OmniFlo™ Series

CONVECTION REFLOW SYSTEM

INSTALLATION MANUAL

Technical Manual Part #560-97-0

Operations Manual

Maintenance Manual

Options Manual

Speedline technologies

Speedline Technologies, Inc.
Hwy. 5 South, Box 709 | Camdenton, MO 65020
Tel: 573-346-3341 | Fax: 573-346-6878

OmniFlo™ Series

CONVECTION REFLOW SYSTEM

INSTALLATION MANUAL

Installation Manual Part #3-9317-310-00-0, Revision 2
Text Part #2-9317-310-00-0, Revision 2

Published May 7, 1999

TO OUR CUSTOMERS

The purpose of this manual is to help obtain the greatest possible return on your investment. It is suggested that new operators study the applicable sections of this manual thoroughly before operating the equipment. It is further suggested that the manual be used as a reference by maintenance personnel and as a text for training new maintenance personnel.

This manual includes instructions for this equipment available at the time this manual was approved for printing. Electrovert® reserves the right to make changes in design and specifications and/or make improvements in the product without imposing any obligations upon itself to install them on previously manufactured products.

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Tel: 800-737-8110 or 573-346-3341
e-mail:
electrovert_tse@speedline.cookson.com

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U.K. RG31 7SD
Fax: 44 11-8-930-1401
Tel: 44 11-8-930-1400

Speedline Technologies Asia
150 Kampong Ampat
#05-08 KA Centre
Singapore 368234
Fax: 65-289 9411
Tel: 65-286 6635

Japan
Electrovert-Seitec Co., Ltd.
1538 Kanoya-cho
Hachioji City, Tokyo 193 JAPAN
Fax: 81-426-23-8350
Tel: 81-426-23-7722

Northern Europe
Speedline Technologies S.A.R.L.
65 Avenue du General De Gaulle
Immeuble le Promethee
77420 Champs-Sur Marne, France
Fax: 33 160-05-6129
Tel: 33 160-06-8181

Central Europe
Speedline Technologies, Gmbh
Daimlerstrasse 1E
D-63303, Dreieich, Germany
Fax: 49 6103-832199
Tel: 49 6103-8320

Speedline Technologies Italy
Via Liguria 2/28
I-20068 Peschiera Borromeo (MI)
Italy
Fax:39- 2 - 5530.8468
Tel: 39- 2 - 5530.8339

EQUIPMENT MANUAL QUESTIONNAIRE

The purpose of this questionnaire is to provide feedback from our customers regarding the effectiveness of the equipment manuals. Please complete the following questions and return to Speedline Technologies, Inc., Electrovert®. Your comments are appreciated.

Customer _____

Address _____

Contact _____ Date _____

Machine Type _____ Manual Part Number _____

Translated Manual Language _____ Part Number _____

Option Manual _____ Part Number _____

1. How often do you refer to the technical manual package?
   - q Frequently
   - q Occasionally
   - q Seldom
   - q Never
2. In what instances do you refer to the technical manual package?
   - q To verify process information
   - q To reference procedures (operational, maintenance)
   - q To order/identify parts
   - q Other (please specify) _____
3. How do you rate the overall layout of the manual package?
   - q Information easy to find
   - q Information difficult to find
   - q If difficult, please explain _____
4. How do you rate our manuals in comparison to your other capital equipment suppliers?
   - q Higher quality
   - q Same general quality
   - q Lower quality

   If same general or lower quality, please explain _____

   _____
5. How do you rate the accuracy of the technical information?
   - q Very accurate
   - q Somewhat accurate
   - q Not accurate
   - q Can you provide examples, with page number indicated? _____

   _____
6. What tools would make the manuals easier to use and/or find information?
   - q Indexes
   - q Glossaries
   - q Improved Table of Contents
   - q Other _____
7. Who are the main users of your equipment manuals?
   - q Operators
   - q Maintenance personnel
   - q Process Engineers
   - q Other _____
8. How do you rate the quality of the language translation (if applicable)?
   - q Very accurate
   - q Somewhat accurate
   - q Not accurate

   If somewhat or not accurate, can you elaborate? _____

   _____

   _____

Please add any additional comments about our manuals on the back of this page.

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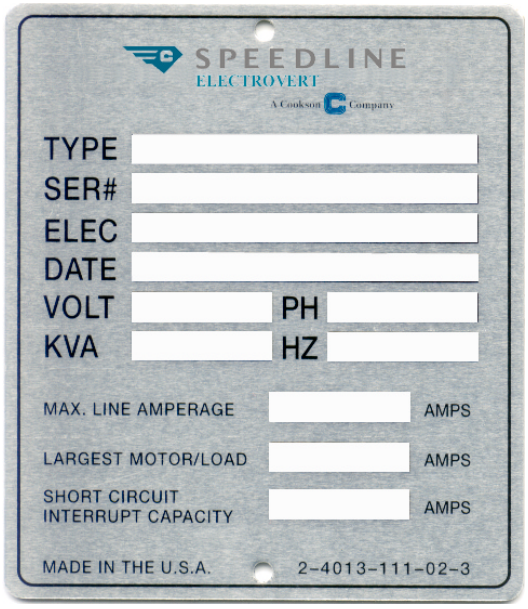


The serial tag information is to be filled by the user for technical support purposes. Please have the following information available when contacting Technical Support or when placing parts orders:

Machine Name
Model Number
Mechnical and Electrical Serial Numbers
Item/Kit Description

COMMON SAFETY WARNING LABELS

The following warning labels are used throughout this manual:

NOTE Notes point out information in this manual that may be of assistance to the operation or maintenance of the machine.

CAUTION Caution notices are used in this manual to call attention to a situation that could cause equipment damage.

WARNING Warning notices are used in this manual to emphasize hazardous voltages, high temperatures, high currents, or other conditions that could cause personal injury.

DANGER Danger notices are used in this manual to warn the operator that DEATH may result if a procedure is omitted or improperly performed.

OmniFlo™ Series

Table Of Contents

SECTION 1: SAFETY INFORMATION

1.1 REFLOW HAZARDS

HOT SURFACES

Figure 1: Hot Surface Warning Tag

Description

The conveyor, conveyor rails, rail guards and boards moving through the system are burn hazards and can cause severe skin burns.

The heat exposed surfaces of the system (rails, conveyor surfaces, etc...) can become very hot, reaching temperatures of 66 C (150 F).

Prevention

Always wear heat resistant gloves and protective clothing on or around the active system. Do not touch the cover of the system or handle finished boards without wearing protective gloves. Allow time for the system to cool prior to servicing. If operations require working on any part of the system while it is still hot, protective clothing is required. If in doubt whether something is hot or not, assume it is hot and take the necessary steps to avoid a burn hazard. Never place any foreign materials on the machine.

BURN HAZARDS

WARNING Hot Components and Surfaces: The preheaters, parts of the conveyor, and other exposed surfaces are potential burn hazards to personnel performing maintenance or operating the machine. Allow hot components to cool prior to performing maintenance. Always observe the safety garment requirements and utilize required safety equipment.

FIRE AND SMOKE HAZARDS

Description

There are two (2) inherent fire hazards present in the reflow system.

Motors: Under normal circumstances, motors tend to create sparks during operation. Should a serious problem ever develop in a motor, sparking might ignite flammable materials.

Heaters: If boards are left stationary inside the system, the high temperatures created by the heaters may cause the boards to ignite.

Additionally, if a board were to drop onto a heater it could ignite.

Prevention

Use good housekeeping techniques and follow the operating instructions with the suggested maintenance schedule to avoid fires. Keep flammable materials and solvents clear of the operating reflow system. Never stop the system with boards remaining inside the machine. Perform regular maintenance to ensure that all motors are in good working order.

NOXIOUS VAPORS AND GASES

Description:

Noxious fumes are created during the normal heating process of reflow soldering. the gases and vapors emitted from the solder and flux are contained in the reflow chamber and should be avoided.

Harmful fumes could arise if a board were trapped and burnt in the system. The fumes created by this burning may be hazardous.

Prevention:

Always connect the exhaust system and ensure it is working before starting the reflow soldering process.

LEAD HAZARDS

Fumes generated during the normal soldering process contain chemical residues. Reflow fumes may contain lead. It is essential to install and maintain an adequate exhaust system.

CAUTION Exposure to lead in any form may cause serious health hazards. Breathing lead dust, which is nearly invisible, can cause lead poisoning.

INERTING HAZARDS

Nitrogen can smother if the gas is not properly exhausted. Nitrogen has two distinct hazards associated with its use, asphyxiation and compressed gas hazards.

Asphyxiation Hazard

Symptoms. The warning signs of asphyxia are dizziness, headache, fainting, and nausea. If you feel any of these symptoms, move to an area that is ventilated with fresh air immediately.

Compressed Gas Hazard

WARNING Compressed Nitrogen - Excessive pressure could cause explosion of Nitrogen Flow Meters.

Do not connect the Nitrogen Flow Control unit to a nitrogen source that exceeds 690 kPa (100 psi). Exploding flow meters are a potential hazard to workers stationed in front of the control panel. Compressed gas can cause projectiles, gas burns to exposed areas of the body, and asphyxiation. It is recommended that nitrogen is delivered at a regulated pressure, at least 103 kPa (15 psi) less than the supply line pressure.

MECHANICAL HAZARDS

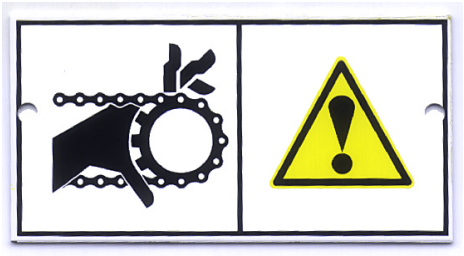


Figure 2: Pinchpoint Warning Tag

Description

All moving parts of the reflow system, including pulleys, sprockets, chains, and the conveyor represent potential hazards. Use caution to avoid having hands or fingers being caught in any moving mechanisms. Long hair, jewelry, and other parts of loose attire could become caught in moving mechanisms causing an injury. Proper attire should be worn.

Prevention

Always stop all moving parts when adjusting or performing maintenance procedures on the machine. When the system is running, keep well clear of the moving mechanisms. Use caution when working on or near moving parts. Wear safety head gear (nets, caps, etc.) to prevent long hair from getting caught in the parts of the system. Never operate or service the system while wearing neckties, necklaces, loose garments, etc.

ELECTRICAL HAZARDS

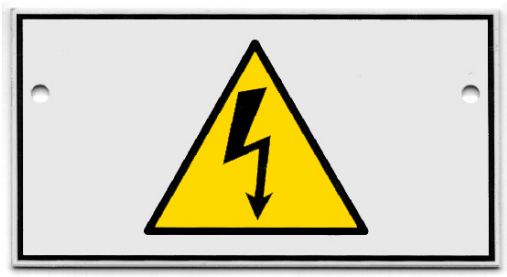


Figure 3: Electrical Hazard Warning Tag

Description

The power panels and terminal blocks of the reflow system present an electrical hazard. High voltages are present on various parts of the system.

Prevention

During operation, ensure that the interlocks and protective panels are closed and remain secure.

Before working on any electrical circuit, shut down the main power, lockout/tagout the source, and check that power is off with a voltmeter at the main power disconnect.

Electrical work should only be performed by qualified electricians and maintenance personnel. Always shut off main power before performing any repairs on electrical circuits.

Prior to applying power to the machine for the first time, ensure that the system is properly grounded.

Do not disable safety interlocks or panels that restrict access to possible energized circuits.

REMOTE OPERATION HAZARD

Description

Computer controlled reflow machines can be started remotely via the computer link. This capability poses a potential hazard. If the machine is controlled from a remote location, a service person could get injured by accidently energizing the machine.

Prevention

Press the Emergency Stop button before servicing the system.

To prevent remote mechanical operation, activate the Emergency Stop by pressing on the Emergency Stop button. This ensures that the machine's moving parts cannot be started remotely.

1.2 WORK AREA SAFETY

No Smoking Signs

Post large, visible "NO SMOKING" signs in the work area. Establish a means of monitoring and enforcing this regulation.

Safety Lockout/Tagout Procedures

Post electrical safety tagout and lockout procedures in the work place and ensure that all servicing personnel are familiar with the appropriate procedures. Mark and label all power supply sources used for the equipment to ensure that the lockout and tagout process is easily accomplished.

Fire Extinguisher

Keep an approved fire extinguisher near the machine at all times. Familiarize all personnel with the operation and use of the unit.

Safety Garments

Protective clothing is required when servicing a hot machine or handling hot boards. Safety clothing includes, but is not limited to, a protective inhalation mask, safety goggles, high temperature resistant gloves and apron, and safety shoes or boots.

Operators must remove all protective clothing and wash thoroughly before eating, drinking, or smoking. Under no circumstances should eating, drinking, or smoking be permitted while operating or maintaining the machine.

Flammables

Never store flammable material on or around the reflow machine. Exposing flammables to the heaters or hot surfaces presents a fire hazard due to the operating temperature of the machine.

Good Housekeeping

Conveyor chains, sprockets, and the entrance and exit of the reflow oven must receive cleaning on a regular basis. Cleaning personnel should use an approved vacuum or wet cleaning method and be suitably attired. Never use flammable cleaning solvents near a heated reflow machine.

Lead compounds should be disposed of observing all environmental control regulations.

Good housekeeping and the cleaning of equipment on a continuous schedule is very important for the safety and reliability of the system's operation.

1.3 EXHAUST AND HOUSEKEEPING

EXHAUST SYSTEM INSTALLATION

Because reflow fumes may contain lead, it is essential to install an adequate exhaust system. An adequate system must filter and monitor the system.

AIR QUALITY CHECKS

Checks can be accomplished through the services of gas suppliers or their agents. Testing and Monitoring the lead content of the air in the workplace should be performed at different times of the operations (full production) at least quarterly, until lead levels are determined for the different production processes and loads.

Clean the exhaust ventilation system on a regular basis.

Fumes generated during the normal soldering process contain chemical residues. One of these residues is lead. It is essential to install an adequate exhaust ventilation system capable of removing potentially dangerous chemical residue emissions from the machine. Refer to the technical data provided for precise data on the type and capacity of exhaust required for your system.

1. Establish an exhaust filtration system. This system must be placed in line with the exhaust venting system so that the emissions created from the soldering processes are captured. Also ensure that the units do not interfere with the soldering operations.
2. Monitor the lead content of the air in the workplace at regular intervals during operations. Check air quality on a regular basis. Due to variables in the environment such as opening or closing windows or doors; changes in the movement of air throughout the course of a working day, it is necessary to update readings periodically during operations.
3. On a scheduled basis, clean the exhaust ventilation duct work, and clean or replace any filtration media using the appropriate safety measures for handling lead and other residue chemicals. Regular cleaning prevents contaminant build-up, reduces the risk of fire, and improves the efficiency of your exhaust system.

NOTE On some Electrovert systems, processing cannot begin unless the exhaust ventilation system is on and the windows and doors are closed. These safety interlocks protect the user against the escape of hazardous fumes and provide safe operation of the system.

