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AccuMixor™

User Manual - revision 3

United PROCESS CONTROLS

AFFILIATED MEMBERS

Furnace Control Corp. | Marathon Monitors Inc. | Process-Electronic | Waukee Engineering Co.

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WARNING

Thank you for purchasing control equipment from Waukee Engineering a member of United Process Controls. We want your new control equipment to operate safely. Anyone who uses this equipment should read this publication (and any other relevant publications) before installing or operating the equipment.

To minimize the risk of potential safety problems, you should follow all applicable local and national codes that regulate the installation and operation of your equipment. These codes vary from area to area and usually change with time. It is your responsibility to determine which codes should be followed, and to verify that the equipment, installation, and operation is in compliance with the latest version of these codes.

At a minimum, you should follow all applicable sections of the National Fire Code, National Electrical Code, and codes of the National Electrical Manufacture's Association (NEMA). There may be local regulatory or government offices that can also help determine which codes and standards are necessary for safe installation and operation.

Equipment damage or serious injury to personnel can result from failure to follow all applicable codes and standards. We do not guarantee the products described in this publication are suitable for your particular application, nor do we assume any responsibility for you product design, installation, or operation.

If you have any questions concerning the installation or operation of this equipment, or if you need additional information, please call us at 414-462-8200

WARNING: Read this manual thoroughly before using AccuMixor gas mixing System.

WARNING: Flo-Meter must be earth grounded. Ungrounded Flo-Meters may become a source of Ignition.

WARNING: Methanol may be harmful if inhaled. It may be fatal or cause blindness if swallowed. Methanol cannot be made non-poisonous. Contact with eyes may cause blindness and with skin may be harmful. If eye or skin contact occurs, flush with water and call a physician.

WARNING: Nitrogen gas cannot be detected by human senses. It can cause asphyxiation in confined areas, which are not properly ventilated. Do not enter areas, which are not properly ventilated.

TABLE OF CONTENTS

1. MANUAL OVERVIEW

1.1 The Purpose of this Manual

Thank You for Purchasing an AccuMixor Control System. This Manual shows you how to install, wire and maintain Waukee's AccuMixor Control System. It also helps you understand how to interface it to other devices in a control system. This manual contains important information and should be read and understood by all individuals who install, use or service this equipment.

1.2 Supplemental Manuals

The Waukee-Tronic Installation and Operation Manual, Valve-Tronic Installation and Operation Manual and Installation and Operation of Waukee Flo-Meters Manual contain technical information as well as precautions about Waukee Flo-Meter's.

1.3 Technical Support

We strive to make our manuals the best in the industry. We rely on your feedback to let us know if we are reaching our goal. If you cannot find the solution to your particular application, or, if for any reason you need technical assistance, please call us at:

+1-414-462-8200 Toll free North America: +1-800-438-3347

Our technical support group will work with you to answer your questions. They are available Monday through Friday from 8:00 A.M. to 4:30 P.M. Central Standard Time. We also encourage you to visit our web site where you can find technical and non-technical information about our products and company.

www.group-upc.com

If you have a comment, question or suggestion about any of our products, services, or manuals, please e-mail or contact us by phone.

1.4 Conventions Used

When you see the "exclamation point" icon in the left-hand margin, the paragraph to its immediate right will be a warning. This information could prevent injury, loss of property, or even death in extreme cases. Any warning in this manual should be regarded as critical information that should be read in its entirety. The word WARNING or CAUTION in boldface will mark the beginning of the text.

When you see the "notepad" icon in the left-hand margin, the paragraph to its immediate right will be a special note.

2. CONTROL SYSTEM INTRODUCTION

The Waukee AccuMixor Control System meets all NFPA 86 requirements when installed in accordance with all National and local codes. The system provides mechanical visual indication of flows as well as both manual and automatic purge for compliance with NFPA safety standards.

The AccuMixor provides critical process data for use with data loggers, PLC's and computer systems. It is ideal for customers who need to control and data log flow rates for compliance to internal ISO specifications, NADCAP, AMS2750D, or CQI-9.

The AccuMixor precisely controls and monitors the flows of Nitrogen and Methanol for the generation of synthetic Endothermic gas within a furnace. The system features Waukee Valve-Tronic *Plus Series* Flo-Meters with and electrical control unit designed specifically for use with the Valve-Tronic *Plus Series* units.

The AccuMixor provides easy operation and automatic adjustment of the process Nitrogen and Methanol flows. A purge warning is activated if there is any deviation from the process set points. Automatic purge occurs under several conditions: furnace temperature goes below 800°F, Nitrogen pressure drops below 20PSIG, loss of process Nitrogen or Methanol, and if purge warning is not corrected within customers specified time.

The system includes two (2) normal run modes:

- *Nitrogen/Methanol Auto* - Used for normal start up and operating conditions. If the furnace doors are open while in this mode, both the Nitrogen and Methanol flows go to the high set points.

- *Nitrogen/Methanol High* - Used to increase the rate at which the furnace is brought up to proper atmosphere. Both process gasses operate at high set points.

The basic system has:

- Ethernet communications with Modbus TCP
- Paperless Chart Recording
- Automatic Atmosphere recovery
- Automatic Flow Set point calculation
- Two (2) run modes
- Capable of interfacing with additive gas control systems, auxiliary alarms and data loggers or computer systems.

3. SPECIFICATIONS

General Specifications			
Panel Power	**Operating Voltage**		24VDC +/- 10% provided by supplied power supply
	Power Consumption		5A
Power Supply	**Operating Voltage**		85-132 (115) / 176-264 (230) VAC 60/50Hz
	Power Consumption		5A/2A Nominal
Supply Pressure	**Nitrogen**		25-125 PSIG
	Methanol		25-125 PSIG
Inputs	**Flow Setting**	**Touch Screen**	In Setup Menu
		External Signal	Ethernet Modbus TCP
	Input Terminals	**Digital Sinking**	4 - Below 1400, Below 800, Door Open, E-Stop
		Analog	1 - 4-20mA (Input Impedance 250Ω)
Outputs	**Output Terminals**	**Digital**	2 - relay 1A @ 30VDC (Methanol Flow "ON", Customer Alarm)
		Analog	2 - 4-20mA (Process Nitrogen, Process Methanol)
Operator Interface	**Operator Device**		6" Color Touch screen display
	Programming		Parameter values for setup and review, fault codes
	Status Display		Nitrogen Set-point flow, Nitrogen Actual flow, Methanol Set-point flow, Methanol Actual flow, calculated gas composition
Environment	**Enclosure Rating**		NEMA
	Ambient Temp		0°C to 65°C (32°F to 150°F)
	Storage Temp		-20°C to 40°C (-4°F to 140°F)
	Ambient Humidity		20 to 90% RH (non-condensing)
	Vibration		9.8 m/s2 (1G) less than 10Hz, 5.9m/s2 (0.6G) 10 to 60 Hz
	Installation Location		Keep from corrosive gas and liquid

4. INSPECTION AND UNPACKING:

The shipment(s) should be checked for visible damage and loss. Any damage or loss should be reported directly to the delivery/trucking company.

