ITW Dynatec
An Illinois Tool Works Company
31 Volunteer Drive
Hendersonville, TN 37075 USA
Telephone 615.824.3634
FAX 615.264.5222

OPERATIONS & SERVICE MANUAL #21-06
Revised 9/15/07

ITW Dynatec

Adhesive Application Solutions • ISO 9001 Certified

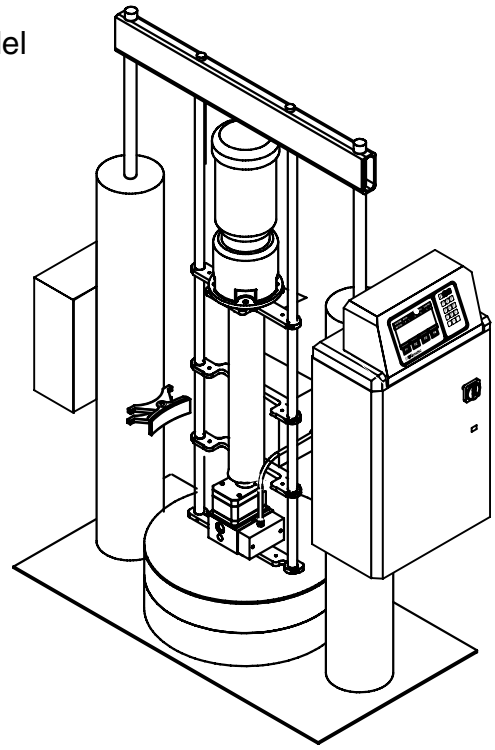
Service Manual Links

OPERATIONS AND SERVICE MANUAL DYNADRUM 55 AIR-OPERATED DRUM UNLOADER w. DynaControl V5.12MDU and up

DU553 Standard Model,

DU554 High Output Model &

PN 812045 Piston Pump Model



For an online copy of this manual, go to www.itwdynatec.com/manuals.htm

IMPORTANT ! - READ ALL INSTRUCTIONS BEFORE OPERATING THIS EQUIPMENT

It is the customer's responsibility to have all operators and service personnel read and understand this information. Contact your ITW Dynatec customer service representative for additional copies.

NOTICE! Please be sure to include the serial number of your application system each time you order replacement parts and/or supplies. This will enable us to send you the correct items that you need.

ITW Dynatec Service Parts Direct Dial: 1-800-538-9540
ITW Dynatec Technical Service Direct Dial: 1-800-654-6711

Moving Forward Through Technology ™

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Chapter 1
SAFETY PRECAUTIONS

All operators and service personnel must read and understand this manual before operating or servicing equipment.

All maintenance and service on this equipment must be performed by trained technicians.

Electrical

Dangerous voltages exist at several points in this equipment. To avoid personal injury, do not touch exposed connections and components while input power is on. Disconnect, lockout and tag external electrical power before removing protective panels.

A secure connection to a reliable earth ground is essential for safe operation.

A disconnect switch with lockout capability must be provided in the line ahead of the unit. Wiring used to supply electrical power should be installed by a qualified electrician.

High Temperatures

Severe burns can occur if unprotected skin comes in contact with molten adhesive or hot application system parts.

Safety glasses, gloves and long- sleeved clothing must be worn whenever working with or around adhesive application systems.

High Pressure

To avoid personal injury, do not operate the equipment without all covers, panels and safety guards properly installed.

To prevent serious injury from molten adhesive under pressure when servicing the equipment, disengage the pumps and relieve the adhesive system's hydraulic pressure (e.g., trigger the heads, hand-held applicators, and/or other application devices into a waste container) before opening any hydraulic fittings or connections.

IMPORTANT NOTE: Even when a system's pressure gauge reads "0" psig, residual pressure and trapped air can remain within it causing hot adhesive and pressure to escape without warning when a filter cap or a hose or hydraulic connection is loosened or removed. For this reason, always wear eye protection and protective clothing.

Either of the two High Pressure symbols shown may be used on equipment.

Protective Covers

Keep all guards in place!

To avoid personal injury, do not operate the application system without all covers, panels and safety guards properly installed.

Eye Protection & Protective Clothing

It is very important that you PROTECT YOUR EYES when working around hot melt adhesive equipment!

Wear safety glasses with side shields which conform to ANSI Z87.1 or EN166.

Failure to wear safety glasses could result in severe eye injury.

It is important to protect yourself from potential burns when working around hot melt adhesive equipment.

Wear protective gloves and long-sleeved, protective clothing to prevent burns that could result from contact with hot material or hot components.

Always wear steel-reinforced safety shoes.

Safe Installation and Operation

To avoid possible failure of hoses, make sure all hoses are routed to avoid kinking, tight radius turns (8” or less) and abrasive contact. Hot-melt hoses should not have prolonged contact with heat-absorbing surfaces such as cold floors or metal troughs. These heat-absorbing surfaces can alter adhesive flow and cause incorrect calibration. Hoses should never be covered with materials that prevent heat dissipation, such as insulation or sheathing.

Read this manual before applying electrical power to the equipment. Equipment may be damaged by incorrect electrical connections.

Do not use adhesive that is dirty or that may be chemically contaminated. Doing so can cause system clogging and pump damage.

When adhesive hand-held applicators or other movable applicators are used, never point them at yourself or at any other person. Never leave a hand-held applicator’s trigger unlocked when not actually in use.

Do not operate the hopper or other system components without adhesive for more than 15 minutes if the temperature is 150 degrees C (300 degrees F) or more. To do so will cause charring of the residual adhesive.

Never activate the heads, hand-held applicators and/ or other application devices until the adhesive’s temperature is within the operating range. Severe damage could result to internal parts and seals.

Treatment for Burns From Hot Melt Adhesives

Burns caused by hot melt adhesive must be treated at a burn center.

Care should be used when working with hot melt adhesives in the molten state. Because they rapidly solidify, they present a unique hazard.
Even when first solidified, they are still hot and can cause severe burns. When working near a hot melt application system, always wear safety gloves, safety glasses and long-sleeved, protective clothing.

Always have first-aid information and supplies available.

Call a physician and/or an emergency medical technician immediately.

Service

Refer all servicing to qualified personnel only.

Explosion/ Fire Hazard

Never operate this unit in an explosive environment.

Use cleaning compounds recommended by ITW Dynatec or your adhesive supplier only. Flash points of cleaning compounds vary according to their composition, so consult with your supplier to determine the maximum heating temperatures and safety precautions.

Lockout/ Tagout

Follow OSHA 1910.147 (Lockout/ Tagout Regulation) for equipment's lockout procedures and other important lockout/ tagout guidelines.

Be familiar with all lockout sources on the equipment.

Even after the equipment has been locked out, there may be stored energy in the application system, particularly in the capacitors within the panel box. To ensure that all stored energy is relieved, wait at least one minute before servicing electrical capacitors.

Use of PUR (Polyurethane) Adhesives

PUR adhesives emit fumes (MDI and TDI) that can be dangerous to anyone exposed to them. These fumes cannot be detected by the sense of smell. ITW Dynatec strongly recommends that an exhaust hood or system be installed over any PUR system.

Consult with your adhesive manufacturer for specifics about required ventilation.

CAUTION: Because of the nature of PUR adhesives to strongly bond in the presence of moisture, care must be taken to prevent them from curing inside Dynatec equipment. If PUR adhesive solidifies in a unit, the unit must be replaced. Always purge old PUR adhesive from the system per your adhesive manufacturer's instructions and timetable. ALLOWING PUR ADHESIVE TO CURE IN A UNIT VOIDS ITW DYNATEC'S WARRANTY.

In This Manual

WARNINGS and CAUTIONS are found throughout this manual.

WARNINGS mean that failure to observe the specific instructions may cause injury to personnel.

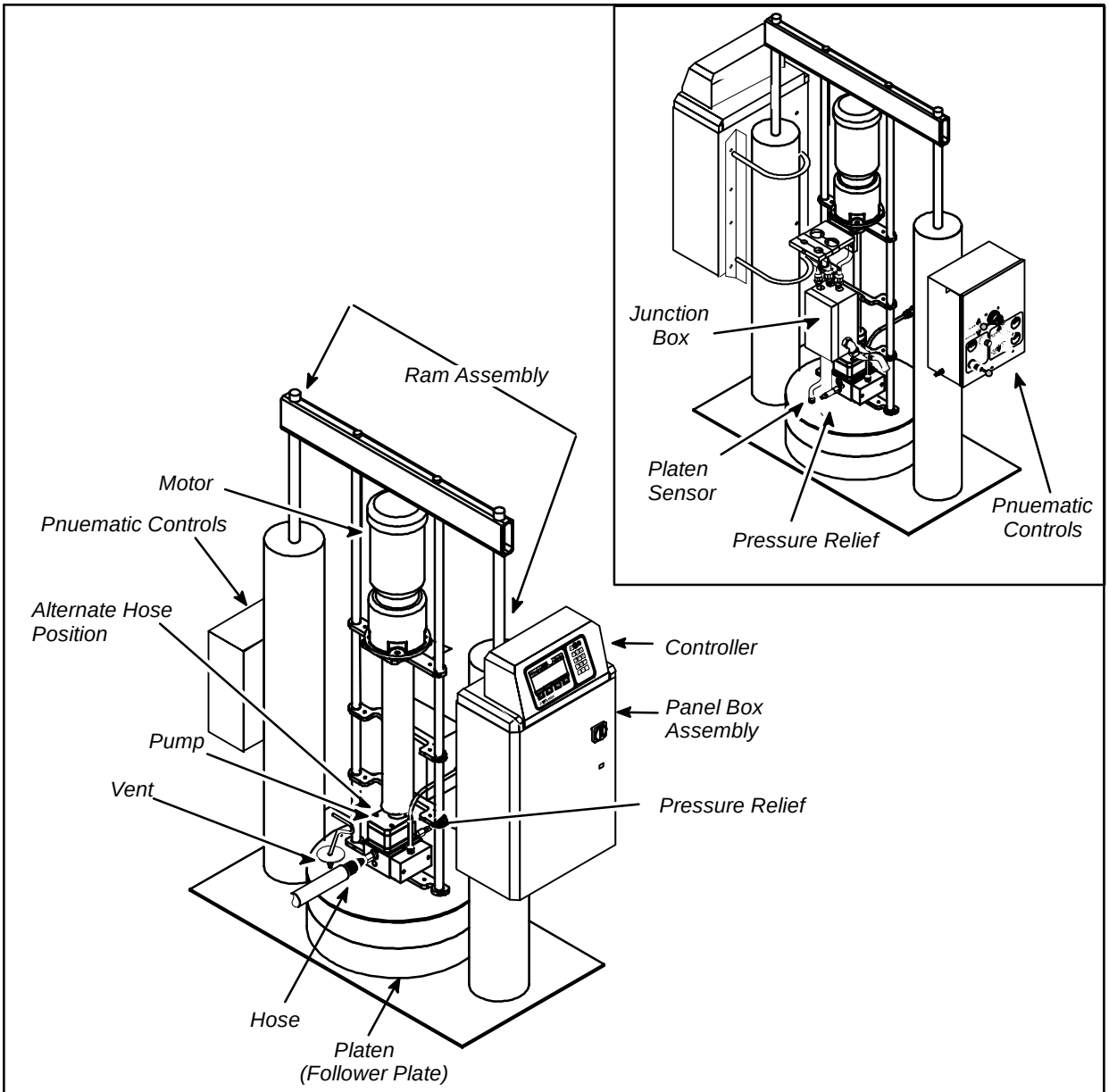
CAUTIONS mean that failure to observe the specific instructions may damage the equipment.

Chapter 2
DESCRIPTION & SPECIFICATIONS

Description

The ITW Dynatec DynaDrum 55 Air-Operated Unloader is a stationary drum unloader that combines a heated platen, pump and all controls needed to melt and dispense hot melt adhesives, sealants or coatings from a standard 55-gallon steel pail (U.S. standard).

The unloader can be utilized as a bulk-transfer unit or as a stand-alone ASU (adhesive supply unit). It can supply one or two hand-held applicators or other applicators.



Unloader Components

Specifications

Environmental:

Storage/ shipping temperature . . . . . -40°C to 70°C (-40°F to 158°F)
Ambient service temperature . . . . . -7°C to 50°C (20°F to 122°F)

Physical:

Dimensions . . . . . see dimensional layouts on following page
Weight . . . . . 1600 lb.
Drum size . . . . . standard U.S. 55 gallon (208 liters)
Drum diameter . . . . . 22.5 inches (570mm)
Gear pump: Model 553 (standard) . . . . . 30cc, positive displacement
Gear pump: Model 554 (high output) . . . . . 45cc, positive displacement
Piston pump/ air motor ratio (optional) 15:1
Motor . . . . . 1 HP, variable speed, AC, brushless
Controller . . . . . modular, fluorescent digital display with keypad, DynaControl
Hose . . . . . 24 foot x 0.625" ID Dynaflex

Performance:

Temperature range . . . . . 38°C to 220°C (100°F to 425°F)
Warm-up time . . . . . 40 minutes
Adhesive delivery . . . . . Continuous or On-Demand
Adhesive viscosity* . . . . . 100 to 5,000,000 mPa. sec. (100 to 5,000,000 centipoise)
** Flow rates of various materials are dependent on their physical characteristics*
Adhesive pressure range . . . . . 69 bar maximum (1000 psi maximum)
Maximum output rate: Model 553 (standard) . . . . . 300 lb./hr*
Maximum output rate: Model 554 (high output) . . . . . 400 lb./hr.*
Noise emission . . . . . tbd dB(A)
Drum change time . . . . . 5 minutes

Air Requirements:

Operating air pressure range . . . . . 4.1 to 5.5 bar (60 to 80 psi)

Electrical:

Supply voltage . . . . . 200-240 VAC/ 3p/ 50-60 Hz
. . . . . 380-400 VAC/ 3p/ 50-60 Hz
Power requirements (240v) . . . . . 100 amp, 3p
Power requirements (380v) . . . . . 63 amp, 3p
Wattage, maximum:
- Platen . . . . . 27,500 watts max.
- Transfer block . . . . . 1000 watts max.
- Hand-held applicator . . . . . 200 watts max.
- Hose, applicator . . . . . 1000 watts max.
- Hose, transfer . . . . . 2000 watts max.

** Based on a 4000 centipoise PSA hotmelt at 350°F*

Pressurized Air (Optional Piston Pump Models):

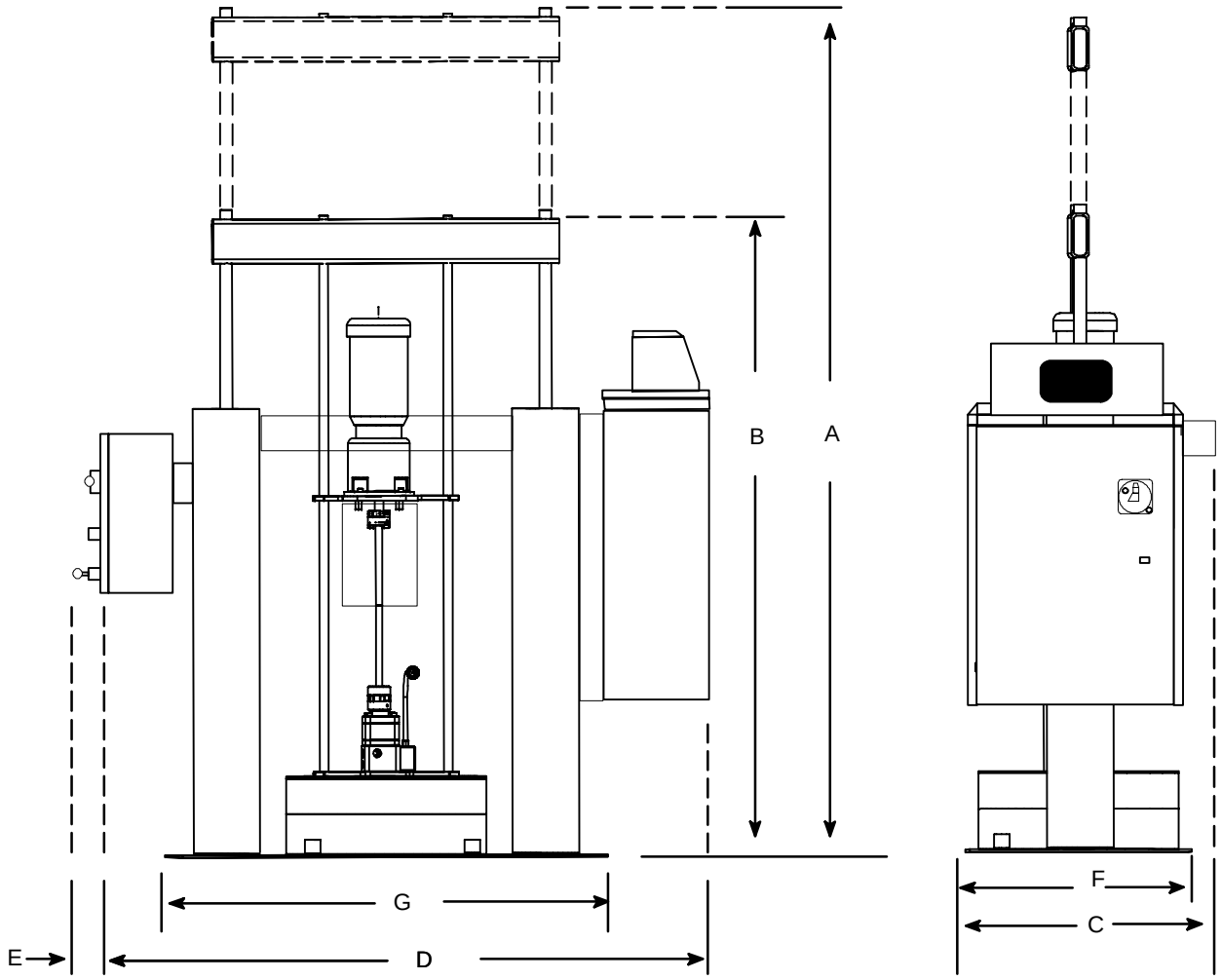
Maximum air pressure supply . . . . . 8.22 bar (120 psig)
Maximum recommended pump speed . . . . . depends on adhesive used
Air consumption at 60 pump cycles per minute . . . . . TBD normal liters/ minute (TBD SCFM at 100 psig)

DynaControl Temperature Control:

Power board . . . . . 48 zones per board, modular construction
Display type . . . . . graphic, liquid crystal
Temperature control zones . . . . . solid state relay output
Solid state relay input . . . . . 3-15 VDC
Line speed inputs . . . . . 1 to 2

Other:

Display languages . . . . . English, French, German, Spanish, Swedish, Italian, Portugese, Japanese and Dutch
Operator interface . . . . . multi-zone, liquid crystal display with alpha/numeric keyboard and function keys
Temperature standby . . . . . yes
High and low temp alarms . . . . . yes
Ready interlock . . . . . yes
Password protection . . . . . yes
Sequential heating . . . . . yes (hopper, hose, head staged heating)
Sensor open alarm . . . . . yes
RS232 and RS485 communications capable . . . . . yes
Line Speed Tracking . . . . . yes
Seven-day scheduler . . . . . yes



DIMENSION	A	B	C	D	E	F	G
mm	2768	1727	736.6	1536.7	102	635	1219
inches	109.00	68.00	29.00	60.50	4.00	25.00	48.00

DYNADRUM 55 Drum Unloader Installation Dimensions

Chapter 3
INSTALLATION & OPERATION

Handling & Shipping Information

The Dynadrum unloader system is shipped in a wooden packing case attached to a wooden pallet suitable for forklift handling. Enclosed are the melt unit, control panel box and individual boxes containing the other necessary components to assemble the system.

Service Requirements

The Dynadrum unloader is configured for either 240 volt/ 3 phase or 480 volt/ 3 phase power. Internal transformers, if required, provide 240v/ 3 phase voltage for hoses, applicators and controls.

Electrical power is connected to the upper disconnect circuit breaker terminals located in the control panel box. A conduit opening must be customer-provided in the panel box for the power leads.

Air pressure is supplied through a 1/4" NPT fitting located at the air control panel. The air supply line should be a minimum of 1/4". Air pressure requirements are 60 to 80 psi.

Installation

The Dynadrum unloader has been tested at the factory and will be ready for operation after completing the following steps.

CAUTION: Prior to installation read the manual throughly. DO NOT operate the unloader in an ambient temperature of less than 20°F (-5°C) or higher than 120°F (50°C).

1. Position the unit so that it is convenient for drum loading and with easy access to the work area. Provide adequate access to the control panel. Be certain there is a minimum of 9 feet (2.95m) of overhead clearance.
2. Bolt unloader and panel box securely to the floor with 1/2" dia. x 3" bolts and flat washers.

WARNING

To prevent injury to personnel, the unloader and control panel box must be firmly secured to the floor.

3. Connect air supply line (minimum size 1/4") to the air control panel located on the left cylinder of the unit.
4. Locate the master circuit breaker in the upper right corner of the controller's panel box. Refer to schematic in Chapter 11 for proper wiring connections.

DANGER HIGH VOLTAGE

To prevent serious or fatal injury, unit must be installed in accordance with applicable codes and be properly grounded.

5. Positively identify the line voltage and be certain that it matches the voltage on the electrical data plate.

CAUTION: Incorrect voltage will cause severe damamge to the equipment

6. Connect the ground wire (green) to the ground bar in the lower right corner of the panel box. Connect the other power leads to the circuit breaker line terminals as shown on the wiring schematic.
7. Connect delivery hoses and applicator(s) if applicable. See their respective manuals for installation instructions.

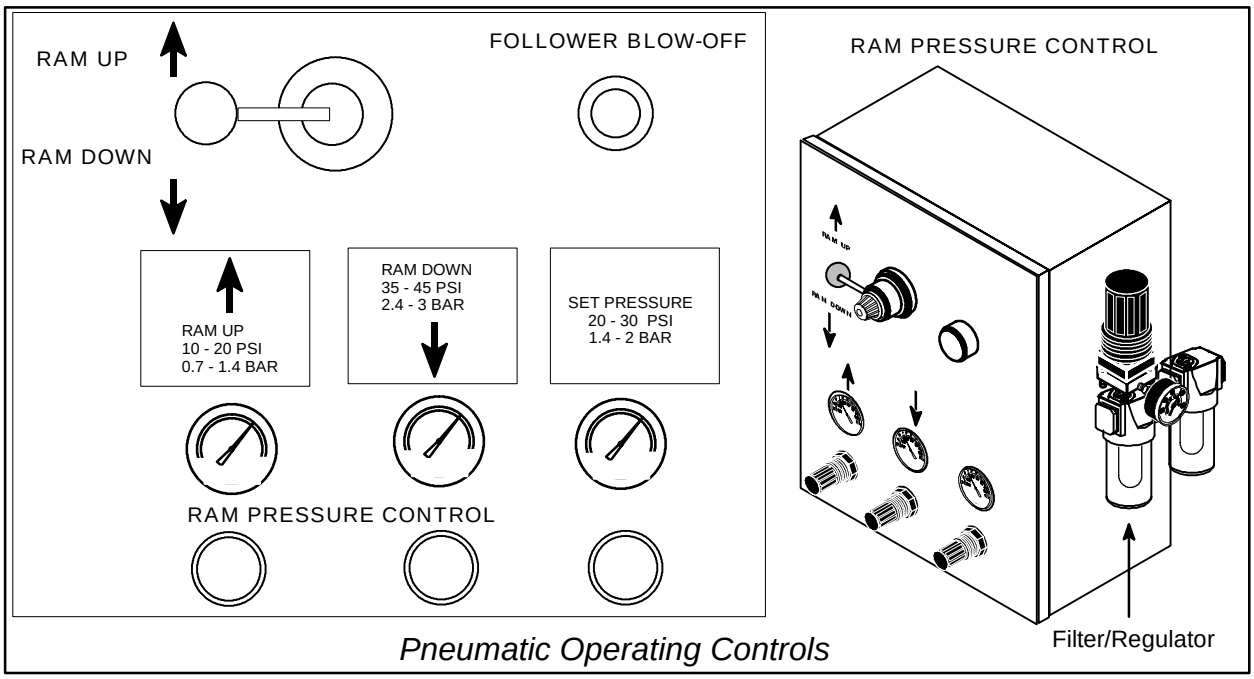
Electrical Controls

Description	Function	Indication
Circuit Breaker Switch	Master ON/ OFF & circuit breaker	Switch down = System OFF Switch up = System ON
DynaController	the controller is detailed in Chapters 4 & 5 of this manual	

Pneumatic Controls

The controls on the pneumatic control box are:

Description	Function	Indication
3 knobs, regulators & gauges	Controls and indicates Up (left hand), Down (middle) & Air Inject (right) air pressure	Right = Increases pressure Left = Decreases pressure
Lever operator	Controls ram (platen) position	UP = Raises platen DOWN = Lowers platen Middle = Maintains position
Follower blow-off button (red)	Injects air to open valve & retract the platen	Push = Injects air
Knob, coalescing filter, regulator & gauge (located on side of control box)	Removes water and air from incoming air. Indicates shop air pressure.	Factory set
Vent Knob (located on the platen)	Relieves trapped air in drum	Screw In = Closed Screw Out = Open



Pneumatic Operating Controls

Startup Procedure

Prior to startup, be certain that the master switch, pump motor and hand-held applicator switches are in the OFF position and the air pressure regulator is set to ZERO.

WARNING

Always wear safety eye protection, protective gloves and long-sleeved clothing when working on or operating the unit.

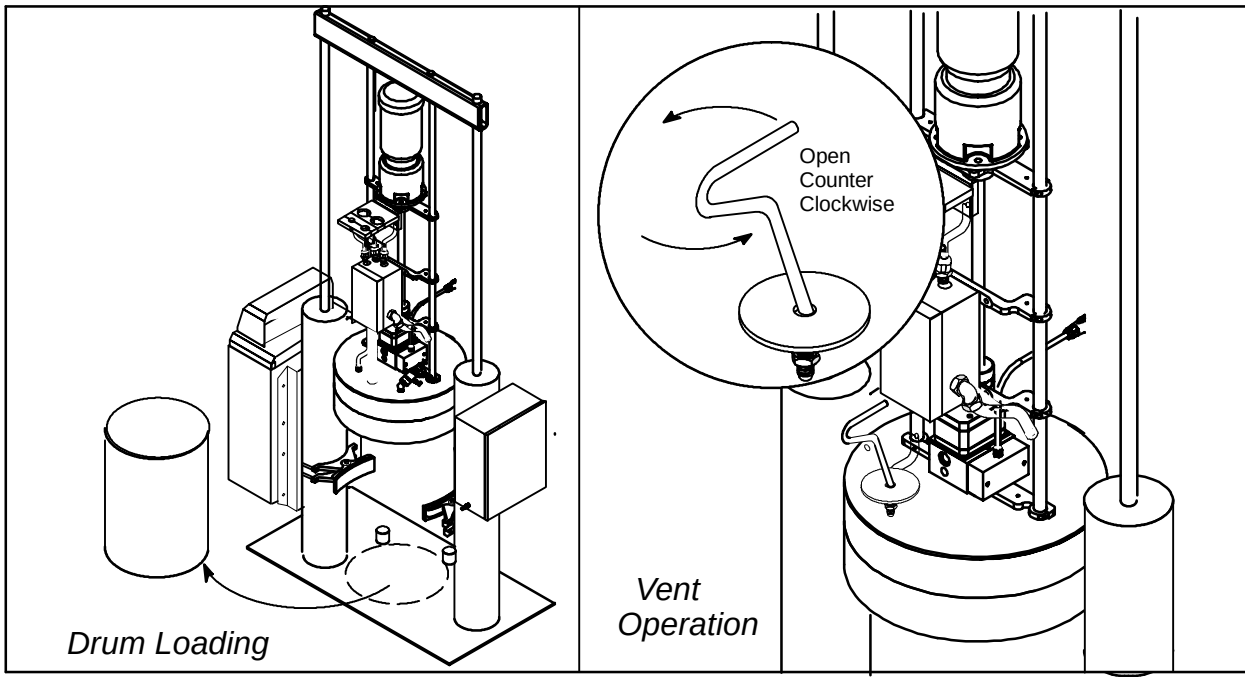
System Warm-up

1. Prior to energizing unloader, the platen, manifold, hose(s) and valve heater setpoints should be programmed into the controller (see Chapter 5). The platen circuit breaker and motor circuit breakers must be ON. Energize incoming electrical power, turn the controller ON and turn ON the main ON/OFF switch.
2. Place the elevator control lever in the middle position and set the coalescing (incoming) air regulator to approximately 60-80 psi.

   Note: a lower pressure setting may be required with low viscosity adhesives to prevent sinking the platen.
3. Place the platen control (RAM) lever in the UP (upper) position and raise the platen to full UP. Then lower the platen by depressing the lever. Platen action should be smooth.

CAUTION: Be sure that the hose(s) are free to move with the platen.