1.4 ENVIRONMENTAL PRECAUTIONS

ADEQUATE EXHAUST AND VENTILATION

If nitrogen released from the machine is allowed to collect in a non-ventilated room or a confined space, oxygen deficiency occurs. Always ensure that the exhaust system that ventilates the nitrogen released from within the machine is running during operation. In addition, the room air ventilation system must always be operating when using the nitrogen inerting system.

NITROGEN GAS DISPOSAL

It is best to vent the gas released from an inerted machine to an outdoor location. Choose a discharge site where the nitrogen is dissipated in a comparatively large volume of unconfined air, and where no one could mistakenly or accidentally inhale the oxygen-deficient gas. Do not release vent gas near the intake of an air conditioning or ventilation duct.

VENTILATION SAFETY INTERLOCK

The machine is equipped with exhaust sensor(s) which generate an alarm if the exhaust system connected to the machine is not operational. Do not operate the system without exhaust.

AIR ANALYSIS

When the inerting system is first put in operation, ask the commercial gas supplier to measure the oxygen content of the air near the machine to help assess the need for additional ventilation in the room. Every time the machine is relocated, ask for a repeat of the analyses, or engage a qualified ventilation contractor to have a new survey done before resuming full machine operation. Ventilation requirements vary from one place to another depending on the room size, air circulation, and other factors.

Nitrogen and the equipment used to inert a machine pose unexpected hazards for persons who operate, service and attend the unit. This section was produced to protect the health of maintenance and operational personnel and to enhance their safety awareness when operating the Electrovert equipment. It is essential that all of those persons are briefed on the precautions in this manual. Only trained and responsible persons should install, operate or service an inerting system.

KEEP MANUAL AS REFERENCE

Retain copies of this manual for future reference and for training new personnel.

Consult nitrogen supplier for safety information.

Consult the nitrogen supplier to ensure that the connection of the nitrogen supply to this equipment conforms to all appropriate regulations. The supplier will also provide valuable safety information relating to the use of nitrogen in the workplace.

OBSERVE LOCAL REGULATIONS

This section is not intended to supersede local rules and regulations governing health and safety in the local area or at the installation site. Whenever there is a conflict between the information in this section and the latter, local rules and practices shall govern.

USE NITROGEN ONLY

The equipment described in this manual was designed for use with nitrogen atmospheres only. Do not substitute or mix other gases without first consulting Electrovert and the gas supplier. Other gases could interfere with the process and introduce additional safety hazards.

1.5 SAFETY REFERENCES

The following is a list of the safety literature that can be references for additional information:

- P–24, Material Safety Data Sheet, Nitrogen Gas, Compressed Gas Association Inc., 1725 Jefferson Davis Highway, Arlington, VA 22202, (703) 413-4341. Note that this is an instruction guide for preparing MSDS's and includes a copy of the MSDS for each of several common gases.
- P–9, "The Inert Gases - Argon, Nitrogen and Helium," Brochure P-9, Compressed Gas Association Inc., 1725 Jefferson Davis Highway, Arlington, VA 22202, (703) 413-4341
- P–14, "Accident Prevention in Oxygen-Deficient Atmospheres," Brochure P-14, Compressed Gas Association Inc., 1725 Jefferson Davis Highway, Arlington, VA 22202, (703) 413-4341
- L-14-162, "A Guide to Safety in Confined Spaces," NIOSH Publication 87-113, U.S. Department of Health and Human Services, Public Health Service, National Institute for Occupational Safety and Health, Robert A. Taft Laboratories, 4676 Columbia Parkway, Cincinnati, Ohio 45226

The next reference is strongly recommended to employers who do not have definitive information on precautions for work in confined spaces:

- ANSI Z117.1 American National Standard, "Safety Requirements for Working in Tanks and Other Confined Spaces," 1989, American National Standards Institute, Inc., 1430 Broadway, New York, N.Y. 10018,

Internet Resources

Many Internet sites offer safety information. Information changes frequently. There are two recommended sites to begin searching for information:

- www.osha.gov
  This site is Occupational Safety and Health Administration's home page.
- www.safetyinfo.com
  This site contains free safety information for business and industry. It also has links to other sites.

SECTION 2: MACHINE INSTALLATION

2.1 SITE SELECTION

The following installation parameters and requirements should be read thoroughly before beginning the installation of the OmniFlo™ System.

AVAILABLE FACILITIES

Choose a location for the machine that provides:

- Adequate machine clearance for maintenance and operation.
- Adequate lighting.
- Adequate ventilation system.
- Utility connections to include
  - Electricity
  - Chilled water (if required for system)
  - Nitrogen or compressed air (if required for system)
  - Exhaust ducting

The nitrogen and flux fumes must be vented to the outside. The exhaust system must meet the minimum requirements for the system. The factory exhaust outlet must not be in the vicinity of an intake for an air conditioning or ventilation duct. Refer to the Engineering Data Sheet (EDS) for proper specifications.

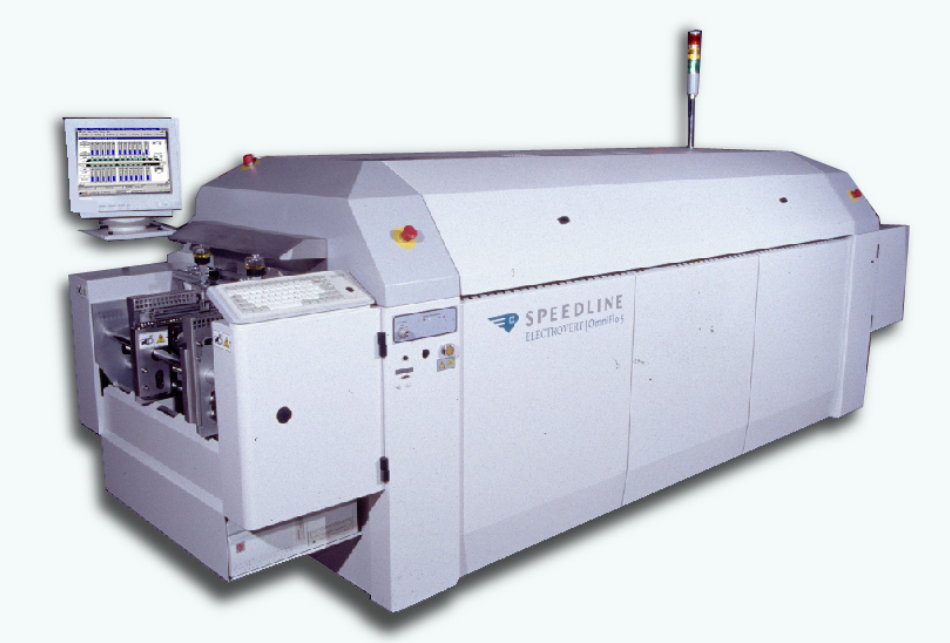


Figure 4: OmniFlo™–5 System

MACHINE SIZE AND ACCESS CLEARANCE

The machine has a maximum length, a maximum width and a maximum height with the levelling legs set at the maximum setting (excluding the optional light tower). An access clearance of 91 cm (36 in.) in the front and 91 cm (36 in.) in the rear of the machine is required to maintain and operate the machine efficiently.

MACHINE WEIGHTS

The OmniFlo™ Series systems have an operating weight and a floor loading weight per levelling leg. Refer to the system layout drawing shipped with the machine for the correct weights specific to each system. The machine must be installed on a solid (no vibration), level, floor that is capable of supporting the machine's weight.

NOTE Pictures in this manual are representative of the OmniFlo™ Series Systems and not indicative of a particular model.

2.2 TECHNICAL DATA

Standard Power Supplies

OmniFlo™–5 and OmniFlo™–7	220-240 VAC, 3-phase, 50 / 60 Hz (4 wires: 3 phase, 1 ground) 380-415 VAC, 3-phase, 50 Hz (5 wires: 3 phase, 1 neutral, 1 ground) 440-480 VAC, 3-phase, 60 Hz (4 wires: 3 phase, 1 ground) *OPTIONAL*: 200/208 VAC, 3-phase, 50 / 60 Hz (4 wires: 3 phase, 1 ground)
OmniFlo™–10	380-415 VAC, 3-phase, 50 Hz (5 wires: 3 phase, 1 neutral, 1 ground) 440-480 VAC, 3-phase, 60 Hz (4 wires: 3 phase, 1 ground)

Power Consumption (FULL LOAD START UP)

NOTE The following values are for maximum power consumption during full load start–up. Power consumption is lower at stabilized process conditions, and varies depending on process parameters and product loading. The supply power requirement is able to be limited through software configuration to consume no more than 65% of the maximum power rating. Selecting this setting extends the time it takes the machine to reach Ready state.

OmniFlo™ — 5		
220 VAC to 240 VAC	64.8 kVA	143 – to 156 Amps
Add optional rail heaters	2.0 kVA	5 Amps
Add optional external water chiller	7.0 kVA	16 – 21 Amps
Add optional integrated heat exchanger	1.5 kVA	4 Amps
NOTE The external water chiller requires a separate power source. It is not connected to the system power.		
380 VAC to 415 VAC	64.8 kVA	83 – 91 Amps
Add optional rail heaters	2.0 kVA	3 Amps
Add optional external water chiller	7.0 kVA	9 – 12 Amps
Add optional integrated heat exchanger	1.5 kVA	3 Amps
440 VAC to 480 VAC	64.8 kVA	72 – 78 Amps
Add optional rail heaters	2.0 kVA	2 Amps
Add optional external water chiller	7.0 kVA	8 – 10 Amps
Add optional integrated heat exchanger	1.5 kVA	2 Amps
OmniFlo™ — 7		
220 VAC to 240 VAC	82.2 kVA	182 – 198 Amps
Add optional rail heaters	2.0 kVA	5 Amps
Add optional external water chiller	7.0 kVA	16 – 21 Amps
Add optional integrated heat exchanger	1.5 kVA	4 Amps

380 VAC to 415 VAC	82.2 kVA	1.5 – 115 Amps
Add optional rail heaters	2.0 kVA	3 Amps
Add optional external water chiller	7.0 kVA	9 – 12 Amps
Add optional integrated heat exchanger	1.5 kVA	3 Amps
440 VAC to 480 VAC	82.2 kVA	91 – 99 Amps
Add optional rail heaters	2.0 kVA	2 Amps
Add optional external water chiller	7.0 kVA	8 – 10 Amps
Add optional integrated heat exchanger	1.5 kVA	2 Amps
OmniFlo™ — 10		
380 VAC to 415 VAC	115.4 kVA	147 – 161 Amps
Add optional rail heaters	2.0 kVA	3 Amps
Add optional external water chiller	7.0 kVA	9 – 12 Amps
Add optional integrated heat exchanger	1.5 kVA	3 Amps
440 VAC to 480 VAC	115.4 kVA	128 – 139 Amps
Add optional rail heaters	2.0 kVA	2 Amps
Add optional external water chiller	7.0 kVA	8 – 10 Amps
Add optional integrated heat exchanger	1.5 kVA	2 Amps

Process Ready Power Consumption

OmniFlo™— 5	
220 VAC to 240 VAC	29 – 47 Amps
Add optional rail heaters	1 – 1.5 Amps
Add optional external water chiller	16 – 21 Amps
Add optional integrated heat exchanger	3 – 4 Amps
380 VAC to 415 VAC	17 – 28 Amps
Add optional rail heaters	0.6 – 0.9 Amps
Add optional external water chiller	9 – 12 Amps
Add optional integrated heat exchanger	2 – 3 Amps
440 VAC to 480 VAC	15 – 24 Amps
Add optional rail heaters	0.4 – 0.6 Amps
Add optional external water chiller	8 – 10 Amps
Add optional integrated heat exchanger	1 – 2 Amps
OmniFlo™— 7	
220 VAC to 240 VAC	37 – 60 Amps
Add optional rail heaters	1 – 1.5 Amps
Add optional external water chiller	16 – 21 Amps
Add optional integrated heat exchanger	3 – 4 Amps

380 VAC to 415 VAC	21 – 35 Amps
Add optional rail heaters	0.6 – 0.9 Amps
Add optional external water chiller	9 – 12 Amps
Add optional integrated heat exchanger	2 – 3 Amps
440 VAC to 480 VAC	19 – 30 Amps
Add optional rail heaters	0.4 – 0.6 Amps
Add optional external water chiller	8 – 10 Amps
Add optional integrated heat exchanger	1 – 2 Amps
OmniFlo™— 10	
380 VAC to 415 VAC	30 – 49 Amps
Add optional rail heaters	0.6 – 0.9 Amps
Add optional external water chiller	9 – 12 Amps
Add optional integrated heat exchanger	2 – 3 Amps
440 VAC to 480 VAC	26 – 42 Amps
Add optional rail heaters	0.4 – 0.6 Amps
Add optional external water chiller	8 – 10 Amps
Add optional integrated heat exchanger	1 – 2 Amps

Exhaust Requirements

OmniFlo™ — 5 **OmniFlo™ — 7** **OmniFlo™ — 10**	
Load End Minimum Requirements	10.16 cm (4 in.) stack 255 m^3/hr. (150 cfm).
Unload End Minimum Requirements (Depends upon processing atmosphere)	Standard air atmosphere stack Minimum of 510 m^3/hr. (300 cfm) Inerted (N_2) atmosphere stack Minimum of 255 m^3/hr. (150 cfm) **NOTE** (Nitrogen version only). The exhaust sensors in the vent cowls shut the system down if minimum exhaust requirements are not met.
Exhaust Slide Dampers • Installed at each stack • Balance ventilation flow	Exhaust rate to generating static water gauge differential 1.25 cm (0.5 in.) measured at the vent cowling Nominal exhaust temperatures Not to exceed 70 °C (160 °F) for water cooled system
Air Cooled System	Requires high temperature ducting equipped with inspection and cleaning access ports

System Overall Dimensions

OmniFlo™ — 5	Length:	378.5 cm (145 in.)
	Width:	130.4 cm (51.3 in.)
	Height:	142.2 cm. (56.0 in.)
OmniFlo™ — 7	Length:	491.7 cm (193.6 in.)
	Width:	130.4 cm (51.3 in.)
	Height:	142.2 cm. (56.0 in.)
OmniFlo™ — 10	Length:	605.0 cm (238.2 in.)
	Width:	130.4 cm (51.3 in.)
	Height:	142.2 cm. (56.0 in.)

Estimated Weight of System

OmniFlo™ —5	1440 kg (3200 lb.)
OmniFlo™ — 7	1796 kg (3960 lb.)
OmniFlo™ — 10	1980 kg (4356 lb.)