The system is shipped as a complete unit in a crate. The contents of the crate are as follows: One (1) Pre-wired, plumbed and fully tested Flush Panel; One (1) Installation Manual; One (1) 24VDC Power Supply.

4.1 UNPACKING:

Extreme care should be taken when unpacking the control unit to avoid damaging the Waukee and Valve Tronic Flo-Meters as well as the solenoids, filter, regulator and pressure gauges mounted on the unit. See Waukee-Tronic and Waukee Flo-Meter installation and operating instructions located in Appendix "B" of this manual for reference.

5. INSTALLATION

5.1 Panel Location

The panel location shall meet the following criteria:

1. It shall be installed at the furnace.
2. It shall be accessible and located in an illuminated area so that its operation can be monitored.
3. Service access space behind the panel should be at least 18" to allow servicing of the panels components.

5.2 Panel Mounting

The panel is equipped with 13/32" (.41") dia. mounting holes. If AccuMixor Control panel was ordered without the floor stand, ensure that the mounting structure you plan to mount the panel to be capable of supporting the total weight of the control panel as well as the weight of any additional piping and/or components.

The panel must be mounted such that the Flo-Meters are plumb in both planes as indicated in the Flo-Meter Manual located in Appendix C "Related Documentation".

5.3 Plumbing

Your company may have guidelines for plumbing installation. If so, you should check those before you begin the installation. As a guideline all plumbing recommendations and requirements are shown on the drawing located in Appendix A "Plumbing Diagrams" of this manual. These diagrams show important and recommended plumbing of the gas supplies to the panel as well as the plumbing to the furnace.

Additional components not shown or included maybe required as per NFPA86. The customer is responsible for the purchase and installation of these components as well as any additional safety equipment required by their company to meet any and all applicable national and/or local codes. These customer supplied components include but not limited to: Lockable isolation valves, check valves, filters, pressure regulators, pressure relief valves, limit switches and Alarms.

WARNING: The Methanol pressure relief valve drains Methanol. Methanol may catch fire and cause serious burns. Pipe Methanol relief valve outlet to a suitable drain.

CAUTION: If panel is equipped with an optional Methanol De-bubbler, plumb vent pipe to a suitable drain. De-bubbler may vent Methanol which may catch fire and cause serious burns.

5.4 Wiring Guidelines

Your company may have guidelines for wiring installation. If so, you should check those before you begin the installation. Here are some general things to consider:

- Use the shortest wiring route whenever possible.
- For signal wires use shielded wiring and ground the shield at the Field Device end. DO NOT ground the shield at both the NMS and Field Device.
- Do not run the signal wiring next to large motors, high current switches, or transformers. This may cause noise problems.
- Route the wiring through an approved cable housing to minimize the risk of accidental damage. Check local and national codes to choose the correct method for your application.
- Be sure to leave enough slack in the cables to allow for maintenance. If seal tight or similar conduit is used, be sure to provide an adequate loop of conduit for maintenance access.

CAUTION: To reduce the risk of electrical shock and also to prevent damage to the AccuMixor Control panel and any Field Device. It is advised to turn off the supply power to all components before connecting or disconnecting any wires.

5.5 Power Supply Location

The power supply is shipped loose and **should not** be mounted inside the AccuMixor Control Cabinet. The AccuMixor Control Cabinet is designed to be low voltage (24VDC). The power supply should be mounted in the furnace control cabinet.

5.6 Wiring Diagrams

Refer to drawing located in Appendix B “Wiring Diagrams” of this manual for all wiring requirements. The customer is responsible for providing wiring, which conforms to any and all applicable local and national codes. Any other safety related wiring or electrical devices, not included, should be installed as required. Customer supplied door and temperature switches should be wired to the control panel terminal block as shown.

All Valve-Tronic’s arrive pre-wired from the factory to the panel and there is no need to rewire any connections. Disregard any wiring diagrams shown in the Valve-Tronic Manuals in Appendix “C”

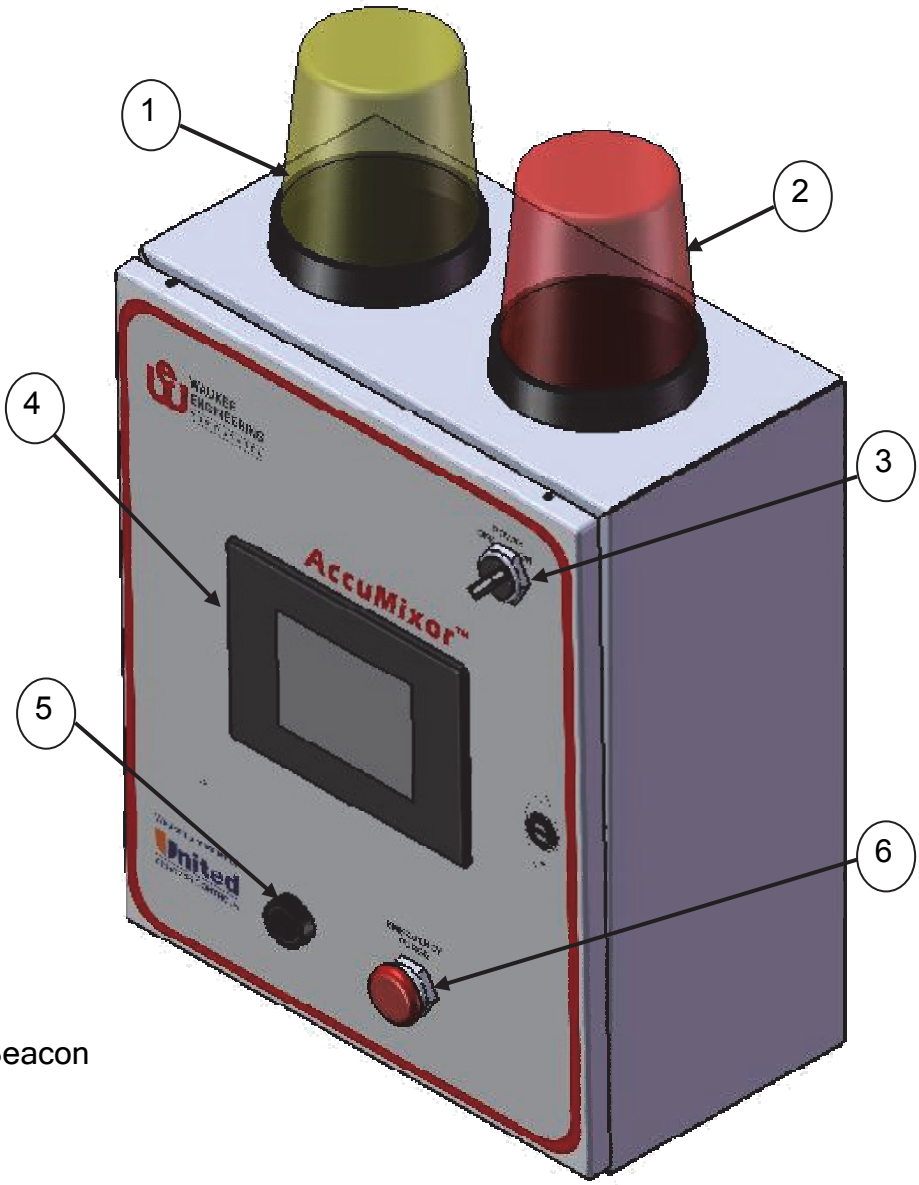
Before Applying Power to unit go through the “Pre-startup Check List” on page 18 of this manual to ensure all necessary electrical and mechanical connections are made.

