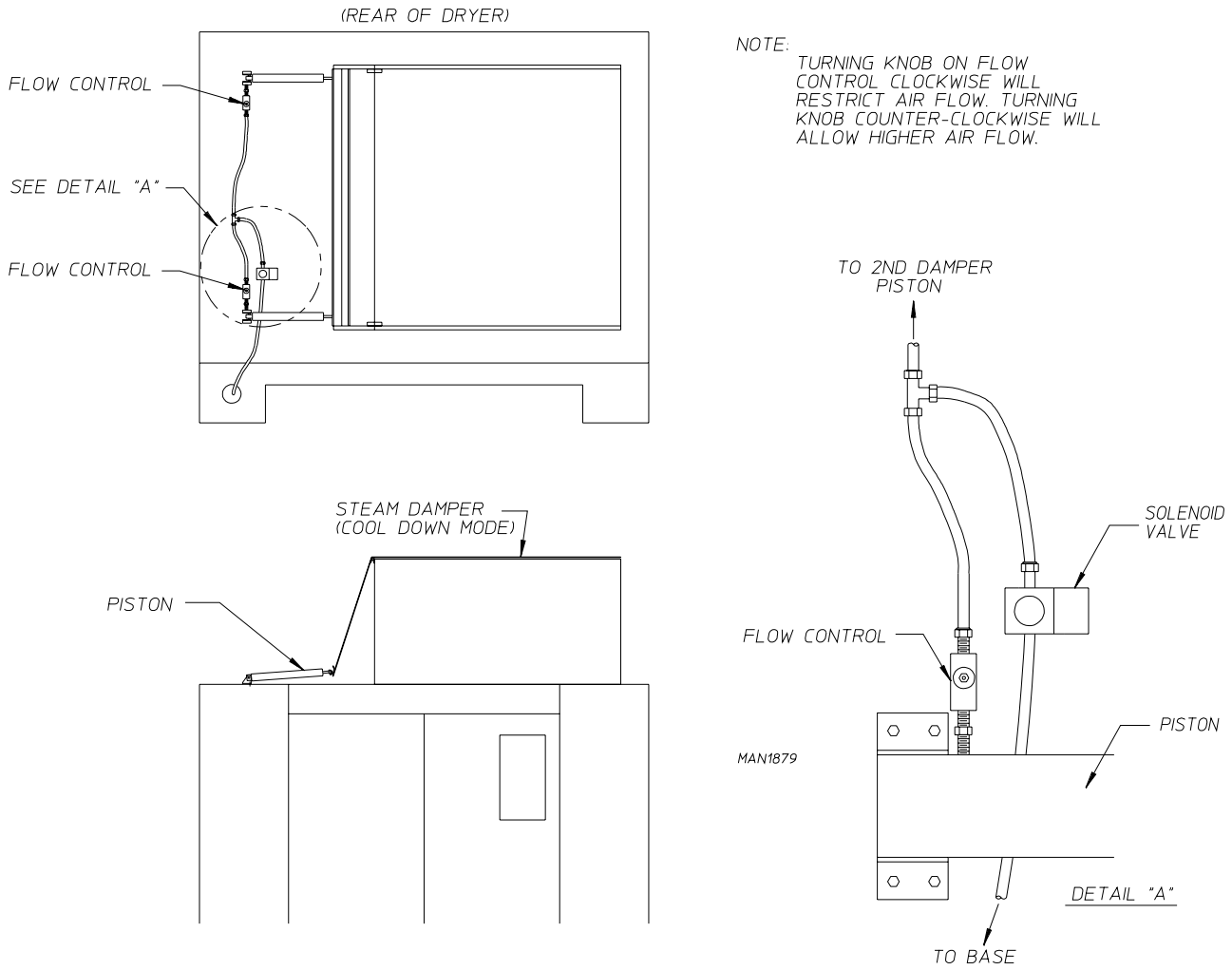
NOTE: With the dryer off or with no air supply, the steam damper is in the cool down mode as shown in **Diagram 2**.



6. Steam Damper Air Piston (Flow Control) Operation Adjustment

Steam damper operation was tested and adjusted prior to shipping at 80 PSI (5.512 bars). If steam damper adjustment is necessary, locate the flow control valve and make the necessary adjustments as noted below.

NOTE: Adjust both flow control valves equally, so that both pistons operate at the same time.



H. WATER SUPPLY CONNECTION FOR OPTIONAL SPRINKLER SYSTEM

If the dryer is equipped with the SPRINKLER SYSTEM OPTION, a water supply of approximately 40 PSI (2.75 bars) **must be** connected into the 1" N.P.T. sprinkler shut-off valve located on the left side of the dryer base.

I. PREOPERATIONAL TESTS

ALL dryers are thoroughly tested and inspected before leaving the factory. However, a preoperational test **should be** preformed before the dryer is publicly used. It is possible that adjustments have changed in transit or due to marginal location (installation) conditions.