4. Elevate the platen and place a drum into the unit. Be sure that the drum is resting against the drum stops (see illustration).



5. Before lowering the platen, open the vent assembly (see illustration above). Unscrew the vent knob counter-clockwise to release. This will allow trapped air to escape from under the platen.
6. When adhesive temperatures are ready, the platen can be lowered into the drum by placing the platen control (RAM) lever into the DOWN (lower) position.
7. Leave the vent open until molten material appears at the vent nozzle. Allow enough flow to insure the air is purged. Once purged, screw vent knob clockwise to lock.

CAUTION: DO NOT leave the vent open during operation or material will flood the top of the platen.

The system is now ready for pump operation.

System Operation, Pump Output

The unloader system has two modes of operation: “Pressure on Demand” mode or “Constant Pressure” mode.

“Pressure on Demand” mode is used with an application device or reservoir that provides a contact close to activate the pump motor, i.e., a hand-held applicator. “Constant Pressure” mode is used with a valved applicator that requires a constant pressure for proper operation, i.e., a valve heater or an automatic applicator (head). “Constant Pressure” is also used for a bulk feed application.

Pump Output, "Pressure on Demand"

1. With the system ON, a fresh drum of material installed and at operating temperature, turn the pump motor control to MANUAL.
2. Point the hand-held applicator into a container and activate the trigger. When hose and handgun are purged of entrapped air and material is flowing in a steady stream, adjust either the pump/ motor speed or air pressure to obtain desired flow.

WARNING

Be sure hand-held applicator (handgun) is pointed away from personnel as entrapped air may cause material to splatter.

3. If a second hand-held applicator is used, point it into a container, pull trigger and purge. When the material is flowing in a steady stream, have an assistant activate the first handgun. With both handguns activated, adjust either the pump/ motor speed or air pressure to obtain desired flow.

   The system is now ready for operation.

CAUTION: Whenever leaving the system in a standby mode, place the platen elevator control in the middle position.

Pump Output, "Constant Pressure"

1. With the system ON, a fresh drum of material installed and at operating temperature, turn the motor control to MANUAL or AUTO.
   Note: for AUTO use a 0-10 VDC signal must be used for flow.
2. Activate the applicator(s) or open the bulk feed valve.
3. When material is flowing in a steady stream, adjust either the pump/ motor speed or air pressure to obtain desired flow.
4. Monitor the system status lights to determine when to replace an empty drum. See page 4-6 for details.

Drum Unloading

1. When drum is exhausted of material (adhesive), raise the platen (follower plate) out of the drum by placing the platen control lever in the RAM UP position. At the same time, depress and hold in the follower blow-off button (which activates the air injection valve) until the platen has risen out of the drum.

   If the drum begins to rise with the platen, momentarily place the platen control lever in the middle position. Normal operation will require holding the blow-off button in while working the platen control lever between the UP and middle positions.

CAUTION: Do not allow the drum to rise with the platen as it may cock off center and be difficult to remove.

CAUTION: Do not attempt to raise or lower platen unless platen is at operating temperature.

2. When the platen is in the full UP position, rock the drum out of the unit and replace with a new one.

WARNING

DO NOT grasp the drum by its lip as severe burns from molten material may occur.

3. Unscrew and remove the vent assembly.
4. Lower the platen into the new drum by placing the platen control lever in the RAM DOWN position.
5. When molten material begins to escape from the vent's port, replace the vent assembly.

Operator Adjustments

DynaControl Controller

All system temperature zone setpoints, standbys, offsets, hi/ low limit deviations, heating sequences, etc. are programmed through and controlled by an ITW Dynatec DynaControl controller. These functions and the actual zone temperatures are displayed at the controller's keypad.

See Chapters 4 & 5 for complete information and programming of the controller.

System Pressure

System pressure is regulated by pump/ motor speed, material viscosity, pressure relief valve setting and by the motor current limit setting. The motor current limit is factory set and does not require further adjustment.

The pressure relief valve is typically factory set to 500 psi. It is located on the front side of the transfer block (on top of the platen).

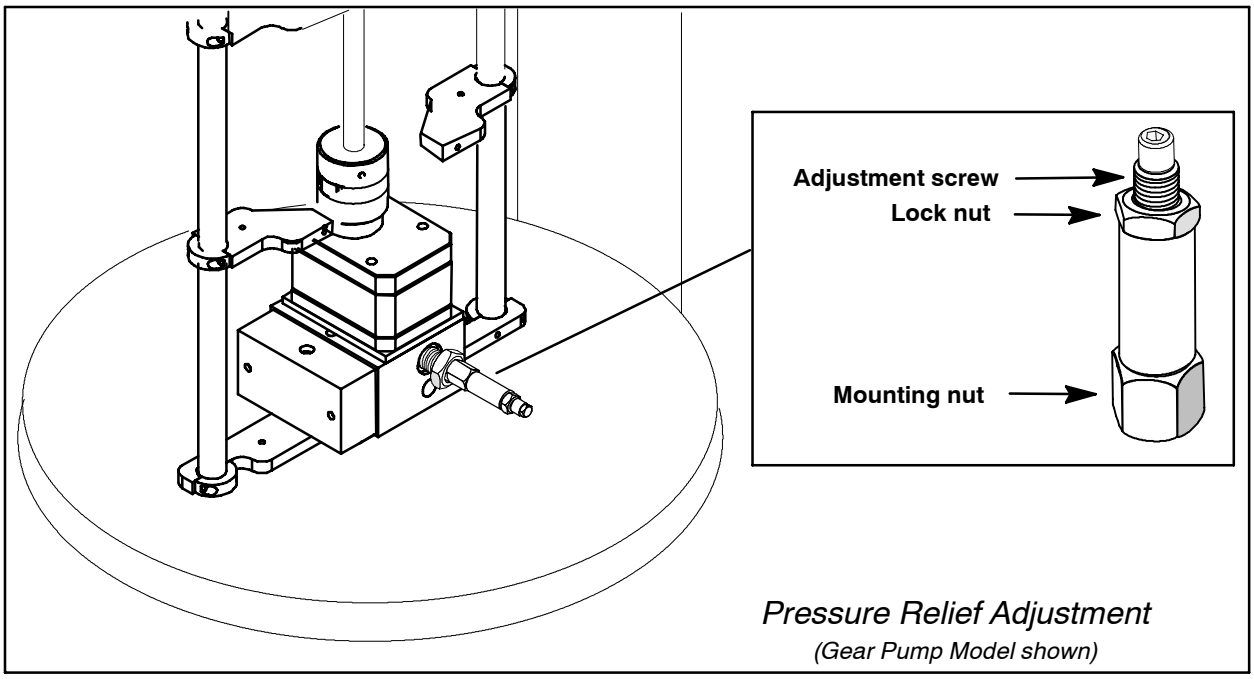
WARNING HIGH PRESSURE

The following procedure will require the adhesive to be at a high temperature and the application system to have substantial pressure. Safety glasses, insulated gloves and long-sleeved protective clothing must be worn to prevent the possibility of serious injury from the hot adhesive.

Prior to pressure relief valve adjustment, turn the system ON and raise the temperatures of all components to normal operating temperatures. At the controller, first set the motor speed to "0" so that the gearmotor is not turning. Then set the motor ON to desired operating speed. Locate the pressure relief valve's adjustment screw and loosen its lock nut. Open (actuate) the valves on the applicators in order to fill them with adhesive and purge air from the system. Then close the valves to stop adhesive flow.

To adjust the pressure relief valve: (see following illustration) with an allen wrench, turn the adjustment screw counterclockwise to decrease pressure or clockwise to increase pressure. After desired pressure is achieved, tighten the lock nut.

CAUTION: Maximum operating pressure should not exceed 1000 psi. DO NOT set the adjustment screw fully clockwise (closed) or serious pump damage will result.



Pressure Relief Adjustment
(Gear Pump Model shown)

Platen Retract Air Pressure

To aid in removal of the platen from the drum it is necessary to create a positive pressure in the drum. This is accomplished by manually injecting air as the platen is raised. Air pressure is controlled by an air regulator located on the left side of the platen. Pressure should not exceed 15 psi.

Inlet Pump Pressure Regulator (Optional Piston Pump Models Only)

When adhesive demand changes, the source pressure may reguire adjusting. This can be done manually by turning the handle of the regulator mounted on the piston pump (for an illustration of the location of this handle, see page 10-7 of this manual).

Chapter 4
DynaControl™ CONTROLLER SET-UP

Temperature Control Functions in General

The DynaControl microprocessor-based proportional temperature control in the unloader performs a number of functions that help to maintain adhesive setpoints in all temperature zones of the system. It maintains permanent system values (fixed proportional and integration values that have been programmed at the factory, such as the maximum temperature setpoint). It enables the user to program temperature settings and heater on/off sequencing that are appropriate to a specific application. It displays all programmed values, and it includes self-diagnostic malfunction alerts and failure alarms. *Note: Some DynaControl functions are direct temperature conversions between degrees Celsius and Fahrenheit. Other parameters are independently selected values.*

Defining DynaControl Temperature Control Terms

Adhesive Temperature Control Range
The temperature limits within which the unit, hoses and applicators may be programmed and maintained.

CPU Module
The central processing unit (CPU) of the microprocessor temperature control.

Cold Start
When the unit resets itself to default setting due to either a malfunction or to a deliberately initiated cold start procedure. When the unit is turned ON via the Main Power Disconnect Switch.

Default Settings
The factory-set programmable system values that will be in effect if the user does not enter new values. The controller will revert to its defaults whenever it is reset. The DynaControl controller's defaults are listed in this chapter.

Error Indication Alarms
Alarms which indicate that the programmed over-temperature values have been exceeded for one or more temperature zone. Alarms may also indicate an open or short-circuited sensor.

Mechanical High-Temperature Protection
A mechanical, redundant thermostat located on the manifold.

Microprocessor-based Proportional Temperature Control
The built-in control system that controls, monitors and displays all system temperature values.

cont.

Over-Temperature Setpoint
The programmable temperatures that will cause alarms (blinking up and down display arrows) to occur when those temperatures are exceeded. Power is not disconnected, the READY contact opens and the alarm contact opens. If an external alarm has been connected, it will activate. The over-temp setpoint is the upper limit of the ready temperature range of each zone.

PC Link
Also referred to as remote I/O interface, this is a DynaControl controller option that allows monitoring and programming from a customer-provided PLC (programmable logic controller) or a PC (personal computer).

P-I Loop
A temperature control loop which bases heater output proportional (P) to the difference betweeen setpoint and actual temperature and combines it matematically with a time (I = integral) factor.

Power I/O PCBs
The Power I/O printed circuit board (PCB) provides control signals to, and monitoring signals from, all the temperature zones in the unit's system.

RTD Sensors
The standard Dynamelt system uses 100-ohm platinum resistance temperature detector sensors for all temperature controls. As an option, the unit can be configured for 120-ohm nickel sensors.

Ready Temperature
The programmable temperature, on gear pump models, which allows the pump to turn ON. The default ready temperature range is a deviation of ± 20°C (± 36°F) from the setpoint. The setpoint minus the deviation is the low limit of the range, and the setpoint plus the deviation is the high limit of the range.

Recipe
A program recipe is a set of temperature setpoints and parameters which the user has programmed and wishes to store in the controller for future use. Up to four recipes may be stored in the DynaControl controller.

Sequential Heating
The heating sequence which allows the slower-heating hopper to reach operating temperature without unnecessary use of electricity for faster-heating hoses and applicators. Sequential heating is the time period during which the hoses and applicators remain OFF while the unloader's zones heat up. Hoses and applicators may be independently programmed. If unloader temperatures are above ready temperature when the unit is turned ON, the hose and applicator *cont.*

sequence is bypassed and they will be turned ON. The heat up sequence is restored after Standby is turned from ON to OFF. Sequential heating is not needed for most applications and can delay total system warm-up time.

Standby Condition
The system condition where the unit, hose and head temperatures are maintained at predetermined reduced temperature values. Standby temperatures are set lower than setpoint temperatures in order to reduce adhesive degradation and energy consumption when the system is temporarily inactive, and to permit rapid system warm-up when run condition is selected.

Setpoint
Programmable temperatures that have been selected for the platen, manifold, hoses, applicators or auxiliary zones.

Setpoint Limitation
This is a universal maximum temperature for all zones. The programmer cannot program a temperature setpoint higher than the setpoint limitation.

System Logbook
This is the controller's record-keeping function. It contains the DynaControl's list of the last 1,000 controller events**,** its Data Logger which records the last 1000 lines of selected actual temperatures and a counter which records the system's elapsed hours.

Temperature Zone Enable
The temperature zone enable allows the operator to disable unused temperature zones in such a way that they do not ever appear on the controller's display and heating is switched OFF.

Temperature Zone Offset
Due to the separation between the heaters and sensors in some systems, the controller can be programmed to display a temperature for a zone which is different from the sensor's actual temperature. The temperture zone offset mathematically corrects for these temperature differences. Each zone may have an individual offset.

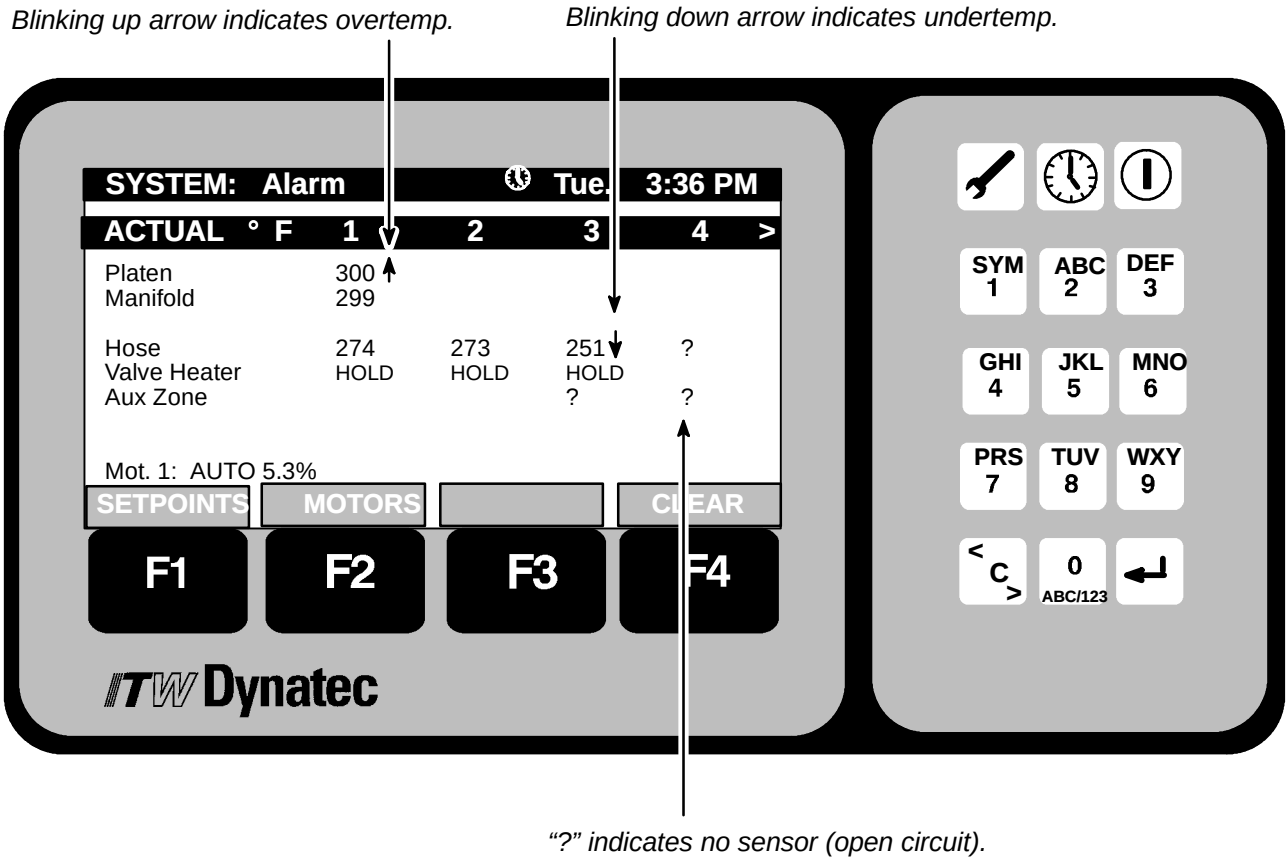
Error Indication & Alarms

Error Indication (Blinking Up and Down Arrows)

The following illustration shows the display screen when one or more error indication conditions occur. The conditions that will trigger an error indication are:

a. When the platen, manifold, hose, valve heater or auxiliary zone has exceeded its selected over-temperature setpoint, which is the setpoint plus its high/low alarm setting, or when it is below its selected under-temperature setpoint, which is the setpoint minus its high/ low alarm setting. In these cases, heater power will not be switched off.

b. When a platen, manifold, hose, valve heater or auxiliary zone sensor has an open circuit. In this case, heater power will be switched off.



Error Alarms (Message Window)

The display of a message window, as illustrated below, signifies an error alarm. The operator's response to an error alarm is to press "F4" and to troubleshoot.

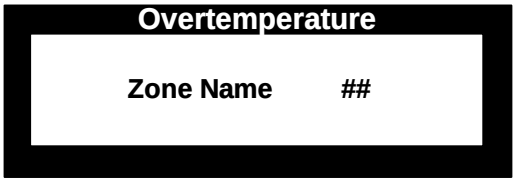
If a sensor error alarm or an overtemperature alarm occurs during operation, the controller will switch off internal power to the heaters and an appropriate error alarm display will appear.

Pressing the "F4" function key acknowledges the error. If several zones display alarms, each must be acknowledged by pressing "F4". The alarm display is switched off and the controller then switches off the faulty zone until the ASU is ready for operation again.

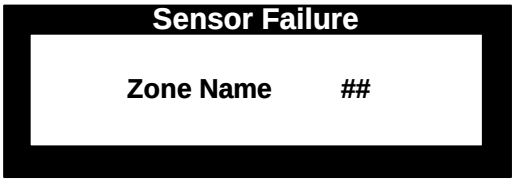
When the actual temperature exceeds the setpoint limitation (plus a tolerance) the overtemperature alarm window is displayed and main power is switched off.

Examples of Error Alarms

The Overtemperature Alarm indicates that the named zone has exceeded its programmed setpoint limitation. The controller will shut off power to the heaters. Press F4 and troubleshoot the problem.



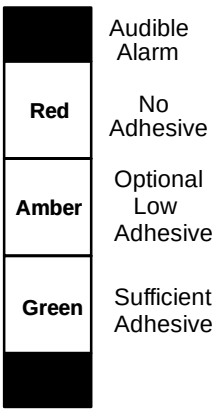
The Sensor Failure Alarm can indicate either a sensor open or a sensor short. Sensor open is accompanied by a blinking up arrow on the actual temperatures display screen. Sensor short is accompanied by a blinking down arrow. Press F4 to switch off the named zone, then troubleshoot the problem.



The Manifold Overtemp Alarm indicates that adhesive temperatures at the manifold have exceeded the setting of the mechanical (redundant) thermostat. Press F4 and troubleshoot the problem.

The Communication Error Alarm indicates an internal failure, unrelated to zone temperatures. Call ITW Dynatec for assistance.

System Status Lights



The stack light(s) mounted on the unloader's control box assembly allows remote monitoring of the unloader's adhesive level status.

The lower, green light illuminates when there is sufficient adhesive in the drum to run. The optional middle, amber light indicates that the adhesive level in the drum is low. The upper, red light illuminates only in an alarm condition (the drum is empty) and is accompanied by an audible alarm. The audible alarm is housed within the upper (black) section of the stack.

When the red light and alarm are activated, the controller screen informs the operator that the "Drum is Empty". The controller then puts the unloader in setback (standby) mode, lowering adhesive temperature and stopping the pump. When this occurs, the operator must reset the alarm (F4), install a fresh drum of adhesive, press F2 (Motor Menu) and then press F3 to re-start operation.

Settings for a Typical Operation

Note: The values given here are approximate settings for a typical packaging operation. The values you choose will be based on the type of equipment and adhesive you are using and the nature of your particular operation.

If Application Temperature is 177°C (350°F):

- Hose and Valve Heater temperature: 177°C (350°F).
- Platen and manifold setpoint temperature: 163°C (325°F).
- Hi/ Lo limit deviation: 12°C (20°F).
- ASU operating range: 149°C to 177°C (300°F to 350°F).
- Standby condition temperature (deviation): 30°C (50°F).
- Manifold over-temperature setpoint : 177°C (350°F)
- Mechanical thermostat (for the manifold) over-temperature: 219°C (425°F)

For most operations, temperature fluctuations will be very small and of short duration. For these reasons, the settings above are recommended.

System Values That Are Factory Programmed (not customer programmable)

- Minimum setpoint value: 10°C (50°F).
- Maximum setpoint value (Setpoint limitation): 218°C (425°F).
  " " " for high temp mode enabled units: 232°C (450°F)
- Maximum alarm deviation: 50° (C or F).
- Minimum alarm deviation: 5° (C or F).
- Maximum standby temperature: 150° (C or F) less than setpoint.
- Minimum standby temperature: 30° (C or F) less than setpoint.
- "Actual" temperature indication range: 0°C to 260°C (32°F to 500°F).

Customer Programmable Values Preset At The Factory

ITW Dynatec can set the controller's system values to customer's specs, if provided.

If customer's specs are not provided, the following values will be entered into the DynaControl controller at the factory. They may be changed by reprogramming through the keypad. (These are not the "default" settings, see following section).

- Valve heater and hose setpoints: varies from 138 to 149°C (280 to 300°F).
- Platen setpoint: 143°C (290°F).
- All zones are switched off, except for the platen and manifold.
- Motor rpm: 0 in the "OFF" mode.
- Standby: 80°C (140°F) under setpoint.
- Hi and low alarms: ± 12°C (20°F) from setpoint.

Default Settings of the DynaControl Controller

Default settings are the manufacturer's preset values to which the system will return if the Dyna-Control is subjected to an internal memory reset (also referred to as a "re-boot"). While you can change your programmed values to anything within the system's limits, the default settings cannot be changed.

Defaults

- Language: English
- Setting for Customer Access Code: "9999".
- Temperature setpoint for each zone: - - -
- Platen ready temperature: 135°C (270°F).
- Over-temperature limit: Your chosen setpoint limitation + 10° C or F.
  For example: if your setpoint limitation is 218°C (425°F), then your over-temp limit = 228°C (435°F).
- Standby temperature for all zones: 80°C (140°F) lower than programmed setpoints.
- Hi/ lo limit deviation for all temperature zones: ± 20°C (36°F).
- Temperature zone offset: 0°C (0°F).
- Sequential heating: first platen & manifold zones, then hose/ head zones and auxiliary zones.
- Setpoint limitation: 218°C (425°F).
- Minimum pump speed: 0% of full speed.
- Maximum pump speed: 100% of full speed.
- Proportional Integral values (P-I values): for Premelt, Hopper and Filterblock temperature zones, P = 15 and I = 3. For all other zones, P = 12 and I = 2

Helpful Tips for the User

- When the unit is turned ON, all temperature setpoints and other operating parameters will be exactly where they were when the unit was turned off.

- When the unit is turned ON, all system heaters go ON unless they have previously been set below 40°C (100°F) (in which case they will be turned OFF) or if sequential heatups have been set. However, if hopper temperature is above ready temperature when the unit is turned on, all hose and head sequential heatups will be bypassed and hoses and heads will be turned ON.

- If the system is turned off and then on again, the standby condition will be disabled.

Serial Protocol for RS232 and RS485 Options, V.5.00M

Specifications

- RS232C, no handshake
- RS485, 4 wires
- Baud rate 9600 baud
- Character format 8 databits + 1 startbit + 1 stopbit
- Parity: no parity check

General information

- DynaControl is always a slave. The controller reacts only when addressed by a master.
- DynaControl responds only when own slave address is received. Slave address is programmable via front panel (PC-LINK Setup).
- Multi-digit values are transferred most significant digit first.
- If Hex-Numbers are transferred, do not use capitals (0…9, a…f)
- Control characters used:

STX	02	Start of Text
ETX	03	End of Text
EOT	04	End of Transmission
ENQ	05	Enquiry
ACK	06	Positive Acknowledge
NAK	15	Negative Acknowledge

Structure of commands

- Master transmits to DynaControl:
  EOT, addr1, addr2, opcode, 0..n data bytes, ENQ
- DynaControl responds:
  STX, 1...n data bytes, ETX

Address Setting

Each telegram sent to the DynaControl contains the slave address. DynaControl responds only if the received address matches the programmable address.

List of Commands

Writing to DynaControl:

WR_TC	A	Write Temperature Setpoint (Temp Scale Celsius)
WR_TF	F	Write Temperature Setpoint (Temp Scale Fahrenheit)
WR_TO	B	Write Hi/Lo-Alarm Temperature Tolerance (+-%)
WR_SPS	C	Write Motor Speed Setpoint (0-99.9% F.S.)
WR_PRA	P	Write Hi/Lo-Pressure Alarm values
WR_PR	H	Write Priority (Heat up Sequence)
WR_PROG_NO	R	Write Temp. Program Number
FQ	L	Reset Error Message

Reading from DynaControl:

RD_TA	d	Read Actual Temperature
RD_TS	a	Read Temperature Setpoint
RD_TO	b	Read Hi/Lo Temperature Tolerance

RD_SPS	c	Read Motor Speed Setpoint
RD_SPA	e	Read Actual Motor Speed (RPM)
RD_CST	f	Read System Status
RD_ZST	i	Read Temperature Status
RD_PR	g	Read Actual Pressure
RD_LSP	l	Read Line Speed Input
RD_PRA	p	Read Hi/Lo Pressure Alarm values
RD_PROG_NO	r	Read Temp. Program Number

Detailed Description of Commands

WR_TC Write Temperature Setpoint, 'A', 41H Temp. Scale Celsius

WR_TF Write Temperature Setpoint, 'F', 46H Temp. Scale Fahrenheit

To follow: zone number (2 byte) 01...48 + setpoints (n x 4 bytes ASCII)

Adding 1000 to setpoint will deactivate this zone. Subtracting 1000 will activate again.

Example: EOT,0,1,A,0,4,0,1,6,0,1,1,8,0ENQ -> Zone no. 4 on unit with address 01 is set to 160°C, no. 5 is set to 180C but temporarily deactivated.

Response from DynaControl: No error: STX,ACK,ETX
Error: STX,NAK,ETX

This command will select the temperature scale for the controller.

WR_TO Write Temperature Hi/Lo-Tolerances, 'B', 42H

To follow: zone number (2 bytes) 00...48 + Temp Tolerance (2 bytes)
zone number = 00: Set tolerance of all zones.
Tolerance: Deviation (plus/minus) from setpoint to get Hi/Lo – indication (Alarm window)
Allowed range: 5 to 50

Example: EOT,0,1,B,1,2,2,0,ENQ -> Set tolerance for zone 12 on slave address 01 at +/-20°

Response from DynaControl: No error: STX,ACK,ETX
Error: STX,NAK,ETX

WR_SPS Write Motor Speed Setpoint, 'C', 43H

To follow: motor number 00...06 (2 bytes), motor speed (nx 4 bytes)
If motor number = 00: all motors will be set to this speed
-> Speed Setting takes place in steps of 0.1% of Full Speed
Allowed Range: 0 to 1000 (0 to 100.0%)

Example: EOT,0,1,C,0,2,5,0,0,ENQ -> Set pump speed no.2 on unit address 01 to 50 %

Response from DynaControl: No error: STX,ACK,ETX
Error: STX,NAK,ETX

WR_PRA Write Pressure Alarm Values 'P', 50H

To follow: transducer number 00...23 (2 bytes), low pressure, high pressure (n x 4+4 bytes)
Example: EOT,0,1,P,0,2,0,2,0,0,1,0,0,0,ENQ
-> Set pressure alarm values on transducer #2 200=low, 1000=high
Response from DynaControl: No error: STX,ACK,ETX
Error: STX,NAK,ETX

WR_PR Write Heat up-Priority, 'H', 48H

To follow: Zone number 00...48 (2 bytes), priority (n bytes)
If zone number = 00: all zones will be set to this priority
Allowed range: 1/2
Example: EOT,0,1,H,0,1,1,1,2,2,2,2,2,2,ENQ
-> Set heat up sequence: first zone 1 and 2, then 3 to 8
Response from DynaControl: No error: STX,ACK,ETX
Error: STX,NAK,ETX

WR_PROG_NO, Write Program number, 'R', 52H

to follow: program number (1 byte)
Allowed range: 1 to 4
Examples: EOT,0,1,R,3,ENQ Select program number 3
Response from DynaControl: No error: STX,ACK,ETX
Error: STX,NAK,ETX

FQ Quit Error Message, 'L', 4CH

no bytes to follow
Example: Master detects open sensor on slave no.2. Slave has shut down, error has to be reset.
EOT, 0,2,L,ENQ
-> Error is reset, defective zone is switched off, slave is switched on again.
Response from DynaControl: NSTX,ACK,ETX

RD_TA Read Actual Temperature, 'd', 64H

To follow: zone number (2bytes) 00....48
zone number = 00: all available actual temps are transmitted.