WARNING: Electric shock can be fatal. Disconnect all power to the unit before opening the control enclosure or before servicing any part of the system.

CAUTION: Unit is shipped with its own power supply. Do not connect any other devices requiring 24VDC to this supply. (i.e.: PLC) Connecting other devices to the same power supply may cause undesirable operation.

6. SYSTEM OVERVIEW

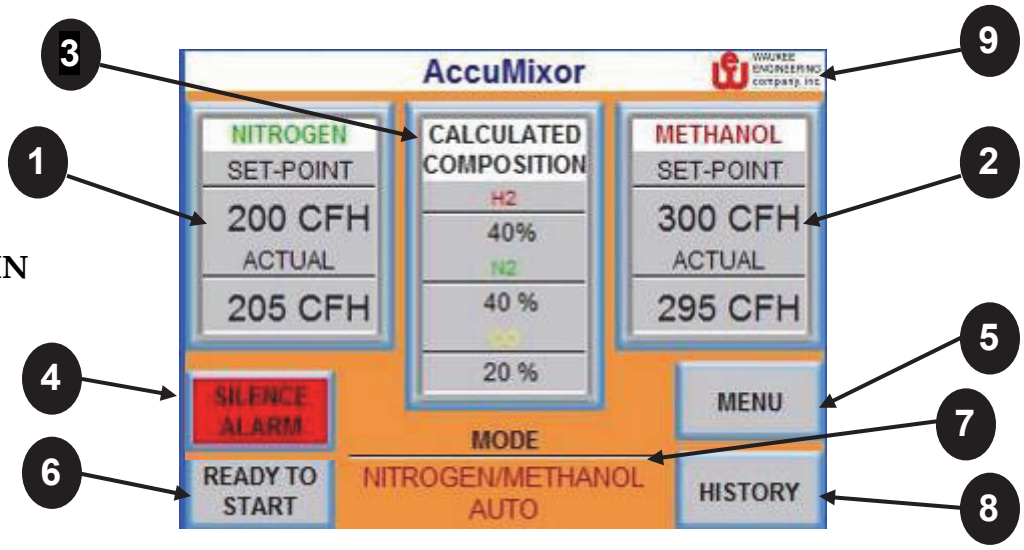
6.1 AccuMixor Front Panel



1. Purge Warning Signal Beacon
2. Alarm Signal Beacon
3. Control Power Switch
4. Operator Interface
5. Alarm Horn
6. Emergency Purge Push Button

6.2 User Interface

6.2.1 MAIN

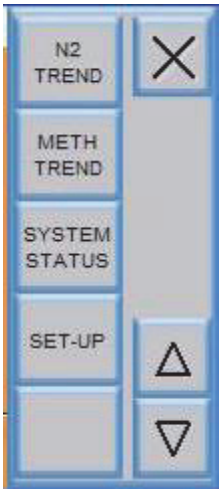


1) **Nitrogen Set-Point / Actual Flow** – Displays the calculated set-point and actual flow rate of process Nitrogen
2) **Methanol Set-Point / Actual Flow** – Displays the calculated set-point and actual flow rate of process Methanol.
3) **Calculated Composition** – Displays the calculated composition of the mixture of Nitrogen and Methanol.

The Calculated Composition is only a calculation and does not represent the actual atmosphere in the furnace. Use these numbers for reference only.

4) **Alarm Silence** – Is only visible when an alarm condition exists, touching this button will silence the alarm.
5) **Main Menu** – touching this soft button brings up a menu screen to select other screens and setup options. *See "Main Menu" on the following page for more details.*
6) **Ready to Start / System Running** – Soft button becomes visible and flashes "Ready to Start" once system is ready to start, touching this button will stop the flow of Purge Nitrogen and start the flow of process Nitrogen and Methanol depending on what mode is selected. When the system is running the button will display "System Running"
7) **Mode** – Shows the currently selected mode, touching this soft button will bring up the mode selection menu. *See "Mode Menu" on the following page for more details.*
8) **History** – Touching this soft button brings up alarm history page which shows all alarms since power up. *See History page (Pg. 15) for more details.*
9) **About** – Touching the Logo soft button will bring up a page that shows version information. *See "About" page (Pg.15) for more details.*

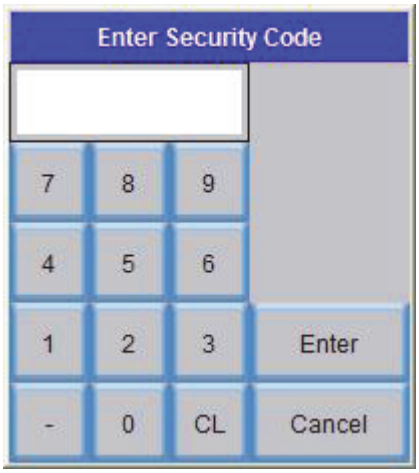
6.2.2 MAIN MENU



Trend – Touching this soft button will bring up the Nitrogen trend graph page. *For more detail see "Trend Graph" on Pg. 16*

Meth Trend – Touching this soft button will bring up the Methanol trend graph page. *For more details see "Trend Graph" on Pg. 16*

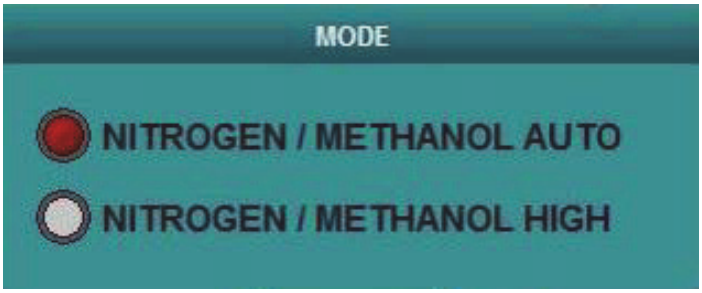
System Status – Touching this soft button will bring up the system status page. *For more details see "System Status" on Pg. 16*



Set-Up – Touching this soft button require entering a security code for access to the set-up page. The default password is "0" entering the correct password will allow access to the set-up page. *For more details see "Set-Up" on pg17*

X – To close the Menu touch the "X" soft button

6.2.3 MODE

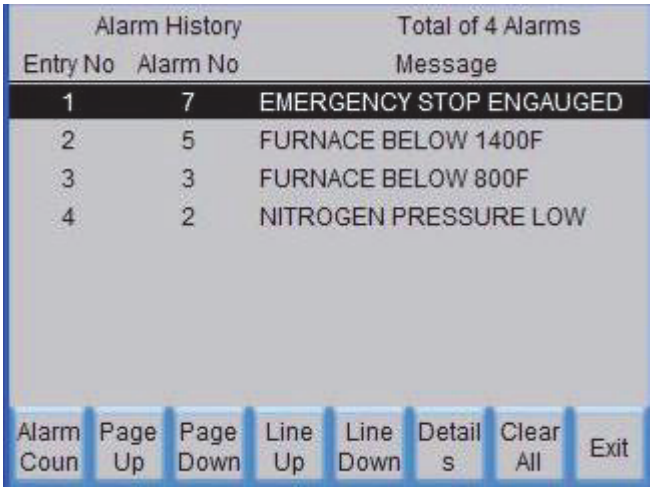


Touch the Radio button next to the desired mode.