Conveyor Data

OmniFlo™ —5 **OmniFlo™ — 7** **OmniFlo™ — 10**	
Speed	3 to 178 cm/min. (1 to 70 in./min.)
Clutch Torque	Standard Mesh Belt Conveyor: 20.3 Newton-m (180 lb.-in.) Pin Chain or Combination Conveyor: 33.9 Newton-m (300 lb.-in.) Motorized Pin Chain Width Adjust: 9.6 Newton-m (85 lb.-in.)
Speed Accuracy	± 1.0 cm/min. (±0.4 in./min.)
Process Height	Belt: 64mm (2.5 in.) Rail: 38mm (1.5 in.) above; 25mm (1.0 in.) below
Pin Chain Conveyor Process Width	Minimum: 50mm Maximum: 508mm (20.0 in.) **NOTE** If equipped with optional CBS conveyor, minimum process width is 7 cm (2.75 in.).
Mesh Belt Conveyor Process Width	Maximum usable: 53.3 cm (21 in.) Overall width: 55.9 cm (22 in.) **NOTE** If equipped with optional combination conveyor, maximum usable mesh belt width is 48 cm (19 in.).
Conveyor Height from Floor	Belt: 81.3 cm (32 in.) to 91.4 cm (36 in.) Rail: 83.8 cm (33 in.) to 94 cm (37 in.) **NOTE** Use leveling bolts to adjust conveyor height.

Maximum Forced Convection Heating Module Blowers

OmniFlo™ — 5	
Top (5 Blowers)	1350 m^3/hr (800 cfm) @ 60 Hz 1283 m^3/hr (760 cfm) @ 50 Hz
Bottom (5 Blowers)	1350 m^3/hr (800 cfm) @ 60 Hz 1283 m^3/hr (760 cfm) @ 50 Hz
Total (10 Blowers)	2700 m^3/hr (1600 cfm) @ 60 Hz 2565 m^3/hr (1520 cfm) @ 50 Hz
OmniFlo™ — 7	
Top (9 Blowers)	2430 m^3/hr (1440 cfm) @ 60 Hz 2309 m^3/hr (1368cfm) @ 50 Hz
Bottom (7 Blowers)	1890 m^3/hr (1120 cfm) @ 60 Hz 1796 m^3/hr (1064 cfm) @ 50 Hz
Total (16 Blowers)	4320 m^3/hr (2560 cfm) @ 60 Hz 4104 m^3/hr (2432 cfm) @ 50 Hz
OmniFlo™ — 10	
Top (12 Blowers)	3240 m^3/hr (1920 cfm) @ 60 Hz 3078 m^3/hr (1824 cfm) @ 50 Hz
Bottom (10 Blowers)	2700 m^3/hr (1600 cfm) @ 60 Hz 1600 m^3/hr (1520 cfm) @ 50 Hz
Total (22 Blowers)	5940 m^3/hr (3520 cfm) @ 60 Hz 5643 m^3/hr (3344 cfm) @ 50 Hz

2.3 TOOL KIT

The standard tool kit that is shipped with the OmniFlo™ Series machines contains the following items:

- Relay 24Vdc, 10 A, single pole double throw, two (2) each
  P/N 2-5004-227-00-0
- O ring, quick connect, two (2) each
  P/N 2-5031-153-00-0
- Insulator, ceramic, two (2) each
  P/N 2-5038-212-00-0
- Speeder Crank tool, one (1) each
  P/N 2-6013-063-00-0
- Hex Wrench, 4mm Short Armort Arm, one (1) each
  P/N 2-6013-066-00-0
- Hex Wrench, $^{5}/_{16}$" Short Arm, one (1) each
  P/N 2-6013-066-00-0
- Hex Socket, $^{3}/_{4}$" x $^{3}/_{8}$" drive, one (1) each
  P/N 2-6013-066-00-0
- Tool Kit Box, one (1) each
  P/N 2-6013-127-00-0
- Hex Wrench, 6mm 6" Short Arm, one (1) each
  P/N 2-6013-130-00-0
- Screw Driver, T20, $^{3}/_{8}$" Drive, one (1) each
  P/N 2-6013-138-00-0
- Adhesive Grease, Krytox, one (1) each
  P/N 2-9304-108-00-0
- Insulation tape, one (1) each
  P/N 2-9305-019-00-0
- EMI Bearing Retainer, (1) each
  P/N 3-0218-439-01-1
- Relay, Double Pole Double Throw, 8 pin, one (1) each
  P/N 520119-01
- Tribol, 930 lubricant, 500ml, one (1) each
  P/N 6-0568-003-01-1