Example: EOT,0,1,d,00,ENQ -> All actual temps on unit address 01 are read
Response from DynaControl : STX, Act.Temps(1...n x 4 bytes), ETX
Error: STX,NAK,ETX
Sensor shorted: STX,1999,ETX
Sensor open: STX,0999,ETX

Example: STX,0155,0165,0159,0160,0999,0159,0160,1999,ETX
-> Unit has 8 zones. Zone 5 shows shorted sensor, zone 8 has open sensor.

RD_TS Read Temperature Setpoint, 'a', 61H

To follow: zone number (2bytes) 00...48
zone number = 00: all available setpoints are transmitted

Example: EOT,1,2,a,0,2,ENQ -> Read setpoint of zone no.2 on unit with address 12
Response from DynaControl: STX, Setpoint (1..n x 4 bytes), ETX

If first digit is 1, zone is deactivated.
Example: Setpoint = 1160 -> Setpoint = 160°, zone is deactivated.

RD_TO Read Temperature Hi/Lo-Tolerances, 'b',62H

To follow: zone number (2 bytes) 00...48
zone number = 00: tolerances off all zones are transmitted
Example: EOT,0,1,'b',1,2,ENQ -> Read tolerance from zone 12 on Unit with address 01
Response from DynaControl: STX, Tolerance (1..n x 2 bytes), ETX
Error: STX, NAK,ETX

RD_SPS Read Motor Speed Setpoint, 'c', 63H

To follow: motor number 00...06 (2 bytes).
If motor number = 00: all motor speed setpoints will be transferred.
Response from DynaControl: STX, Motor speed (1..n x 4 bytes),ETX
Example: EOT,0,1,'c',0,1,ENQ -> Read motor speed from motor 1 on unit with address 01

RD_SPA Read Actual Motor Speed, 'e', 65H

To follow: motor number 00...06 (2 bytes).
If motor number is 00, actual speed of all motors is transferred.
Example: EOT,0,2,'e',0,1,ENQ -> Read motor speed number 1
Response from DynaControl: STX, 4 bytes, ETX
-> actual speed has to be scaled to real RPM (sczle factor = gear ratio)

RD_CST Read System Status, 'f',66H

No bytes to follow
Example: EOT,0,2,f,ENQ
Response from DynaControl: STX, Status (4 bytes),ETX
Status: the 4 bytes build a number 0 to 2047. Each bit represents dedicted information:
Bit 0: 1 = Controller is switched on
Bit 1: 1 = a High Alarm is present
Bit 2: 1 = a Low Alarm is present
Bit 3: 1 = Controller is switched to standby mode
Bit 4: 1 = Pump Enable Thermostat is closed (= pumps are enabled)

Bit 5: 1 = 7 Day Scheduler is active
Example: STX,0037,ETX -> 0037 = 0025 hex: Scheduler active, low temperature alarm

RD_ZST Read Temperature Status, 'i',69H
To follow: zone number (2 bytes) 00...48
zone number = 00: status of all zones is transmitted
Example: EOT,0,3,i,0,0,ENQ -> All zone status are requested from slave address 03
Response from DynaControl: STX, Status,ETX
Status: 0 Zone is deactivated
1 zone is activated but waiting for enable (heat up sequence)
2 zone is activated and heating is enabled but tolerance is not reached.
3 Zone is activated, enabled and has reached tolerance window
4 Zone is in low temp condition
5 Zone is in high temp condition
6 Sensor shorted
7 Sensor open

RD_PR Read Pressure Value, 'g',67H
To follow: transducer number 00...12 (2 bytes).
If transducer number is 0: all pressure values are transferred
Example: EOT,0,2,g,0,0,ENQ -> Read all pressure values from slave address 02
Response from DynaControl: STX, n x 4 bytes, ETX
Depending on the controller's configuration, pressure will be in PSI or BAR scale.

RD_LSP Read Line Speed Input, 'l' , 6CH
To follow: motor number 00...06 (2 bytes)
If motor number = 00: all line speed inputs will be transferred.
-> line speed range: 0...10V = 0...100.0%
Response from DynaControl: STX, Line speed (1..n x 4 bytes),ETX
Example: EOT,0,1,'l',0,1,ENQ -> Read line speed motor 1 on unit with address 01

RD_PRA Read Hi/Lo Pressure Alarm Value, 'p', 70H
to follow: transducer number 00...12 (2 bytes)
If transducer number is 00: all pressure alarm values are transferred.
Example: EOT,0,2,p,0,0,ENQ Read all pressure alarm values
Response from DynaControl: STX, n x 4+4 bytes, ETX

RD_PROG_NO, Read Program Number 'r', 72H
to follow -
Examples: EOT,0,2,r,ENQ Read program number on slave #2
Response from DynaControl: STX, program number (1 byte), ETX

Chapter 5
PROGRAMMING INSTRUCTIONS
FOR V5.16DU DynaControl™ CONTROLLER WITH EXPANDED KEYPAD

Controller Safety Consideration

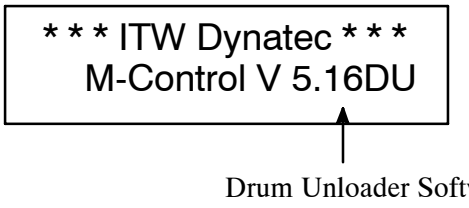
DANGER HIGH VOLTAGE

Never open the control panel without switching off the main disconnect switch to ensure that it is disconnected from its power source.

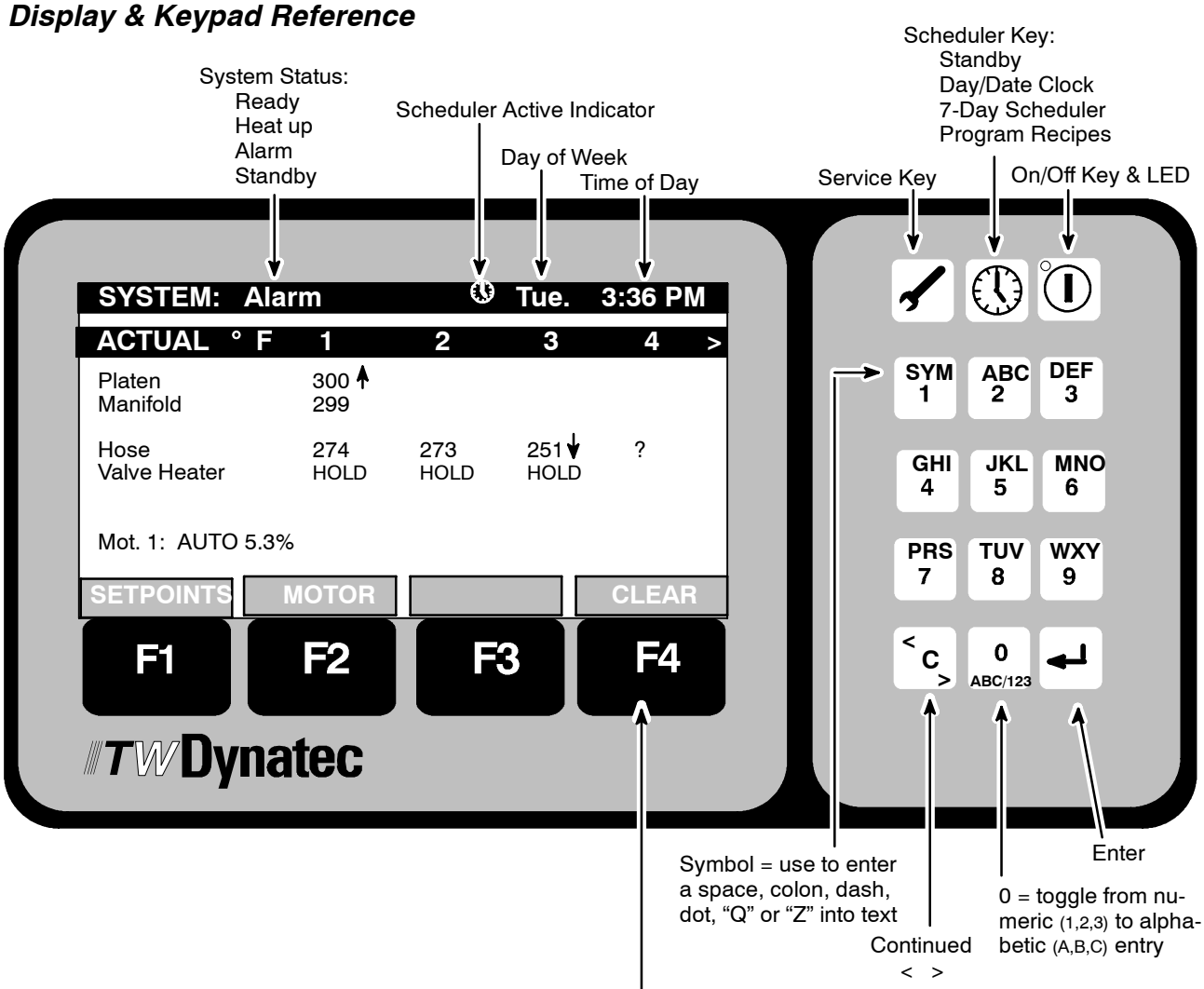
The printed circuit boards should always be carefully removed. DO NOT handle the boards except by their edges. Read the section on PCBs in Chapter 7 of this manual for further cautions.

Software Version

You can determine the software version of your controller by noting it when it comes up on the display at startup:



Display & Keypad Reference



Display & Function Keypad
(Actual Temps Screen shown as example)

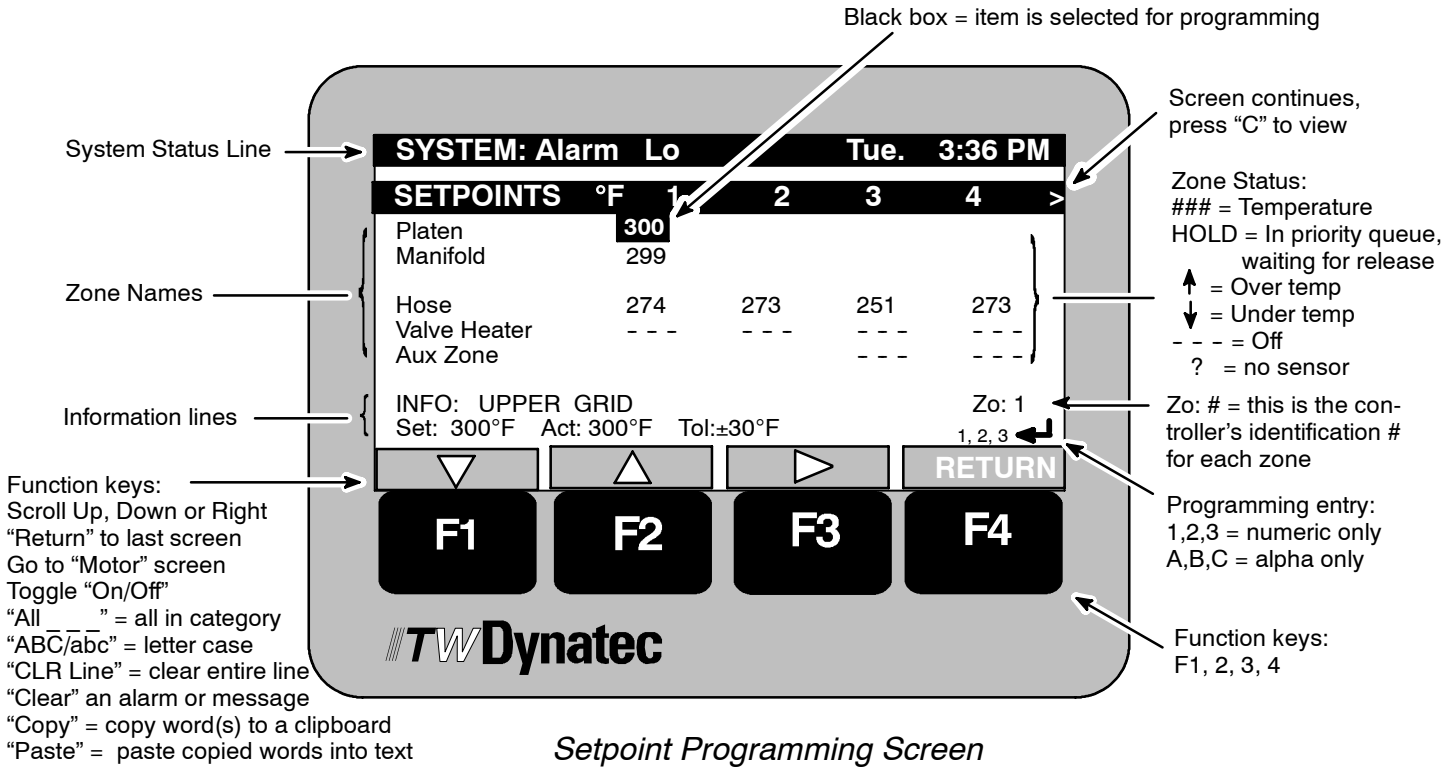
Numeric Keypad

↵	Press Enter to activate or confirm
1, 2, 3	Enter a numeric value with 0 - 9 keys
A,B,C	Enter a letter on the alpha-numeric
🔑	This item or this screen is locked
🔑 F	This item is factory setup* only
< >	Press button C to see more zones

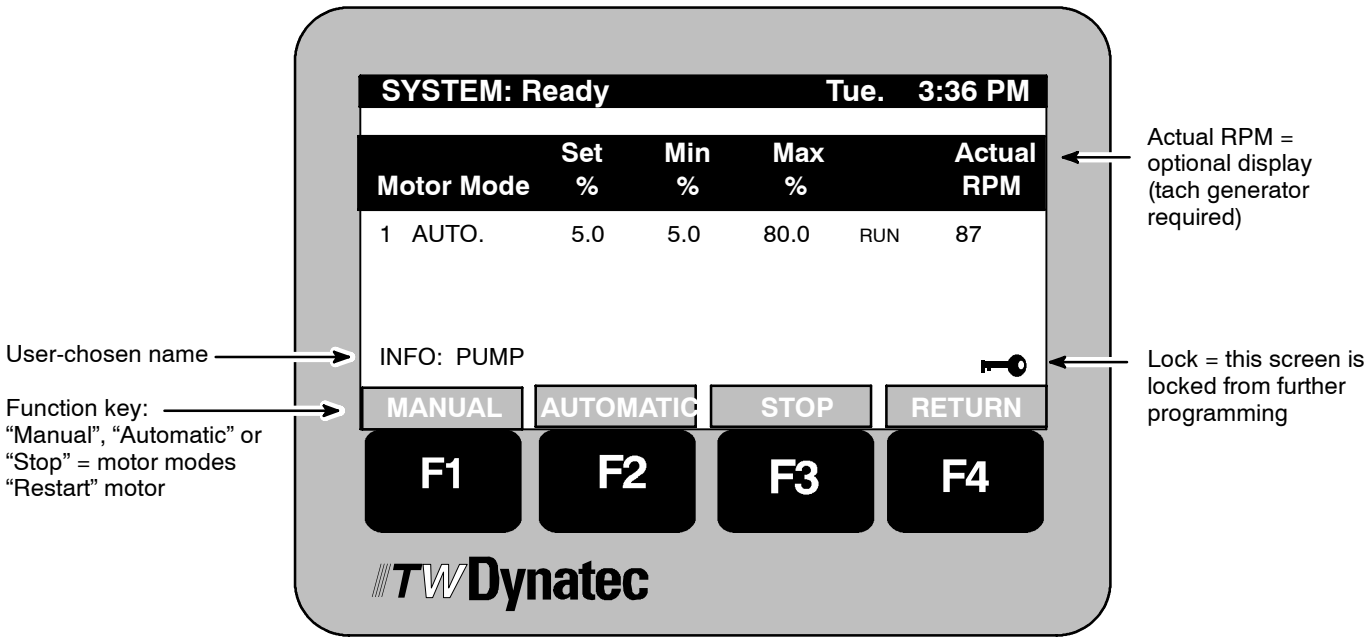
HELP Screen (F4 on Actual Temperatures Screen)

** Factory Setup = can be modified by ITW Dynatec's technicians only*

Display Reference, cont.



Setpoint Programming Screen



Motor Programming Screen

Basic Programming Sequence: Quick Reference

Follow the screen-by-screen steps outlined in the remainder of this chapter for complete setup and programming instructions. Thereafter, use this page as a "quick reference".

Press

Turn Controller On

x3, 2 Language Selection

x1, 8 Temperature Scale Selection

F4 Actual Temperatures:

F1 To Program Setpoints

F2 To Program Motor*

x1 Service Functions (1 of 3):

1 = High Low Temperature Deviation
2 = Setback Temperature
3 = Setback Time Delay
4 = Setpoint Limitation
6 = Temperature Offset
7 = Sequential Heating
8 = Temperature Scale
9 = Change Security Lock or Access Code

x2 Service Functions (2 of 3):

1 = Customer Zone Names
2 = Power On Configration
3 = Factory Defaults
4 = Keypad Locking
5 = PC Link
6 = Language
7 = LCD Contrast
8 = System Logbook
9 = Change Security Lock

x3 Service Functions (3 of 3):
(These functions are factory-programmed only)

To Program Scheduler

1 = Manual Standby Activation
2 = Time & Date Clock
3 = Program 7-Day Scheduler
4 = Select Program Recipes
5 = Manual Scheduler Activation

End

* The controllers for the Drum Unloader's Piston Pump Models does not contain any motor screens or references to "motor" or "RPM".

Controller Setup

Below is the step-by-step process of setting up the controller.

*Note: Whenever an Access Code is required, enter your individual code. The default code is 9999. If you have lost your code, call ITW Dynatec Customer Service: 1-800-538-9540 (in the USA) or contact your local repsentativ*e.

Turn the Controller ON

Turn the controller ON using the units main On/ Off switch.

Language Selection

English is the default language. If you desire another language (choices are German, French, Italian, Spanish, Swedish, Portugese, Japanese and Dutch), make your selection:

Press the Service Key [🔧] two times to advance to Service Functions page 2/3.

Press #6 on the numeric keypad, followed by Enter [↵].

Press the numeric key of your language choice, followed by Enter [↵] .

(OR Scroll ▽ △ to your choice, then press Enter [↵] .

Temperature Scale Selection

Press the Service Key [🔧] twice to advance to Service Functions page 1.

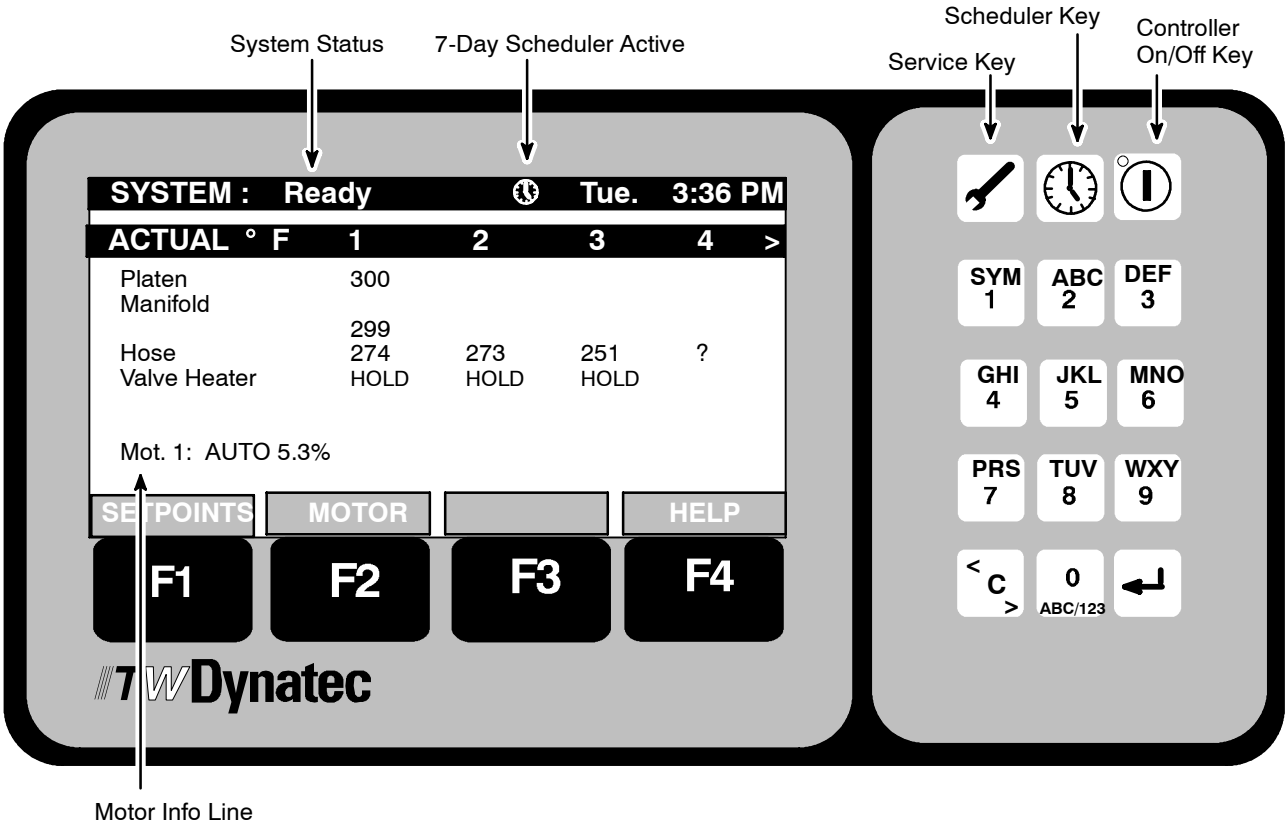
Press #8 on the numeric keypad, followed by Enter [↵].

Toggle to make your choice between °C scale or °F scale. Press [↵] Enter.

Press Return (F4) to Go to the Actual Temperatures Screen

Actual Temperatures Screen

The Actual Temperatures Screen serves as the controller's main menu. From here you can go to any other screen. The Actual Temperatures Screen is also the most useful screen to display for monitoring purposes.



Use of the Actual Temperatures Screen

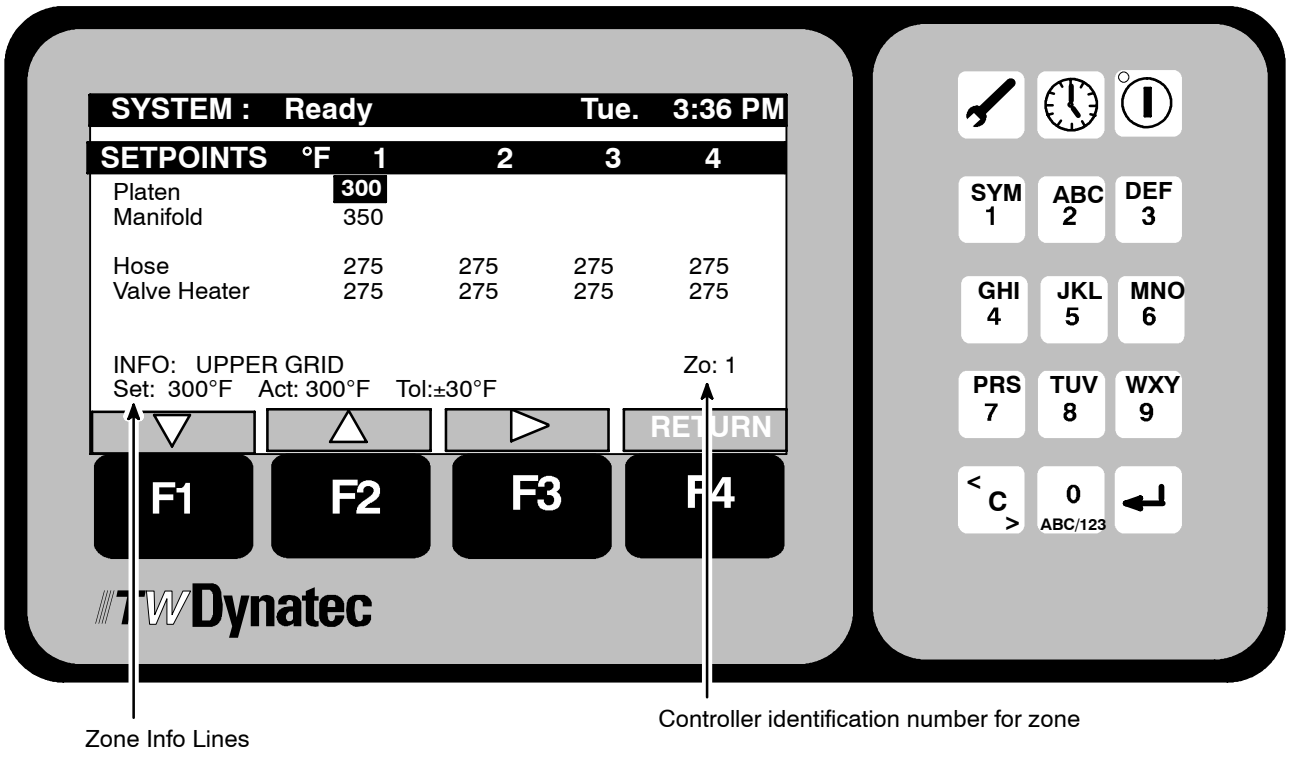
Press This Function Key	To:
On/Off	Toggle display, motors and heaters power ON or OFF
Setpoints (F1)	Go to the setpoints programming screen
Motor (F2)	Go to the motor programming screen
Help (F4)	Go to the Help screen.
Service	Go to the first of the three service screens
Scheduler	Go the the Main Scheduler screen

Use of the Actual Temperatures Screen, cont.

Programming Sequence (details on following pages)
1. Press Setpoints. After programming all of your temperature setpoints, return to the Actual Temperatures Screen.
2. Press Motor. After programming the motor, return to the Actual Temperatures Screen.
3. Press Scheduler Key to program the following functions: Standby, Time & Date Clock, 7-Day Scheduler and/ or Program Recipes.
4. Press Help to view the Help screen (illustrated on page 5-2).

Monitoring:
1. System Status display describes system status as one of the following:
   a. System Heat up: power is ON but zone temperatures have not risen to setpoint range.
   b. System Ready: all zones have reached setpoint temperatures.
   c. Alarm: a temperature zone is out of its setpoint tolerance range. An overtemp alarm is indicated by an upwards arrow next to a temperature. An undertemp alarm is indicated by a downwards arrow next to a temperature.
   d. Alarm Lo: the programmed low level deviation is preventing operation due to an actual low temperature condition.
   e. Standby: the system is in a programmed standby state.
2. Actual Temperatures or Zone Status of all zones is displayed:
   a. ###: a three-digit number indicates a zone's actual temperature.
   b. HOLD: zone is waiting for release. Zones with higher priority have been released.
   c. Arrow up: zone is over temperature.
   d. Arrow down: zone is under temperature.
   e. ?: there is no sensor. Zone needs troubleshooting.
   f. >: there are more temperature zones not seen on the current display. To view them, press C on the numeric keypad (bottom row, first key).
3. 7-Day Scheduler Active display shows that the 7-Day Scheduler is programmed and in use.
4. Motor Info Lines indicate motor mode ("Auto" on the illustration on page 5-6) and external reference percent.
5. If the optional Actual RPM display (shown on page 5-3) is installed, actual pump rpm may be monitored.

Setpoints Programming Screen



Alternative programming function keys:

Use of the Setpoints Programming Screen

Each of the temperature zones is programmed individually by using the function keys as follows:

Press This Function Key	**To:**
Scroll Up, Down or Right (F1, 2, 3)	Select each zone's setpoint
Return (F4)	Return to the Actual Temperatures Screen
↵ (Enter)	Enter a numeric value
All - - - (F1)	All zones in a category (ie, All Hoses, All Heads, etc.)
On/Off (F3)	Toggle a zone on or off
Clear (F4)	Eliminate an error message or alarm

Programming

1. Scroll to the first temperature zone setpoint you desire to program.
2. On the numeric keypad, enter the desired setpoint value.
3. Press Enter ↵ .
4. Scroll to the next setpoint to be programmed and repeat steps 2 and 3.

Notes:

a. To turn a zone OFF: scroll to zone, press Enter to select, press ON/OFF (F3).