- ***Nitrogen/Methanol Auto*** - Used for normal start up and operating conditions. If the furnace doors are open while in this mode, both the Nitrogen and Methanol flows go to the high set points.

- ***Nitrogen/Methanol High*** - Used to increase the rate at which the furnace is brought up to proper atmosphere. Both process gasses operate at high set points.

6.2.4 HISTORY



This page shows all alarm history.

Alarm Count / Alarm History – "Alarm Count" groups all common alarms and shows a total count. "Alarm History" shows alarms in order of event.

Page up – Pages Up

Page down – Pages Down

Line Up – Moves which alarm event is highlighted "UP" one line.

Line Down – Moves which alarm event is highlighted "Down" one line.

Details – Shows more details regarding the highlighted event such as date and time of event.

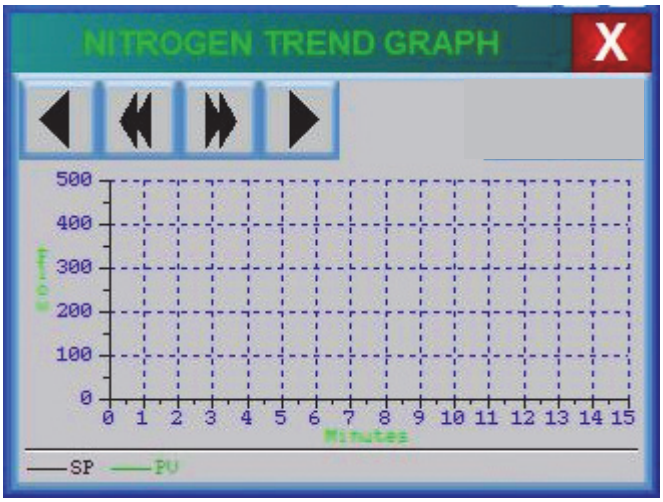
Clear All – Clears all alarm events from history

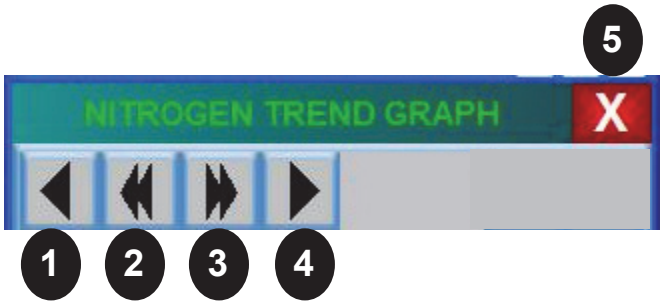
Exit – Exists alarm history page and returns to the main page.

6.2.5 ABOUT

This page shows the PLC and Touch screen version; this may be helpful troubleshooting a problem with Waukee.

6.2.6 TREND GRAPH





1) Advances graph to the beginning
2) Advances graph one page back
3) Advances graph one page forward
4) Advances graph to the end
5) Closes Graph page and returns to Main

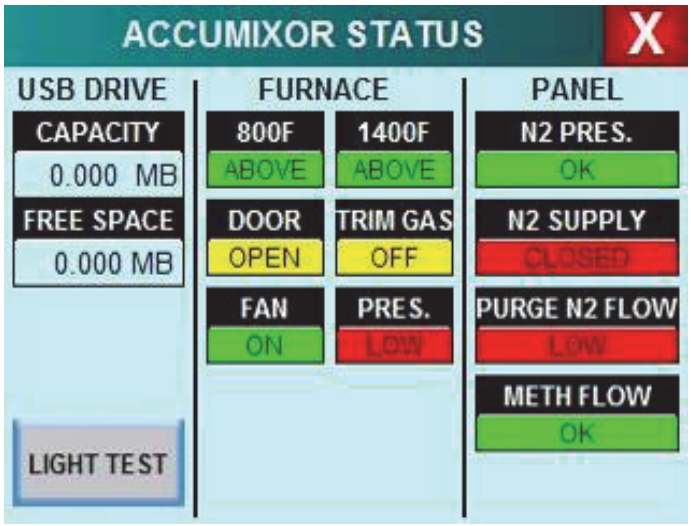
6.2.7 STATUS

The Status page is where you can view the status of the furnace, panel and USB Drive

USB DRIVE – Shows Capacity and Free Space of USB Flash Drive used for data logging

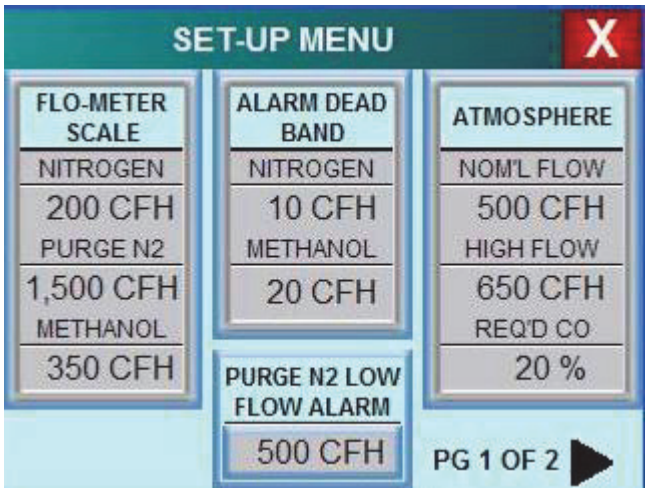
FURNACE – Shows status of Furnace Temperature, Furnace Door, Furnace recirculation fans, Furnace Pressure and Trim Gas Enable/Disable

PANEL – Shows Status of Nitrogen supply pressure, Nitrogen Supply Valve, Purge Nitrogen Flow, Methanol Flow.