2.4 SYSTEM DRAWINGS

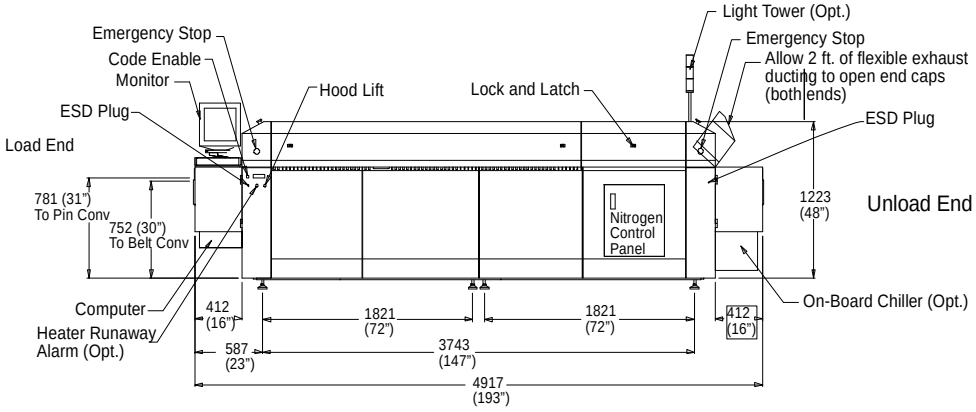


Figure 5: OmniFlo™-5 Front View

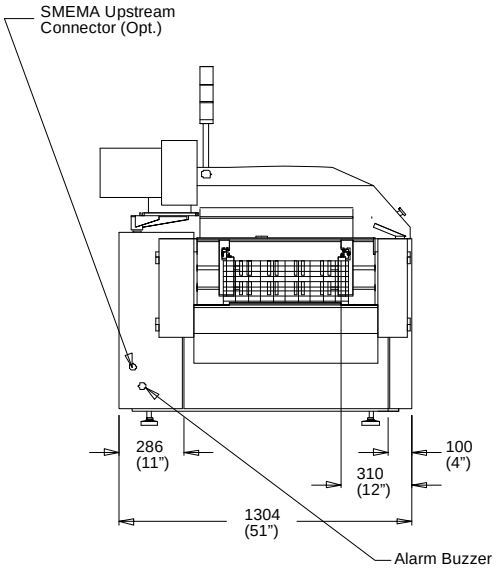


Figure 6: OmniFlo™-5 Load End View

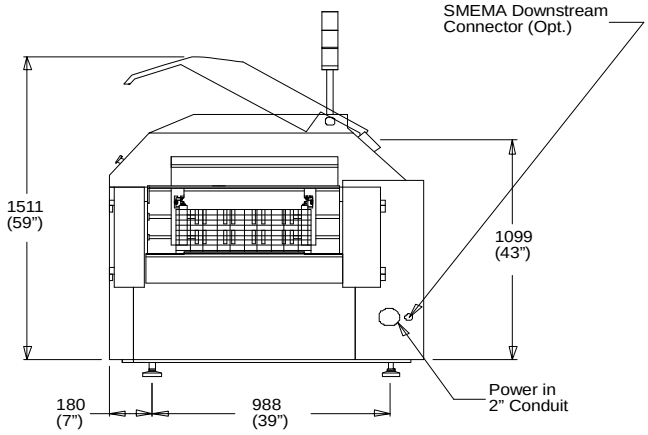


Figure 7: OmniFlo™-5 Unload End View

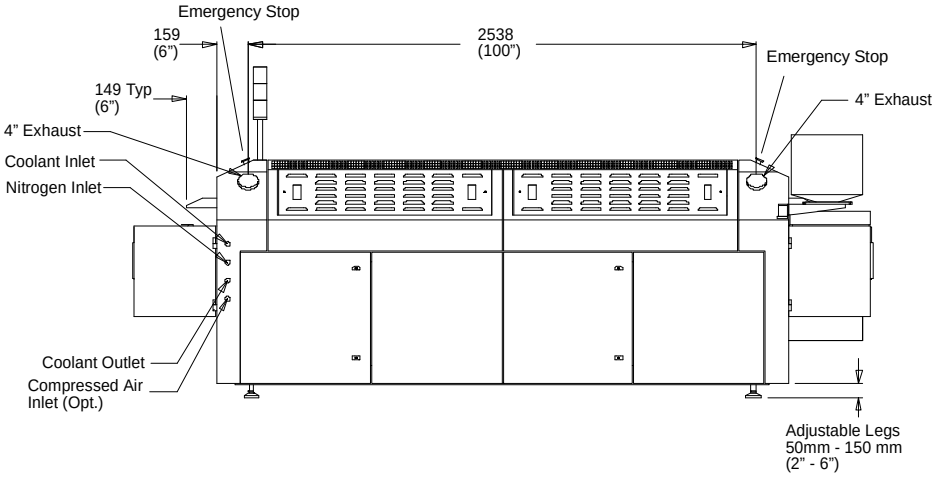


Figure 8: OmniFlo™-5 Rear View

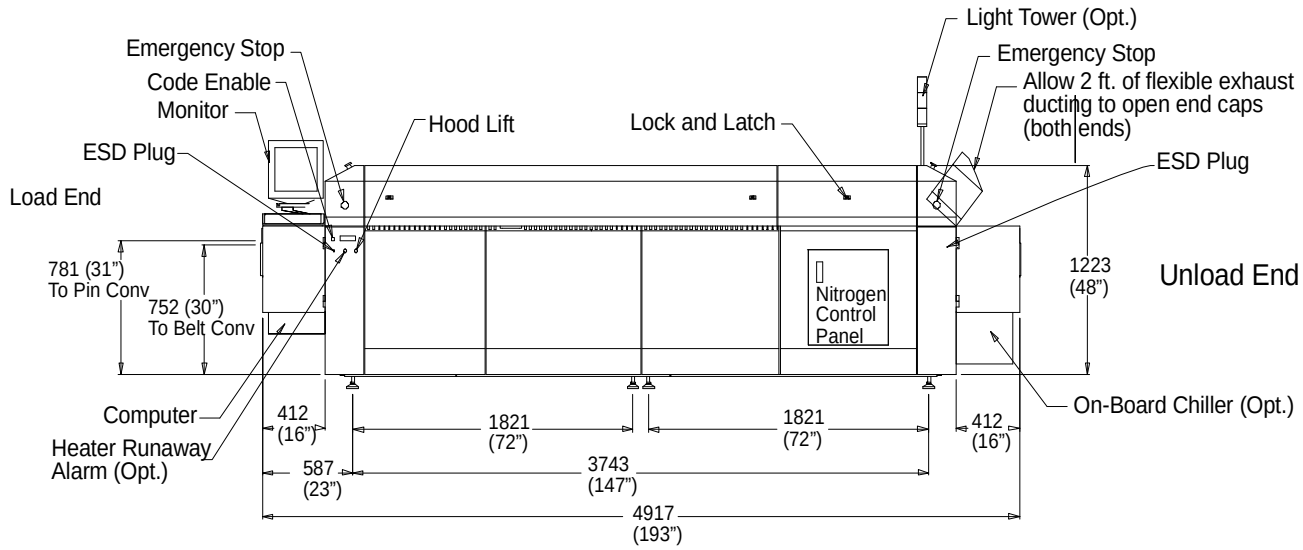


Figure 9: OmniFlo™-7 Front View

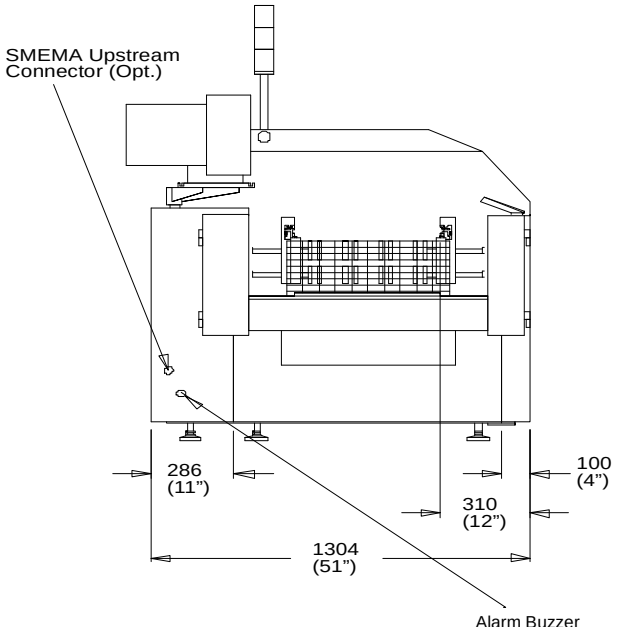


Figure 10: OmniFlo™-7 Load End View

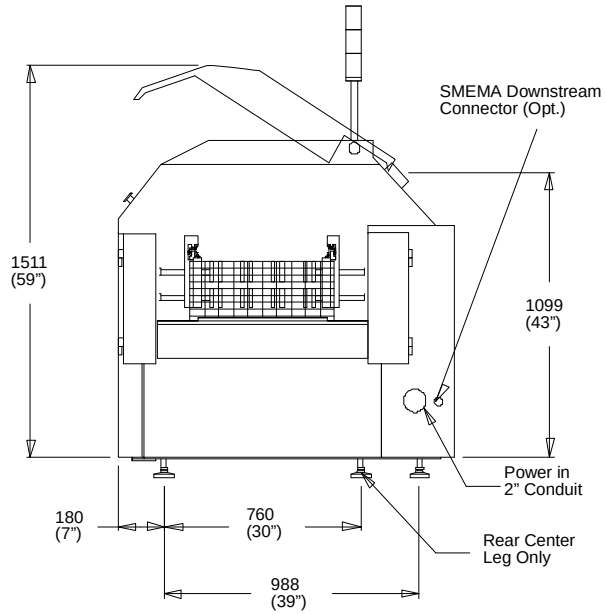


Figure 11: OmniFlo™-7 Unload End View

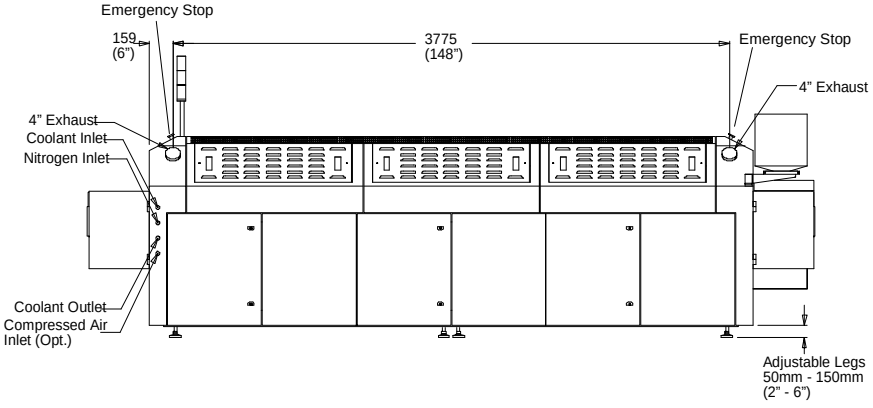


Figure 12: OmniFlo™-7 Rear View

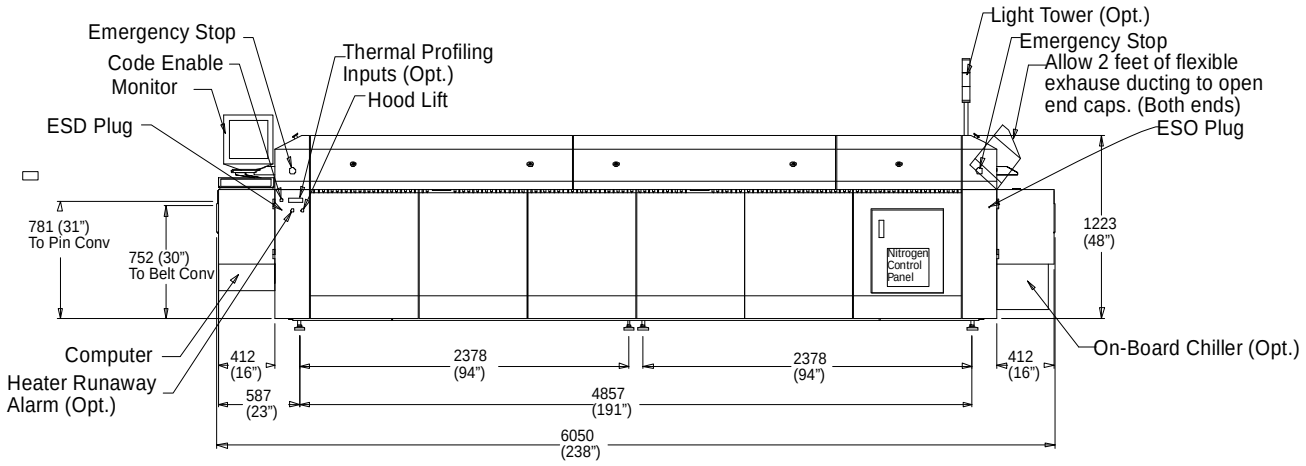


Figure 13: OmniFlo™-10 Front View

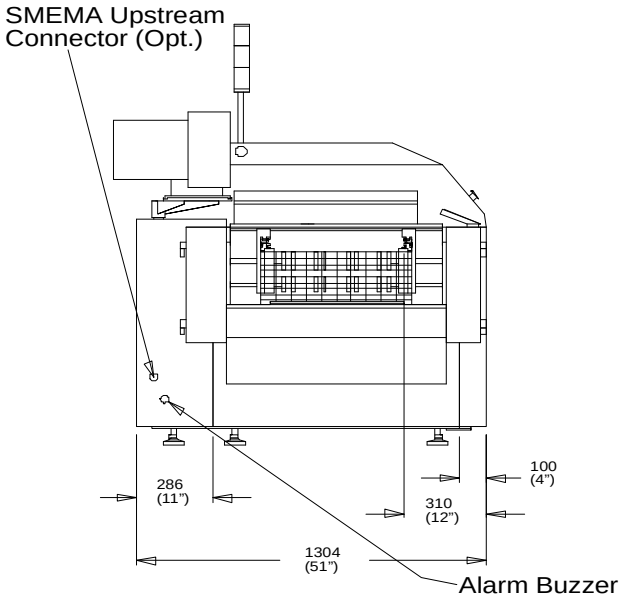


Figure 14: OmniFlo™-10 Load View

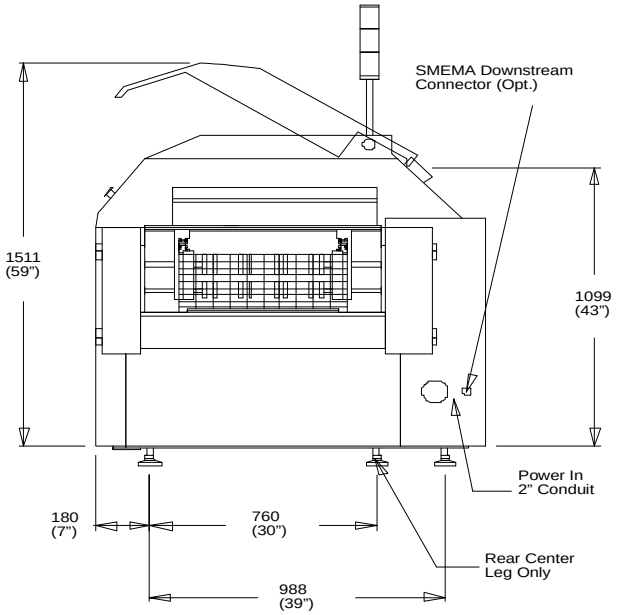


Figure 15: OmniFlo™-10 Unload View

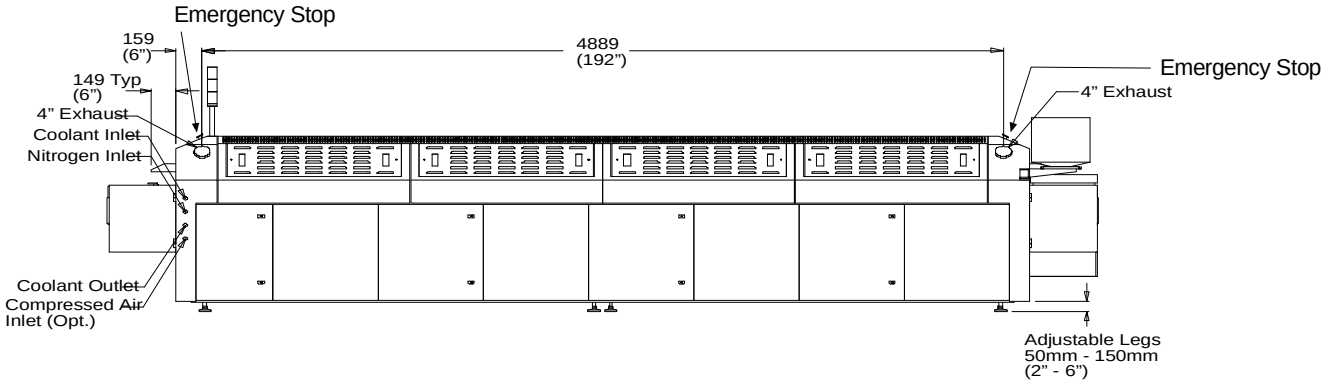


Figure 16: OmniFlo™-10 Rear View

2.5 INSTALLATION CHECKLISTS

Table 1: Standard System Installation Checklist

	Inspect machine for damage from shipment.	Refer to 2.7 and 2.8
	Verify that all parts of the machine are present.	Refer to 2.7
	Verify that warning labels are on the machine.	Refer to Section 1 Safety
	Level the OmniFlo™ System.	Refer to 2.9
	Install the computer.	Refer to 2.11
	Install the monitor.	Refer to 2.11
	Make utility connections from facility to OmniFlo™ System	Refer to 2.12
	Verify that all electrical components are and wires are correctly torqued.	Refer to 2.13
	Verify machine name plate voltage.	Refer to 2.14
	Verify facility power.	Refer to 2.14
	Verify system voltage.	Refer to 2.14
	Verify that computer turns On and machine software boots.	Refer to 2.14
	Verify that software is configured with correct options.	Refer to OmniFlo™ Series Operations Manual Section 4
	Verify ease of operation of doors, panels and covers.	Refer to 2.18
	Verify Hood Open.	Refer to 2.18
	Verify thermocouple location.	Refer to 2.19
	Verify exhaust hose connection.	Refer to 2.15
	Verify continuous seal around top chamber.	Refer to 2.22
	Operate the conveyor and verify speed accuracy.	Refer to 2.20
	Confirm that the photocell is operating correctly.	Refer to 2.21
	Close hood and verify seal.	Refer to 2.22
	Verify that blowers work properly.	Refer to 2.23
	Test OmniFlo™ System operation	Refer to 2.25

NOTE All sections referenced are in this Installation Manual unless otherwise noted.

Table 2: Options Installation Checklist

Pin Chain/Combination Conveyor		
	Verify pin chain is lubricated.	Refer to OmniFlo™ Series Maintenance Manual Section 7.3
	Verify rails are not bent or warped and are parallel within tolerance.	Refer to OmniFlo™ Series Maintenance Manual Section 7.5
	Verify width adjust works properly	Refer to OmniFlo™ Series Operations Manual Section 6.3 — Width
	When the machine is hot, verify rail expansion.	Refer to OmniFlo™ Series Maintenance Manual Section 7.3
Inert Chamber		
	Verify oxygen level is below 30 ppm with nitrogen set to 1500 scfh.	Refer to 2.17
	Verify coolant flow in cooling zone. An alarm appears if coolant flow is low.	Refer to OmniFlo™ Series Operations Manual Section 7 for more information on Software Error Messages

2.6 RECEIVING INSTRUCTIONS

Damage Inspection

Upon receipt, the shipment should be thoroughly inspected. If any signs of damage or loss are detected, details should be entered on the freight bill or receipt and signed by the carrier's agent. Failure to follow this procedure may result in refusal of the claim by the carrier. The carrier will furnish the necessary forms for filing a claim.

If it is necessary to file a claim for concealed damage, it must be filed within 48 hours of delivery. As soon as the damage is discovered, request an inspection by the carrier. Keep all cartons, packing materials and paperwork. The carrier will furnish an inspection report and the necessary forms for filing the concealed damage claim, since such damage is the carrier's responsibility.

2.7 CRATE AND SYSTEM HANDLING

When the shipment arrives at the factory, keep it in the crate until ready to start the installation. This minimizes the chance of damaging the system while moving it through the factory.

WARNING Heavy Equipment Hazard – Attempting to lift the system with only one (1) device that is not configured or rated for the system's load capacity or measurements is dangerous to both equipment and personnel and will damage the system's structure.

CRATE REMOVAL

International Shipments Only

Read this section in its entirety prior to performing any dismantling procedures to prevent damage to the equipment.

WARNING Heavy Objects – Do not attempt to move large assemblies without the use of a fork lift or other rigging equipment. Some large assemblies are extremely heavy. Attempting to lift by hand may cause equipment damage or injury to personnel.

1. Transport the system crate to the general vicinity of installation using a forklift that is large enough to safely handle the system's shipping weight.
2. Using a circular saw with a rip cut blade, adjust the blade depth to approximately 2 cm ($^3/_4$ in.). Carefully cut one (1) end panel of the crate as illustrated by the dotted line in Figure 17, approximately 20 cm (8 in.) from the top of the crate. Repeat this step for the opposite end of the crate.
3. Adjust the depth of the circular saw blade to maximum depth.
4. Cut along the length (long side) of one (1) side of the top edge of the crate as illustrated by the dotted line in Figure 17, approximately 20 cm (8 in.) from the top of the crate.

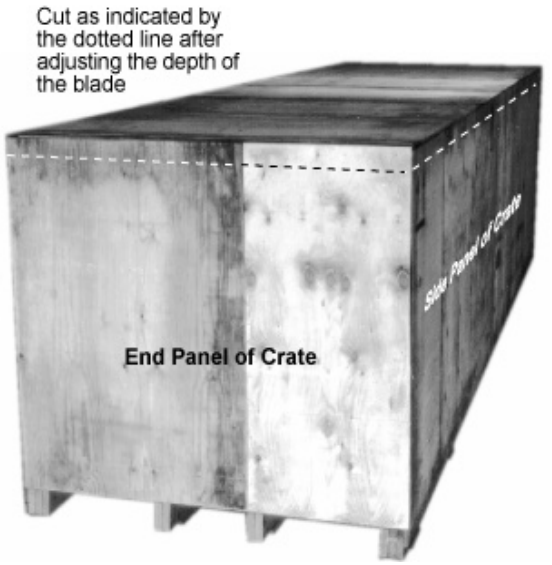


Figure 17: Location of Cutting Line

5. Make an additional cut using the circular saw along the length of the opposite side of the top edge of the crate, approximately 20 cm (8.0 in.) from the top of the crate.
6. The top of the crate should now be free from the crate as illustrated in Figure 18. Carefully slide the top of the crate off using several personnel or with the aid of a fork lift.

Figure 18: Removing Lid from Machine Crate

NOTE Ensure that the trailing edge of the crate top does not drop into the open crate onto the system.

7. Carefully remove any additional bracing from the inside of the top of the crate.

8. Using pry bars and claw hammers, remove the ends of the crate, then remove the sides of the crate.

PACKING REMOVAL

The system arrives carefully padded and secured. Remove the packaging materials from the locations outlined below:

1. Remove the strapping from the perimeter of the system.
2. Remove the foam padding and packaging tape covering the external areas of the system.
3. Remove any desiccant packs placed inside the system's electrical cabinet and hood covers near the blower fans.
4. The entire system is wrapped in moisture absorbent plastic to prevent damage to the equipment during transit. Remove the plastic from the system.
5. Cut and remove the strapping securing all cardboard containers and optical components secured to the system skid.
6. Carefully place all components in a safe place close to the site of installation for further installation procedures.

NOTE Do not open any cardboard containers until directed by the procedures in the manual.

Verify that all parts of the machine are present. In addition to this manual, a bill of materials, mechanical drawings and electrical drawings are included.

NOTE Sales drawings with facility requirements are included in the documentation package to aid in installation.

SKID REMOVAL

The system is mounted on wooden planks with foam shock pads and then bolted to a wooden skid.

Bolts are installed in the existing levelling foot locations to secure the metal shipping plates to the underside of the system frame. Bolts are then inserted through the mounting holes in the skid, through the foam pads, through the planks, then through the mounting holes on the shipping plates. They are retained with jam nuts to secure the system in place on the skid.

1. Use a 3/4 in. socket wrench and ratchet to remove the two (2) jam nuts from each of the bolts from the top side of the wooden planks.

CAUTION Extend the forks to the maximum width to minimize the risk of tilting the system off the end of the forklift. To avoid damage, lift the system via the two frame supports located under the system cabinet adjacent to the leveling pads.

2. When all jam nuts have been removed from the shipping plates, carefully position a fork lift, with the fork extensions at their widest setting, under the frame. Make sure that the forks make proper contact with the base beams to avoid damage to the wiring and metal panels underneath the machine.

3. With the fork lift in place at the rear of the machine, carefully raise the system off the skid high enough to remove the shipping plates and bolts, securing them to the system frame.

Use a $1^1/_2$ in. socket with ratchet to remove the bolts.

Proceed immediately to the next section, “Installing Leveling Feet.”