1. Turn on electric power to the dryer.

2. Make sure the loading doors are closed and the lint drawer is closed.

3. Make sure "green" power button is in and illuminated.

4. Microprocessor (computer) system operational test -- to start the dryer;

   a. Display will read "READY."

   b. Press "D" (preprogrammed) cycle key on the touchpad of the keyboard.

5. The dryer will then start. (i.e., Blower, tumbler [basket] and heat).

6. The L.E.D. (light emitting diode) display will read MANUAL DRYING CYCLE D, 00:00 MIN REMAIN.

NOTE: Press the "UP ARROW" to view the tumbler (basket) temperature at anytime.

NOTE: The dryer can be stopped at any time by pressing the "CLEAR/STOP" ⊡ key. If the temperature is above the Cool Down set point when the "CLEAR/STOP" is pressed, the dryer will go into a Cool Down cycle. If the "CLEAR/STOP" key is pressed again at this point the cycle that was in progress **will be canceled** and returned to the "READY" state. If the temperature is below the Cool Down set point. The cycle that was in progress **will be canceled**, and go to Wrinkle Guard.

7. When the programmed drying time has expired, the Phase 7 OPL microprocessor controller (computer) will proceed into the Cool Down Cycle (Mode).

8. Once the COOL DOWN Cycle begins at the end of the heat cycle the L.E.D. display will read COOL DOWN TEMP ___/___MINUTE REMAINING. At the end of the heat cycle the dryer will shut off the heat, and continue the Fan and Tumbler until the Cool Down Time, or temperature is reached.

9. Once the COOL DOWN cycle is completed the Phase 7 OPL microprocessor controller (computer) will proceed into the Wrinkle Guard cycle. The Audio Alert tone will sound for (the amount set in Audio Alert ON Time). The L.E.D. display will read "WRINKLE GUARD." The times are fixed at two (2) minutes OFF, two (2) minutes ON for a max time of 99 minutes. These times are not programmable. During the ON time, the Blower (fan) and the tumbler (basket) will start to rotate (without heat for two [2] minutes). The Phase 7 OPL microprocessor controller (computer) will repeat this process until the Maximum Wrinkle Guard On Time has expired (99 minutes). The L.E.D. display will then read "CYCLE DONE" and lockout the dryer functions until the doors are opened. It will then return to "READY."

NOTE: Mechanical functions of the dryer **is not** allowed during the ON time. The blower (fan) ***must be*** OFF to perform mechanical functions. However the "CLEAR/STOP" key may be pressed at anytime to end a the Wrinkle Guard cycle. Mechanical functions of the dryer is allowed during the OFF time.

NOTE: Dryer can be stopped at any time by opening the main door or by pressing the "CLEAR/STOP" key. To restart the dryer, press the "ENTER/START" key or a preprogrammed cycle key (i.e., "E").

NOTE: Pressing keyboard (touchpad) key "A," "B," "C," "D," and "F" will also start the dryer. The six preprogrammed drying cycles ("A" thru "F") have been stored in the Microprocessor (computer's) memory. Refer to the Programming Manual supplied with the dryer for these preprogrammed cycles.

10. Check to insure that the tumbler (basket) starts in the clockwise (CW) direction. Additionally, check the direction of the blower motor to insure that it rotates in the counterclockwise (CCW) direction as viewed from the left side of the dryer. If it does, the phasing is correct. If the phasing is incorrect, reverse two (2) of the leads at L1, L2, or L3 of the power supply connections made to the dryer.

IMPORTANT: Dryer blower motor and impellor/fan shaft as viewed from the left side of the dryer ***must turn*** in the counterclockwise (CCW) direction, otherwise the dryer efficiency **will be** drastically reduced, and premature component failure can result.

11. Heat Circuit Operational Test

a. Gas Models

1) When the dryer is first started (during initial start-up), the burners have a tendency not to ignite on the first attempt. This is because the gas supply piping is filled with air, so the dryer may have to be stopped and restarted several times for this air to be purged from the lines.

2) The dryer has two (2) burner boxes and each burner has its own Direct Spark Ignition (DSI) Module and Spark Ignition/Flame-Probe Assembly. If ignition is not established after first attempt, the heat circuit DSI Module will lockout until it is manually reset. To reset the DSI system, open and close the loading doors and restart the dryer (press "ENTER/START" key).

If one burner lights and the other does not, then the system will shut both burners off and the burner fault code will be displayed showing which of the two (2) burners failed to ignite.

NOTE: During the purging period, verify that **ALL** gas shut-off valves are open.

3) Once ignition is established, a gas pressure test **should be** taken at each gas valve pressure tap of the dryer to assure that the water column pressure is correct and consistent.

NOTE: Water column pressure requirements (measured at both gas valve pressure taps)...

NATURAL GAS ---- 3.5 Inches Water Column (W.C.) - 8.7 mb.
L.P. GAS ---------- 10.5 Inches Water Column (W.C.) - 26.1 mb.

IMPORTANT: There is no regular provided in an L.P. dryer. The water column (W.C.) pressure ***must be*** regulated at the source (L.P. tank), or an external regulator ***must be*** added to each dryer.

b. Steam Models

1) Check to insure that the steam damper is functioning properly.