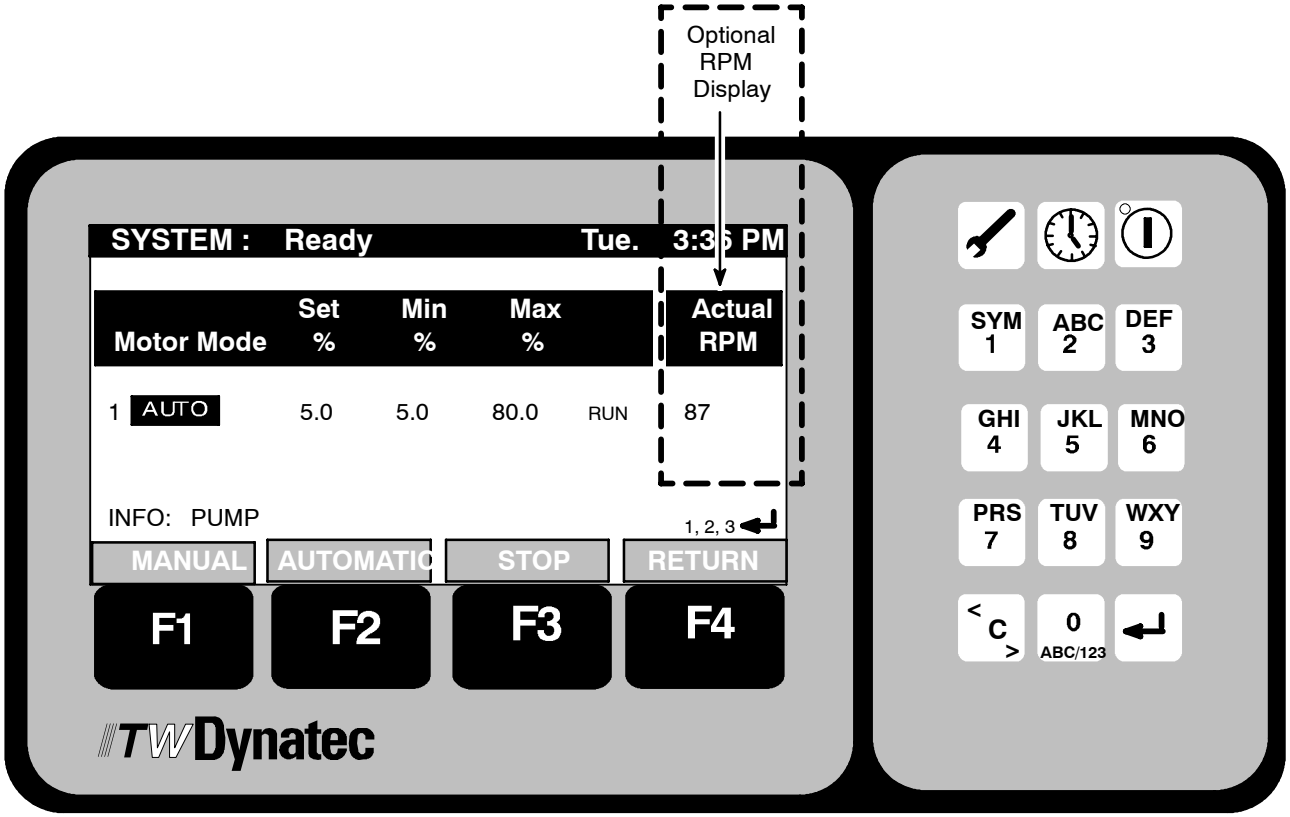
b. When turning a switched-off zone back ON, it will retain its previous setpoint.

c. To change all zones in a category (ie, all hoses, or all aux zones, etc.): scroll to one item in that category, enter desired value, then press F1 (this does not apply to zones which are turned OFF).

Monitoring

1. "Zo #": the number which appears here is the controller's identification number for this zone. This number cannot be changed by user.
2. The Zone Info Lines indicate the user-defined zone name (programmed on page two of the Service Key functions, menu item 1), the zone's setpoint, the zone's actual temperature, the zone's tolerance (programmed on page 1 of the Service Key functions, menu item 1) and the zone's identification number.

Motor Programming Screen



Alternative programming function keys:

Use of the Motor Programming Screen

Program the motor by using the function keys as follows:

Press This Function Key	**To:**
Re-Start (F4)	To re-start motor
Manual (F1)	Choose Manual Mode for the selected motor
Automatic (F2)	Choose Automatic Mode for the selected motor
Stop (F3)	Choose Stop Mode for the selected motor
Return (F4)	Return to the Actual Temperatures Screen
↵ (Enter)	Enter a numeric value

Programming

1. Press Manual, Automatic or Stop as desired motor mode. Press Enter.
2. If in Manual mode, enter pump speed ##.# in the Set % column:
    a. Use numeric keypad to enter desired rpm value.
    b. Press Enter.
3. If in Automatic:
    a. Scroll to Min % to program minimum pump speed. Enter value as described above.
    Note: typically, at 0 volts, this value will be between 0 and 10% (default = 0%).
    b. Scroll to Max % to program maximum pump speed. Enter value as described above.
    Note: typically, at 10 volts, this value will be between 0 and 100%, depending on motor installed on ASU (default = 100%).

Monitoring

1. RUN indicates the pump/ motor is enabled.
2. HOLD indicates that the controller is preventing the pump/ motor from running, due to a low temperature, a standby condition, etc.
2. The Info Line indicates the user-defined name for the selected motor (programmed on page two of the Service Key functions, menu item 1).
3. If the optional Actual RPM display is installed, actual pump rpm may be monitored. With this option, the RUN/HOLD column is eliminated. The Actual RPM display is also seen on the Actual Temperatures Screen.

Service Functions Screens

The three Service Function Screens are designated Page 1/3, Page 2/3 and Page 3/3. They are accessed by pressing the Service Key 1, 2 or 3 times.

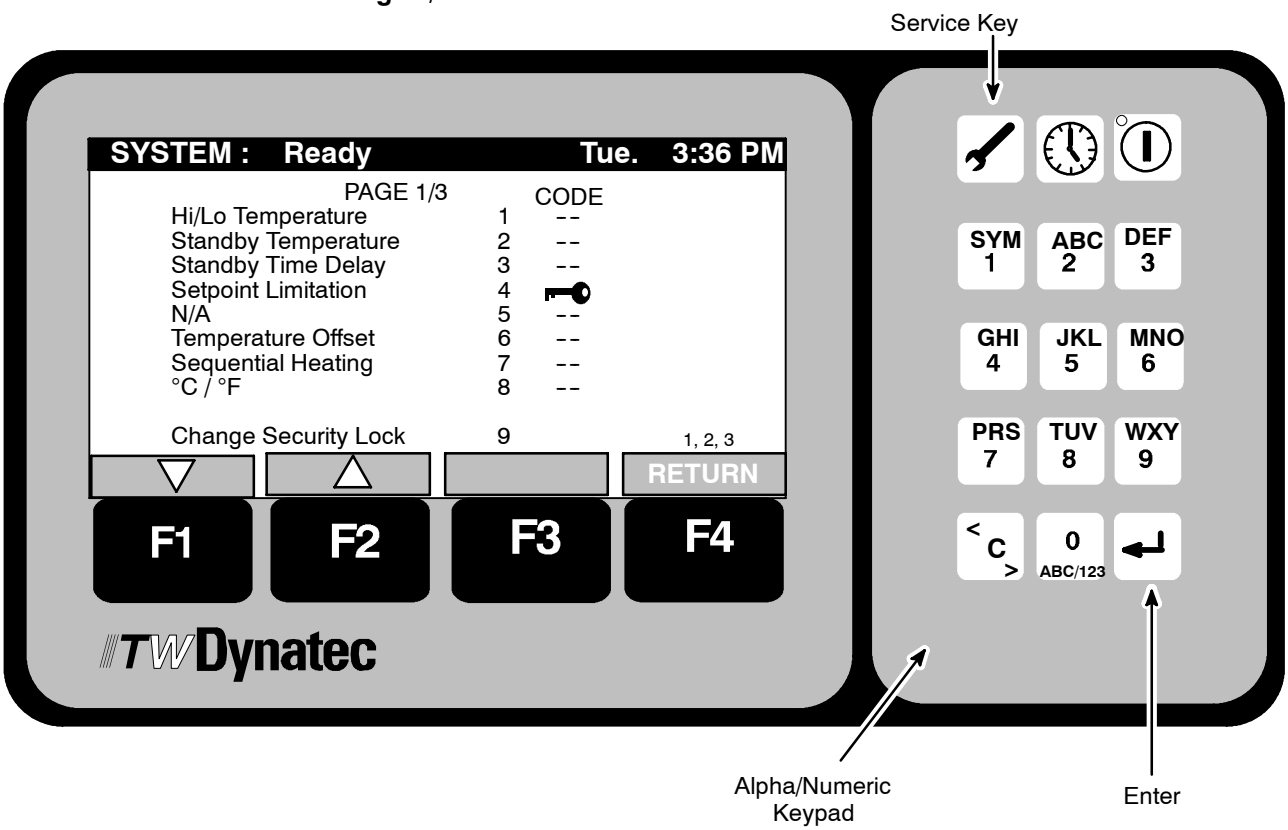
Functions coded -- are active and require no code to program.

Functions coded with a key are locked and require entry of a code before programming. *For example, as seen on the diagrammed screen below, Setpoint Limitation is locked from further programming.*

Functions coded F are ITW Dynatec factory setups and are not user accessible.

Program the Service Functions as described on the following pages. Many functions are programmed simply by a toggle or by a single numeric entry.

Service Functions Screen Page 1/3



Service Functions Screens, cont.

Function #

Press #1 to program High/ Low Temperature Deviation. Enter a numeric value for the first zone selected. Press Enter to confirm. Scroll to next desired zone and repeat until all zones are programmed. Then Press Return (F4) to return to menu. Note: after entering one value in any category, you may press All xxx. (F1) to change all the items in that category.

The High/ Low Temperature Deviation is a range (±) representing the high and low temperature limits of each setpoint. During operation, these limits activate the error alarms which alert the operator to over-temp and under-temp conditions in the temperature zones. The smallest deviation programmable is ±5° (C or F) and the largest is ± 50°.

CAUTION: DO NOT set your low temperature limit below the softening point of your adhesive or pump damage will result. The softening point of a material is the lowest temperature at which that material can be pumped.

Press #2 to program Standby Temperature. Enter a numeric value for each category. Press Enter. Press Return (F4). Note: if the same Standby Temperature is desired for all zones: enter the value, then press All xxx.

The Standby Temperature is a reduction in temperature by which all the temperature zones will be reduced in a standby condition. For example, if the platen setpoint is 275° and you program a 100 degree standby temperature, the controller will reduce the platen temperature to 175°. Numerically, the controller will accept any standby temperature within the range of -30°C and -150°C (-30°F and -150°F).

Press #3 to program Standby Time Delay. Enter a numeric value. Press Enter. Press Return (F4).

The Standby Time Delay allows programming of a delay from the time the "external standby" terminals (for connection, see Chapter 3) are connected until the unit enters its standby mode. The time delay selected must be in the range from 0:00 (which represents an immediate entry into standby, i.e. no delay) to 7:59 (seven hours and 59 minutes).

Press #4 to program Setpoint Limitation. Enter a numeric value. Press Enter. Press Return (F4).

The Setpoint Limitation is a universal maximum temperature for all temperature zones (ie, the overtemperature limit). The controller will not allow the operator to program a higher setpoint than the value of the setpoint limitation. The default setpoint limitation is 218°C (425°F). The selectable range for the setpoint limitation is 40°C - 232°C (100°F - 450°F).

Function #5 is not active in the present controller configuration. No programming is possible.

Press #6 to program Temperature Offset. Enter a numeric value for the first zone selected. Press Enter. Scroll to next desired zone and repeat until all zones are programmed. Press Return (F4). Note: to enter a negative value, enter the value, then press Negative (F3).

The Temperature Zone Offset is a mathematical factor which compensates for differences in temperature between the placement of the system's heaters and sensors. An offset is often used for large applicator heads, printrolls, printwheels or other custom devices. Usually no offset is required for standard heads. The offset may be programmed up to ± 50 degrees (C or F) of the setpoint.

Service Functions Screens, cont.

Press #7 to program Sequential Heating. Scroll to choose one of the two selections (No sequence, or First all hopper zones). Press Confirm (F3).

The controller allows you to choose the heating order of the various temperature zones, so that zones requiring more time to heat up to temperature can be programmed to begin heating before others. This is done by programming each zone with a sequential heating priority.

A "Priority 1" designation means the temperature zone will begin to heat immediately after the ASU is powered on. Zones with high priority do not begin heating until all zones with low priority have reached the low limit of their setpoints. Zones which are switched OFF are not applicable.

The most common heating sequence for the Dynamelt ASU is first platen and manifold, then hose/ head/ auxiliary zones. This allows the larger mass of adhesive in the platen zone to begin heating first. This sequence (platen and manifold, then hose/ head/ auxiliary) is the controller's default heating sequence.

Press #8 to program Temperature Scale. Program directly on the menu screen by pressing #8 key to choose between Centigrade or Fahrenheit. Press Return (F4).

Press #9 to Change Security Lock for Page 1/3. Enter your access code. Press Enter. Scroll F1 or F2 to select desired function. Press F3 to Lock or Unlock function from programming. Repeat for each desired function.

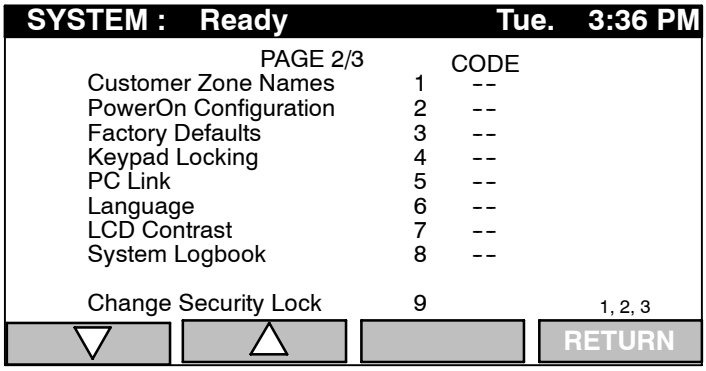
To Change Your Access Code: Scroll F1 or F2 to select "Change Security Lock". Enter your desired new access code. Press Enter to Confirm. Press Return (F4).

Press Service Key to advance to Page 2/3.

Service Functions Screens, cont.

Service Functions Screen Page 2/3

Programming of the Service Functions on this screen is similar to the programming of screen 1/3.



Function #

Press #1 to program Customer Zone Names. *This function allows the programmer to enter his desired name for each temperature zone and the motor. This up-to-20-character name will be the name displayed in the controller's Info Lines. Program following these rules:*

a. use the Alpha/Numeric keypad to enter letters and numbers. When entering letters, use one, two or three presses of a key to distinguish between the letters. Press Enter after each desired letter or number is in place.
b. press the 0 (zero) key to toggle from letters to numbers,
c. press the SYM key to enter a space, colon, dash, dot, "Q" or "Z",
d. press F1 to toggle from upper to lower case,
e. you cannot back up. If an error is made, press Enter repeatidly to advance through the name loop until you reach the point for correction and re-write as desired,
f. press CLR LINE to clear an entire line,
g. you may COPY (F2), PASTE (F3) and then modify to save time when names are similar,
h. press F4 to advance to the next motor or zone to be named.

To program Customer Zone Names: Press F1 to program Temperature zones or F2 to program Motor. Scroll to the first item to be named. Press Enter to allow naming. Using the Alpha/Numeric keypad and following the rules given above, spell out name as desired. Press F1, F2 or F3 to select another item to name. Repeat until all items are named as desired. Press F4 again to Return to Service Function Page 2/3 screen.

Press #2 to program Power On Configuration. *This function gives the user the choice of having the heaters and motor come on (or remain off) whenever the unit is powered on.* USA default is both On. European default is Heaters On, Motors Off. Note: programming here overrides programming made at the next Service Function (Function #3 Factory Defaults).

Press 1 to toggle the heaters On or Off. Press 2 to toggle the motors On or Off. Press 3 to toggle the external inputs On or Off. Note: if you select heaters Off, the controller will remind you, at power on, to press F1 to turn the heaters On.

Service Functions Screens, cont.

Press #3 to program Factory Defaults. Enter your 4-digit access code. Press Enter. Select either EU Setup (F2) or US Setup (F3). Press F4 to Return to menu. Note: Customer Defined (F1) is a FUTURE PROGRAMMING FUNCTION and not selectable in this version.

This function reloads all factory setpoints and parameters.
EU (European) Setup = Temperature scale is Centigrade, pressure is measured in BAR, motors are in STOP mode at startup and heaters are active at startup.

US (United States) Setup = Temperature scale is Fahrenheit, pressure is measured in PSI, motors start in the mode they were left in at shutdown and heaters are inactive at startup.

Note: an active Seven-Day Scheduler (option) overrides this function. See "Seven-Day Scheduler" in this chapter for more details.

Press #4 to program Keypad Locking. Scroll to either Temperature Settings or Motor Settings. Press F3 to toggle Locked or Free. Scroll to other setting and press F3 to toggle Locked or Free. Press F4 to Return to menu.

Selecting Locked prevents further programming to either temperature setpoints or motor. Selecting Free allows further programming.

Press #5 to program PC Link. Scroll to select either:
"Load: from Computer to this Controller" or
"Save: From this Controller to Computer.
Press F1 to Load. Press F2 to Save. Press F3 to Configure BAUD rate. The message "Waiting" indicates the controller/ computer is processing data. The message "Transmission Done" indicates the computer/ controller has completed transmission. Press F4 to Return to menu.

The DynaControl is capable of bi-directional data transfer of all system parameters to a remote computer. If this option is installed on your ASU, program it at this step. To program your remote computer, see page 5-27.

Press #6 to program Language. Scroll to desired language. Press F4 to Return to menu.

Press #7 to program LCD-Contrast. Press F1 (+) to increase contrast or F2 (-) to decrease contrast of display. Press F4 to Return to menu.

Press #8 to program System Logbook. The System Logbook function has the following functions:
1. System Logbook: a list of the last 1,000 controller events. Use F1 and F2 to move forward or backward thru the logbook. Use F3 Configuration to choose to log "all system data" or "errors only".
2. Data Logger: *FUTURE PROGRAMMING FEATURE*, not currently functioning.
3. Elapsed Hours: the number of hours that the system has been running. Not resettable.

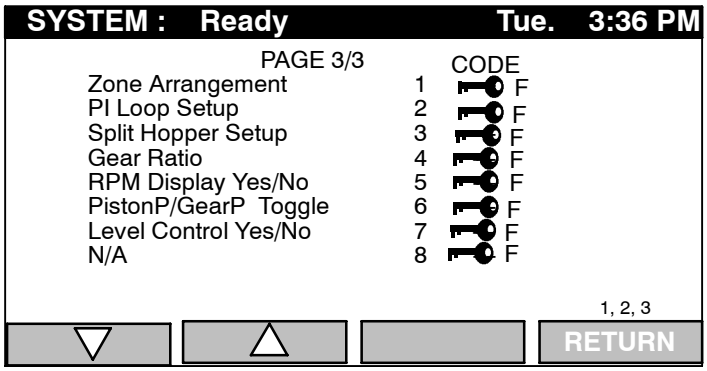
Press #9 to Change Security Lock for Page 2/3. Enter your 4-digit access code. Press Enter. Press F1 or F2 to select desired function. Press F3 to Lock or Unlock function from programming.

Service Functions Screens, cont.

Repeat for each desired function. Press Return (F4). Press Return (F4) again to go to Actual Temp Screen.

Service Functions Screen Page 3/3

All of the Service Functions on page 3/3 are ITW Dynatec-accessible only. No operator programming is possible.

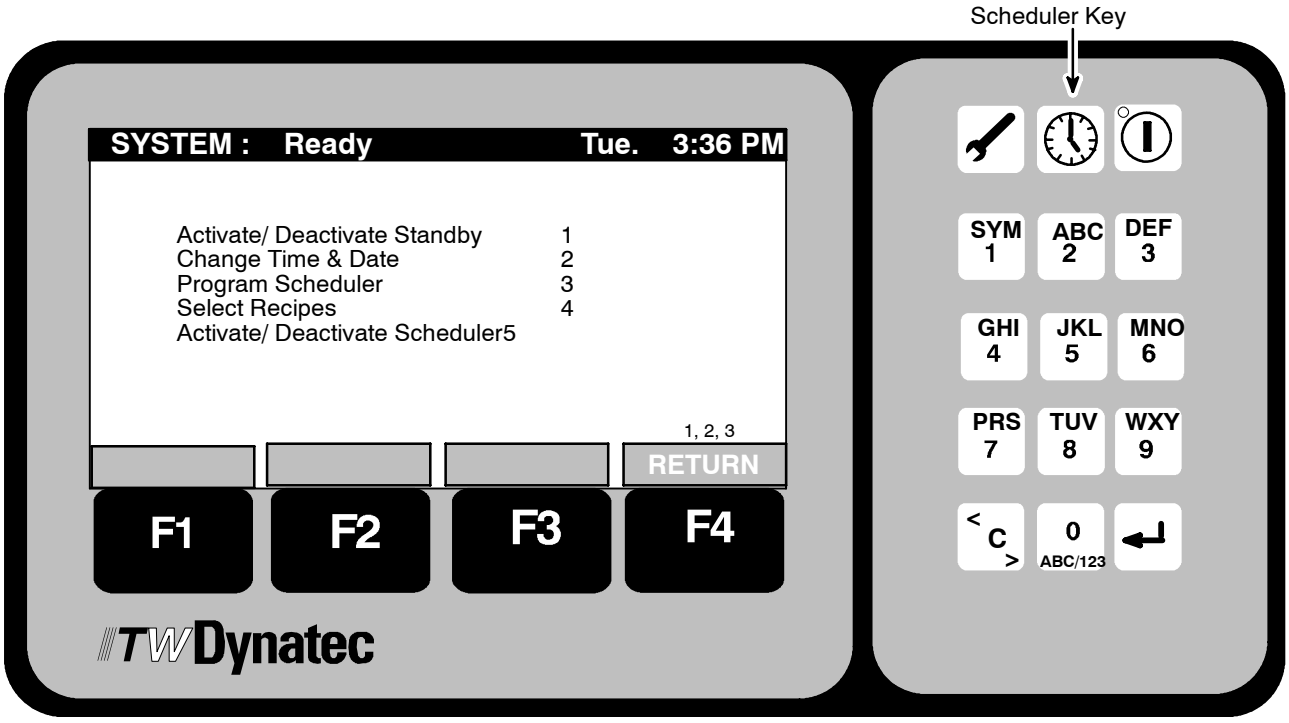


Programming at Main Scheduler Screen

The Main Scheduler Screen functions include Standby, Date & Time Clock, 7-Day Scheduler and Program Recipes.

Press the Scheduler Key to advance to the Main Scheduler Screen.

Main Scheduler Screen



Use of the Main Scheduler Screen

Function #

Press #1 to manually activate or deactivate Standby. Press Press F4 to return to the Main Scheduler screen. Note: use of this key will override a programmed Standby.

Press #2 to program the time-of-day and date-of-year clock. Press F1 or F2 to change a selected item, press F3 to select another item. Press Press F4 to return to the Main Scheduler screen.

Press #3 to program the 7-Day Scheduler. See programming details and screen on following page.

Press #4 to select an active recipe (1-4). Use F1 or F2 to select recipe #1, 2, 3 or 4. Press F3 to Confirm. Press F4 to return to the Main Scheduler screen.

Two separate setpoint recipes (programs) can be programmed and stored in the controller, though only one recipe is active at any given time. Setpoints may differ from one recipe to another. When switching between recipes, the new recipe's setpoints take over, so there may be error alarms if the new recipe's unused temperature zones are turned on.

The program recipes are referred to as: P1 and P2.

To create a Recipe: advance to the Main Scheduler Screen and press #4. Use F1 or F2 to choose a recipe number (for this example, say #2). Press F3 to confirm. Press F4, then press F4 again to go to the Actual Temperatures Screen. Program all controller setpoints and functions as outlined on page 5-4. When all programming is completed, Recipe #2 (P2) is created.

Note: at Power On, the program mode defaults to P1.

Press #5 to activate or deactivate the 7-Day Scheduler. Press F4 to return to the Main Scheduler screen.

Press F4 to return to the Actual Temperatures Screen.

Programming of 7-Day Scheduler

7-Day Scheduler

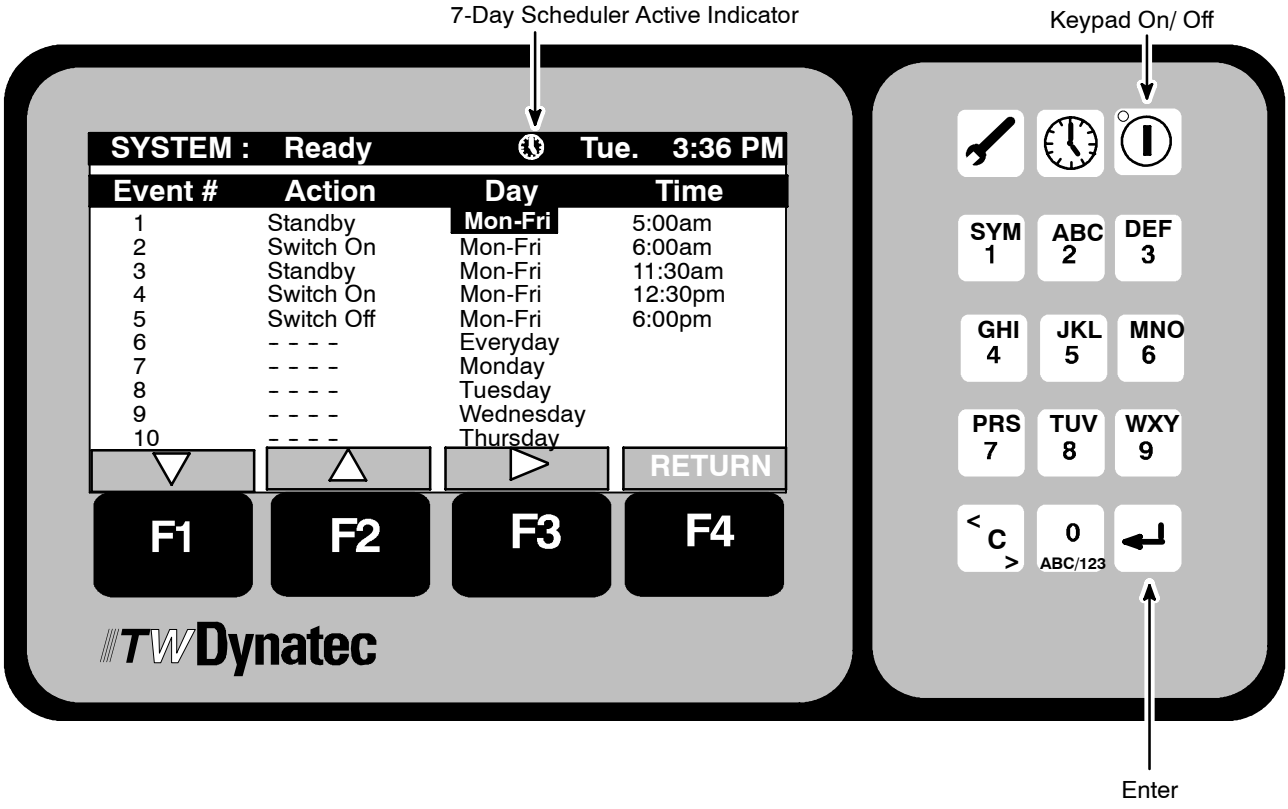
The Seven-Day Scheduler allows the operator to program main power ON and OFF times which coincide with his daily production schedule throughout the work week. Up to ten "events" may be scheduled. An event is a specific day and time or every day at the same time.

A unit which has an active seven-day scheduler should be turned ON at the main power switch. It should not be turned off by the main power switch while the scheduler is active. To turn the unit OFF (temporarily overriding the scheduler), use the DynaControl on/ off keypad icon.

In the event of a power outage, or a manually switched main power ON, an active scheduler overrides the "Power On Heater Start" parameter. That is, if the scheduler is in "Switch ON" at the time of a power ON, the heaters will be turned ON. Likewise, if the scheduler is in "Switch OFF" at the time of a power ON, the heaters will be turned OFF.

When the seven-day scheduler is programmed and active, the scheduler icon on the controller screen flashes continuously.

7-Day Scheduler Screen



Use of the 7-Day Scheduler Programming Screen

Press This Function Key	To:
Scroll Up, Down or Right (F1, 2, 3)	Select an individual action, day or time
Return (F4)	Return to the Main Scheduler Screen
↵ (Enter)	Enter a chosen selection

Programming

1. Press F3 to scroll to the Action column. Then scroll to the first event you desire to program.
2. Press Enter ↵ until the desired Action [ie, Standby, Switch On, Switch Off or - - - (no event)] is displayed.
3. Scroll (F3) to the Day column.
4. Press Enter until the desired Day (ie, Mon-Fri, Everyday or any individual day) is displayed.
5. Scroll (F3) to the Time column.
6. Press Enter to display the time you desire the event to start. Enter hour, minutes and am/ pm individually.
7. Repeat steps 1 through 6 for each event desired.
8. Press F4 to return to Main Scheduler screen.