INSTALLING LEVELING FEET

1. Locate and open the cardboard container labeled “Documentation Package Enclosed”. Remove the system leveling feet from the container.
2. While the system is still elevated above the skid, install the leveling feet.
3. Install the leveling feet so they extend approximately 12.7 cm (5 in.) from the base of the system frame. Be consistent with each leveling foot
4. Bring the lift truck in from the rear of the machine (do not lift from the front), and make sure that the forks are long enough to span the width of the system. Extend the lift forks to their widest position on either side of the machine’s center of gravity to minimize the risk of toppling the machine.
5. Using the fork lift, carefully position the system into place for installation.
6. Carefully and slowly lower the system onto the pads at the site of installation; then, remove the fork lift.

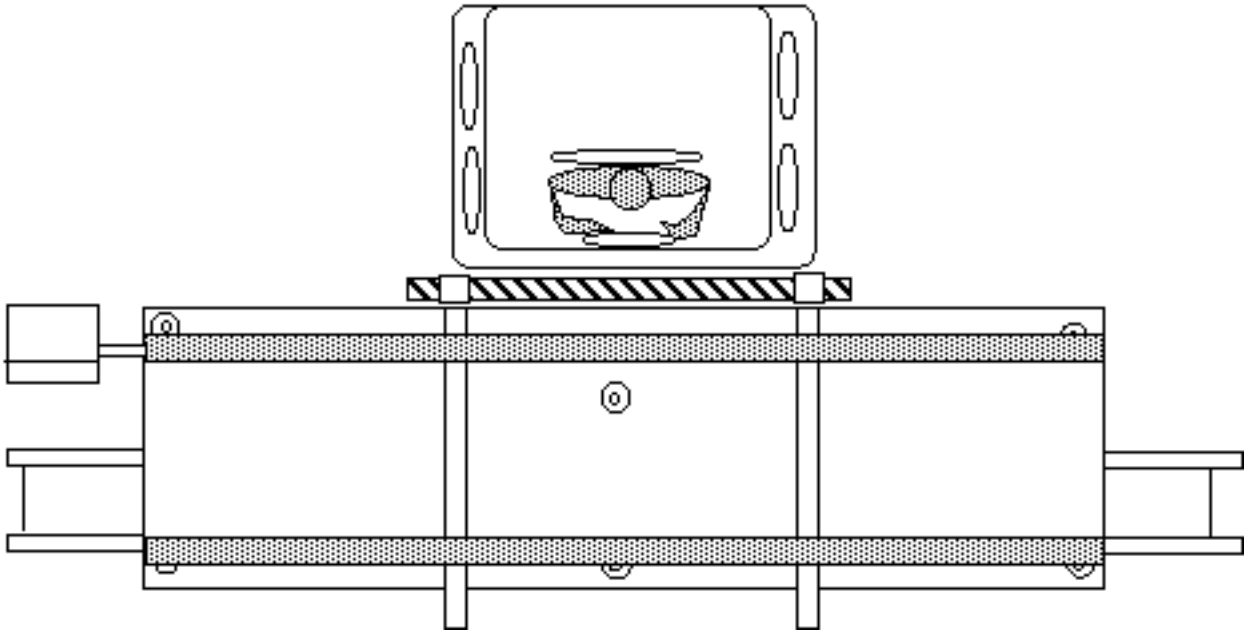


Figure 19: Positioning Crate on Fork Lift

2.8 INSPECTION

When the shipment is placed at the installation site and has been unpacked, check the parts that are crated or boxed separately. Take care not to damage these items when unpacking them. Until all machine parts are accounted for, do not discard any boxes or packing materials.

Machines that are shipped either by sea or air have desiccant bags inserted in electrical cabinets to prevent moisture buildup and corrosion of components; for the same reason, motor vents and exposed shafts or moving parts may also be taped or sealed with special sealants. Remove all desiccant bags and tapes. Use mineral spirits and a clean rag to wipe off the remaining sealant residues.

Visually inspect for concealed damages. Check for damage to any of the sensitive instruments and controls. Check for dents or punctures through the enclosure. Ensure that nothing is missing. All machines are supplied with a tool and accessories kit, keys for control switches, a technical manual and mechanical and electrical drawings. Report any loss or damage to an Electrovert representative immediately.

2.9 HEIGHT AND LEVELING ADJUSTMENT

The machine is configured with leveling pads/ legs used for height adjustment and leveling. The height is dependent on the heights of the incoming and outgoing conveyors. The leveling must be accomplished from Unload–to–Load and from front–to–rear.

Adjust the feet so that the machine is at its approximate required height and level the system using the following procedure:

1. Ensure that the system is positioned on a level area of the floor.
2. Open the cabinet hood and place a spirit (bubble) level on the front edge of the cabinet frame.
3. Adjust the Unload End and Load End front pads until the spirit level indicates that the front face of the cabinet is level from Load End to Unload End.
4. Level the system from front to rear by placing a spirit level across the conveyor shaft at the Unload End of the machine. Adjust the two (2) Unload End pads (front and rear) until the spirit level indicates a level condition.
5. Repeat the same procedure at the Load End of the system.
6. When the machine is level front–to–rear, it is necessary to re–check the leveling at the front of the machine for Load–to–Unload leveling, as done in Step 3. If it is necessary to correct the leveling, adjust the legs at the front and rear equally to avoid disturbing the front–to–rear leveling.
7. When the four (4) end legs (two load and two unload) have been adjusted for the most level condition possible, adjust the remaining center legs to make contact with the floor surface firmly to serve as support for the remaining system weight.

2.10 POSITION TERMS

Throughout this manual the terms front, rear, load end, and unload end are used. These terms have a direct relationship to the conveyor. The front side is the side closest to the operator's control panel, load end is the end where the product is placed on to the conveyor. The following diagram illustrates these locations:

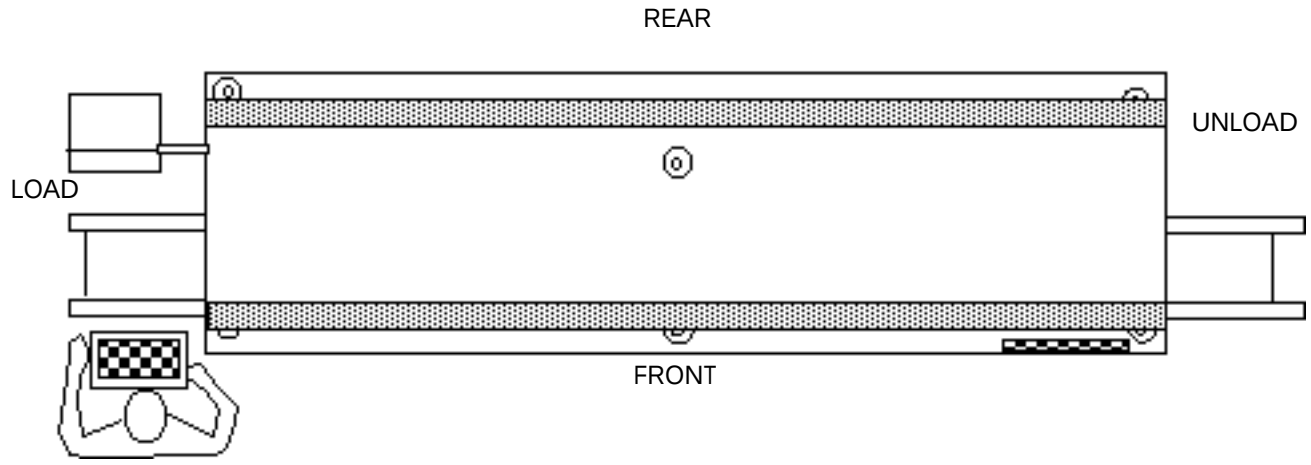


Figure 20: Location Descriptions

2.11 COMPUTER INSTALLATION

The computer and monitor are packed separately. Remove the computer from the packing material. Place it in the CPU slot at the Load End of the machine. It is located under the keyboard on the front of the machine.

The monitor is mounted on the monitor viewing pedestal.

Figure 21: Load End OmniFlo™ System

Align the monitor with the tabs on the pedestal and snap into place.

Figure 22: Monitor Pedestal

The computer cables that plug into the CPU are connected to the machine when the machine is shipped. It is important to plug the power supply into the CPU before attaching any other cables. This ensures that ground is provided to the computer to avoid static damage.

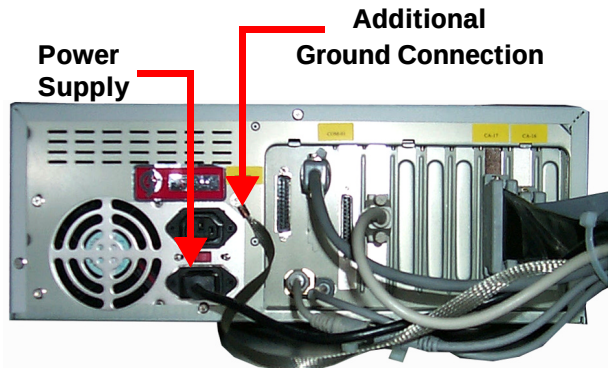


Figure 23: Back of the Computer Case (Properly Connected)

After the cables to the Computer Case are connected, connect the cables from the Computer Case to the monitor.

Figure 24: Back of Computer Monitor

The hard disc drive for the OmniFlo™ Series system computer is shipped separately.

Figure 25: Hard Drive in Packing Material

Two keys are taped to the hard drive. The key is used to secure and lock the hard drive in the computer case when it is installed.

Remove the hard drive and the keys from the box. Place the hard drive in the Computer Case and slide it toward the back until it fits into place — the metal side of the cassette faces upward.

Insert one of the keys provided into the lock just to the right of the hard drive and turn it clockwise a quarter of a turn to lock it in place.

Close the small door that covers the cassette case.

2.12 SYSTEM CONNECTIONS

Main Power is supplied by the user to the unload end of the system cabinet. The machine is equipped with a Main Power Disconnect switch (not fused). It is recommended that main power be brought to the machine via wall-mounted fused (lockout capable) disconnect in accordance with local electrical codes.

The utility connections are made at the rear unload end of the system cabinet.

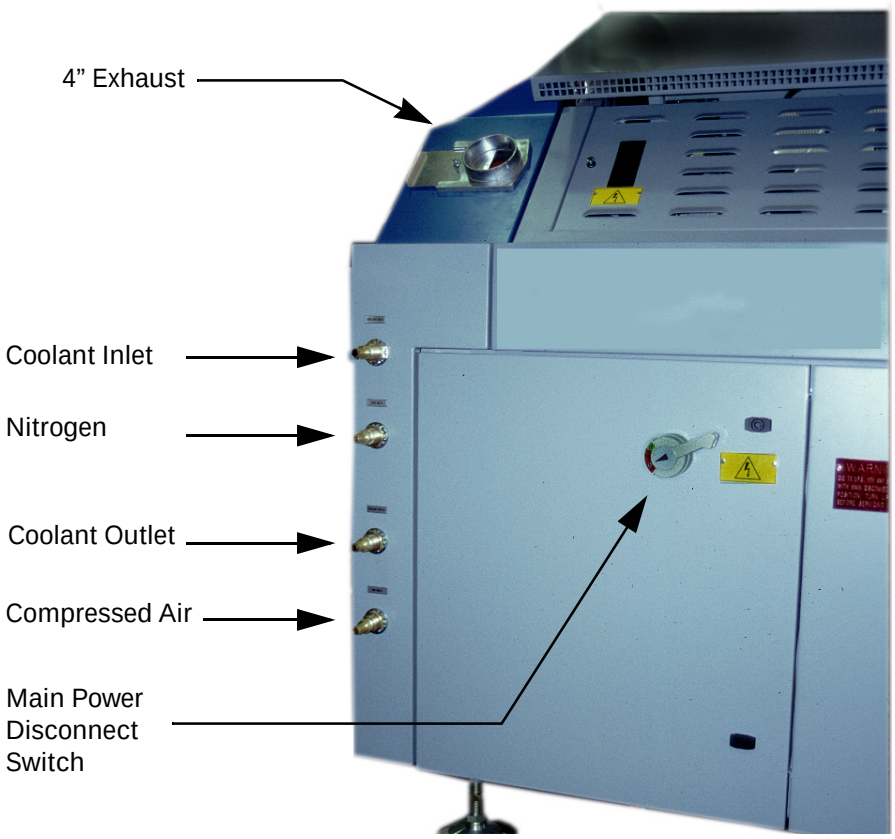


Figure 26: System Connections and Main Power Disconnect

UTILITY CONNECTIONS

The 1/2 in. FNPT inlet fittings are pre–treated with teflon tape at the factory. To connect the utility hoses, place the hose on the hose barb and tighten with a hose clamp.

2.13 ELECTRICAL CONNECTIONS

WARNING **Electrical Hazard**: Ensure that power is not applied to the machine before performing the following procedure. Failure to do so exposes personnel to dangerous voltage levels.

It is possible for the wire connections to the electrical connections to become loose during the crating, transportation and uncrating process. **A potential fire hazard exists if the wires overheat.**

To ensure that a safety hazard does not exist, torque the appropriate connections during machine installation (and also quarterly as part of the preventive maintenance of the machine — refer to the OmniFlo™ Series Maintenance Manual).

Visually inspect all electrical connections first to see if any are noticeable loose or damaged as a result of transit. Check for any debris that may have fallen onto a connection during uncrating. Clean out any dust or particulate matter. When complete, torque the Terminal Blocks, Circuit Breakers and SSR's to the specifications in the following table.

Table 3: Newton–Meter/Torque Settings

DEVICE	Nm	IN.–LBS.
CB (Circuit Breaker)	2.0	17.5
SSR — Terminals 1 & 2 (AC)	2.3	20.0
SSR — Terminals 3 & 4 (dc)	1.2	10.0
TB (Terminal Block) M6	0.6	5.3
TB M10	1.4	12.4

WARNING It is particularly important to torque the heater terminal blocks located under the 45° angle panels on the upper rear edge of the machine. Failure to maintain proper torque settings on the Terminal Blocks poses a fire hazard. Damage to equipment or personnel may occur.

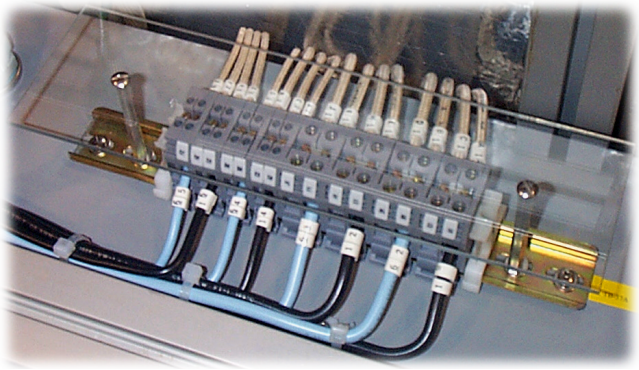


Figure 27: Example of a Terminal Block Strip for the Heaters

TORQUING PROCESS

Tools/Materials Needed

- Torque Wrench

Procedure

- The terminal block connections for the heaters are located on the upper rear edge of the machine under the 45°–angled panels. Remove the panels to access the heater's terminal blocks.

NOTE The larger terminal blocks are M10 terminal blocks. The smaller terminal blocks are M6 terminal blocks.