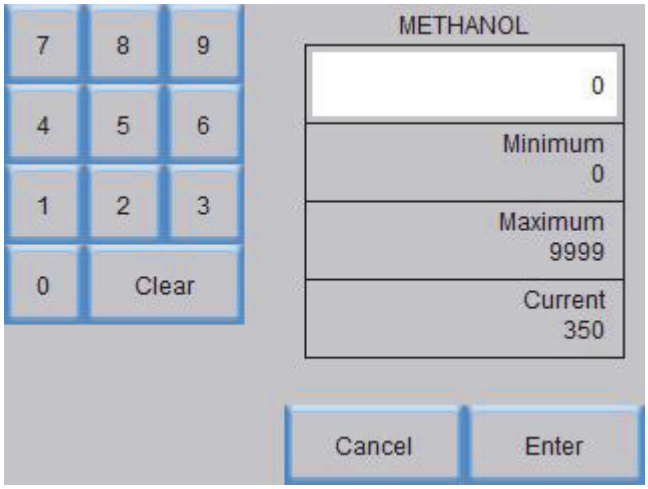


Light Test - Press this soft button to test the Yellow and Red Signal Beacons.

6.2.8 SET-UP



The Set-up Page is used to setup all flow control and alarm parameters. Touching the display in the data entry field will bring up the data entry page as shown below.

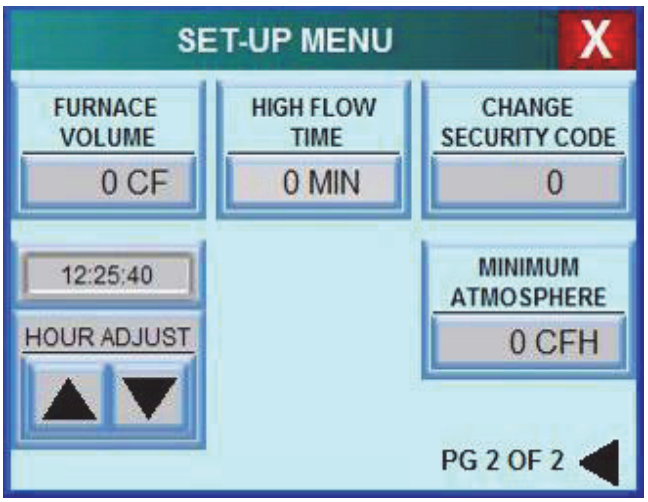


Flo-Meter Scale – used to set the scales of the Flo-Meters. These values are set by the factory and should not need to be changed unless the scales of one of the Flo-Meters are changed.

Alarm Dead Band – used to set the Alarm Dead Band for Nitrogen and Methanol. Setting these values too low may result in false alarms.

Purge N2 Low Flow Alarm – used to set the low flow alarm for Purge Nitrogen. The alarm should be set to trigger if the flow is not enough to maintain positive pressure in the furnace or no less than half the normal purge flow rate.

Atmosphere - used to set the amount of atmosphere the process requires and the desired %CO.



Furnace Volume – Enter the internal volume of the furnace here.

High Flow Time – Enter the amount of time you require the flow of atmosphere to be at the high set-point after the furnace door closes.

Change Security Code – change the security code to access the setup Menu.

Hour Adjust – Allows adjustment of system time for changes in time zone or daylight savings

Minimum Atmosphere – Enter the minimum amount of atmosphere required to maintain positive furnace pressure.

7. BEFORE STARTING THE SYSTEM

The following precautions and system checks should be performed before commissioning this equipment for service:

- Instructions shall be provided by the furnace manufacture for the proper operation of the furnace and equipment, read and understand these instructions before operating this equipment. If the system was installed by someone other than the furnace manufacture, read and understand Chapter 13 of NFPA 86 Standards for Ovens and Furnaces 2013 edition for proper and safe operation of your furnace and equipment.
- Ensure that all safety interlock devices (i.e. 800F Contact, 1400F Contact, Low Purge N2 Flow, etc.) are functioning properly.
- The System is equipped with an excess flow switch on the methanol line; to prevent damage to this sensor the line must be primed. Refer to “First Time Start-up” section of the manual for procedures on priming the line.
- For shipping purposes all Flo-Meters are shipped with the float rod assemblies taped with red shipping tape. This tape must be removed for proper operation of the Flo-Meter’s
- Fill all Flo-Meter’s except the Methanol Flo-Meter with Waukee Flo-Meter oil as per the instructions in the Flo-Meter manual.
- Open the Nitrogen and Methanol Isolation valves and check all plumbing to the panel for leaks and proper connection.
- Check that all parameter settings are correct in the Setup Menu of the AccuMixor.
- Perform a Timed Flow Purging Trial as per NFPA 86 13.5.12.2 to ensure that cumulative volume of Purge Nitrogen is correct.

WARNING: Standard furnace safety procedures should be followed prior to starting up the AccuMixor. Insure that the furnace temperature is at or above 1400 degrees F. Insure that the furnace has been purged with Nitrogen with at least 5 complete furnace volume changes. Comply with any and all required furnace safety procedures. Failure to comply with these and other safety procedures may result in an explosive situation within the furnace.

7.1 PRIMING OF METHANOL LINE

WARNING: This procedure shall only be performed to prime the methanol line and shall not be used to by-pass the safety interlocks during normal operation. All by-passes shall be removed once procedure is complete. Before proceeding the furnace shall be cold and all sources of ignition shall be extinguished.

1. Turn the Power switch on the control panel to the “OFF” position
2. Disconnect the methanol line at the nearest point to the furnace or vaporizer and drain to an approved location.
3. In the control panel add a jumper wire between terminals 34 and 1101. This will bypass all the Safety interlocks on the methanol safety valve.
4. Turn the Power switch on the control panel to the “ON” position, which will open the Methanol safety valve.
5. On the back of the panel locate the valve labeled “Methanol Prime Valve” and connect a drain line to the hose barb and drain to an approved location.
6. Slowly open the “Methanol Prime Valve” about ¼ open.
7. Once methanol is observed flowing at a steady stream shut-off “Methanol Prime Valve”
8. In the control panel add a jumper wire between terminals 20 and 208. This will enable the Methanol Valve-Tronic and allow the valve to be driven open and closed.
9. Press the “Man” key on the Methanol Valve-Tronic to put the unit in manual mode
10. Drive the valve open with the “UP” key until the Flo-Meter just begins to indicate flow and stop driving open.
11. Once flow is observed at the open end of the methanol line, turn the Power switch on the control panel to the “OFF” position to stop the flow of Methanol.
12. Remove jumpers as added in steps 3 and 8.
13. Reconnect methanol line as removed in step 2.
14. Priming of the methanol line is complete and system is ready for first time start-up.

If the methanol line is not primed all the way to the furnace/vaporizer, the system will false trigger the excessive methanol flow alarm until the line is properly primed.

8. FIRST TIME START UP

Reference
Refer to Appendix "A & B" of this manual for system drawings

System pressure specifications are shown on drawing of piping diagram located in Appendix "A"

CAUTION:
Use standard furnace safety procedures prior to starting up the AccuMixor Control System. Insure that the furnace is at or above 1400°F and that the furnace has been purged with 5 volume changes of an Inert Gas. Comply with any and all required furnace safety procedures. Failure to comply with any and all safety procedures may result in an explosive situation within the furnace.