Typical Downloading Instructions: DynaControl Controller to Remote PC

1. Create a Tab-delimited Text-File at the Remote Computer

A template file is available in Microsoft Excel format. Open the Excel program, load the template file (M-Cntrl Temp.xls) and fill in all accessible fields as desired. Do not change the protected cells. When completed, use the "Save as" function and select the "Text (tab-delimited*.txt)" option.

2. Connect the DynaControl Controller to the Remote Computer

Remove the controller mounting bracket from the ASU via four screws accessed from inside the panel box assembly. Using a standard serial extension cable (Male/Female DB9) (if necessary, utilize a DB25 to DB9 adapter), connect the DynaControl controller's Download Port (on the Display CPU PCB, see illustration on page 7-7) to the remote computer's COM1 or COM2.

3. Configure the Com-ports on the DynaControl Controller

At the DynaControl's keypad, advance to Service Functions Screen 2/3, Function #5 "PC-Link" (reference page 5-16). Press F3 CONFIG. Press F1 to access the baudrate selection. Select the desired baudrate with F3. Note: the address setting is not used in this mode.

4. Start LOAD Function on the DynaControl Controller

At the DynaControl's keypad, Press F4 RETURN and press "5" to re-enter the PC-Link. Press F1 LOAD to start the load function. Display will read ******WAITING******. On the Display CPU PCB, move jumper J1 to position 1.

5. Download Text-file from the Remote PC to the DynaControl Controller

At the remote PC, start the terminal program (e.g. HyperTerminal). Make sure that the transmission parameters match (ie. selected baudrate, 8bit, no parity, no flow control). Start the download function using "text mode". Select your previously saved file (see step #1 above) and start the download. Note: if you are using HyperTerminal and change the transmission parameters, you may have to exit and re-start the HyperTerminal program.

6. Successful Transmission

Monitor the DynaControl's display screen. After a successful transmission of data, the controller will read "TRANSMISSION DONE". On the Display CPU PCB, move jumper J1 back to position 3.

Chapter 6
MAINTENANCE

Inspection & Checks

Item	Inspect for	Frequency	Action
Pump	Tightness of mounting bolts	At startup	Tighten to 50 ft/lbs with torque wrench
Platen seals	Wear	As required	Replace when necessary
Air inject checking valve	Plugging	Every 3 months	Clean

Fasteners

After the first ten hours of operation, check all set screws, socket head and cap screws for tightness. Thereafter, re-check all fasteners after every three months of operation.

Hose Fittings

All hose fittings should be checked for tightness after every three months of operation.

Motor

The unloader's motor will never need lubrication. See Appendix for manufacturer's notes on maintenance.

Chapter 7
Part 1: UNLOADER TROUBLESHOOTING AND SERVICE

Unloader Troubleshooting Notes

Verify the following before proceeding:

1. The equipment is switched on.
2. The equipment is supplied with power.
3. The equipment is supplied with pneumatic air.
4. Pneumatic and electrical connections are correct.
5. A drum is loaded into the unloader and there is adhesive is it.

Unloader Mechanical Troubleshooting Guide (for Gear Pump Models)

Trouble	Probable Cause	Solution
No flow from applicator when pump is running.	1. Pressure relief is set too low.	1. Increase pressue relief setting.
	2. Pump not primed (air pocket in platen).	2. Open vent until there is a continuous flow of material.
	3. Ram is not completely lowered.	3. Use pneumatic control to lower ram.
Pump will not run.	1. Unit is not in ready mode.	1. Allow longer warmup.
	2. Motor breaker tripped.	2. Reset breaker.
	3. Drive shaft key sheared.	3. Replace key (be sure pump is not jammed).
	4. Pump jammed.	4. Remove and inspect pump for any foreign objects.
Pump output low.	1. Speed setting wrong.	1. Reset pump output.
	2. System temperature low.	2. Increase temperature.
	3. Material viscosity high.	3. Increase temperature setpoint or increase pressure relief setting.
	4. System not primed.	4. Open vent until there is continuous flow of material.
	5. Pressure relief setting is too low.	5. Re-adjust as required.
Pump runs fast but no material flow.	1. Drum is empty.	1. Change drum.
	2. Air in pump.	2. Open vent until there is continuous flow of material.
	3. Pump is cavitating.	3. Slow down pump speed.

Trouble	Probable Cause	Solution
Pump leaks.	1. Defective o-ring seal on pump.	1. Replace.
	2. Loose pump mounting bolts.	2. Tighten (DO NOT overtighten).
Material leaks past wiper seal.	1. Defective seal.	1. Replace.
	2. Low viscosity material.	2. Decrease system air pressure.
Drum difficult to remove from platen.	1. Injection air pressure too low.	1. Increase injection air pressure, not to exceed 15 psi.
	2. Platen temperature low.	2. Allow platen to warm up – increase platen temperature.

Unloader Mechanical Troubleshooting Guide (for Optional Piston Pump Models)

Trouble	Probable Cause	Solution
No flow from applicator when pump is running.	Ram is not completely lowered.	Use pneumatic control to lower ram.
Pump will not run.	1. Unit is not in ready mode.	1. Allow longer warmup.
	2. Pump jammed.	2. Remove and inspect pump for any foreign objects.
Pump output low.	1. Pump air inlet pressure setting wrong.	1. Adjust pump regulator.
	2. System temperature low.	2. Increase temperature.
	3. Material viscosity high.	3. Increase temperature setpoint or increase pressure relief setting.
Pump runs fast but no material flow.	1. Drum is empty.	1. Change drum.
	2. Air in pump.	2. Open vent until there is continuous flow of material.
Pump leaks.	1. Defective o-ring seal on pump.	1. Replace.
	2. Loose pump mounting bolts.	2. Tighten (DO NOT overtighten).
Material leaks past wiper seal.	1. Defective seal.	1. Replace.
	2. Low viscosity material.	2. Decrease system air pressure.
Drum difficult to remove from platen.	1. Injection air pressure too low.	1. Increase injection air pressure, not to exceed 15 psi.
	2. Platen temperature low.	2. Allow platen to warm up – increase platen temperature.

Unloader Electrical Troubleshooting Guide

Trouble	Probable Cause	Solution
Unit does not heat.	1. Circuit breaker tripped.	1. Reset.
	2. Inoperative temperature controller.	2. Replace.
	3. Over-temperature.	3. Reset switch, located within transfer block by pump.
Unit too hot. Over-temperature light ON.	1. Temperature controller set too high or out of calibration.	1. Reset or recalibrate.
	2. Short circuit in system.	2. Find short and correct.
Unit will not go into ready mode.	1. Inoperative RTD sensor.	1. Replace.
	2. Unused temperature zone is turned On.	2. Turn zone Off.
Unit heats slowly or does not reach operating temperature.	Low voltage.	Correct low voltage condition.

Heaters

Four 250 watt heaters are installed within the transfer block, which is located on top of the platen. An ohmmeter may be used to verify if they are operable. A reading of 230 ohm indicates the heater is good. The total for the four heaters (1000 watts) is 57 ohms in parallel.

Heaters, Sensors and Switches on Optional Piston Pump Models

On the optional piston pump models, there is no transfer block and the only heater and sensor are in the platen. The over-temperature and under-temperature switches (thermostats) have been eliminated.

Part 2: DYNACONTROL CONTROLLER TROUBLESHOOTING

General Troubleshooting Notes

DANGER
HIGH VOLTAGE

WARNING
HOT SURFACE

Dynamelt systems use electrical power that can be life threatening and hot-melt adhesives that can cause serious burns. Re-read Chapter 1 "Safety Precautions" before performing any troubleshooting or repair procedures. All troubleshooting and repair procedures must be performed by qualified, trained technicians.

CAUTION: Printed circuit boards (PCBs) are prone to damage from static electrical charges during handling. Read "Handling Printed CIrcuit Boards" in this chapter before handling or attempting service on Dynamelt's PCBs.

The Dynamelt's DynaControl includes malfunction self-diagnostics, alerts and error indication alarms. The error indication alarms (the alarms displayed on the DynaControl readout) are triggered whenever there is a sensor failure and whenever there is an over-temperature condition. The operation of the error indication alarms is described in Chapter 4 of this manual.

Preliminary Checks: Verify the following before proceeding:

1. The ASU is switched on.
2. The ASU is supplied with power.
3. The ASU is supplied with pneumatic air.
4. Pneumatic and electrical connections are correct.
5. There is adhesive in the drum.

Error Messages:

See Ch. 4 for complete instructions on Error Alarms and Message**s.**
Sensor Failure on Zone # = temperature zone "#" has an open or shorted sensor.
Overtemperature on Zone # = temperature zone "#" has exceeded setpoint limitation.
Communication Error = indicates a serious problem which requires service by Dynatec.
Manifold Overtemp = manifold temperature has exceeded the overtemp thermostat's setting.

Hose/ Valve Heater Troubleshooting Tip

Hose or valve heater (or applicator if applicable) problems can be isolated by electrically connecting the valve heater and hose to the alternate socket on the unloader. If the malfunction goes with the valve heater and hose, the problem will usually be in the valve heater or hose that was moved. If the malfunction does not move with the valve heater and hose, the problem is probably in the unloader.

Motor Speed Control PC Board Re-set

Anytime the AC drives's Motor Speed Control printed circuit board must be re-set due to line surges or over-currenting the motor, turn the unloader OFF by the main power switch and wait at least 20 seconds before attempting to re-start. This will allow the pcb to re-set. See the table on page 7-9 to troubleshoot.

High-Temperature Redundant Overtemp Thermostat

The unloader includes a mechanical (redundant) overtemp thermostat that acts as a safety backup. If the unit's manifold temperature should exceed 232°C (450°F), the thermostat will cause the unloader's circuit breaker to open and power to the manifold, platen, valve heater and hose(s) will be cut off. The mechanical thermostat must be manually re-set after the manifold temperature falls below 204°C (400°F).

To reset thermostat: turn OFF the unit's main power switch; push the center of the thermostat's insulator to re-set; restart the unit.

Lithium Battery on Display CPU PCB

The Display CPU Board contains a lithium battery. The normal life of this battery is about ten years. When the battery needs replacement, the (optional) scheduler's clock does not function, but other controller features remain intact. Return the board to ITW Dynatec for battery replacement.

Handling Printed Circuit Boards (PCBs)

The unloader and DynaControl controller utilize several printed circuit boards (PCBs). These boards are extremely sensitive to electrostatic charges. When working near or with any PCBs, the following procedures must be followed to avoid damage to them.

DANGER HIGH VOLTAGE

Before unplugging connectors from the I/O PCBs, ground yourself to the unit by touching any available unpainted cool metal surface, mounting screws, etc. This will avoid electrical discharge to the PCB assembly when you are removing and replacing connectors.

CAUTION: Printed circuit boards (PCBs) should be handled using the following procedures:

1. **Wear a wrist grounding strap. If a grounding strap is not available, frequently touch a bare metal part of the ASU (unpainted frame, mounting screw, etc.) to safely discharge any electrostatic buildup on your body.**
2. **Handle a PCB by its edges only. Don't grip a PCB across its surface.**
3. **When removed from the unit, each PCB must be individually packaged inside a metallized, static drain envelope. Do not place the removed PCB on a table, counter, etc. until it has first been placed in or on a static drain envelope.**
4. **When handing a PCB to another person, touch the hand or wrist of that person to eliminate any electrostatic charge *before* you hand the PCB to him.**
5. **When unwrapping a PCB from its static drain envelope, place the envelope on a *grounded, nonmetallic* surface.**
6. **To cushion PCBs for shipment, use only static-drain bubble pack. Do not use foam peanuts or bubble pack not known to be static draining.**

The following pages detail the Dynamelt M Series PCBs.

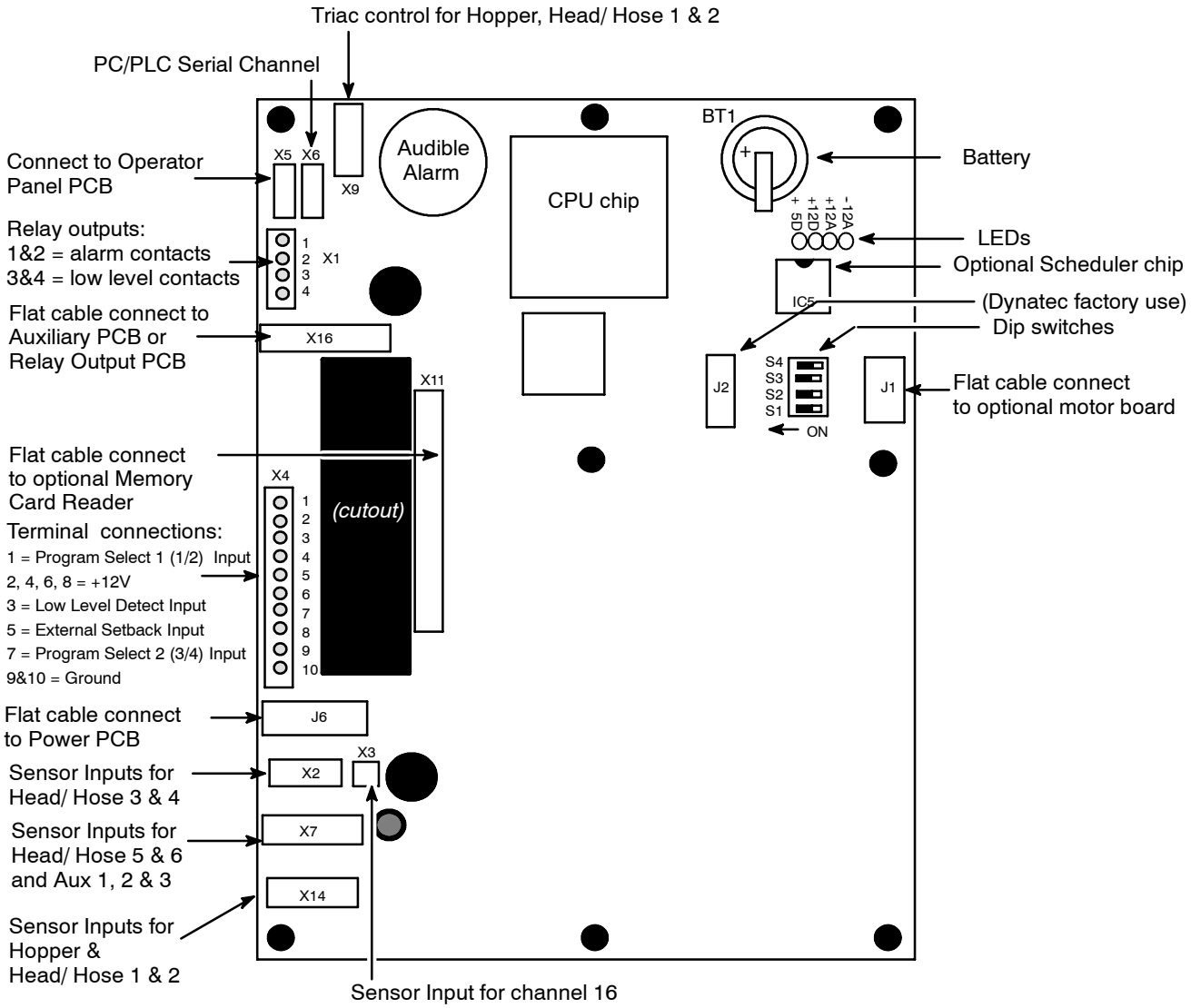
CPU Printed Circuit Board

The CPU board contains the controller's software chip (EPROM), CPU chip and optional 7-Day Scheduler chip. It also contains the optional Memory Card Reader interface and ribbon cable connection.

The CPU board is mounted directly behind the Operator's Keypad PCB, behind a protective, metal cover. All of the user terminals are located outside of the protective cover.

The Low Level relay is fixed at normally open. The High/ Low Alarm relay is fixed at normally closed. During normal operation, the two red indicator lights are always ON.

Set the dip switches as follows: for gear pump models: set S1 to ON; set S2, S3 & S4 to OFF
for piston pump models: set all switches (S1 - S4) to OFF



Layout of Components on CPU Board

Display CPU Printed Circuit Board

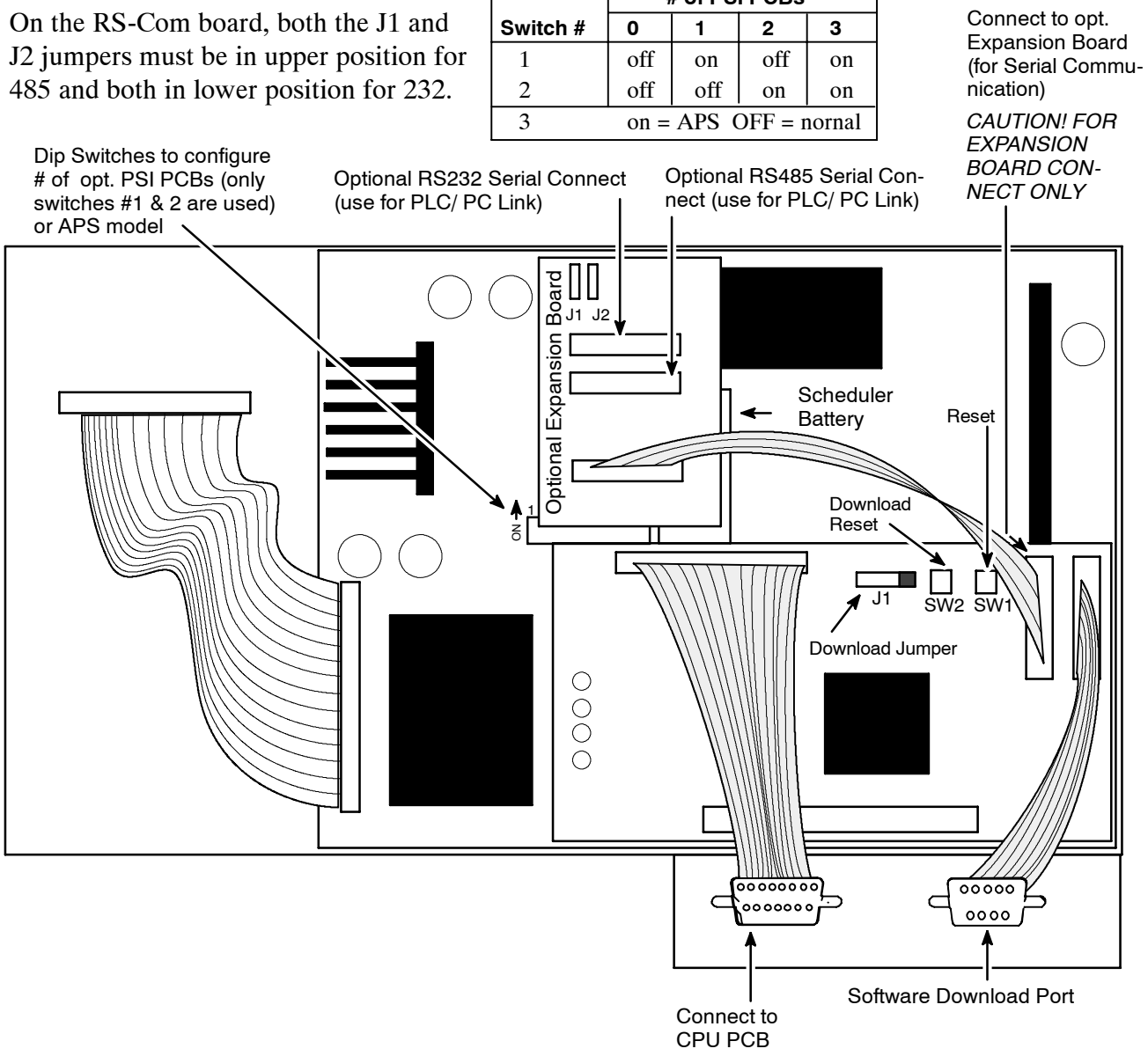
The Display CPU PCB contains the controller's CPU module, scheduler battery, serial ports and optional connections. It is located directly behind the controller's display panel within its mounting bracket (or within the remote pendant assembly (option), if applicable).

When downloading software updates, use the download serial port seen at the lower right of the illustration. While downloading, the J1 jumper is moved temporarily to its #1 position.

To configure the number of (optional) pressure transducers on an ASU, use the dip switches (shown below beneath the expansion board) and the following chart. There are four transducers per PSI PCB and a maximum of three PSI PCBs per ASU. Note: PSI not available on APS models.

On the RS-Com board, both the J1 and J2 jumpers must be in upper position for 485 and both in lower position for 232.

	# of PSI PCBs			
Switch #	**0**	**1**	**2**	**3**
1	off	on	off	on
2	off	off	on	on
3	on = APS OFF = nornal			



Layout of Components on Display CPU PCB

Motor Control Interface Printed Circuit Board

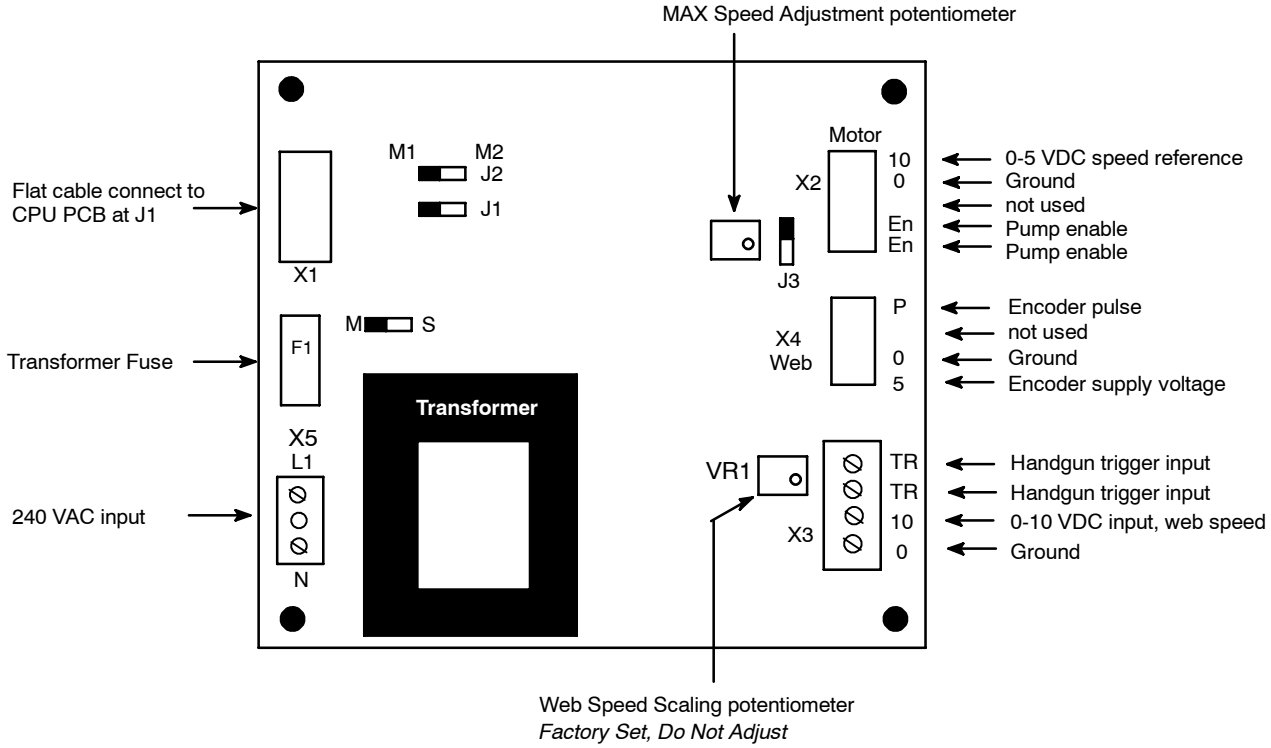
For each motor on the unit, there is a Motor Control Interface PCB and a Motor Speed Control PCB. The Motor Control Interface PCB (diagrammed below) connects directly to the CPU PCB. The Motor Speed Control PCB (diagrammed on the following page) connects via a spade connector to the Motor Control Interface PCB. Up to two motor's pcbs may be connected to one CPU PCB. The optional piston pump models do not contain either of the motor PCBs.

On the Motor Control Interface PCB, the three jumpers (J1, J2 and J3) should always be set in the positions diagrammed below for motor #1. For motor #2, jumpers J1 and J2 are set in the positions opposite from those diagrammed below. The M/S selection jumper must be set in the "M" position.

"MAX" speed adjusting pot: This pot adjusts the maximum output voltage of the motor speed control board. It is factory preset so that full (100%) applies 60 Hz to the pump motor. Normally, this pot does not need adjustment. Turning clockwise increases the voltage. To verify adjustment, set the motor to "manual" mode and to 100% speed. Then adjust the pot to desired maximum speed (±5%).

NOTE: Do not attempt to use the MAX pot adjustment to trim the line speed to a given value. Proper automatic line speed following is accomplished with correct motor programming into the controller (see Chapter 5).

"ENCODER" connections: the optional Digital RPM Readout's encoder is installed onto these board connections.



Layout of Components on Motor Control Interface Board

Motor Speed Control Printed Circuit Board

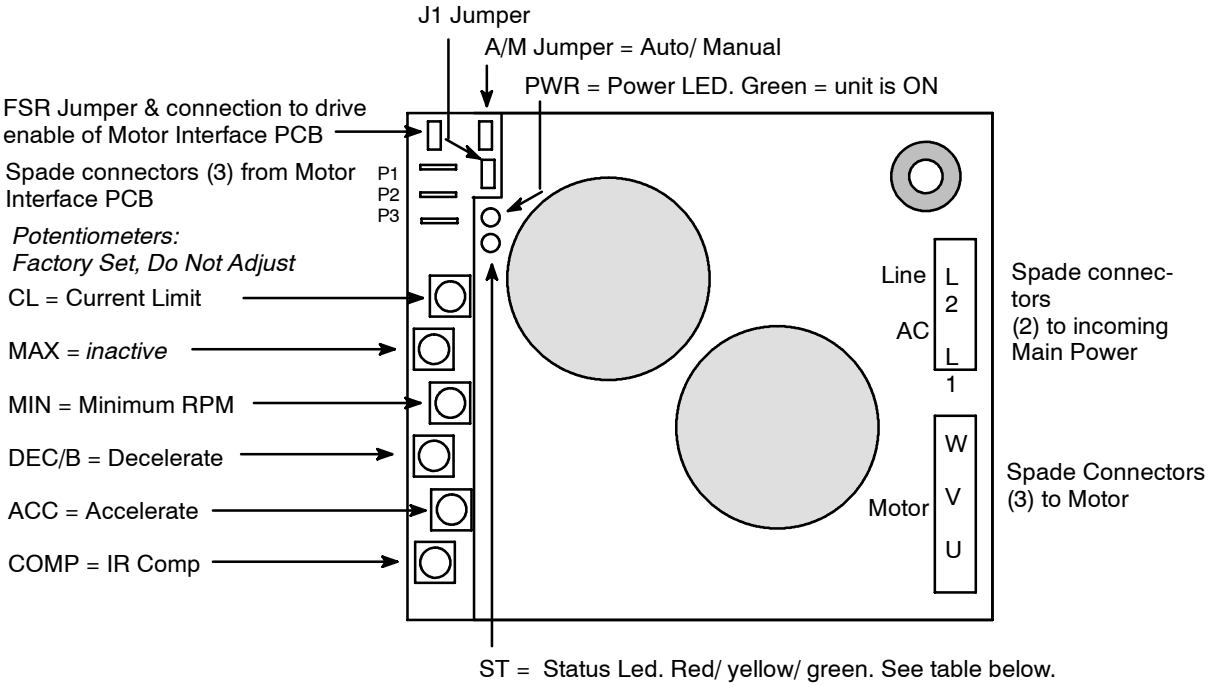
The Motor Speed Control PCB is connected to the Motor Control Interface Board via spade connctors P1 and P2. P3 is not used.

The three jumpers (FSR, J1 and A/M) are factory set, do not change. The J1 jumper is always set in the upper position. The A/M Jumper is always present.

"CL" adjusting pot: The current limit (CL) adjustment will limit the maximum current available to the AC pump motor during overload. This will protect the motor from damage. The setting is factory set to deliver 100% of the rated horsepower for the ASU. When the motor load exceeds the current limit value, the Status LED (light) will illuminate red (indicating an overload condition). Turning clockwise increases the current limit value; turning counter-clockwise decreases it. The current limit is factory preset, so no adjustment is necessary.

"ACC" and "DEC/B" adjusting pots: These pots change the time required for the pump motor to accelerate (ACC) or de-accelerate. Turning full counter-clockwise equals 0.3 seconds. Turning full clockwise equals 20.0 seconds. Factory default for either pot is 10.0 seconds.

cont.