- Using a torque wrench, torque the M10 terminal block connections to 1.4 Nm (12.3 in.–lbs).
- Torque the M6 terminal blocks to 0.6 Nm5 (.3 in.–lbs).
- Torque the bus bar screws to 0.6 Nm (5.3 in.–lbs).

2.14 POWER CHECK AND CONNECTION

Tools Needed

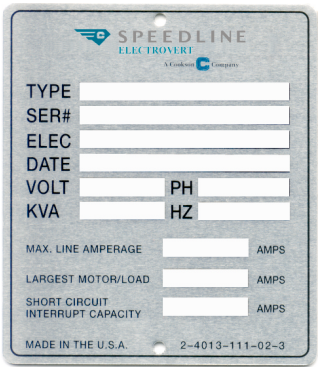
- Digital Voltmeter (DVM)
- M6 Hex Wrench
- Hex Wrench appropriate to power connections

Procedure

1 Inspect the machine serial number name plate and note the voltage configuration.

2. Verify that facility voltage conforms to machine specifications.

SERIAL NAME PLATE



- Using a digital voltmeter set to the expected range, measure the facility voltage between L1 and L2.
- Measure the facility voltage between L2 and L3.
- Measure the facility voltage between L1 and L3.

The three voltage measurements should be approximately equal.

The facility voltage (just measured) and the voltage listed on the machine serial number name plate must be approximately the same.

CAUTION Ensure that the power delivered to the machine matches the power indicated on the serial number nameplate (and on the electrical drawing) supplied with the system. If power does not match, do not apply power: contact Speedline/Electrovert Technical Support.

NOTE If configured with the UPS option, ensure that the UPS is electrically connected and that the output is enabled. The UPS is turned Off for shipping. Refer to the Options Manual for more details on the UPS.

CAUTION **First–time** power up is performed by a trained Speedline Electrovert Representative during the initial installation.

POWER CONNECTION

CAUTION Connect the wiring to the machine before connecting the wiring to facility power.

3. The customer must provide a fuse or circuit breaker between the facility power and the machine. Refer to the electrical schematics that shipped with the machine documentation for the rating necessary for a specific OmniFlo™ Series System.
4. Locate the main power inlet at the rear unload end of the system. Locate the Main Power Disconnect Switch and circuit breaker configuration in the unload rear of the machine.
5. Route the power lines from the entry point of the machine to the Main Power Disconnect Switch.
6. Use an appropriately sized Allen wrench to connect the wires to the Main Power Disconnect Switch — the size of the connections differ with voltage configuration.

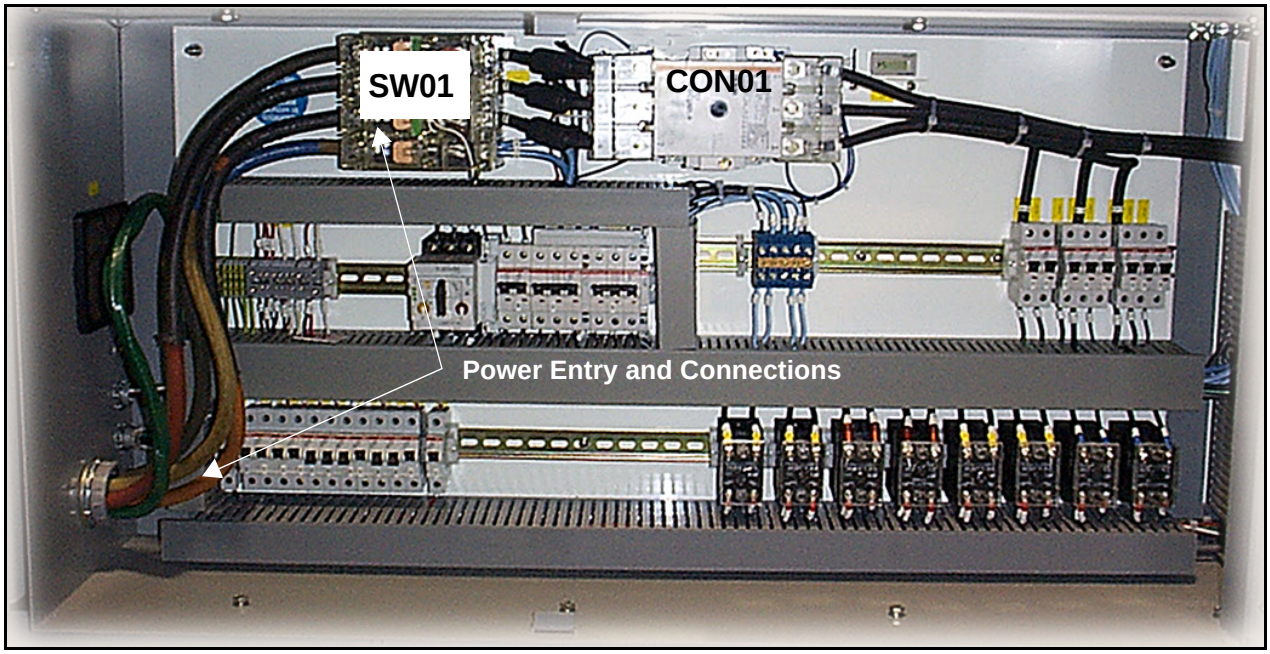


Figure 28: Power Cabinet

7. Using an M6 Allen Wrench, connect the ground line to the ground terminal block located near the Main Power Disconnect Switch.
8. Turn on the Main Power Disconnect Switch — SW01.

NOTE On “five wire” systems, connect the neutral wire to the additional (neutral) terminal block. Verify the electrical grounding with an ohmmeter before applying power for the first time.

Power Distribution Signal Flow Diagram

9. Check the voltage at CB51 between #3 (L1) and #5 (L2). It should be approximately the same voltage that was measured in Step 2.
10. Check the voltage at CB50 between L1 and L2. It should be approximately the same voltage that was measured in Step 2.
11. Check the voltage across CB51 #5 (L3) and CB50 L2. It should be approximately the same voltage that was measured in Step 2.
12. Check the voltage between #116 (GND) and #61 on CB52. It should be approximately 150 VAC.
13. Check the voltage between #116 (GND) and #60 on CB52. It should be approximately 190 VAC.
14. Check the voltage between #116 (GND) and # 59 on CB52. It should be about 230 VAC.

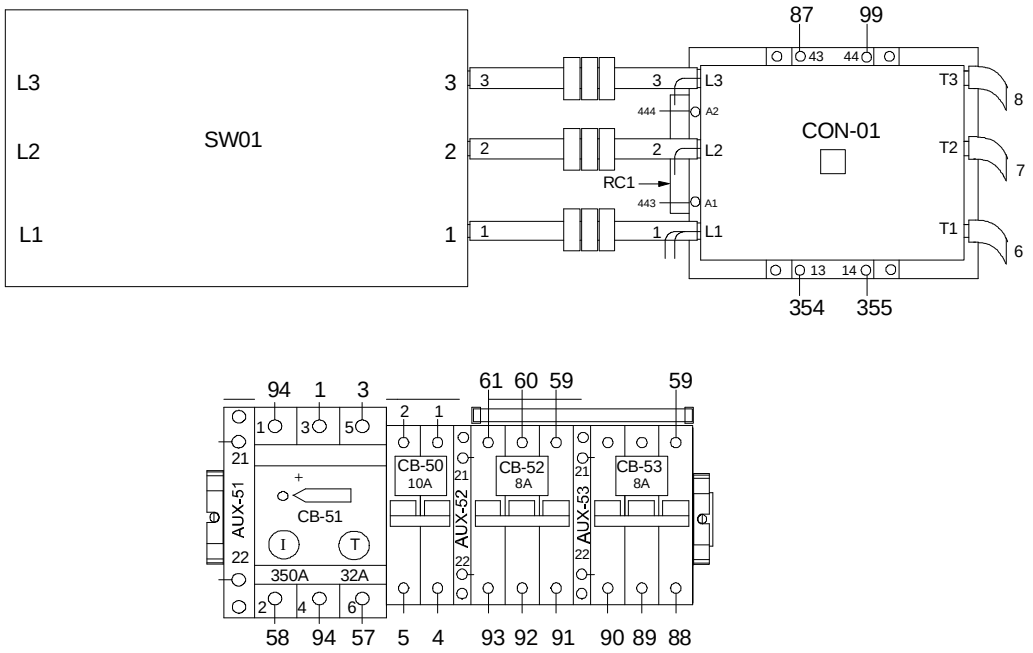


Figure 29: Disconnect Switch SW01, Contactor CON01, Circuit Breakers CB51, CB50, CB52, and CB 53 (Located in Power Cabinet)

15. Check the voltage between 115 and 114 at CB30 and GND. It should be about 115 VAC.
16. Turn the computer and monitor On and verify that machine software boots.

NOTE The computer should turn On with the Process Graphic Screen displaying on the monitor.

ESD (Electrostatic Discharge) Grounding Jacks

There are ESD Jacks located at the Load End and Unload End of the machine. They are provided to minimize the risk of static damage to the boards or components during loading or unloading of the product. During installation it is not necessary to connect anything to the ESD jacks.

NOTE The optional Extended Cooling Module is powered by a three–phase AC motor. If the module does not operate upon installation, remove power from the machine and reverse any two of the three leads to the motor. Re–apply power and continue with installation.

2.15 EXHAUST SET–UP AND BALANCING PROCEDURE

EXHAUST SET–UP

NOTE The following exhaust specifications are to assist the customer in specifying an exhaust blower capable of exhausting the system. All exhaust measurements are measured at the system exhaust port. Contact your local HVAC - Heating, Ventilation, and Air Conditioning specialist for blower requirements and ventilation hook-up for your facility.

Exhaust Connection

There are two 10.4 cm (4 in.) exhaust ports total on the rear of the OmniFlo™ machine. Flexible exhaust hose that adequately vents the machine must be secured to the exhaust ports.

- If the factory connection is not flexible tubing, attach flexible tubing to the factory connection and secure with a hose clamp.
- Attach the tubing to one of the exhaust ports on the OmniFlo™ system.
- Secure the hose with a hose clamp.

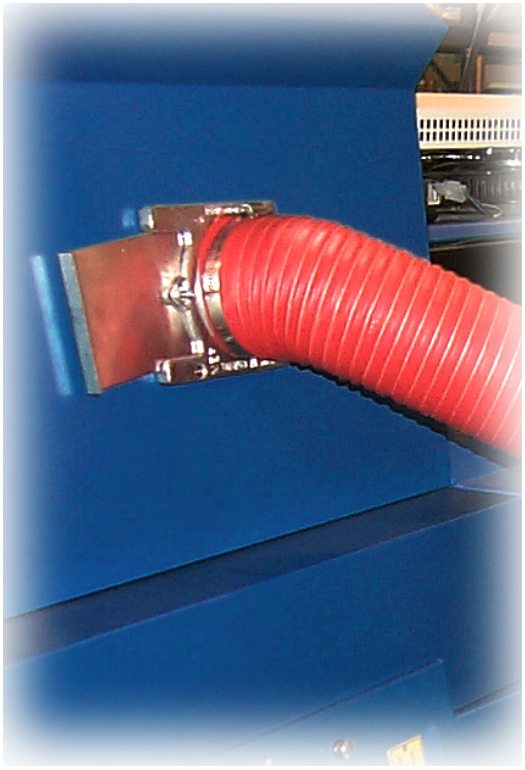


Figure 30: Exhaust Port Properly Connected

- Repeat for the other exhaust port.
- Proceed with Exhaust Balancing Procedure.

EXHAUST BALANCING PROCEDURE

While the load end exhaust requirements are the same for both air cooling and inert models, the function of the unload end exhaust changes depending upon whether the machine is equipped with air cooling or inert cooling.

Exhaust Control Dampers (Blast Gates)

Exhaust intakes are located at the entrance and exit of the reflow tunnel to extract the fumes and nitrogen before they escape into the workplace. To adjust the exhaust, each exhaust intake has its own damper located just before the exhaust flows into one of the main stacks. Use a smoke generator (Draeger) to adjust the damper so there is a slight flow from the oven to the exhaust intakes. Suppliers of Draeger air flow detectors are:

Manufacturer (Germany)

Dragerwerk Aktiengesellschaft
2400 Lubeck 1
Moislinger Allee 53/55
Postfach 1339
Tel: 011-49-451-8820
Fax: 011-49-451-8822080
Tlx: (41) 26807 O DWL D

US Sales Office

National Draeger Inc.
101 Technology Drive
Pittsburgh, PA 15230 U.S.A.
Tel: (412) 787-8383
Fax: (412) 787-2207

Canada Sales Office

Draeger Canada Ltd.
6730 Davand Drive, Unit 15
Mississauga, Ont., L5T 1J5
Tel: (416) 564-2844
Fax: (416) 564-2860

NOTE If a supplier is not available in your area, contact Electrovert for further assistance.

Air Cooling Unload End Exhaust

For air cooling, the supply exhaust pressure should measure 300 CFM @ 1" water column.

To setup this exhaust:

- Close the load end exhaust blast gate and close the heating chamber.

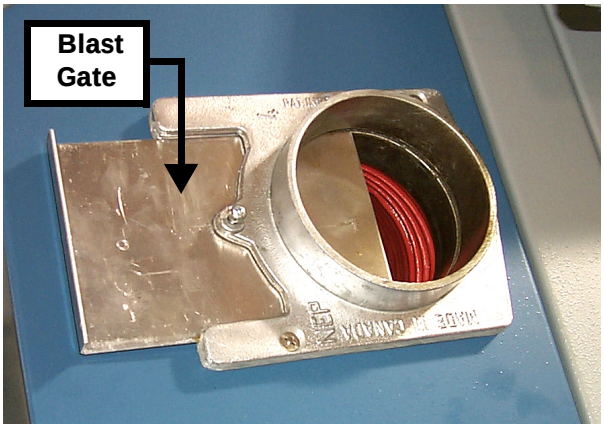


Figure 31: Exhaust Vent

- Ensure that the convection and cooling blowers are Off.
- Gradually open unload end exhaust blast gate until air current smoke migrates toward the load end of the machine.
- Turn the Air Cooling Module Blower 1 to High.
- Ensure that air current smoke continues to migrate into the load end of the tunnel. If not, gradually open the unload end exhaust blast gate until the air current smoke does migrate into the load end of the tunnel.

The unload end exhaust is now set up.

Inert Cooling Unload End Exhaust

If the machine has inert cooling, set up the unload end exhaust in the same manner as load end described below. Inert unload end and load end exhaust requirements are the same.

Load End Exhaust

The load end exhaust serves the same function on both air cooling and inert machines. This exhaust should have a pressure measurement of 150 CFM @ 1" water column. This exhaust is connected to the load end exhaust plenum over the process area.

Gradually open the load end exhaust blast gate until all fumes exiting the load end of the tunnel are collected by the exhaust lip vent in the stainless awning. The load end exhaust is now set up.