6. Make a complete operational check of **ALL** safety-related circuits (i.e., lint drawer switch and sail switches on Gas Models).

7. **A reversing tumbler (basket) should never be operated with less than a 250-pound (113.39 kg) load (dry weight)**. The size of the load will affect the coast-down and dwell (stop) times. ***The tumbler (basket) must come to a complete stop before starting in the opposite direction***. For automatic (mode) cycle only, the spin and stop times are not adjustable and have been preprogrammed into the microprocessor controller (computer) for a 2-minute spin time and a 7-second dwell (stop) time.

BASKET COATING

The tumbler (basket) is treated with a protective coating. We suggest dampening old garments or cloth material with a solution of water and non-flammable mild detergent and tumbling them in the tumbler (basket) to remove this coating.

8. Each dryer **should be** operated through one (1) complete cycle to assure that no further adjustments are necessary and that **ALL** components are functioning properly.

9. Microprocessor Controller (computer) programs/selections...

   a. Each microprocessor controller (computer) has been preprogrammed by the factory with the most commonly used program (parameter) selections. If computer programming changes are required, refer to the Computer Programming Manual which was shipped with the dryer.

J. PREPARATION FOR OPERATION/START-UP

The following items **should be** checked before attempting to operate the dryer:

1. Read **ALL "CAUTION," "WARNING,"** and **"DIRECTION"** labels attached to the dryer.

2. Check incoming supply voltage to be sure that it is the same as indicated on the dryer data label affixed behind the right control box door. In the case of 208 VAC or 230 VAC for dryers with sprinkler option, verify single-phase (1ø) voltage is correct. ***THE SUPPLY VOLTAGE MUST MATCH THE ELECTRICAL SERVICE EXACTLY.***

3. **GAS MODELS --** Check to assure that the dryer is connected to the type of heat/gas indicated on the dryer data label.

4. **GAS MODELS --** the sail switch damper assembly was installed and adjusted at the factory prior to shipping. However, each sail switch adjustment **must be** checked to assure that this important safety control is functioning.

5. **GAS MODELS --** be sure that **ALL** gas shut-off valves are in the open position.

6. Be sure **ALL** side and base panels are on the dryer.

7. Check **ALL** service doors to assure that they are closed and secure.

8. Be sure the lint drawer is securely in place.

NOTE: Lint drawer ***must be*** **ALL** the way in place to activate the safety switch otherwise the dryer **will not** start.

9. Rotate the tumbler (basket/drum) by hand to be sure it moves freely.

10. Check bolts, nuts, screws, terminals, and fittings for security.

11. Check to insure air supply (80 PSI [5.512 bars]) is connected to the dryer.

12. **STEAM MODELS** -- check to insure **ALL** steam shut-off valves are open.

K. SHUT DOWN INSTRUCTIONS

If the dryer is to be shut down (taken out of service) for a period of time, the following **must be** performed:

1. Discontinue power to the dryer either at the external disconnect switch or the circuit breaker.

2. Discontinue the heat supply:

   a. ***GAS MODELS*** **... discontinue the gas supply...**

      1) SHUT OFF external gas supply shut-off valve.

      2) SHUT OFF internal gas supply shut-off valves located in the gas valve burner area.

   b. ***STEAM MODELS*** **... discontinue the steam supply...**

      1) SHUT OFF external (location furnished) shut-off valve.

      2) SHUT OFF internal steam valves located in the supply lines and the return lines.

SECTION IV

SERVICE/PARTS INFORMATION

A. SERVICE

1. Service **must be** performed by a qualified trained technician, service agency, or gas supplier. If service is required, contact the distributor from whom the **ADC** equipment was purchased. If the distributor **cannot** be contacted or is unknown, contact the **ADC** Service Department for a distributor in your area.

NOTE: When contacting the **ADC** Service Department, be sure to give them the correct **model number** and **serial number** so that your inquiry is handled in an expeditious manner.

B. PARTS

1. Replacement parts **should be** purchased from the distributor from whom the **ADC** equipment was purchased. If the distributor **cannot** be contacted or is unknown, contact the **ADC** Parts Department for a distributor in your area. Parts may also be purchased directly from the factory by calling the **ADC** Parts Department at (508) 678-9000 or you may FAX in your order at (508) 678-9447.

NOTE: When ordering replacement parts from the **ADC** dealer or the **ADC** factory be sure to give them the correct **model number** and **serial number** so that your parts order can be processed in an expeditious manner.

SECTION V
WARRANTY INFORMATION

A. RETURNING WARRANTY CARD(S)

1. Before any dryer leaves the **ADC** factory test area, a warranty card is placed in a plastic bag behind the right control door. These warranty cards are intended to serve the customer where we record the individual installation date and warranty information to better serve you should you file a warranty claim.

    a. If a warranty card did not come with your dryer, contact the **ADC** Warranty Department or **ADC** Service Department at (508) 678-9000.