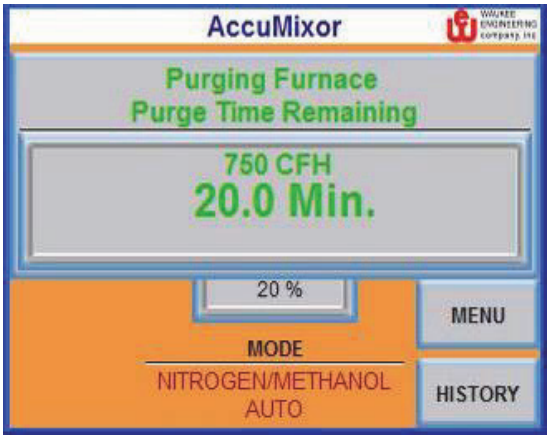
NFPA 86 "Standard for Ovens and Furnaces" recommends a purge volume equal to 5 furnace volume changes. However, the furnaces atmosphere should be confirmed to be free of oxygen using procedures outlined in NFPA 86 before introducing any flammable gasses.

It is recommended that someone familiar with the use of this equipment as well as the furnace is present when starting up this system for the first time. If needed a technician from Waukee Engineering can be present to provide start-up assistance as well as training. This service is provided at an additional cost. Contact the factory at **1-800-438-3347** for start-up assistance.

Before proceeding ensure that you followed all precautions and system checks as outline on the previous page "Before Starting the System"

INITIAL POWER UP

- Turn the control unit **"Power"** switch to the **"ON"** position
- The Touch screen will turn on and the screen will show "**Purging Furnace"** Message as shown. Assuming there are no alarm conditions.
- The Waukee-Tronic units should be **"ON"** (red lights glowing)
- The Valve-Tronic units should be **"ON"**
- Verify that Valve-Tronic Flo-Meters are in the **"AUTO"** mode by pressing the **"AUTO"** key
- Verify that all setting in the setup menu are correct.
- If the System was installed by the furnace manufacture refer to their operating procedures for the operation of this equipment and the furnace. If the system was installed by someone other than the furnace manufactures refer to "Typical Start-up" for a sample Start-up procedure.



9. TYPICAL START-UP

NOTICE

All connections and gas supplies must be connected in order for the unit to function properly. Failure to connect everything as shown in Appendix "A&B" will result in undesirable operation or the inability to start the unit.
If the furnace manufacture provided operating instructions use those instructions for proper operation of your equipment and furnace.
Due to differences in furnace designs and types of furnaces, the procedure outlined below is only an example of a start-up procedure and should only be used as a reference. It is customer's responsibility to write instructions on the proper use of our equipment with the furnace it is servicing.

Purge-in Instructions

1. Open all manual valves for flame curtains
2. Light all Burn-off pilots
3. Bring Furnace up to Temperature 1400F
4. Turn furnace recirculation fans "ON"
5. Open Nitrogen Isolation Valve (NIV-1)
6. Verify that the flow of purge nitrogen is 1500CFH
7. Close Furnace Doors
8. Turn control power **"ON"** on the AccuMixor Atmosphere control panel. The display should show "Purging Furnace" and not display any alarms.
9. Check that Valve-Tronic units are in the **"Auto"** mode (green **"Auto"** indicator illuminated)
10. Wait 30 minutes for purge cycle completion **"Ready to Start "** (soft button will appear once purge is complete)
11. Select "Nitrogen/Methanol Auto" mode
12. Depress the **"Ready to Start"** soft button to start process.
13. Once cycle starts the following will happen:
    A. Purge Nitrogen will stop flowing after flow of process Nitrogen and Methanol is established.
    B. Flame should appear at the furnace doors or effluent lines
14. The Purge-in atmosphere introduction process is considered complete and the furnace is ready for operation

Purge-out Instructions

1. Close Furnace Doors
2. On the touch screen of the AccuMixor press the "Stop" soft button which will stop the flow of process Nitrogen and Methanol once the Purge Nitrogen flow rate is established.
3. After 30 Minutes, open the furnace doors
4. Turn off the following
   A. Furnace recirculation fans
   B. Flame Curtains
   C. Burn-off pilots
   D. AccuMixor Atmosphere control panel
   E. Nitrogen Supply
5. Purge-out of furnace is complete

10. ABNORMAL MODES

PURGE DURING START UP
A complete purge cycle must be completed before a normal run mode can be started to be sure that oxygen has been displaced from the furnace before combustibles are admitted.

The **"Ready To Start"** soft button will not pop-up and will not allow a normal run mode to start under the following conditions.

- Nitrogen supply pressure is below 20 psig
- Nitrogen supply OK contact not engaged
- An open furnace door
- A furnace temperature below 1400 °F
- A low Purge Nitrogen flow or incomplete purge cycle

PURGE WARNING INITIATED DURING NORMAL OPERATION
A purge warning during operation could be due to flow rates deviating more than the set Alarm Band set in the set-up menu or if the one of the Valve-Tronic units reaches "Top Limit"

EMERGENCY PURGE DURING NORMAL OPERATION
An emergency purge cycle can be initiated for the following reasons.

- The furnace temperature drops below 800° F
- The **"Emergency Purge"** button is pushed
- A purge warning time delay is exceeded
- Nitrogen supply pressure falls below 20 psig
- System power is lost

NOTE: If emergency purge is initiated, a complete purge cycle must be completed before a normal operating mode can again be started.

11. BEFORE SERVICING

The following precautions and any other normal safety procedures should be observed when installing, maintaining or operating this equipment:

! Shut off main isolation valves for Methanol and Nitrogen (customer supplied and on the panel). Make sure that the system is not pressurized before opening any piping.

! Methanol supply must be shut off; supply pressure must be relieved, power to the control system disconnected before attempting to service the Methanol Flo-Meter.

! Refer to any and all safety information and M.S.D.S. sheets for Methanol and Nitrogen gas supplied by the vendor of the gasses and liquids and distribution equipment.

! Conform to all information found in the M.S.D.S. sheets for Methanol supplied by the vendor.

! Do not allow open flame, smoking or any sources of ignition near the system.

12. MAINTENANCE

Recommended Scheduled Maintenance

Follow these recommended maintenance tips in addition to any provided by the furnace manufacture.

WARNING: The furnace should be off-line and shut down before performing any maintenance or tests. Failure to do so may result in a unsafe condition which may result in fire or explosion. If provided, follow the furnace manufactures procedures on the safe shut down of the furnace before proceeding.

Once a week:

1. Leak Test of Methanol Safety Shutoff Valves
    - If the system is flowing methanol, stop the flow of methanol by pressing the "Emergency Purge" Mushroom button located on front of the panel.
    - Shut-off Methanol valve located on the front of the panel *Red Handle.* Refer to drawing 2-2231 in Appendix A (IT21)
    - Slowly open test cock located on the back of the panel labeled *Methanol Test Valve*. (IT28 on drawing 2-2231)
    - Initially a small amount of methanol will leak, after that there should be no leaks. If leakage is observed, replace the methanol solenoid valve and retest.