Exhaust Flow Sensors

Two (2) differential pressure switches are used on the inert machines and one (1) on the standard machine configuration to sense if the exhaust flow is either too low or is Off while the machine is On. When triggered, an alarm condition is activated by the computer.

Each differential pressure switch setting can be changed to any pressure between 0.15 to 0.50 in. of water. The factory setting is at 0.22 in. The differential pressure switches are located on the Rear Unload End and the Rear Load End of the machine. They are accessible by removing the Unload and Load End 45° angle panels. To remove the panel, turn the spring screw $^{1}/_{2}$ turn counterclockwise until it releases. Lift the panel away from the machine.

Figure 32: Side View of 45° Angle Panel

Exhaust Alarms

The exhaust alarms activate if the exhaust is insufficient to meet machine requirements. If it is suspected that the setting on the differential pressure switch needs adjustment, it is first necessary to verify adequate exhaust flow exists. Use a manometer to verify the exhaust requirement.

If the exhaust is adequate, remove the differential switch cover as described below.

Figure 33: Differential Pressure Switch

To access the set screw, remove the switch cover by loosening its retaining screw and pulling firmly at the bottom end. Remove the cover from the switch.

NOTE For purpose of display, a switch was photographed that was not installed in a machine. When adjusting the sensor, however, it is necessary to ensure that it is installed with the vacuum connected. The machine should be On and the exhaust should be On.

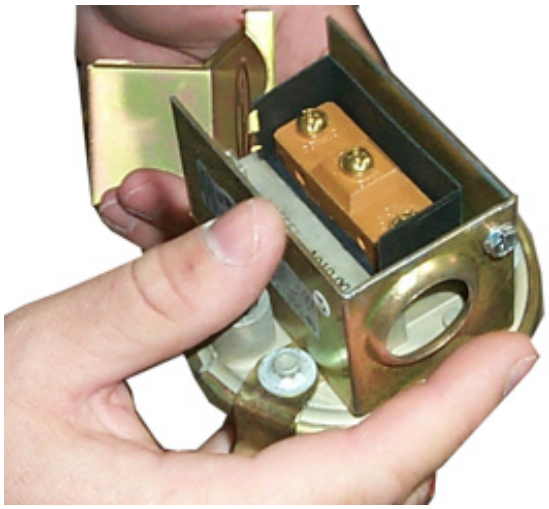


Figure 34: Cover removed from switch

CAUTION The following section refers to voltage measurements that are taken on a live circuit. The procedure should only be performed by trained electrical personnel.

To determine an accurate setting, it is necessary to monitor the voltage on the switch. The voltage from the N.O. contact to COM (chassis ground) should be 24 Vdc. The voltage from the N.C. contact to COM (chassis ground) should also be 24 Vdc. The contacts are labeled.

It is necessary to first measure the voltage at the Unload End. Use a voltmeter set to the correct range to measure the voltage across the contacts.

If both voltages measure 24 Vdc, it indicates that the switch is closed, as the switch should always measure 24 Vdc across one of the contacts to ground, regardless of exhaust status. If neither contact measures 24 Vdc, the problem is not with the differential pressure switch.

If the voltage is not correct, adjust the set screw until 24 Vdc is measure across each of the contacts to COM (chassis ground).

Turn the slotted adjustment screw clockwise to raise the set point pressure or counterclockwise to lower the set point pressure. After the Unload End switch is operational, adjust the Load End switch, if needed.

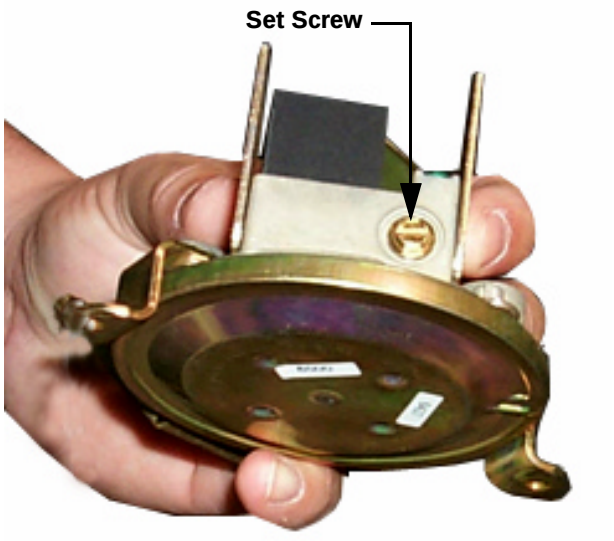


Figure 35: Set Screw on Switch

After adjusting the Unload End switch, select Screens > Debug Data > Digital I/O from the pull down menu. A Debug DIgital I/O window appears.

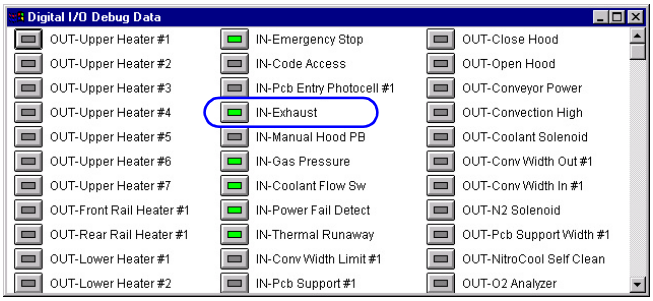


Figure 36: Digital I/O Debug Data

There is a field labeled “IN–Exhaust”. When the button is green, it indicates that both exhaust flow switches are closed (operating properly). If the button is gray, it indicates that at least one of the exhausts is not closed (in this case the Load End Switch).

NOTE A note about the Digital I/O Debug Window: On an actual machine, digital inputs and outputs are read and set by the machine software. The OmniFlo™ software maintains a list of digital inputs and outputs and their current states (ON/OFF). The states can be changed by reading from, or writing to, computer hardware, or manually forced (e.g., from the debug screen in demo simulation). Manually toggling an input from the debug screen doesn’t ensure that the state was physically changed on the computer I/O board. The Digital Input/Output Debug screen can be unpredictable, especially on an operating machine. It is generally recommended that the debug screen be used for viewing purposes only.

If it is necessary, perform the voltage measurement adjustment on the Load End Switch. With the exhaust is On, the switch should measure 24 Vdc across one of the contacts to ground. If neither contact measures 24 Vdc, the problem is not with the differential pressure switch.

When both differential pressure switches measure the correct voltage across their contacts, the software Digital I/O Debug Data window indicates they are working correctly by displaying a green button.

Alarm Check

After adjusting the differential pressure switch, verify that the exhaust alarm is operational. Close one of the exhaust dampers. Verify an alarm occurs (it takes only a few seconds). The Digital I/O Debug Data Screen IN-Exhaust button also turns from green to gray.

After an alarm activates, open the damper and clear the alarm. Repeat the procedure with the remaining exhaust damper.

If an alarm does not activate, repeat the adjustment procedure. If it is not possible to activate the alarm, the switch is likely defective.

2.16 NITROGEN FLOW SETUP

To create an inert atmosphere, nitrogen gas from an external source must be continuously injected into the sealed tunnel where the reflow process takes place.

NOTE If the system is operated without nitrogen, dry compressed air may be introduced in its place. This is to minimize condensation of ambient humidity in the cooling zone. The flow rate of compressed air does not necessarily have to match the nitrogen flow rates, but should be Nitrogen connection

The customer is responsible for installing the nitrogen supply and nitrogen supply line to the machine. Consult with the local gas supplier and/or qualified installers to ensure that all appropriate installation and safety codes are met.

PRESSURE REQUIREMENT

The inlet nitrogen pressure to the machine must be between 54 and 100 psig. If necessary, the customer must install a separate pressure regulator on the nitrogen supply line before connecting to the machine.

NITROGEN SUPPLY REQUIREMENT

Approximately 71 M^3/hr (2500 SCFH), depending on process conditions and requirements, are required of the nitrogen supply. Ensure that the nitrogen supply plumbing is adequately sized to bring this flow rate at the correct pressure to the machine.

NOTE Connection considerations: Nitrogen must be connected to the machine before the machine is powered up. The nitrogen supply line is equipped with a pressure sensor switch. If nitrogen is not connected or its input pressure is too low, and the system is configured for nitrogen operations, a low nitrogen alarm will be displayed on the computer screen and an alarm buzzer will sound when the machine is powered up. If the Nitrogen low pressure alarm activates, refer to the OmniFlo™ Series Maintenance Manual for information about Nitrogen Pressure Switch adjustment.

Figure 37: Nitrogen Plumbing

1. Place a 5 (five) micron filter between the nitrogen supply and the machine to ensure nitrogen entering the machine is contamination free.
2. Purge the factory nitrogen supply line of any particulate or gases.
3. Close the manual On/Off inlet valve and the pressure regulator on the machine.
4. Connect tightly using tubing between the factory supply line and the machine inlet. Refer to the individual machine footprint diagrams for the connection site.
5. After connecting, open the manual On/Off inlet valve and slowly increase the pressure to 3 Bar (44 psi). At this pressure, the nitrogen flow rate can be read directly from the flow meters.

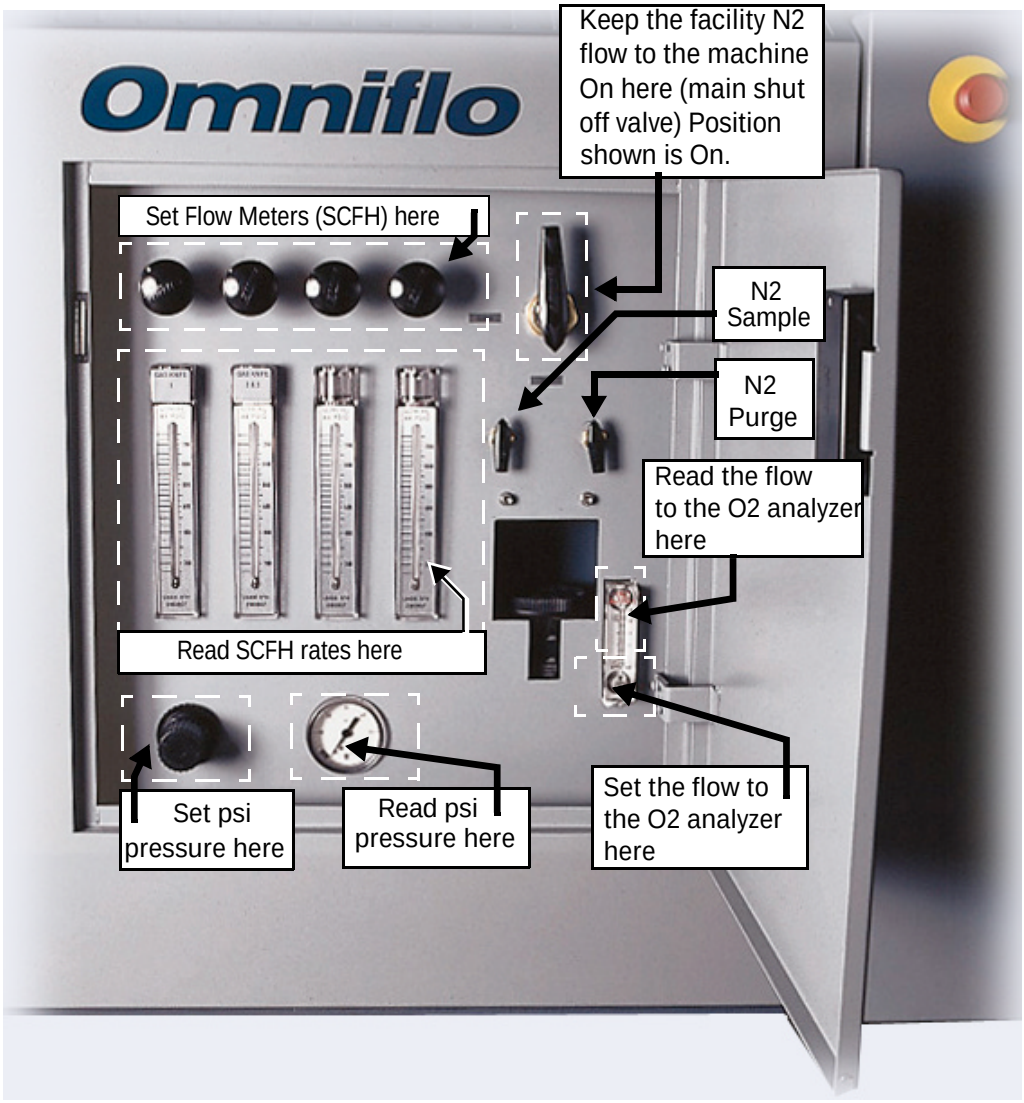


Figure 38: Nitrogen Control Panel

6. Check the connection for leaks.

NOTE After setting the nitrogen flow rate, it is important to ensure that the line pressure does not change from use. Verify that the pressure remains at 44 psig (304 kPa).

Testing for Leaks

Pressure test the supply line and the distribution lines inside the machine for leaks with nitrogen after the supply line is installed and connected to the machine controls.

While gradually pressurizing the external supply line and the distribution lines inside the machine, bubble test them with soapy water. If leaks are found, bleed the nitrogen lines down

to atmospheric pressure before tightening any fittings or leaky joints.

If a Leak Is Discovered

If a leak is discovered in the nitrogen supply line, refer to the Section 3.5 in the Maintenance Manual Section 3 Machine Operation for information on troubleshooting leaks.

NITROGEN FLOW ARRANGEMENT

- The nitrogen enters the machine through a 1/2 in. FNPT inlet fitting located at the rear unload end of the machine.
- If the machine is equipped with the oxygen analyzer option, the nitrogen stream branches to the oxygen analyzer line. The nitrogen purges the gas sample delivery line to make sure it is not contaminated before taking a sample reading. It also is possible to check the purity of the nitrogen source with this method.
- When the nitrogen flow is turned On, a normally–closed solenoid valve is opened to direct nitrogen to the reflow tunnel.
- A manual shut–off valve is used to stop the flow of nitrogen in case of an emerges or during maintenance. It is left open under normal operating conditions.
- A pressure regulator lowers the nitrogen gas pressure to 44 psi. It is indicated on the pressure gauge.
- If the pressure is too high, a pressure relief valve relieves excess pressure.
- A flow control valve regulates nitrogen flow. The flow rate is read from the flow meters located on the rear of the machine.
- At the flow meters, the nitrogen flow is sent into the specially designed tunnel extrusion at the rear tunnel all and distributed to the injectors.

A pressure switch sends a signal to the machine computer if the nitrogen pressure is too low, activating an alarm. It is located in the nitrogen line behind the nitrogen control panel. The pressure switch is factory set at 276 kPa (40 psi).

2.17 OXYGEN ANALYZER SETUP

Initial Electrolyte Charge

When the sensor is being charged with electrolyte for the first time, check for leaks in case of damage from shipment.

- Locate the analyzer behind the nitrogen control panel. Remove the threaded cap on top of the sensor cell.