B. PARTS

For a copy of the **ADC** commercial warranty covering your particular dryer(s), contact the **ADC** distributor from whom you purchased the equipment and request dryer warranty form. If the distributor **cannot** be contacted or is unknown, warranty information can be obtained from the factory by contacting the **ADC** Warranty Department at (508) 678-9000.

NOTE: Whenever contacting the **ADC** factory for warranty or warranty information, be sure to have the dryer's **model number** and **serial number** available so that your inquiry can be handled in an expeditious manner.

C. RETURNING WARRANTY PART(S)

ALL dryer or parts warranty claims or inquiries **should be** addressed to the **ADC** Warranty Parts Department. To expedite processing, the following procedures **must be** followed:

1. No parts are to be returned to **ADC** without prior written authorization ("Return Material Authorization") from the factory.

NOTE: An R.M.A. ("Return Material Authorization") is valid for only sixty (60) days from date of issue.

    a. The R.M.A. issued by the factory, as well as any other correspondence pertaining to the returned part(s), **must be** included inside the package with the failed merchandise.

2. Each part **must be** tagged with the following information:

   a. **Model number** and **serial number** of the dryer from which the part was removed.

   b. Nature of failure (be specific).

   c. Date of dryer installation.

   d. Date of part failure.

   e. Specify whether the part(s) being returned is for a replacement, a credit, or a refund.

NOTE: If a part is marked for a credit or a refund, the invoice number covering the purchase of the replacement part ***must be*** provided.

NOTE: Warranty tags (**ADC** Part No. 450064) are available at "no charge" from **ADC** upon request.

3. The company returning the part(s) must clearly note the complete company name and address on the outside of the package.

4. **ALL** returns **must be** properly packaged to insure that they are not damaged in transit. *Damage claims are the responsibility of the shipper.*

IMPORTANT: No replacements, credits or refunds **will be** issued for merchandise damaged in transit.

5. **ALL** returns **should be** shipped to the **ADC** factory in such a manner that they are insured and a proof of delivery can be obtained by the sender.

6. **Shipping charges are not the responsibility of ADC. ALL returns *should be* "prepaid" to the factory. Any "C.O.D." or "COLLECT" returns will not be accepted.**

IMPORTANT: No replacements, credits, or refunds **will be** issued if the claim **cannot** be processed due to insufficient information. The party filing the claim **will be** notified in writing, either by "FAX" or "CERTIFIED MAIL - Return Receipt Requested," as to the information necessary to process claim. If reply **is not** received by the **ADC** Warranty Department within thirty (30) days from the FAX/letter date, then no replacement, credit, or refund **will be** issued, and the merchandise **will be discarded.**

SECTION VI
ROUTINE MAINTENANCE

A. CLEANING

A program and/or schedule **should be** established for periodic inspection, cleaning, and removal of lint from various areas of the dryer, as well as throughout the duct work system. The frequency of cleaning can best be determined from experience at each location. Maximum operating efficiency is dependent upon proper air circulation. The accumulation of lint can restrict this airflow. If the guidelines in this section are met, an **ADC** dryer will provide many years of efficient, trouble-free, and - most importantly - safe operation.

WARNING: LINT FROM MOST FABRICS IS HIGHLY COMBUSTIBLE. THE ACCUMULATION OF LINT CAN CREATE A POTENTIAL FIRE HAZARD.

WARNING: KEEP DRYER AREA CLEAR and FREE FROM COMBUSTIBLE MATERIALS, GASOLINE and OTHER FLAMMABLE VAPORS and LIQUIDS.

NOTE: REMOVE POWER FROM THE MACHINE BEFORE PERFORMING ANY MAINTENANCE IN THE MACHINE *(cleaning the lint drawers is the only exception).*

NOTE: Suggested time intervals shown are for average usage which is considered six (6) to eight (8) operational (running) hours per day.

SUGGESTED CLEANING SCHEDULE

EVERY THIRD or FOURTH LOAD

Clean the lint basket. A clogged lint basket will cause poor dryer performance. The lint basket is located in the lint drawer in the base of the dryer. Pull out the lint drawer, brush the lint off the lint basket, and remove the lint. Inspect the lint screen and replace if torn.

NOTE: The frequency of cleaning the lint screens can best be determined from experience at each location.

WEEKLY

Open the hinged panels on each side of the tumbler (basket) section and remove any lint accumulation from the tumbler (basket) drive motor, drive shafts, drive wheels, and drive shaft bearings.

Slide the lint basket **ALL** the way out of the dryer and clean any lint accumulation off of the temperature sensor bracket, which is located above the lint basket.

WARNING: TO AVOID THE HAZARD OF ELECTRICAL SHOCK, DISCONTINUE ELECTRICAL SUPPLY TO THE DRYER.

MONTHLY

Empty the compressed air filter bowl.

Retighten set screws in the collars of the four (4) 2-inch (5.08 cm) diameter tumbler (basket) drive shaft bearings.

Clean any lint accumulation from the gas valve burner area at the top of the dryer, the fan (impellor) motor, and the fan (impellor) bearings located in the dryer base.

NOTE: To prevent damage, avoid cleaning and/or touching ignitor/flame-probe assembly.