Once a month:

1. Test operation of safety interlocks
    - When the furnace temperature is below 800F both the "800F" and "1400F" status indicators shall read "*Below*" on the status page of the touch screen. The LED indicator lights on relays CR136 & CR137 located inside the control panel shall be "OFF"
    - When the Nitrogen Supply valve to the control panel is shut-off the "N2 Pres. status indicator shall read **LOW**, the N2 Supply status indicator shall read **CLOSED** and the "Purge N2 Flow" status indicator shall read **LOW** on the status page of the touch screen. The LED indicator light on relays CR124, CR131 and CR135 located inside the control panel shall be "OFF"
    - When the Furnace Door on the furnace is open the "Door" status indicator shall read "open" on the status page of the touch screen.
    - When the Furnace Fans are OFF the "Fan" status indicator shall read **OFF** and the LED indicator light on relay CR129 located inside the control panel shall be "OFF"
    - When gas is not flowing to the furnace, the "Pres." Status indicator shall read **LOW** on the status page of the touch screen. The LED indicator light on relay CR127 located inside the control panel shall be "OFF"

2. Test operation of signal beacons
    - On the status page of the touch screen touch the LIGHT TEST soft button both the Red and Yellow signal beacons should come on.

3. Test operation of Emergency Purge push button located on front of panel. This can be performed at any time the system is running. Press the Emergency Purge push button and the flows of Process Nitrogen and Methanol shall halt and the flow of purge Nitrogen shall resume.

4. Test Methanol Excess flow switch

WARNING: This procedure shall only be performed to test the methanol excess flow switch and shall not be used to by-pass the safety interlocks during normal operation. All by-passes shall be removed once procedure is complete. Before proceeding furnace shall be cold and all sources of ignition shall be extinguished.

- Turn the control panel Power switch to the “OFF” position
- Add a jumper wire between terminals 34 and 1101. This will bypass all the safety interlocks on the methanol safety valve.
- On the back of the panel locate the valve labeled “Methanol Prime Valve”
- Connect a drain line to the hose barb and drain to an approved location
- Turn the control panel Power switch to the “ON” position, which will open the Methanol safety valve
- On the touch screen go to the “Status page” and observe the “METH FLOW” status indicator shall read “OK”
- Open the “Methanol Prime Valve” full open
- Look at the touch screen and the “METH FLOW” status indicator shall indicate “EXCESS”
- Close the “Methanol Prime Valve
- If the Sensor does not detect excess flow, replace the sensor and retest
- Remove jumper wire that was added between terminals 34 and 1101.
- Test is complete and system is ready to be put back into service.

13. ACCUMIXOR MEMORY ADDRESSES

Memory Addresses			
Description	**MODBUS Address Only**	**MODBUS Data Type**	**Octal**
READ ONLY			
Methanol Set-Point	0303	(04) Holding Register	V456
Methanol Process Variable	0260	(04) Holding Register	V403
Methanol Low Flow Alarm	6148	(01) Coil	T3 (V41100.3)
Methanol High Flow Alarm	6147	(01) Coil	T2 (V41100.2)
Methanol Solenoid Valve Status	2054	(01) Coil	Y5 (V40500.5)
Methanol Excess Flow (Sensor)		(02) Input	X11 (V40500.9)
Methanol Excess Flow (Flo-Meter)		(01) Coil	C31 (V40600.9)
Nitrogen Set-Point	0298	(04) Holding Register	V451
Nitrogen Process Variable	0257	(04) Holding Register	V400
Nitrogen Low Flow Alarm	6150	(01) Coil	T5 (V41100.5)
Nitrogen High Flow Alarm	6149	(01) Coil	T4 (V41100.4)
Nitrogen Solenoid Valve Status	2053	(01) Coil	Y4 (V40500.4)
Nitrogen Supply Valve Status		(02) Input	X12 (V40400.10)
Purge Nitrogen Process Variable	0274	(04) Holding Register	V421
Purge Nitrogen Low Flow Alarm (Flo-Mete	3105	(01) Coil	C40 (V40602.0)
Purge Nitrogen Low Flow Alarm (Sensor)		(02) Coil	X6 (V40400.6)
Purge Time Remaining	0169	(03) Input Register	V250
Alarm Status	2051	(01) Coil	Y2 (V40500.2)
Purge Warning Status	2050	(01) Coil	Y1 (V40500.1)
Enriching Gas Enable	2052	(01) Coil	Y3 (V40500.3)
800F Contact Status	12051	(02) Input	X2 (V40400.2)
1400F Contact Status	12050	(02) Input	X1 (V40400.1)
Furnace Door Contact Status	12054	(02) Input	X5 (V40400.5)
Furnace Fan Contact Status		(02) Input	X7 (V40400.7)
Furnace Pressure Contact Status		(02) Input	X10 (V40400.8)
Low Nitrogen Pressure Status	12052	(02) Input	X3 (V40400.3)
Read/Write			
% CO	0306	(04) Holding Register	V461

14. TROUBLESHOOTING

Error Messages

The AccuMixor has a comprehensive diagnostic system that includes several different error messages. The error messages are displayed on the bottom of the Touch screen.

Error Messages	
Error Name/Description	**Corrective Actions**
OPEN FURNACE DOORS	1. Open furnace doors 2. Restore Nitrogen Purge flow
NITROGEN PRESSURE LOW	1. Check that Nitrogen Pressure at the inlet of the regulator is above 20psig 2. If Nitrogen supply pressure is below 20psig, check for any closed valves up steam.
FURNACE BELOW 800F	1. Check if furnace temperature is above 800F 2. Check that the temperature controller is providing a contact closure when the furnace is above 800F 3. Check wiring to term 521.
FURNACE BELOW 1400F	1. Check if furnace temperature is above 1400F 2. Check that the temperature controller is providing a contact closure when the furnace is above 1400F 3. Check wiring to term 581.
PURGE NITROGEN FLOW LOW	1. Check Nitrogen Supply Pressure 2. Check for any blockage up or down stream of the Purge Nitrogen Flo-Meter. 3. If indicated flow is correct check 4-20mA output of Waukee-Tronic
EMERGENCY PURGE ENGAGED	1. Reset buy pulling the Emergency Purge Push button back. 2. Check terminal 821, 821 is shipped jumpered to terminal 20
NITROGEN SOLENOID VALVE FAILURE	1. Check for debris inside the solenoid valve that may be preventing the solenoid from closing. 2. Replace Solenoid valve

Error Messages (Continued)	
Error Name/Description	**Corrective Actions**
METHANOL SOLENOID VALVE FAILURE	1. Check for debris inside the solenoid valve that may be preventing the solenoid from closing. 2. Replace Solenoid valve
NITROGEN FLOW LOW	1. Check Nitrogen Supply Pressure 2. Check for any blockage up or down stream of the Process Nitrogen Flo-Meter. 3. If indicated flow is correct check 4-20mA output of Waukee-Tronic
NITROGEN FLOW HIGH	1. Check that the Nitrogen Valve-Tronic is in Automatic mode and controlling the flow.
METHANOL FLOW LOW	1. Check Methanol Supply Pressure 2. Check for any blockage up or down stream of the Process Methanol Flo-Meter. 3. If indicated flow is correct check 4-20mA output of Waukee-Tronic
METHANOL FLOW HIGH	1. Check that the Methanol Valve-Tronic is in Automatic mode and controlling the flow.
CLOSE FURNACE DOORS TO BEGIN	1. Furnace doors must be closed before the system will start totalizing the flow of purge nitrogen.
REPLACE BATTERY IN TOUCH SCREEN	1. Replace battery in touch screen

For additional assistance, please call the factory at 1-800-438-3347 or (414) 462-8200.