ST LED Color	*State*	*Function*	*ST LED Color*	*State*	*Function*
Green	Slow Flash	Normal Operation	Red/Yellow	Quick Flash	Undervoltage
Red	ON	CL	Red/Yellow	Slow Flash	Overvoltage
Red	Quick Flash	I^2 x time	Yellow	ON	Stop
Red	Slow Flash	Short Circuit			

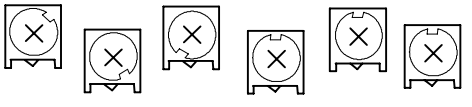
Layout of Components on Motor Drive Board

"MIN" adjusting pot: This pot adjusts the minimum speed of the pump motor when it is enabled. The pot is factory preset to exactly zero RPM when the speed setting is 0.00% full scale. Turning clockwise increases the minimum RPM above zero RPM when the motor is enabled. This adjustment can be utilized to "creep" the motor (also referred to as "auto preload") so that positive adhesive pressure is always maintained in the system.

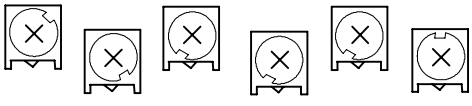
Optional Signal Isolator Printed Circuit Board

Set the trimpot knobs as diagrammed below:

When a hand-held applicator is not present:



When a hand-held applicator is present:

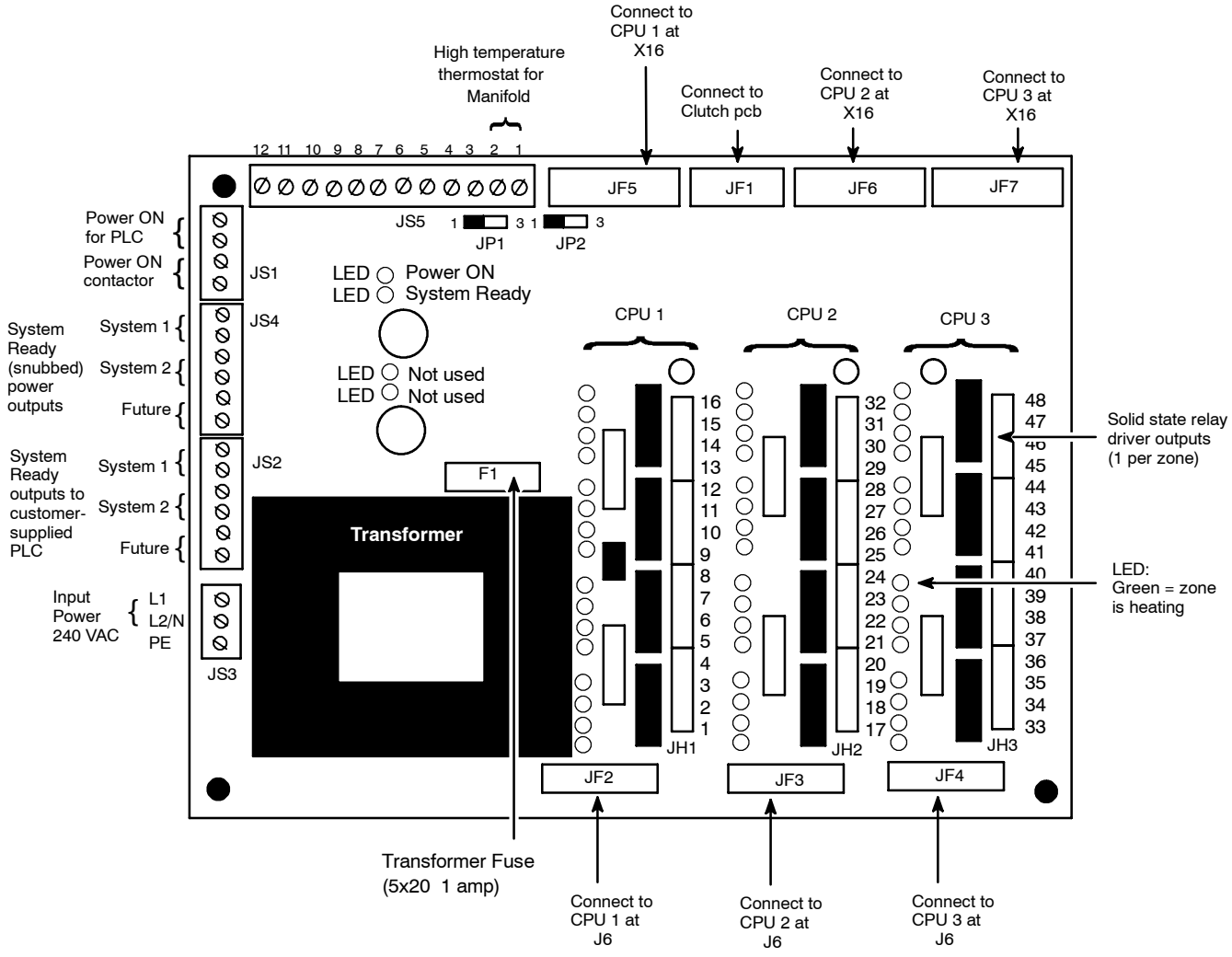


48-Zone Power Printed Circuit Board

The 48-Zone Power PCB has the capacity to monitor adhesive temperatures for multiple temperature zones.

The LEDs for each temperature zone (1 through 48 illustrated below) will flash on and off as their heaters output to maintain setpoint temperature. The Power On and System Ready LEDs will light continuously once the system is up to temperature.

The JP1 and JP2 jumpers must be set to position 1-2 (shown).



Layout of Components on 48-Zone Power Board

Chapter 8
DISASSEMBLY

General Notes

Re-read Chapter 1 “Safety Precautions” before performing any disassembly procedures. All disassembly and repair procedures must be performed by qualified, trained technicians. Refer to the exploded-view diagrams in Chapter 10 to aid in disassembly.

Prior to disassembly of mechanical components, a complete set of o-rings, seals and high temperature lubricant should be on hand. One quart of flushing fluid (PN L15653 = 1 gallon) and an electrical-type heated air gun will reduce the time required to clean components of the unit.

Pump Assembly Replacement

Prior to disassembly, heat the unit above the melting point of the material in the pump. Turn pump motor control to OFF. Activate the applicator to relieve pressure. Elevate the platen to make work easier.

WARNING

Safety goggles and protective clothing and gloves must be worn during this operation. Disconnect main electrical power. Disconnect air pressure at air control panel. Provide safety blocking under the platen.

Note: a drum with a lid and fiber separator sheet between the lid and platen may be used as a safety block to prevent lowering of the platen.

1. Loosen lovejoy couplers and swing the drive shaft up clear of the pump. Remove coupling from top of pump shaft.
2. Remove the four 7/16 x 4” socket head cap screws holding the pump to the manifold. Remove the pump.

WARNING

Hot, molten material may flow from the pump.

CAUTION: For high viscosity materials, it may be necessary to heat the platen to full operating temperature. The high viscosity material may make the pump difficult to remove.

3. After the pump is removed, use a clean, soft cloth to wipe all the material out of the pump cavity.
4. Remove the pump adapter and inspect the o-rings on both sides.
5. Prior to installation of the new pump assembly, remove and inspect the pump adapter o-rings. When installing new o-rings, liberally coat the pump adapter sides with lubricant.
6. Re-install the pump assembly in reverse order of disassembly outlined above.

CAUTION: Observe the "arrows" stamped on the pump adapter that show in which direction to install.

7. Pump replacement is now complete. Prior to startup, read startup instructions in Chapter 3.

Platen Replacement

Prior to disassembly, heat the unit above the melting point of the material being pumped by the unit. Turn pump motor control to OFF.

WARNING

Safety goggles and protective clothing and gloves must be worn during this operation. Disconnect main electrical power.

1. Insert a fiber sheet on the floor of the unit and lower the platen completely.
2. Remove motor and drive shaft assembly. Remove upper bracket.
3. Disconnect electrical box. Remove electrical box bracket.
4. Remove retainer clamps and rotate bottom bracket clockwise to clear the main rods.
5. Tighen jack screws to raise manifold and pickup tube approximately 1". Grasp bottom bracket and carefully remove from platen. Remove the nuts from the top of the two main rods.
6. Slowly raise the platen carrier. Be sure that the electrical wiring is free to pass through the connecting conduit.
7. The platen assembly may now be removed from the unit for further disassembly or cleaning.

Platen Reassembly

Note: all mating surfaces must be cleaned of material (adhesive), RTV sealant, or foreign matter prior to reassembly.

1. Prior to reassembly, coat the pickup tube hole and the pickup tube with a coat of RTV sealant. Assemble immediately. Wipe excess sealant from edges.
2. Re-attach main rods of platen carrier to platen. Lower carrier and thread rods back into the hole in the carrier frame.
3. IMPORTANT: Properly orient platen in the unit with "Front" forward. Lower carrier to allow feeding the wiring up into the electrical junction box.
4. Continue reassembly in reverse order of disassembly outlined above.

Wiper Seal Replacement

Prior to beginning this operation, heat the platen above the melt point of the material being pumped by the unit. The platen carrier must be in the UP position. Be sure that safety blocking is provided to hold platen in the UP position.

WARNING

Safety goggles and protective clothing and gloves must be worn during this operation. Disconnect main electrical power. Place safety blocking under the platen to prevent platen from lowering.

There are two wiper seals installed on the drum unloader's platen, an upper, white one (o-ring style) and a lower, black one (hose style). Wiper Seal Kits are available from ITW Dynatec (see pg. 10-2).

Clean the Seal Grooves

1. Using a wooden or plastic tool (to prevent damage to the wiper), clean all material from the seal grooves.

2. Lubricate ram plate grooves, bands and wipers before assembly. Lubricate the wipers with a lubricant that is compatible with the material to be pumped. Check with your material supplier to verify compatibility.

Install Wiper Seals

1. Raise the platen up out of the drum. Remove the drum from the base. Wipe any fluid from the platen.
2. Pull the upper (white) wiper over the platen assembly. Roll the wiper ring down to the top ring groove.
3. Install the first upper band over the wiper ring, placing it in the top groove of the wiper.
4. Secure the top band using the screw in the band. Note: To avoid deforming the wiper ring, do not over-tighten the screw in the band.
5. Install the second upper band onto the bottom of the wiper ring on the top groove of the wiper.
6. Secure the top band using the screw in the band.
7. Separate the lower (black) wiper at its butt-joint. Bend back the strapping covering the clamp. Loosen the clamp by unscrewing the worm gear. Remove the wiper.
8. Thread the strapping through the new wiper. Install the new wiper on the platen. Position the two wipers so that their butt-joints are 180 degrees apart. Insert the end of the strap through the clamp and tighten by screwing the worm gear.
9. Pound the wiper all the way around the platen with a rubber mallet until the ends of the wiper are butted tightly together.

CAUTION: Make sure the wipers are lubricated. Without lubrication, the wipers will tear.

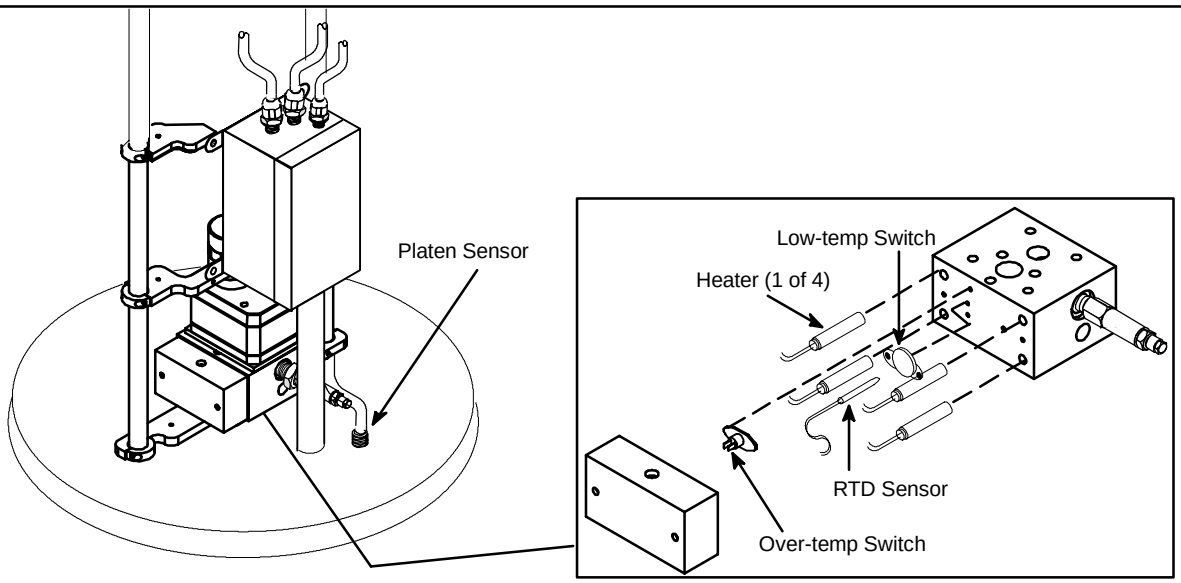
Electrical Parts Replacement

DANGER HIGH VOLTAGE

Disconnect incoming electrical power. Turning OFF the unloaders's circuit breaker will not reduce the danger of electrical shock at the terminals or connections at the circuit breaker.

To Access Electrical Parts within the Transfer Block

The transfer block is located on top of the platen. Within it are located the over-temp and low-temp thermostats (switches), an RTD sensor and four heaters



Transfer Block Location & Details

Over-Temp and Low-Temp Thermostats

1. Remove the transfer block's wire cover by removing the two 8/32" socket head cap screws located on the panel side of the transfer block. Then pull the wire cover back. The over-temp (NC) thermostat is mounted directly above the low-temp (NO) thermostat.
2. a. *To remove over-temp thermostat (switch):* remove the two 6/32" mounting screws which hold it to the transfer block. Verify that you have the over-temp thermostat by reading the small print on the switch (over-temp is labeled "450 F"). Pull off the two quick-disconnect connectors.

   b. *To remove low-temp thermostat (switch):* remove the two 6/32" mounting screws which hold it to the transfer block. Verify that you have the low-temp thermostat by reading the small print on the switch (low-temp is labeled "F 250"). Pull off the two quick-disconnect connectors.

Heater Removal

1. Remove the transfer block's wire cover by removing the two 8/32" socket head cap screws located on the panel side of the transfer block. Then pull the wire cover back.

2. Check each of the four heaters with an ohmmeter to determine if heaters are operable. 230 ohms = a good heater. Total for four heaters in parallel (1000w) = 57 ohms.

3. To remove a heater, carefully pull the heater out of its port in the transfer block. Follow the heater's leads to the ceramic terminal block. Unscrew leads and remove heater.

Note on Cast-in Heater (Model 554 Only)

The platen of the High Output Model Dynadrum contains a cast-in heater which should last the life of the drum unloader.

RTD Sensor (in Transfer Block) Removal

1. Remove the transfer block's wire cover by removing the two 8/32" socket head cap screws located on the panel side of the transfer block. Then pull the wire cover back.

2. Carefully pull the sensor out of the sensor port in the transfer block. Follow the sensor's leads to the ceramic terminal block. Unscrew leads and remove sensor.

Platen RTD Sensor Removal

There is a RTD sensor in the platen. It is located at the back of the platen, in the area beneath the electrical junction box. The sensor is inside a 1/8" compression fitting at the end of stainless steel flexible tubing.

1. Loosen and remove the nut at the top of the compression fitting.

2. Carefully pull the sensor out of the compression fitting. Follow the sensor's leads to the ceramic terminal block. Unscrew leads and remove sensor.

To Access Electrical Components inside the Panel Box

Verify again that the main power is OFF. On the outside of the panel box, use the main disconnect switch to open panel box door.

1. **Fuse Replacement:** Fuses are located in the upper right corner of the inside of the panel box assembly. The following printed circuit boards are fused: Motor Control Interface and Power I/O.

2. **Printed Circuit Board Replacement:** Reference the section entitled "Handling Printed Circuit Boards" in Chapter 7. The PCBs are located in the panel box assembly. Refer to detailed layout in Chapter 11.

The PCBs snap into and out of their standoffs. To remove: place your fingertips under one corner of the PCB and pull out firmly from the standoff. Repeat for each corner of the PCB.

Note: aside from fuses listed above and the Lithium battery on the CPU PCB (see Chapter 7), there are no replaceable parts on the PCBs.

Chapter 9
RECOMMENDED SPARE PARTS LIST & OPTIONS

Part Number	Description	Quantity
808907*	Wiper Ring Kit, standard (w. hose clamps)	1
808908*	Wiper Ring Kit, option (w. springs)	1
810325*	Wiper Ring Kit, option (w. steam hose & “T” wiper)	1
809791*	Wiper Ring Kit, option (w. two “T” wipers)	1
036A015	Heater, 150w (in optional ASU Fill Kit)	1
N07958	RTD Sensor, PT100 (in optional ASU Fill Kit)	1
806575	Flow Control Valve	1
Parts for Gear Pump Models only:		
036B103	RTD Sensor, Pt (located in transfer block)	1
806580	RTD Sensor (located in platen)	1
805406	Over-temp Thermostat, NC (located in transfer block)	1
805407	Low-temp Thermostat, NO (located in transfer block)	1
805322	Heaters, 250w (located in transfer block)	2
801241	Relief Valve, 100-800psi	1
069X270	O-ring 025	5
069X064	O-ring 041	2
N01010	O-ring 021	2
N05752	O-ring 236	2
808680	Pump Seal (for large TSHA pumps)	2
Parts Within the Panel Box (DCL V5.16DU):		
048H384	Solid State Relay, Dual, 240v	3
805634	Solid State Relay, 530v	2
807053	Relay DPDT	1
103184	Fuse, GDC4	4
104117	Fuse, T6.3AL 5x20 (printed circuit boards)	2
804535	Fuse, 15A, LP-CC	2
804536	Fuse, 20A, LP-CC	3
102762	Fuse, 1 amp (motor interface pcb)	1
113006	CPU Printed Circuit Board, V5	1
108256	Control Assembly	1
110090	Motor Interface Printed Circuit Board (gear pump models only)	1
107440	Power Printed Circuit Board, 48 zone	1
107853	Motor Control Drive Printed Circuit Board (gear pump models only)	1
106149	Aux. RTD Printed Circuit Board	1
806762	DC Power Supply	1
Additional Parts for Optional Piston Pump Models:		
810984	O-ring 2-227	1
811275	Air Control	1
N05752	O-ring 236	1
812053	Solenoid, Actuator	1
NA	Spanner Wrench (available locally)	1
NA	V-Packing material (available locally from Graco supplier)	1
Misc.:		
108700	TFE Lubricant	1
L15653	Kit, Flushing Fluid, 1 gallon	1

** choice is dependant on customer application*

Level Control Options

PN 806430 Level Control Kit

Used to automatically meter the flow of material from the unloader to the ASU. The kit consists of a level control assembly, a heated ball valve assembly, a ball valve actuator and a modified Dynamelt M ASU lid assembly.

PN 806573 Level Control Kit without Heated Ball Valve & Actuator

Used to automatically meter the flow of material from the unloader to the ASU. The kit consists of a level control assembly and a modified Dynamelt M ASU lid assembly.

PN 805732 Heated 1" Ball Valve

Used with the PN 806573 Level Control Kit, the heated ball valve automatically opens the valve to refill the hopper after manually being actuated.

PN 806387 Ball Valve Air Actuator

Used with the PN 806573 Level Control Kit and the PN 805732 Heated Ball Valve. The ball valve actuator automatically actuates the ball valve to open the valve to refill the hopper.

Pump Options

The standard pump for the Dynadrum 55 Unloader is a 30cc, single output Zenith gear pump. The following pumps are available as options:
PN 084E410: 10cc/rev single output, high accuracy Zenith gear pump
PN 084E411: 20cc/rev single output, high accuracy Zenith gear pump
PN 084E412: 30cc/rev single, output high accuracy Zenith gear pump
PN 084E413: 45cc/rev single, output high accuracy Zenith gear pump (standard on high flow models)
PN 811272: 15:1 ratio piston pump/ air motor

Platen Option

The following is offered as an option to the standard Megafow platen:
PN 805965 Flat Bottom Platen: built without fins for adhesives with lower melting points, including PUR adhesives.

Clam Shell Option PN 808906

The optional clam shell is designed to give support to and hold in place the fiber drum as its glue is emptied by the drum unloader. It also guards against the spills that can occur when there are defects in the drum.

Drip Tray Option PN 809068

The drip tray sits under the drum of adhesive to catch any molten glue that drips from the drum or platen. The drip tray installation consists of a PN 805695 drip tray, PN 805644 mounting brackets (2) and PN 805643 u-bolts (2).

Vent Hood Option PN 806679

The vent hood kit provides for the connection of an exhaust duct to carry away adhesive fumes generated during drum exchange. The kit does not provide an exhaust fan or tubing.

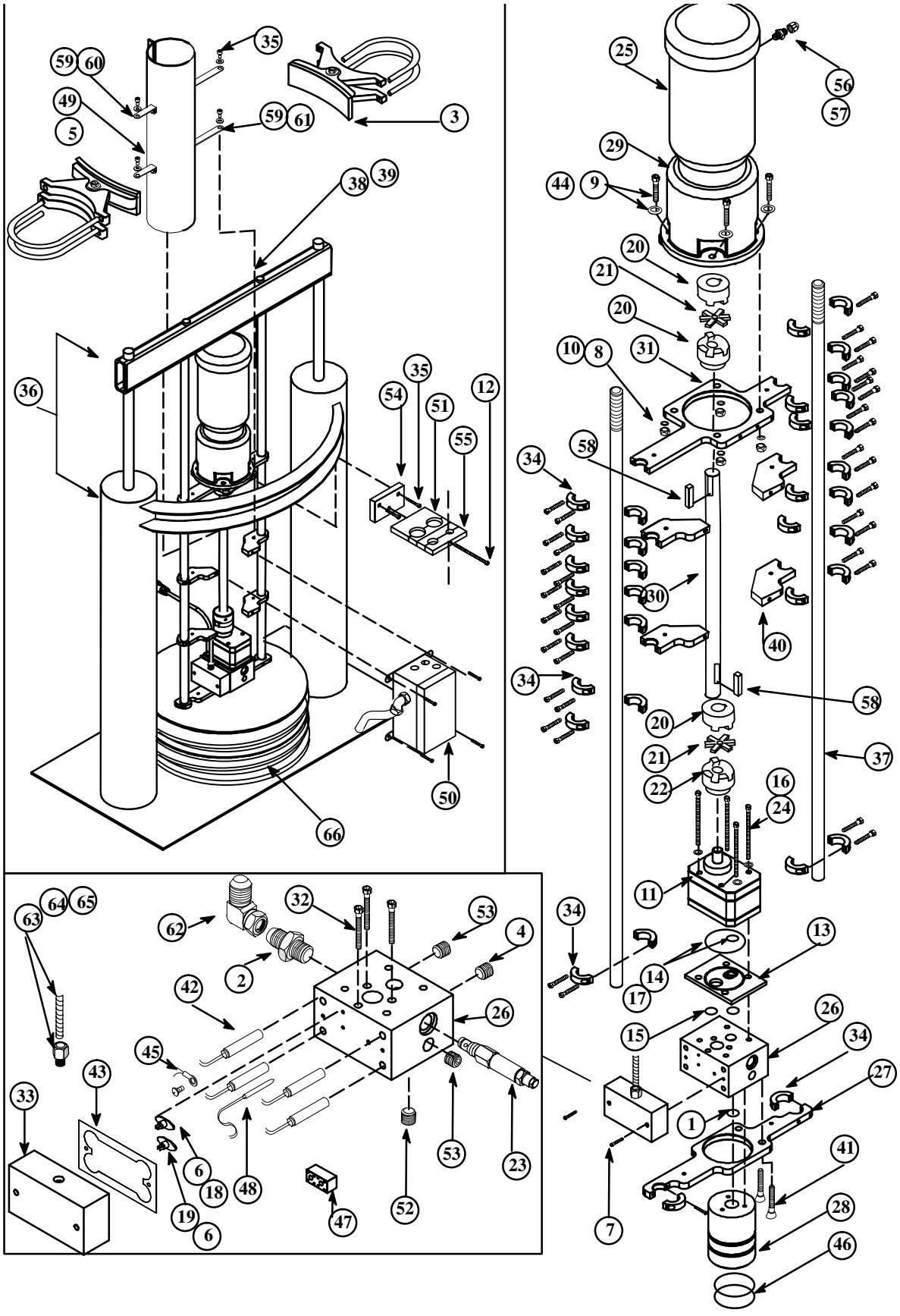
Chapter 10
COMPONENT ILLUSTRATIONS

Chapter Format

This chapter contains the component illustrations (exploded-view drawings) for each assembly of the DU55 Drum Unloader. These drawings are useful for finding part numbers as well as for use when maintaining or repairing the unit.

Note: most common nuts, bolts and fasteners can be obtained locally at your hardware store. Specialty fasteners are available by contacting Dynatec's Customer Service.