Grease the two (2) fan (impellor) shaft bearings in the base of the dryer with Shell Alvania #3 grease or its equivalent unless otherwise stamped on the motor label.

Check the fan (impellor) V-belts for tightness and wear. Retighten and/or replace if required.

STEAM MODELS - Clean the steam coil fins. We suggest using compressed air and a vacuum cleaner with brush attachment.

NOTE: ***When cleaning steam coil fins, be careful not to bend the fins***. If fins are bent, straighten by using a ***fin comb,*** which is available from any local air conditioning supply house.

Inspect and remove any lint accumulation in customer furnished exhaust duct work system and from the dryer's internal exhaust ducting.

NOTE: THE ACCUMULATION OF LINT IN THE EXHAUST DUCT WORK CAN CREATE A POTENTIAL FIRE HAZARD.

NOTE: ***DO NOT*** OBSTRUCT THE FLOW OF COMBUSTION and VENTILATION AIR. CHECK CUSTOMER FURNISHED BACK DRAFT DAMPERS IN THE EXHAUST DUCT WORK. INSPECT and REMOVE ANY LINT ACCUMULATION WHICH CAN CAUSE THE DAMPER TO BIND or STICK.

NOTE: When cleaning the dryer cabinet(s), avoiding using harsh abrasives. A product intended for the cleaning of appliances is recommended.

B. ADJUSTMENTS

7 DAYS AFTER INSTALLATION and EVERY 6 MONTHS THEREAFTER

Inspect bolts, nuts, screws (bearing set screws), nonpermanent gas connections (i.e., unions, shut-off valves, orifices), and grounding connections. Fan (impellor) V-belts, along with the drive motor V-belts **should be** examined and replaced if necessary. Tighten loose V-belts when necessary. Complete operational check of controls and valves. Complete operational check of **ALL** safety devices (i.e., door switches, lint drawer switch, sail switch, burner and hi-limit thermostats).

30 DAYS AFTER INSTALLATION

SHUT OFF ALL POWER TO THE DRYER. Verify that the electrical connections to the motor contactors and overloads are tight. This is done to accommodate the compression of the wires over time.

C. LUBRICATION

MONTHLY

The two (2) 1-3/4-inch (4.45 cm) bearings that support the impellor/fan shaft **should be** lubricated. Use Shell Alvania #3 grease or its equivalent. Impellor/fan shaft bearings **must be** lubricated.

EVERY 3 MONTHS

The four (4) 2-inch (5.08 cm) bearings that support the drive and idler shaft **should be** lubricated. Use Shell Alvania #3 grease or its equivalent. Drive and Idler shaft bearings **must be** lubricated. The motor bearings, idler bearings...and under normal/most conditions the tumbler bearing are required to be lubricated.