APPENDIX A “PLUMBING DIAGRAMS”

On request

APPENDIX B “WIRING DIAGRAMS”

On request

APPENDIX C "RELATED DOCUMENTS"

Valve-Tronic Manual
Waukee-Tronic Manual
Flo-Meter Manual
De-bubbler Manual

APPENDIX D “DIMENSIONS”

On request

Waukee Warranty Policy, Disclaimer and Limitation of Liability

EXPRESS WARRANTY ON WAUKEE EQUIPMENT

WAUKEE warrants its products for a period of one (1) year from date of shipment from WAUKEE to the original purchaser to be free from defects in material and workmanship under normal recommended use, service, inspection and maintenance. Normal recommended use, service inspection and maintenance mean:

1. Not to be used in excess of nor below the rated capacity, pressures and temperature ranges specified in the applicable quotation, purchase order, acknowledgment, marketing literature, nameplate(s), specification sheet or the Installation, Operation, Inspection and Maintenance Manual (THE MANUAL);

2. Using only clean liquids or gases (only liquids in liquid Flo-Meters and only gases in gas Flo-Meters); air and fuel gases used in mixing equipment to be clean and free of solids all as further explained in THE MANUAL; and

3. Installation, operation, inspection and maintenance in compliance with THE MANUAL; and

4. The WAUKEE products being used only in:

a) Ambient environments lower than 132° Fahrenheit (54° Celsius) unless specifically designed and so labeled by WAUKEE for higher temperatures; and

b) Non-corrosive environments; and

c) Completely protected from moisture, rain, snow or other outside environments; and

d) Not to be used below 32° Fahrenheit (0° Celsius) unless special precautions are taken for low temperature conditions as shown in THE MANUAL

5. Being used only for applications permitted by THE MANUAL or other WAUKEE literature or special applications approved in a separate written authorization by WAUKEE

WARRANTY EXCEPTIONS

This Warranty does not apply to damage caused by any or all of the following circumstances or conditions:

1. Freight damage;

2. Parts, accessories, materials or components not obtained from nor approved in writing by WAUKEE;

3. Any consequential or incidental damages including but not limited to loss of use, loss of profits, loss of sales, increased costs, arising from the use of any product, system or other goods or services manufactured, sold or provided by WAUKEE;

4. Misapplication, misuse and failure to follow THE MANUAL or other literature, instructions or bulletins (including drawings) published or distributed prior to THE MANUAL

The exclusive remedy under this Warranty or any other express warranty is the repair or replacement without charge for labor and materials of any WAUKEE parts found upon examination by WAUKEE to have been defective. Since certain WAUKEE equipment is heavy, bulky and not deliverable by U.S. mail or other parcel service, WAUKEE equipment may be returned only upon written consent of WAUKEE and then only to the

location designated by WAUKEE. Generally such consent will be given only upon the condition that the customer assume and prepay all carrier charges and responsibility for damage in transit.
Purchasers of WAUKEE products, equipment, goods or services waive subrogation on all items covered under their own or any other insurance.

DISCLAIMER

THIS WARRANTY IS EXCLUSIVE. WAUKEE EXPRESSLY DISCLAIMS ANY AND ALL OTHER WARRANTIES WHETHER EXPRESS OR IMPLIED INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY PURPOSE.

No person, including any dealer, seller or other representative of WAUKEE is authorized to make, on behalf of WAUKEE, any representations beyond those contained in WAUKEE literature and documents or to assume for WAUKEE any obligations or duties not contained in this Warranty and Warranty Policy.

WAUKEE reserves the right to make design and other changes, modifications or improvements to its products, services, literature or systems, without any obligation, to furnish or install same on any previously sold or delivered products or systems.

LIMITATION OF LIABILITY

It is expressly agreed that the liability of WAUKEE is limited and WAUKEE does not function as an insurer. The purchaser and/or user agree that WAUKEE is not liable for loss, harm or damage due directly or indirectly to any occurrence or consequences there from. If WAUKEE should be found liable to anyone on any theory (except any express warranty where the remedy is set forth in Section 2 of this Warranty and Warranty Policy) for loss, harm or damage, the liability of WAUKEE shall be limited to the lesser of the actual loss, harm or damage or the purchase price of the involved WAUKEE equipment or service when sold (or when service performed) by WAUKEE to its customer. This liability is exclusive and regardless of cause or origin resulting directly or indirectly to any person or property from:

1. The performance or nonperformance of any obligations set forth in this Warranty and Warranty Policy:
2. 2 Any agreement including specifications between WAUKEE and the customer;
3. 3 Negligence, active, passive or otherwise of WAUKEE or any of its agents or employees;
4. Breach of any judicially imposed warranty or covenant of workmanship, durability or performance; and
5. Misrepresentation (under the Restatement, common law or otherwise) and/or strict liability involvement
6. Liability for fraud-in-the-inducement

INFORMATION NECESSARY TO OBTAIN TECHNICAL ASSISTANCE

For WAUKEE to appropriately respond to a request for assistance or evaluation of customer or user operating difficulty please provide at a minimum the following information:

1. Serial number and type or model of meter, compressor or other equipment and all other data shown on the nameplate and on the specific component which appears to be involved in the difficulty;
2. The date and from whom you purchased your WAUKEE equipment and your purchase order number

3. State your difficulty, being sure to mention at least the following:
4. Application
5. Input pressure where Flo-Meters or compressors are involved
6. Condition of filters, strainers or screens, upstream or downstream of the WAUKEE equipment
7. Gas or liquid temperatures and other ambient conditions at the time of the difficulty
8. Type of lubrication being used (if any) - give specifics
9. Any other relevant pressures including gauge readings both upstream and downstream of the WAUKEE equipment.
10. All electrical information available.
11. Performance activity.
12. Any other pertinent information. If a sketch would help explain the difficulty, please include one.

WARRANTY FIELD SERVICE

If warranty Field Service at the request of the purchaser or user is rendered and the difficulty is found not to be with WAUKEE's product, the purchaser shall pay the time and expense (at the prevailing rate at the time of the service) of WAUKEE's field representative(s). Charges for service, labor and other expenses that have been incurred by the purchaser, its customer or agent without written approval of WAUKEE will not be accepted. The OEM or other reseller is responsible for transmitting installation and operating instructions, THE MANUAL or other service literature supplied by WAUKEE with the equipment.

Reach us at www.group-upc.com

United Process Controls brings together leading brands to the heat treating industry including Waukee Engineering, Furnace Control, Marathon Monitors and Process-Electronic.

We provide prime control solutions through our worldwide sales and services network with easy-to-access local support.

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