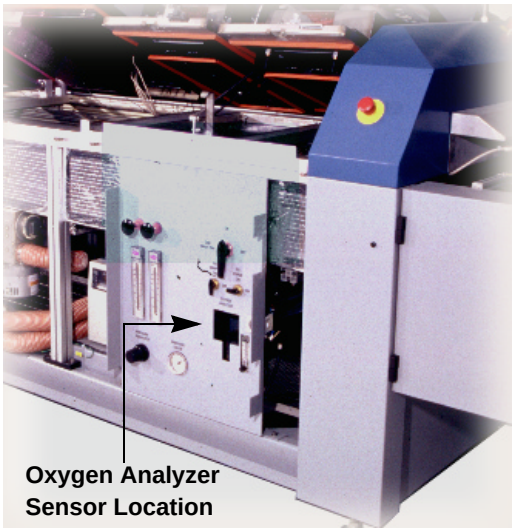


Figure 39: Front Unload End (Panel Removed)

- The reservoir should be filled with deionized or distilled water up to the maximum level line on the reservoir label.
- Allow the sensor to sit for 15 minutes. Check for leaks at the base of the reservoir and at the seams and corners. If a leak is found, report it to a supervisor before proceeding.
- Drain the distilled water into a suitable container for disposal.
- Close the drain valve.
- Add the entire contents of one (1) bottle of electrolyte to the sensor. Do not add water.
- Replace the sensor screw cap and hand tighten securely.

Rinse and dry the electrolyte drain kit. Store for future use.

More on Oxygen Analyzer

2.18 DOORS, COVERS AND HOOD CHECK

Verify that the panels lift off the machine cabinets and are easily replaced. A key is provided to unlock the latches. Check that the hinged doors on the Load End and Unload End covering the ends of the conveyor swing open freely and shut easily.

Open the hood using the manual Hood Open button, located under the plastic cover at the Load End of the machine. A “Hood Open” message appears when the hood is open.

Check the foam seal on the bottom of the chamber to ensure that is forms a continuous seal.

2.19 THERMOCOUPLE LOCATION

Verify that the thermocouples are secured to the heater panels. The tip of each thermocouple should be over a hole in the heater panel. Refer to OmniFlo™Series Maintenance Manual Section 9.6 Thermocouple Removal and Replacement for more information. EMI 3–0223–049–01–1 and EMI 3–0223–049–02–1 are both included in the documentation package and reference the thermocouple placement.

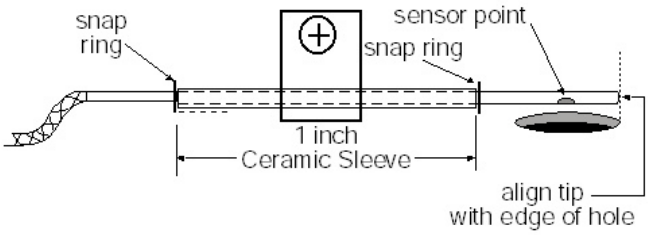


Figure 40: T/C Placement

2.20 CONVEYOR ACCURACY

Confirm that the conveyor speed is accurate.

Tools/Materials Needed

- Stopwatch

Procedure

- Mark a place on the mesh belt or rail to use as a reference spot.
- Using a stop watch, measure the time it takes for that point to travel a defined distance.
- Use the following formula to calculate speed:

  Speed = Length/Time

The following tables indicate suggested distances and the times calculated within specs.

NOTE When a conveyor is the combination type that has both a pin chain and a mesh belt, the pin chain is the determining component for speed calibration.

Table 4: Reference for a Mesh Belt Conveyor Running 50 in./min.

MODEL	REFERENCE LENGTH	MINIMUM	TYPICAL	MAXIMUM
OmniFlo™—5	358.14 cm (141.0 in.)	2’47.86”	2’49.2”	2”50.56”
OmniFlo™—7	481.65 cm (189.625 in.)	3’45.74”	3’47.55	3’49.39”
OmniFlo™—10	592.46 cm (233.25 in.)	4;37.67”	4’39.90”	4’42.16”

Table 5: Reference for Pin Chain Conveyor Running 50 in./min.

MODEL	REFERENCE LENGTH	MINIMUM	TYPICAL	MAXIMUM
OmniFlo™—5	356.24 cm (140.25 in.)	2’46.98”	2’48.30”	2’49.62”
OmniFlo™—7	480.06 cm (189.0 in.)	3’45.00”	3’46.80”	3’48.60”
OmniFlo™—10	591.82 cm (233.0 in.)	4’37.20”	4’39.60”	4’41.82”
OmniFlo™—10 Ext.	683.26 cm (269.0 in.)	5’20.28”	5’22.28”	5’25.28”

If it is necessary to calibrate the conveyor, refer to OmniFlo™ Series Maintenance Manual Section 8.2 Conveyor Speed Calibration.

Conveyor Speed Control Signal Flow Diagram

2.21 PHOTOCELL

Ensure that the incoming photocell is operating correctly. With machine software displaying the Process Graphics Screen, block the end of the photocell closest to the machine with a hand or a solid object. The REL BOARD parameter on the Process Graphic Screen should increment by one (1). Refer to Figure 41.

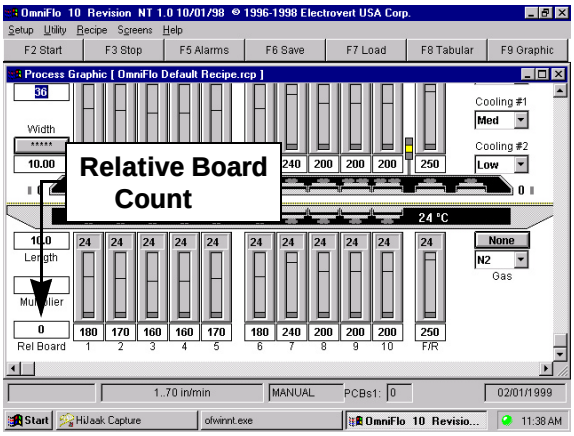


Figure 41: Process Graphics Screen

The PCB count can be reset to 0 by selecting Screens > Maintenance from the menu bar at the top of the screen. Select “Clear Entry PCB” to reset the count.

2.22 GASKET SEAL

Press CTRL–PgDn to close the hood. A “Hood Closed” messages displays on the monitor when the hood is closed. After a few seconds, a “Hood Fully Closed” message appears, indicating that the seal is complete.

After the hood is closed, visually inspect the seal to ensure that there is a continuous seal around the perimeter of the chamber. It should be free of voids or indentations and thoroughly secured to the machine.

If the hood does not appear to be properly sealed, access the proximity switche(s) located on the rear of the machine under the 45° angled panels. Refer to Figure 42. The proximity switches are located at the center of the machine. Adjust the proximity switch(s) so that the hood closes properly.

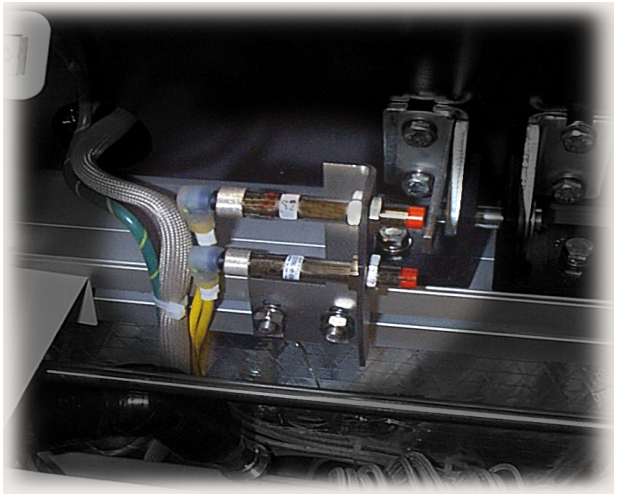


Figure 42: Proximity Sensors for Hood

More information on the gasket seal can be found in the OmniFlo™ Series Maintenance Manual Section 6.6 Main Gasket Seal.

2.23 BLOWER OPERATION

Verify that all blowers operate. The blowers can be turned on by clicking on the blowers icon on the Process Graphic Screen. The blower icons are located horizontally in the center of the screen. Refer to the following figure.

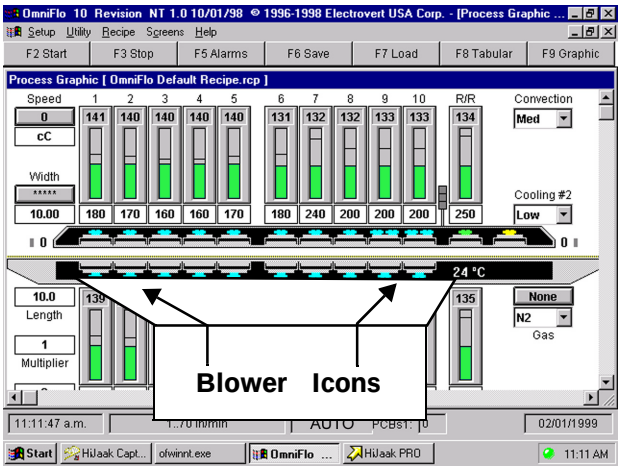


Figure 43: Process Graphic Screen

The blowers can also be turned On in the Process Tabular Screen. To use the Process Tabular Screen, select the status button next to the “Convection Fans” field.

Confirm that the blower rotation is correct. Standing behind the rear of the machine with the hood up, the heating zone (convection) blower rotation appears counterclockwise. The cooling zone blower rotation for inert machines also appears counterclockwise. Standard air machine cooling zone blower rotation appears clockwise.

2.24 SOFTWARE CUSTOMIZING

Windows NT™ (Microsoft Corp.) Operating System boots up with a log on screen. To make system changes, such as time, it is necessary that the user log on as Administrator (case sensitive). There is no password set as default. It is necessary to log Off of Windows NT and log back On as Administrator if changes to the NT environment or a software update is necessary.

Changing NT Settings

- Close the machine program.
- Select the Start button in the lower left hand portion of the screen.
- Select “Close all programs and log on as a different user.”

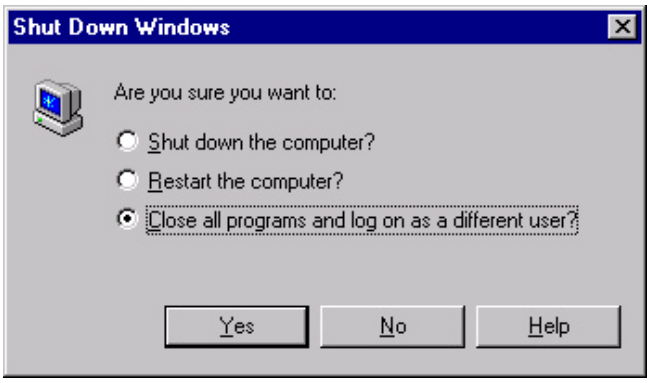


Figure 44: Reboot Window

- The Login Window appears. Change “Omniflo” to “administrator”.

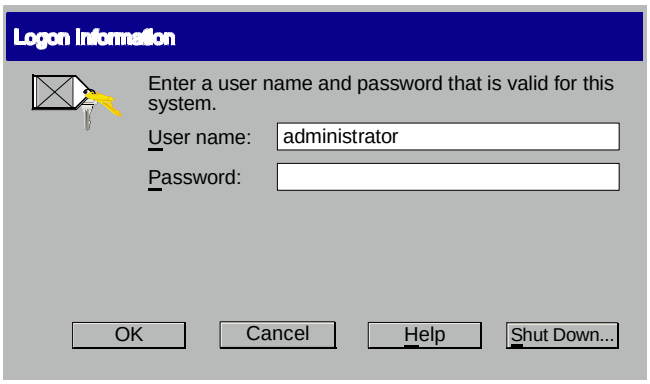


Figure 45: Logging on to Windows NT as administrator

- Do not enter a password (should be blank).
- Make whatever changes are necessary.
- After the changes are made, repeat the log On procedure to return the User name to OmniFlo. The machine software does not function unless the User is logged On as Omniflo.

The OmniFlo™ Series system software is fully documented in the OmniFlo™ Series Operations Manual, Sections 4 — 7.

System Time

Set the system time by logging on as Administrator and selecting the time display from the status bar by double clicking it. You can change both the time and date.

TIME/CLOCK

This menu can be accessed to program the machine to turn on and turn off at designated times. Select Configure > Time Clock from the menu bar. The timer is used to set the system starting times and stopping time, which are then repeated each week unless disabled.

The “ON” time field is used to enter the time to switch to Auto Mode and the “OFF” time field is used to cause the machine to switch to Manual Mode. If 0:00 is entered, the entry will not activate.

To change any setting, advance to that particular time field and type the new setting over the current value. Press the Enter key.

To toggle the enable On or Off for the timer., click on the box at the top of the display next to “Enable Time Clock”.

When the timer is enabled, the power disconnect switch must be in the On position at all times.

ALARMS

This screen allows the operator to designate machine action upon alarm activation. Select Configure > Alarms from the menu bar at the top of the display. If the alarm descriptions scroll below the screen area, access the side bar to the right of the screen and move it down until the rest of the screen displays.

The Action column defines the type of alarm action the machine will take when the corresponding alarm is activated.

±Alarm defines the alarm deviation. When the process parameter deviates from the set point by this value, the alarm condition is activated.

Repeat determines if the alarm will reoccur. If selected, the alarm is repeated every ten (10) minutes, or until the alarm condition is fixed.

+ Process defines the process deviation. When a process parameter deviates from the set point by at least this amount, the actual value is shown on the process screens, represented by the appropriate high or low color.

Clearing Alarms

Either pressing function key F5 or selecting Utility > Alarms from the menu bar invokes a window that displays the alarms status. The status indicates the alarm messages for all active, acknowledged and cleared alarms. The alarms are categorized into three (3) groups:

- Alm Alarm: Active and not yet acknowledged
- Ack Alarm: Active and acknowledged
- Clr Alarm: Was active, then cleared

There are four (4) buttons at the bottom of the Alarms Window: Ok, Acknowledge, Clear All and Cancel.

Selecting “OK” acknowledges the active alarms and removes the previously cleared alarms from the window. The Alarms window closes when Ok is selected.

Selecting “Acknowledge” acknowledges all active alarms, all previously cleared alarms are removed from the window, and the window is left open.

Selecting “Clear All” clears all alarms. If any alarm conditions still exist, they will trigger the alarm again.

Selecting “Cancel” closes the window and the contents are not changed.

2.25 RECIPE TEST

Load a test recipe by pressing function key F7 and selecting the default recipe. Put the machine in “AUTO” mode by pressing function key F2 and run a test recipe. When the machine reaches “Ready Mode” put the machine in “Auto Shutdown Mode” by pressing function key F3. Verify that the convection and cooling fans stay On until the heater temperatures drop below 100° C (212° F). Refer to OmniFlo™ Series Operations Manual Section 4.3 Menu Bar and 4.4 Process Graphics Screen for additional information regarding software.

For information on creating new recipes, refer to OmniFlo™ Series Operations Manual Section 5.3 Recipe.

APPENDIX A: INDEX

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