SECTION VII

COMPONENT SYSTEM DESCRIPTIONS

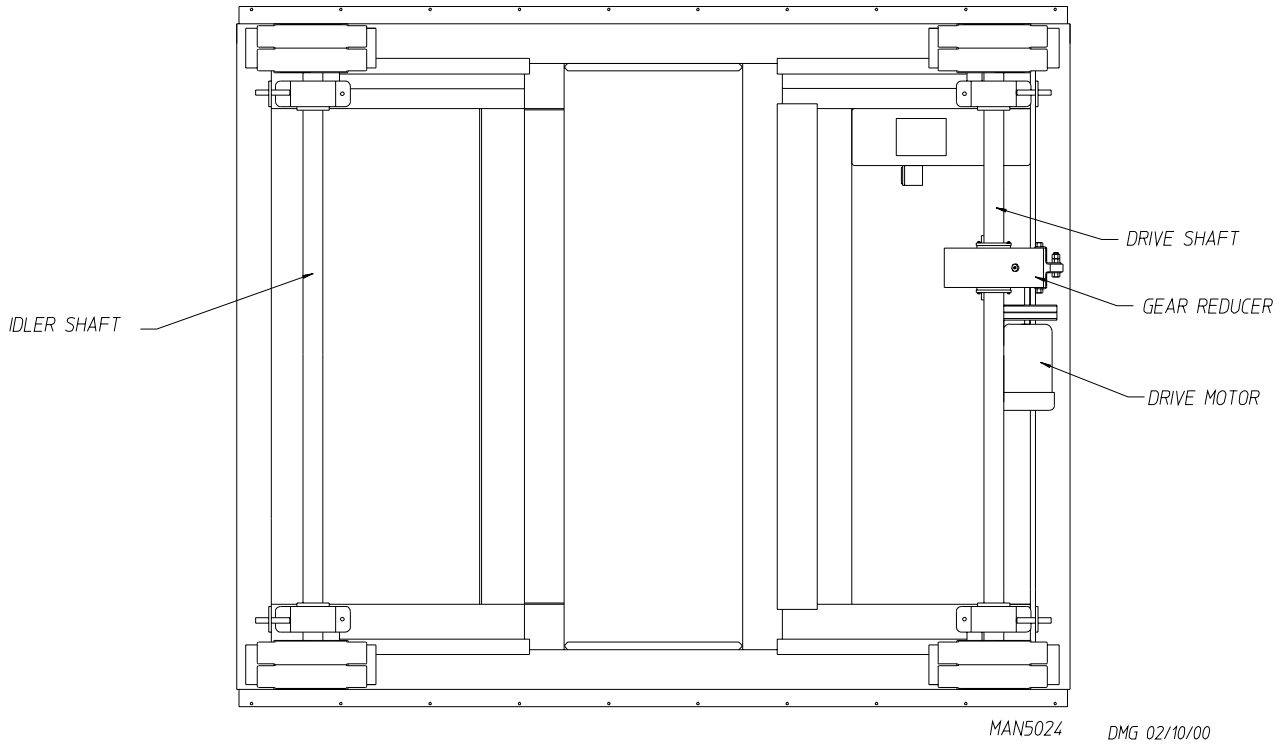
A. TUMBLER (BASKET) DRIVE SYSTEM

The tumbler (basket) is supported and driven by four (4) 11-inch (27.94 cm) diameter drive wheels assemblies. Two (2) of these drive wheel assemblies are attached to a 2-inch (5.08 cm) diameter idler shaft, while the other two (2) assemblies are attached to a 2-inch (5.08 cm) diameter drive shaft. Each of the drive wheel assemblies are fastened to the shafts by a wheel taper lock bushing.

The idler shaft and drive shaft are each supported by two (2) 2-inch (5.08 cm) diameter pillow block bearings. These bearings sit on slotted support channels and can be moved inward or outward by the adjustment bolts to raise or lower the tumbler (basket).

The drive system consists of a 7-1/2 HP (5.59 kw) drive motor which is connected to the drive shaft by two (2) "A" section V-belts, driving a shaft-mounted (5.6 to 1 ratio) gear reducer. This produces a tumbler (basket) speed of approximately 31.5 r.p.m. Proper tension is maintained on the V-belts by tightening the gear reducer turnbuckle support. The oil in the gear reducer **must be** replaced every six (6) months by 1.4 liters of I.S.O. viscosity grade 460 gear oil.

ML - 410 TUMBLER DRIVE SYSTEM



B. TUMBLER (BASKET)

The tumbler (basket) is made of 14-gauge stainless steel perforated panels, five (5) stainless steel ribs, and two (2) tumbler rings. The tumbler (basket) is a completely welded assembly so the perforated panels are not removable.

C. AIR BLOWER DRIVE SYSTEM

The impellor (fan) used in the ML-410 dryer is a 22-1/4" (56.52 cm) diameter squirrel cage impellor (fan) wheel. It spins in a counterclockwise (CCW) direction looking at the back of the blower housing.

The impellor (fan) shaft is mounted in two (2) pillow block bearings, and the shaft is driven by two (2) B-section V-belts connected to the 25 HP (18.64 kw) blower motor.

The blower motor is mounted on an adjustable base. The motor position can be easily adjusted so that proper tension can be maintained on the V-belts.

D. AIR JET SYSTEM

The Air Jet System is activated at the end of a drying cycle to clean lint accumulation off of the blower (impellor/fan).

E. SAFETY DEVICES

1. Load/Unload Door Switches

   There are two (2) of these switches located above the main loading doors. These switches ensure that the doors are closed before the dryer can start and ensures that the doors are fully open before the dryer will tilt. If the dryer is started when the load doors are open, the microprocessor controller (computer) L.E.D. (light emitting diode) display will show "door."

2. Lint Basket Switch

   This switch ensures that the lint basket is closed before the dryer can start. This switch is located at the front of the dryer at the right side of the lint basket. If the lint basket is open when the dryer is started, the microprocessor controller (computer) L.E.D. (light emitting diode) display will show "lint door open."

3. Tumbler (Basket) Manual Reset Hi-Limit Safety Thermostat

   This disc temperature switch has a setting of 225º F (107º C). It is located below the tumbler (basket) on the temperature sensor bracket, along side the computer (microprocessor) sensor, and is an automatic reset type switch. Access to this switch is gained by sliding/pulling the lint basket completely out of the dryer.

   This switch backs up the computer (microprocessor) sensor and in case of a computer (microprocessor) malfunction will prevent the tumbler's (basket's) temperature from becoming excessive. If this switch trips, the gas flow to the burner boxes will be shut down; however, and the Phase 7 microprocessor controller (computer) will display "exhaust high temp fault."

4. Burner Box Manual Reset Hi-Limit Safety Thermostats (for Gas Models Only)

   These disc temperature switches have a setting of 330º F (165º C). They are located on the right side of each burner box, and they are a manual reset type of switch. These switches ensure that there is proper airflow through the burner box. Upon a low airflow condition, which may be caused by a clogged lint screen, excessively long or blocked exhaust duct, or improper make-up air, the temperature in the burner boxes will increase tripping these switches. This will shut off the gas flow to the burner boxes, and the Phase 7 will display either "front burner hi-limit fault" or "rear burner hi-limit fault."