Item No.	Part Number	Description	Qty.
	805090	**DynaDrum Unloader Assembly**	**1**
1	069X270	O-ring, #025	1
2	072X103	3/4 NPT x 1-1/16 JIC, Hex Nipple	1
3	805612	Clamp, Swivel, Drum	2
4	072X161	3/4 NPT Level Seal Plug	1
5	078A174	8A x 1/2 HH Screw	7
6	N00790	6-32 x 1/4 SHC Screw	5
7	N01385	8-32 x 1.75 SHC Screw	2
8	078C013	3/8 Flat Washer, SAE	12
9	N00698	3/8 Lock Washer	4
10	107393	3/8-16 Hex Nut w Washer	8
11	110290	30cc Single TSHA Pump (standard)	1
12	078A327	5/16-18 X 5.25 SHC Screw	2
	806041	Pump Adapter Kit	1
13	806040	Adapter Plate	1
14	069X064	O-ring, #041	1
15	069X270	O-ring, #025	2
16	078C141	7/16 Special Flat Washer	4
17	N01010	O-ring, -021	1
18	805407	Thermostat N.O.	1
19	805406	Thermostat N.C.	1
20	106714	Jaw Type Coupling,1” Shaft	3
21	106875	Open Spider Coupling	2
22	107429	Coupling Jaw Type, 3/4 Shaft	1
23	801241	Pressure Relief Valve, 100-800 PSI, CP200	1
24	801561	7/16-14 x 4 1/2 SHC Screw	4
25	801679	Motor, AC,3P, 240V,1 HP, K25	1
26	805079	Transfer Block, 2 Hose	1
27	805080	Lower Drum Bracket	1
28	805082	Pickup Tube	1
29	805083	Vertical Gear Reducer, 20:1	1
30	805084	Drive Shaft	1
31	805085	Upper Drum Bracket	1
32	805086	1/4-28 x 3 1/2 SHC Screw	3
33	805087	Wire Cover	1
34	805088	1” Shaft Collar, 2-Piece	22
35	078A572	1/4-28 x 1/2 SHC Screw	6
36	805148	Ram, Pneumatic, 55Gal Drum **(Part of 805154 Ram Kit)**	1
37	806364	Tie Rod **(Part of 805154 Ram Kit)**	2
38	N04521	3/4 lock washer **(Part of 805154 Ram Kit)**	2
39	N05964	Nut, 3/4-10 **(Part of 805154 Ram Kit)**	2
40	806151	Junction Box Bracket	4
41	805321	7/16-14 x 1 Csk Screw 82 deg.	2
42	803443	Heater, 3/8 x 1 3/4, 240V, 250W	4
43	805323	Gasket Vin 5.2 x 2.8	1
44	N02382	3/8-16 x 1 3/4 HHC screw	4
45	N07430	Terminal Ring, 22-16, #6	1
46	N05752	O-ring, -236	2
47	107881	Terminal block, 2 Post, Ceramic	1
48	N07958	Sensor RTD	1
49	805500	Guard	
50	805163	Junction Box Assembly	1
51	805311	Conduit Bracket (large)	2
52	N00754	1/4-14 Level Seal Plug	1
53	N00756	1/2-14 Level Seal Plug	2
54	805550	Base Clamp, Conduit Bracket	1
55	805549	Conduit Bracket, Small	2
56	804774	Cord Grip	2
57	804066	Power Cable (not Shown)	16’
58	078I013	Shaft Key	2
59	078C011	1/4 Lock Washer	4
60	806149	Bracket, Small, Guard	2
61	806150	Bracket, Large, Guard	2
62	805324	90 deg x #12 JIC Fitting	1
63	101610	Cable Assembly, DCL	1
64	078A055	10-24 x 3/16 Set Screw	1
65	048J056	Conduit, 3/8” I.D.	16”
66	805604	Hi Flow Platen (Standard 375°F)	1
	TBD	Hi Flow Platen with wiper kit (Option 300°F)	
	TBD	Hi Flow Platen with wiper kit (Option 400°F)	
	808907	Wiper Ring Kit (optional 400°)F) w/Clamps	1
	808908	Wiper Ring Kit without hose clamps (optional 300°F) w/ springs	1
	805965	Flat Bottom Platen (option)	1
	810325	Wiper, Tee / Steam Hose Kit (Use with Hi flow Standard only)	
	813243	Seal Kit (use withSteel Rib Drums)(option)	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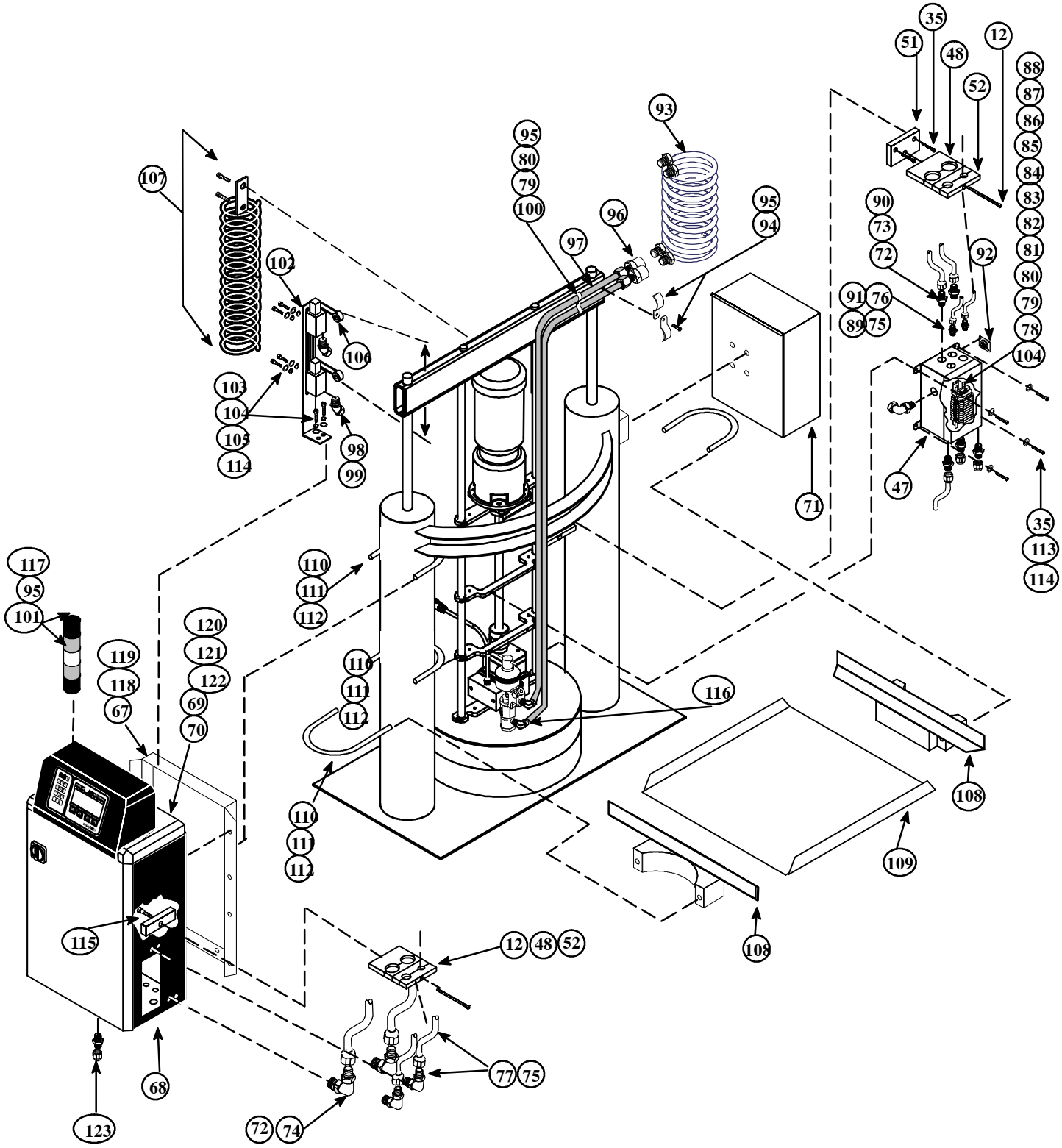
Item No.	Part Number	Description	Qty.
67	805309	Panel Box Mounting Bracket	1
68	805720	Panel Box Assembly	1
69	106188	Panel Top	1
70	107390	M6 Nut	12
71	805961	Pneumatic Panel Box Assembly	1
72	048J034	1” Conduit (9’ each)	18’
73	048J012	1” Straight Conduit Fitting	2
74	048J013	1” 90° Conduit Fitting	2
75	048J017	1/2” Conduit (8’3”each)	16.5’
76	048J015	1/2” Straight Conduit Fitting	2
77	048J043	1/2” 90° Conduit Fitting	2
78	078C004	Flat Washer, 1/4 SAE	5
79	078C027	#10 Lock Washer	6
80	078C133	Flat Washer, Fender	6
81	048J095	Cord Grip, 3/8 to 1/2	1
82	048J184	Cord Grip, 1/8 to 1/4	1
83	806134	Terminal Block 47A 130C	
84	806135	Terminal Block 20A 130C	
85	806136	Terminal Block47A 130C	1
86	806138	Terminal End 20A 130C	1
87	103663	Conn, IDC, .156, 02, End	1
88	105256	End Stop	1
89	048J018	Bushing, Plastic Cap, 1/2” Conduit	2
90	TBD	Yellow Bushing Cap , 1”	1
91	048J051	1/2 Locking Nut	2
92	101074	Recpticle	2
93	806324	Air Hose, Double	1
94	809796	Rubber Coated Loop Strap	3
95	078A164	10–24 x 1/2, HWH Screw	4
96	N05779	Brass Connector Fitting	2
97	N01068	Aluminum Tubing,.2500D x .035 WAL	12’
98	048J183	3/8* 45 DEG.Connection Fitting	4
99	048J186	3/8” Conduit Sealtite	2.5’
100	N03732	Duplex Clip, 1/4”	1
101	806332	Stack Light Assembly	1
102	806333	Motion Sensor, Stack Light Assembly	2
103	N00815	1/4-20 3/4 SHC Screw	2
104	N00805	10-32 x 1/2 SHC Screw	4
105	806395	Stack Light Sensor Mounting Bracket	1
106	806334	Lever, LS, Adj.	2
107	805149	Hose Support Kit	1
	809068	**Drip Tray Kit**	**1**
108	805644	Drip Tray Mounting Bracket (option)	2
109	805695	Drip Tray (option)	1
110	805643	U-clamp Assembly (option)	2
111	107393	Nut, Hex, 3/8-16 with lock washer	8
112	078C013	3/8 Flat Washer	8
113	078C004	Flat Washer	4
114	078C011	Lock Washer	11
115	078C018	5/16 Lock Washer	1
116	N00101	Connector Fitting	2
117	048J014	Conduit Fitting, 3/4” 45° (not Shown)	1
118	101156	M6 x 20mm SHC Screw	8
119	107390	M6 Nut	8
120	106066	M5 x 16mm HHC Screw	4
121	106318	M5 Lock Washer	4
122	107539	Grommet, 3/4 ID	1
123	804774	Cord Grip	1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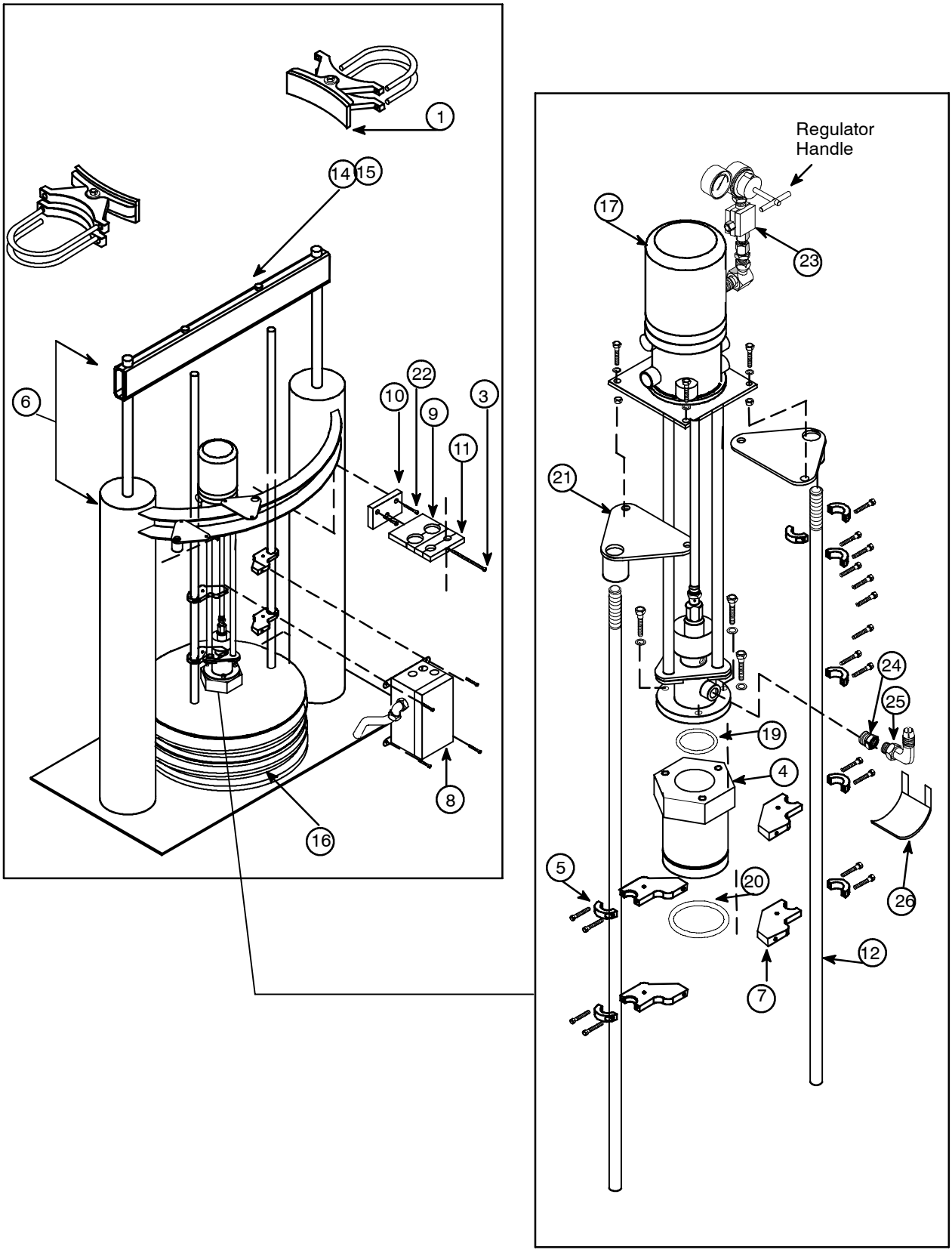
Item No.	Part Number	Description	Qty.
	812045	**DynaDrum Unloader with Piston Pump Assembly**	**1**
1	805612	Clamp, Swivel, Drum	2
2	078A174	8A x 1/2 HH Screw	7
3	078A327	5/16-18 X 5.25 SHC Screw	2
4	TBD	Piston Pump Adapter	1
5	805088	1” Shaft Collar, 2-Piece	6
6	805148	Ram, Pneumatic, 55Gal Drum	1
7	806151	Junction Box Bracket	4
8	805163	Junction Box Assembly	1
9	805311	Conduit Bracket (large)	2
10	805550	Base Clamp, Conduit Bracket	1
11	805549	Conduit Bracket, Small	2
12	806364	Tie Rod	2
13	806150	Bracket, Large, Guard	2
14	N04521	3/4 lock washer	2
15	N05964	Nut, 3/4-10	2
16	805604	Hi Flow Platen (Standard 375°F)	1
	TBD	Hi Flow Platen with wiper kit (Option 300°F)	
	TBD	Hi Flow Platen with wiper kit (Option 400°F)	
	808907	Wiper Ring Kit (optional 400°)F) w/Clamps	1
	808908	Wiper Ring Kit without hose clamps (opt.300°F) w/springs	1
	805965	Flat Bottom Platen (option)	1
	810325	Wiper, Tee / Steam Hose Kit (Use with Hi flow Standard only)	
	812046	**Piston Pump Kit**	
17	811272	Piston Pump, 15 x 1	1
18	811275	Air Control Kit	1
19	TBD	O-ring 2-227	1
20	TBD	O-ring 2-237	1
21	811273	Piston Pump Mounting Bracket Assembly	1
22	812048	Piston Pump Adapter	1
23	812053	Sol, Actuator, 240Vac	1
24	106634	Fitting, #6JIC x 1/2–14 NPT	1
25	N07830	Fitting, SVL90, 06FJ x 06MJ, STL	1
26	102987	Insulator Jacket	2

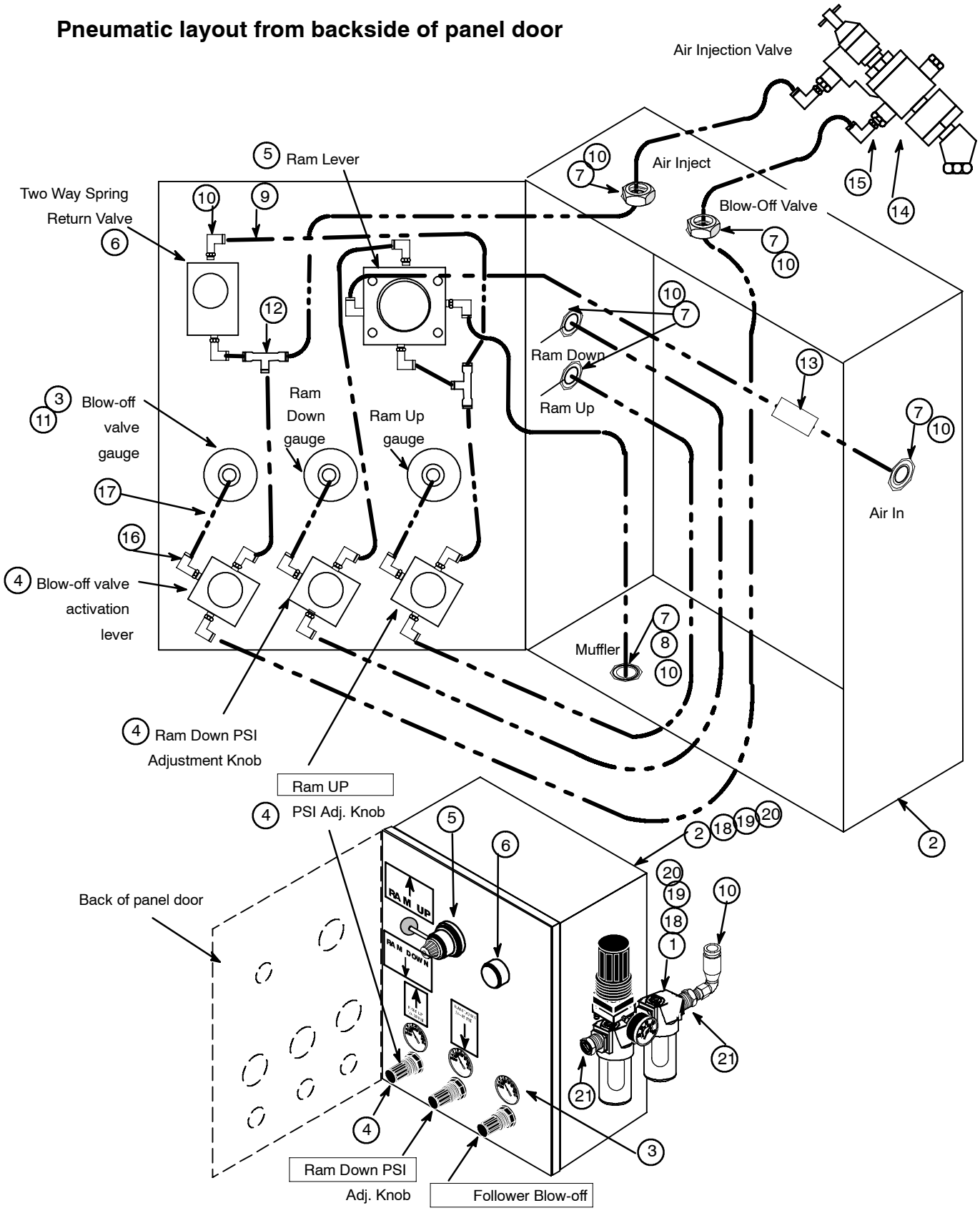
DynaDrum Unloader 55 -812045 With Piston Pump Kit 812046



Bill Of Material: Air Control Box Assembly - 805961

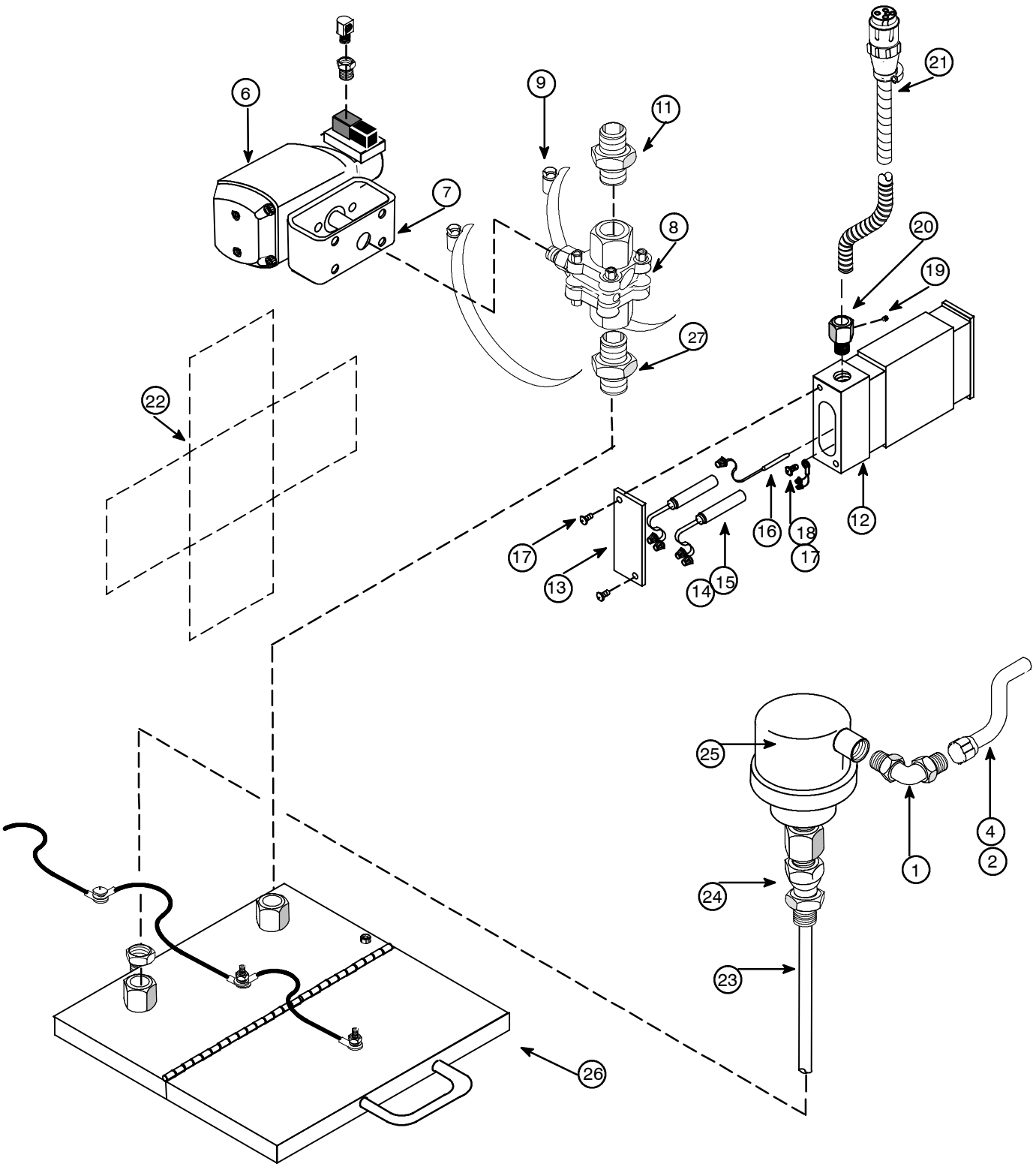
Item No.	Part Number	Description	Qty.
1	806685	Filter Regulator Assembly	1
2	805774	Air Panel Box	1
3	806168	Air Pressure Gauge	3
4	806169	Pressure Regulator	3
5	806170	Valve, 3 Position,	1
6	806171	Valve, 2 Way, Spring	1
7	806172	Bulkhead Fitting, 1/4 x 1/4, 3/4-12	6
8	806179	Muffler, 1/4 NPT	1
9	806517	Tubing, 5/16	11’
10	806519	Elbow, Push–in, 90°	22
11	806173	Fitting, Push–in, 1/4” Tube	3
12	806518	Tee, Fitting, Push-in, 5/16 Tube	2
13	806575	In-line Check Valve	1
14	806811	Air Injection Valve (Supplied With Platten)	1
15	N00101	Fitting, Elbow, .25T x 1/4 NPT, Brass	2
16	N06436	1/4” 90° Push–in Ftting	4
17	N07677	1/4” Tubing	2’
18	078A035	1/4-20 x 3/4 SHC Screw	2
19	078C004	1/4 Flat Washer	2
20	078C011	1/4” Lock Washer	2
21	066X028	Bushing, 3/8 - 1/4 NPT	2

Pneumatic layout from backside of panel door

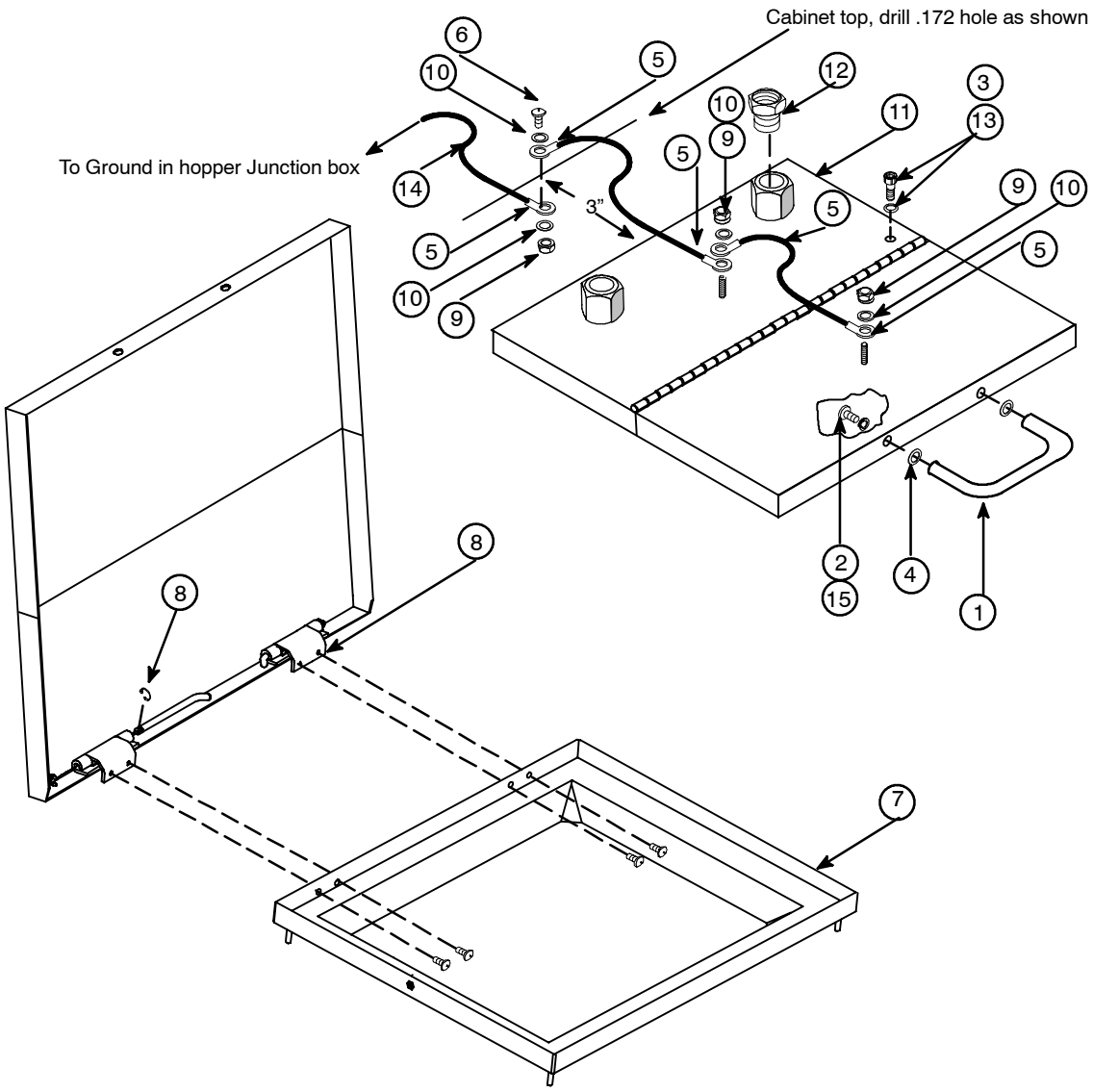


Bill Of Materials: ASU Level Control/ Ball Valve Assembly For M Series Mounting - 809148

Item No.	Part Number	Description	Qty.
1	048J019	3/8 90° Fitting	2
2	048J022	3/8 Straight Conduit Fitting	2
3	048J043	1/2 90° Conduit Fitting (not Shown)	2
4	048J186	3/8 Conduit	5’
5	072X389	1 1/16-12 to 1”NPT Adapter	1
6	030B080	Air Actuator, 24VDC,	1
7	102989	Actuator Bracket	1
	805732	**Ball Valve Assembly**	**1**
8	030B086	Ball Valve 1” NPT	1
9	078H012	Clamp , Worm Drive Hose	2
10	048J095	Cord Grip (Option)	1
11	072X389	1 1/16-12 to 1”NPT Adapter	1
12	103044	Heater Block	1
13	103140	Cover, Junction Area	1
14	036A015	Heater, 3/8 x 2, 150w	2
15	N02541	Ceramic Wire Nut	4
16		Temperature Sensor (Located In Cable Assembly)	1
17	N02680	6-32 x 3/8 BHSC Screw	3
18	048G016	Wire Terminal	1
19	078A055	10-24 x 3/16 SHS Screw	1
20	048J049	3/8” Conduit Fitting	1
21	101610	Cable Assembly, DCL	1
22	800409	Jacket, Insulation	1
	084Q210	**Level Control Assembly**	**1**
23	036B100	Level Probe, 3/4 NPT	1
24	072X419	3/4 Swivel Fitting	1
25	084Q192	XMTR, RSHAW, 240V, 4-20MA	1
26	**806400**	**Lid Assembly**	**1**
27	072X598	1” Hex Brass Nipple	1

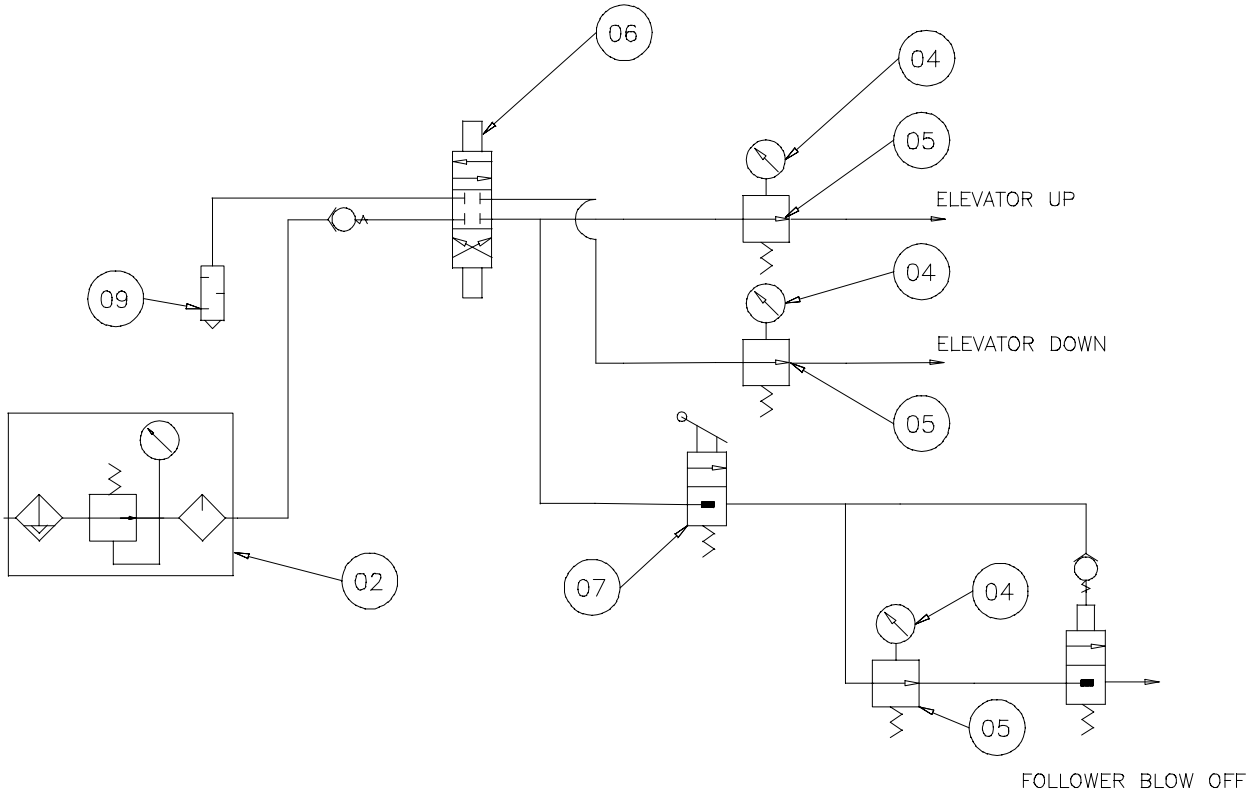


Component Illustration: ASU System Level Control Kit & Ball Valve Assembly – 806430