5. Sail Switches (for Gas Dryers Only)

   These sail switches are located in the front and back of the burner boxes. A sail switch consists of a round damper plate on a lever arm which is in contact with an electric switch. When the air blower comes on, it draws air through the gas burners. This creates a negative pressure inside the burner boxes. This negative pressure pulls in the round dampers and activates the sail switches. If there is an improper (low) airflow through the dryer, the sail switch dampers will not pull in, preventing the heat from coming on and the Phase 7 will display either "front sail switch close fault" or "rear sail switch close fault."

   Low airflow through the dryer will be caused by overly long or block exhaust ducting, lack of make-up air, or a clogged lint screen.

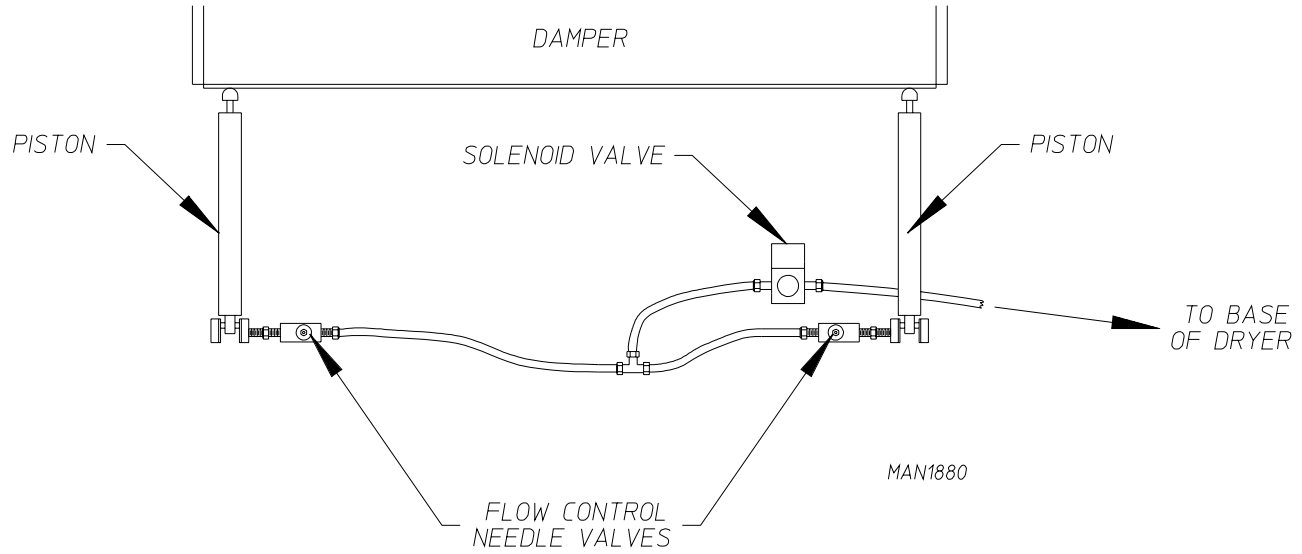
F. STEAM DAMPER ACTUATOR SYSTEM

The system consists of a hinged damper plate, two (2) pneumatic pistons (each with its' own airflow needle valve) to control the speed of both pistons actuation, and a 24 volt solenoid valve.

On a call for heat, a 24 volt signal is applied to the 3-way/2-position solenoid valve. This signal switches the valve so that compressed air is sent to the pistons. The piston rods extend, pushing the hinged steam damper plate to the open position. This allows room air to be drawn through the hot steam coil and then through the tumbler (basket).

When the temperature set point has been reached, the 24 volt signal is removed from the solenoid valve, so that the solenoid valve blocks the air supply to the pistons, and the air in the pistons is bled to atmosphere. The springs in the pistons now retract the piston rods, closing the steam damper. The steam damper plate now covers the steam coil and allows room air to bypass the coil before entering the tumbler (basket) for a rapid cool down.

The steam damper plate should open and close slowly and smoothly. The speed can be modulated by adjusting both needle valve knobs. Turning the knob clockwise (CW) restricts the compressed airflow and slows down the steam damper movement. Counterclockwise (CCW) adjustment speeds up the steam damper motion. Upon completion of adjustment, tighten the needle valve's locking nut.



NOTE: Turning the knob on the FLOW CONTROL VALVE ***clockwise*** (CW) ***will restrict airflow***. Turning the knob on the FLOW CONTROL VALVE ***counterclockwise*** (CCW) ***will allow higher airflow***.

SECTION VIII

OPTIONAL SPRINKLER SYSTEM COMPONENTS

OPTIONAL SPRINKLER CIRCUIT COMPONENTS

AUTO "EMERGENCY STOP" (E-Stop) RELAY

This device, located in the Front Right Electrical Enclosure, supplies the main control voltage to the dryer.

The ML-410's Sprinkler Circuit supplies or removes 120 VAC to the coil of this relay for the "EMERGENCY STOP" (E-Stop) power disconnect control.

TEMPERATURE CONTROLLER

This device is located in Front Left Electrical Enclosure and monitors the Sprinkler Circuit temperature. Its operating functions are preset at the factory and **should not** require any adjustment.

RTD (Resistive Temperature Device) TEMPERATURE PROBE

This device is a high temperature 100 ohm (100 Ω) RTD (Resistive Temperature Device) Probe and is located on the upper left side of the tumbler (basket).

PNEUMATIC VALVE

This is a Dual Pneumatic 110 VAC Control Valve and is located in the lower rear base section of the dryer. Power to turn "ON" the Pneumatic Valve is supplied from the Sprinkler Control Circuit. Power to turn "OFF" the sprinkler is supplied from a manual reset button located on the Right Front Control Door.

SPRINKLER VALVE

This valve controls the flow of the sprinkler water. It is air actuated and requires air pressure to turn "ON" or "OFF."

NOTE THAT THERE IS A "RED" INDICATING PISTON AT THE REAR OF THIS SPRINKLER VALVE.

The piston indicates the current state of the valve; when the piston is "IN" the valve is "CLOSED," when the piston is "OUT" the valve is "OPEN."

ALARM HORN

This component is an audible device to indicate that the Sprinkler System has tripped and that water is flowing into the tumbler (basket). The Alarm Horn will reset when the Sprinkler System is reset.

SPRINKLER RESET BUTTON

This amber colored push button is located on the Right Hand Control Door and illuminates when the Sprinkler System is activated. Attempting to reset the Sprinkler System with this button can be tried, however, if the sprinkler circuit continues to be in the active mode the reset function will not latch.

SPRINKLER and MAIN POWER CONNECTIONS

There are two (2) individual power connections to an ML-410 that includes the Sprinkler System Option.

1. Main Dryer Power (three-phase [3ø]).

2. Dedicated Sprinkler System Circuit Power (single-phase [1ø]).

   Both of these connections are at the voltage rating of the dryer and can be installed in the Front Right Base Electrical Enclosure. The larger connection is for Main Electrical Power and the smaller connections, located to the right of the larger connection is for the Dedicated Sprinkler System Circuit Power.

   Refer to the Dryer Nameplate for voltage rating information.

SPRINKLER THEORY OF OPERATION

1. Power Sprinkler System circuit.

2. **"TURN TO RELEASE" ALL** "EMERGENCY STOP" (E-Stop) buttons.

3. Run dryer.

   If the temperature of the tumbler (basket) should rise above the sprinkler controller's preset value the Sprinkler System will activate and the following will occur:

   - An "AUTOMATIC 'EMERGENCY STOP' " (E-Stop) will stop the dryer.
   - The Alarm Horn will sound.
   - The amber Sprinkler System reset button will light.
   - The Sprinkler System will spray water into the tumbler (basket).
   - The water will flow and the Alarm Horn will sound until;

     The temperature of the tumbler (basket) falls below sprinkler controller's preset value and the Sprinkler System reset button is pressed.

NOTE: THE SPRINKLER SYSTEM ***DOES NOT*** AUTOMATICALLY RESET.

ML-410
Sprinkler Option Temperature Controller Settings

NOTE: Refer to Controller's User's Manual for further information on controller options.

Message Display	Message Description	Settings
SP	TEMPERATURE SET POINT	575º F OR 301.6º C
ALHi	ALARM HI	575º F OR 301.6º C (NOTE: ADJUST SAME AS SP)
InP	INPUT DEVICE	P 385 = RTD INPUT
F-C	º F OR º C	SELECT TYPE REQUIRED (FAHRENHEIT OR CELSIUS)
dpt	DECIMAL POINT	0, NO DECIMAL POINT
InPt	INPUT FAULT TIMER	0.2
SPL	SET POINT LOW	500 (SETTING ***CAN NOT BE*** LOWER)
SPH	SET POINT HIGH	700 (SETTING ***CAN NOT BE*** HIGHER)
SPSt	SET POINT STATE	rE (REVERSE ACTION)
SPOL	SET POINT OUTPUT LOW LIMIT	0% (NOT USED)
SPOH	SET POINT OUTPUT HIGH LIMIT	100% (NOT USED)
SPLP	SET POINT LAMP	0 OFF (LAMP OFF WHEN OUTPUT IS ON)
AL	HIGH ALARM ONLY	Hi
ALt	ALARM TYPE	Abs (ABSOLUTE ALARM)
ALrE	ALARM RESET	OnOf (AUTOMATIC RESET)
ALPi	ALARM POWER INTERRUPT	OFF (ALARM INHIBIT IS OFF)
ALiH	ALARM INHIBIT	OFF (ALARM INHIBIT IS OFF)
ALSt	ALARM OUTPUT STATE	CLOS (CLOSES CONTACTS AT ALARM SET POINT)
ALLp	ALARM LAMP	O ON (ALARM LAMP IS ON WHEN ALARM CONTACT IS CLOSED)
SECr	SECURITY CODE	FULL SECURITY - SET TO 110 (DISPLAYED AS 1) "VIEW ONLY" NO SECURITY - SET TO 111 (DISPLAYED AS 4) "ALL FEATURES UNLOCKED"

American Dryer Corp.