Dynamelt M Series Lid Assm. w/ Level Control Option-806400			
Item No.	**Part Number**	**Description**	**Qty.**
1	075D005	Handle	1
2	078A009	1/4-20 x 1/2 BHC Screw	2
3	078C025	#10 Flat Washer	1
4	078C089	#12 Flat Washer	2
5	104870	Terminal ring, Non-ins, 14-16G	5
6	105937	M4x.7 x 12 SHC Screw	1
7	106771	Hopper Collar	1
8	106876	Clip, 4mm, Circlip, SS	2
9	107391	M4-0.7 Nut , W/L' Washer	3
10	806269	M4 Flat Washer, SST	4
11	806399	Hopper Lid	1
12	806979	Reducer Fitting, 1" x 3/4" NPT	1
13	807231	M5-0.80 x 25mm SHC Screw	1
14	807297	Wire, 14 Ga, Teflon. Ground,CE, HT	5'
15	N00697	1/4 Spring Lock Washer	2

Chapter 11
SYSTEM SCHEMATICS
& ENGINEERING DRAWINGS



9	806179	1	EA	MUF,1/4NPT,DU
–				
7	806171	1	EA	VLV,SPNG,RTN,DU
6	806170	1	EA	VLV,3 POS,CNR BLK,ROT,DU
5	806169	3	EA	REG,PRSR
4	806168	3	EA	GA,PRSR,1.5,BKCON,PNLMNT
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2	107404	1	EA	FLTR/REG,0–50,PSI
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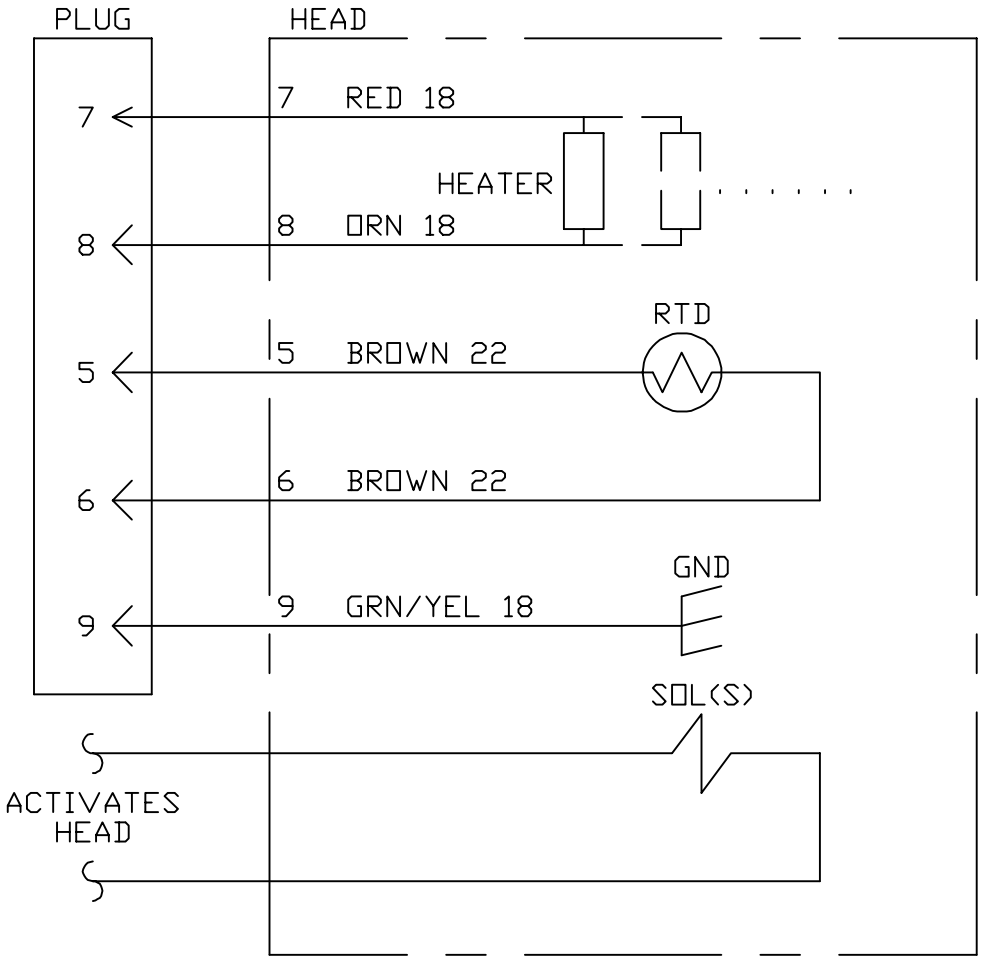
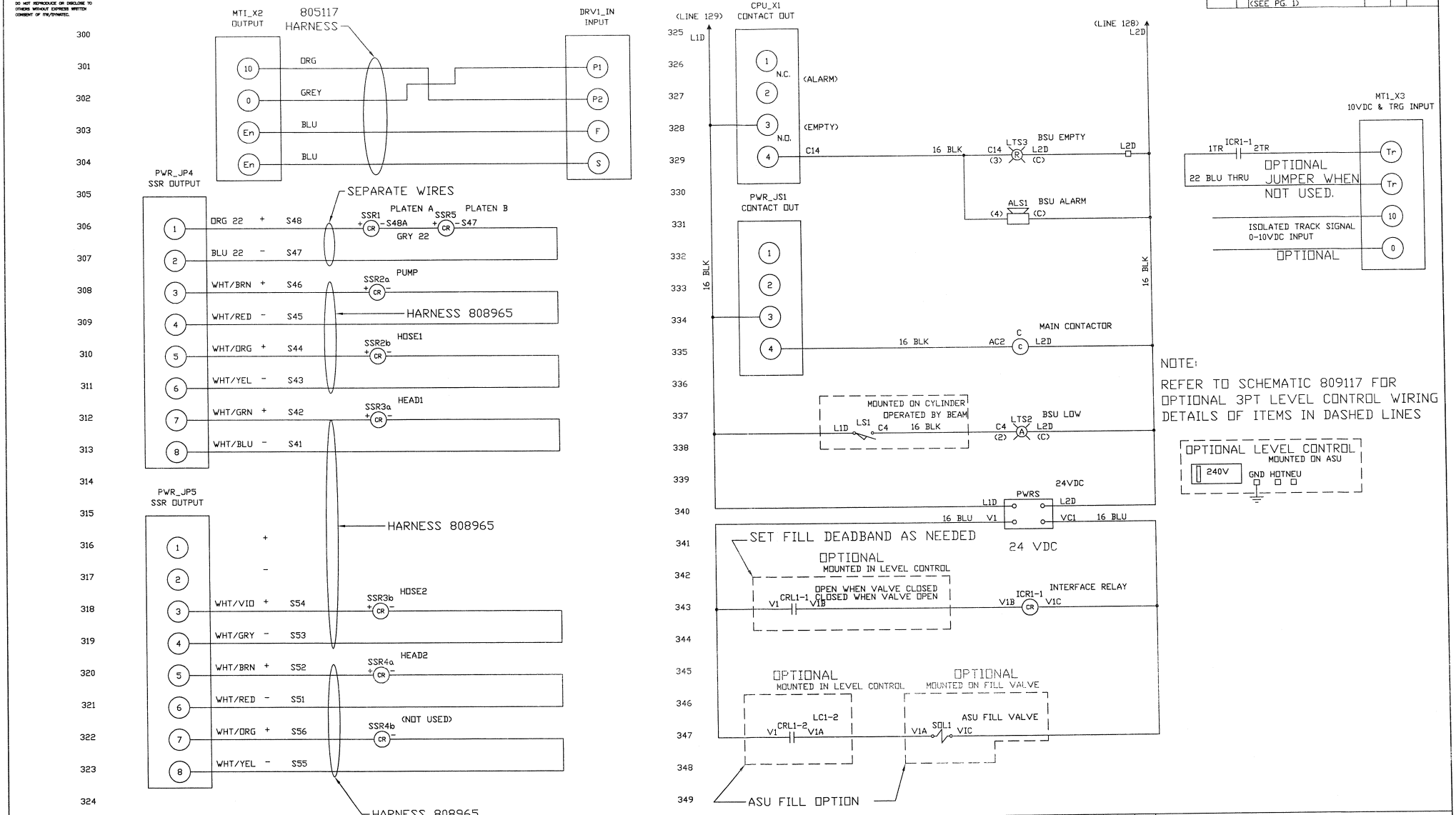


Notes:
1. ALL WIRE MIL-W-22759/10 OR 12, MINIMUM 600 VOLTS, 260 DEG. C
2. SOLENOID(S) VOLTAGE AND TIMING METHOD DEPENDS ON APPLICATION.
3. RTD WILL BE PLATINUM 100 OHM.

DWG. NO. 805718 SH 3 REV J

REV.	DESCRIPTION	DATE	BY	APPROVED
	(SEE PG. 1)			



ITEM	PART NUMBER	QTY.	U/M	DESCRIPTION

PARTS LIST

DO NOT SCALE DRAWING

COMPUTER DESCRIPTION(25 CHARACTERS) | NEXT ASSY. | FOR MACHINING STANDARDS AND SYMBOLS, SEE ITW/DYNATEC SPEC. A05800

TOLERANCES (UNLESS OTHERWISE SPECIFIED): U/M

STATUS: S | SIZE: B | SOURCE: J | REV.:

ITW Dynatec HENDERSONVILLE, TN

TITLE: SCHEM, 55 DRUM OUTPUT

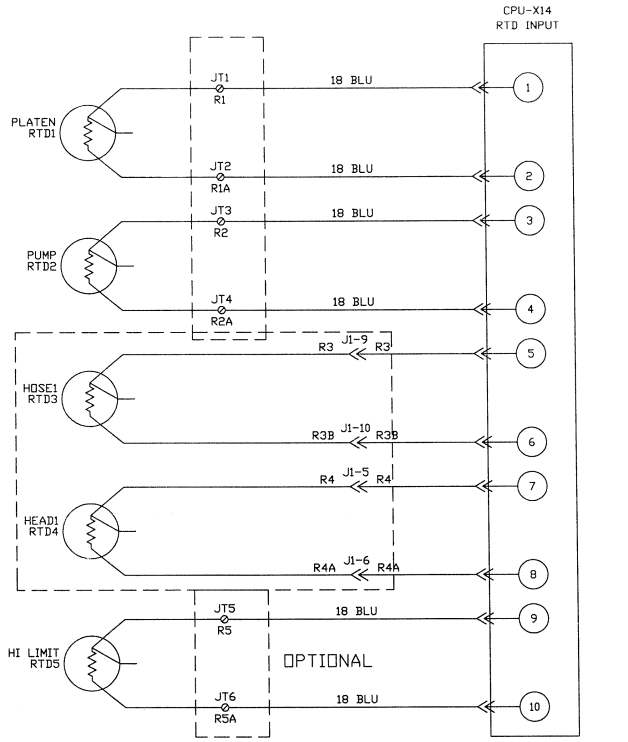
SCALE: NONE | DRAWN BY: DS | CHECKED BY: | APP'D BY:

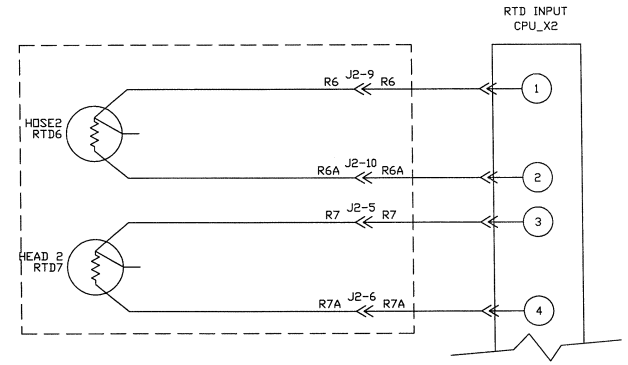
DATE: 11.01.00 | SHEET 3 OF SHEETS 3 | DRAWING NO. 805718

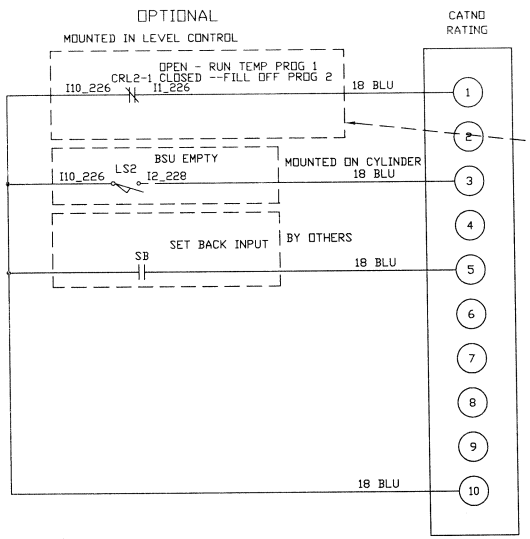
DWG. NO. 805718 SH 2 REV J

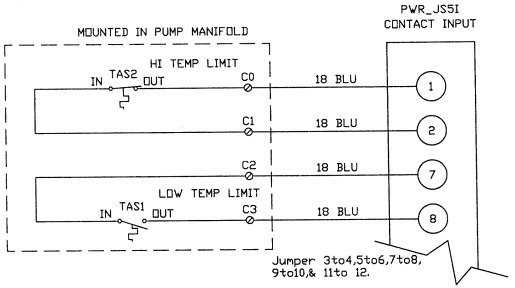
REVISIONS

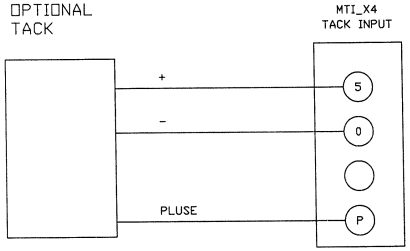
REL.	REV.	DESCRIPTION	DATE	BY	APPROVED
		(SEE PG. 1)			











ITEM	PART NUMBER	QTY.	U/M	DESCRIPTION

PARTS LIST

DO NOT SCALE DRAWING

COMPUTER DESCRIPTION(20 CHARACTERS): PBA,MV5S2M1D55G240V

NEXT ASSY.

FOR MACHINING STANDARDS AND SYMBOLS, SEE ITW/DYNATEC SPEC. AD5800

TOLERANCES (UNLESS OTHERWISE SPECIFIED)

U/M

STATUS: S SIZE: B

SOURCE: C REV: J

ITW Dynatec HENDERSONVILLE, TN

TITLE: SCHEM 55GAL DRUM UNLOADER I/O

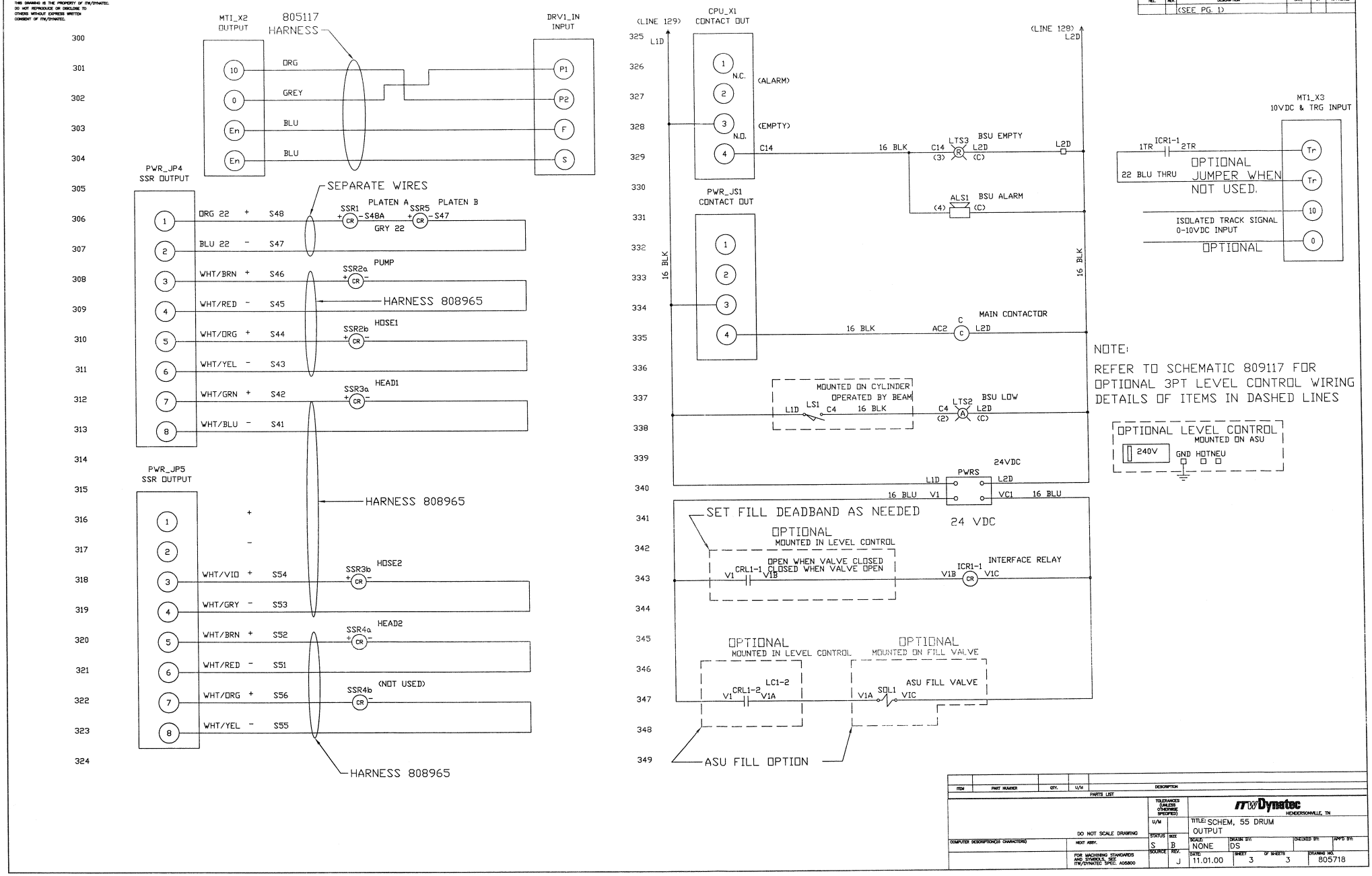
SCALE: DRAWN BY: DS CHECKED BY: APP'D BY:

DATE: 11.01.00 SHEET 2 OF SHEETS 3 DRAWING NO. 805718

DWG. NO. 805718 SH 3 REV J

REVISIONS

REL.	REV.	DESCRIPTION	DATE	BY	APPROVED
		(SEE PG. 1)			



ITEM	PART NUMBER	QTY.	U/M	DESCRIPTION

PARTS LIST

DO NOT SCALE DRAWING

COMPUTER DESCRIPTION(CIS CHARACTERS) | NEXT ASSY.

FOR MACHINING STANDARDS AND SYMBOLS, SEE ITW/DYNATEC SPEC. A05800

TOLERANCES (UNLESS OTHERWISE SPECIFIED)

U/M

STATUS S | SIZE B

SOURCE | REV. J

ITW Dynatec HENDERSONVILLE, TN

TITLE: SCHEM, 55 DRUM OUTPUT

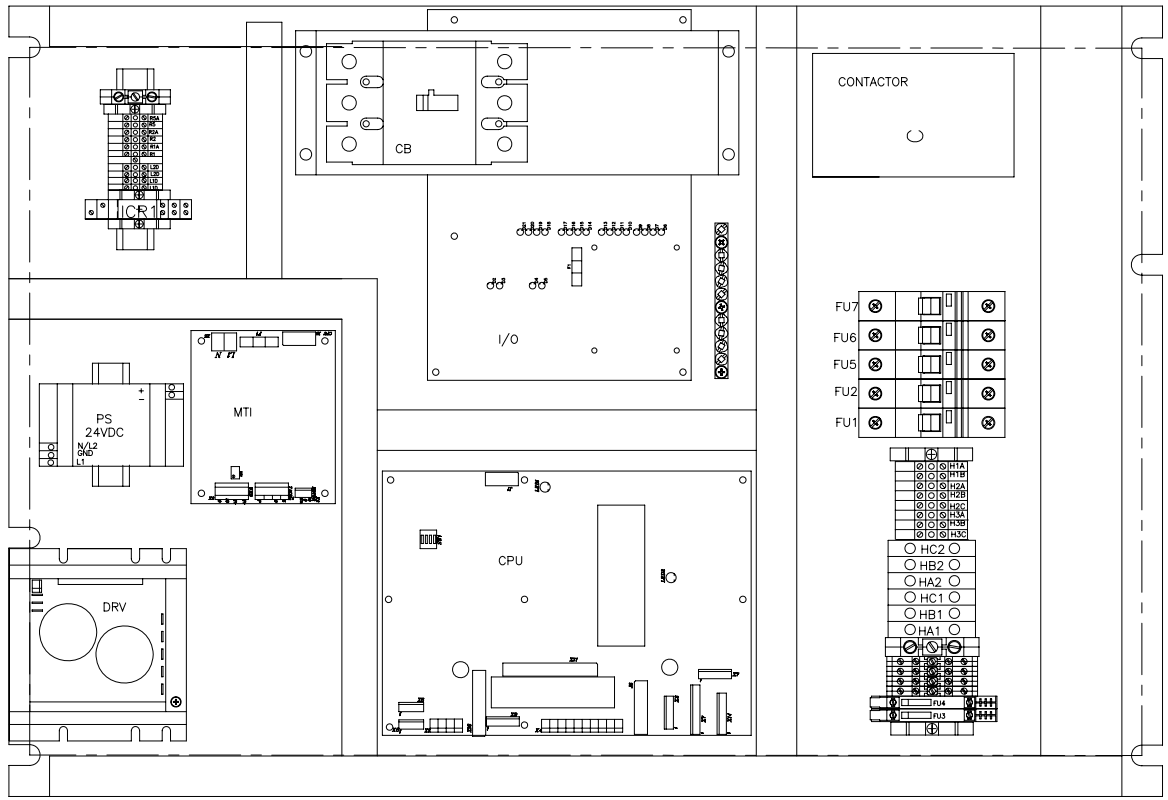
SCALE: NONE | DRAWN BY: DS | CHECKED BY: | APP'D BY:

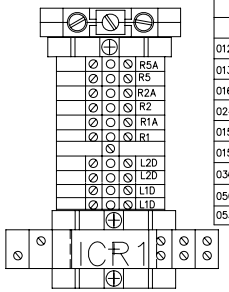
DATE: 11.01.00 | SHEET 3 OF SHEETS 3 | DRAWING NO. 805718

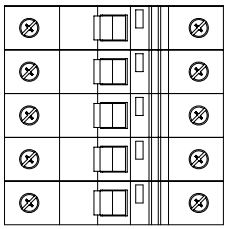
DWG. NO. 805720 SH 1 REV P

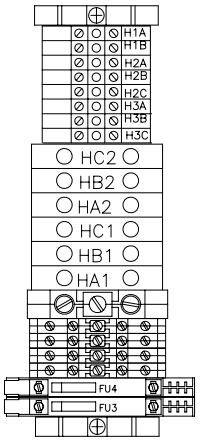
REVISIONS

REL.	REV.	DESCRIPTION	DATE	BY	APPROVED
	A	REL FOR PROTOTYPE	11/1/00	DS	DS
	B	REL FOR PRODUCTION	2.13.01	DS	DS
	C	REV FOR STACK LITE	3.20.01	DS	DS
01250	D	HEATSINK WAS 802626	4.16.01	BB	
01310	F	ADD 24VDC PWR	5.22.01	DS	DS
01608	H	ADD 24VDC RLY ICR1	9.10.01	DS	DS
02482	K	106093 CHANGED TO 109857	9.11.02	BB	
01550	L	106148 CHANGED TO 110090	9.11.02	BB	
01550	M	REMOVED RELAYS MOVED PS	8.07.03	JJ	
03634	N	ADDED EXTRA L1,L2 TERMS	3.11.04	JJ	
05071	O	ADD'D 810683 TO BOM	2.25.05	ADC	
05359	P	CHANGED HS HARNESS	9.22.05	JJ	









ITEM	PART NUMBER	QTY.	U/M	DESCRIPTION

PARTS LIST

55 Gal Drum Unloader

DO NOT SCALE DRAWING

COMPUTER DESCRIPTOR CHARACTERS: LO ,MV5S2M1D55G240V

NEXT ASSY.

FOR MACHINING STANDARDS AND SYMBOLS, SEE ITW/DYNATEC SPEC. AD5800

TOLERANCES UNLESS OTHERWISE SPECIFIED: U/M

STATUS: S NOTE: B

SOURCE: E REV.: P

ITW Dynatec HENDERSONVILLE, TN

TITLE: PBA 55GAL DRUM UNL LAYOUT

SCALE: DS | DRAWN BY: DS | CHECKED BY: DS | APP'D BY: DS

DATE: 11/1/00 | SHEET 1 OF SHEETS 1 | DRAWING NO. 805720

DWG. NO. 809117	SH. 1	REV. A

REVISIONS

REL.	REV.	DESCRIPTION	DATE	BY	APPROVED
03493	A	FIRST RELEASE	9.10.03	JJ	

BSU PANEL BOX

BRN
BLU
GRN
L1D L2D GND

1TR
X5 X1
SET FOR M1
MTR. INT. 106148
5V
ICR1-1
1TR 2TR
ICR1
V1B V1C
CR
2TR
X3 X4 X2
V1B (W2)
V1C
22 BLU

DISPLAY/CONTROLLER
108160
X5 X6
CPU 106093
J1
X16
X4
I1_226 (W4)
I10_226 (W5)
1 2 3 4 5 6 7 8 9 10
J6
RTD EXP. 106149

240V AC PWRS
24VDC + −
V1 (W1)
V1C (W3)
(3) 16 BLU

LEVEL CONTROL PANEL BOX

INPUT VOLTAGE SEL SW
SET AT 240V

PROG
ON
X X
1 2
OFF
SW1

MODE ON OFF
6 X
5 X
4 X
3 X
2 X
1 X

MODE ON OFF
6 X
5 X
4 X
3 X
2 X
1 X

CRL1 −1 −2
CRL2 −1 −2
C NO NC

GROUND HOT NEU
GND GRN
L1D BRN
L2D BLU
GND SIG
BLK WHT
V1 (W1)
V1B (W2)
V1 (W1)
V1A
I10_226 (W5)
I1_226 (W4)

35FT 107320
3/8" FLEXTITE
V1A 16 BLUE
V1C (W3)
SV
VALVE

35FT 809066
CABLE WIRES 1−5 (W1−W5)
3/8" FLEXTITE
SHD WHT/BLK
PROB
SIG GND IN GND
WHT BLK GRN/YEL

THIS PAGE FOR SINGLE TANK SYSTEMS, REFER TO SYSTEM SCHEMATIC FOR ADDITIONAL WIRING

ITEM	PART NUMBER	QTY.	U/M	DESCRIPTION

PARTS LIST

DO NOT SCALE DRAWING
COMPUTER DESCRIPTION(25 CHARACTERS)
NEXT ASSY.
FOR MACHINING STANDARDS AND SYMBOLS, SEE ITW/DYNATEC SPEC. A05800

TOLERANCES (UNLESS OTHERWISE SPECIFIED)
U/M
STATUS
SOURCE
SIZE
REV. H

ITW Dynatec
HENDERSONVILLE, TN

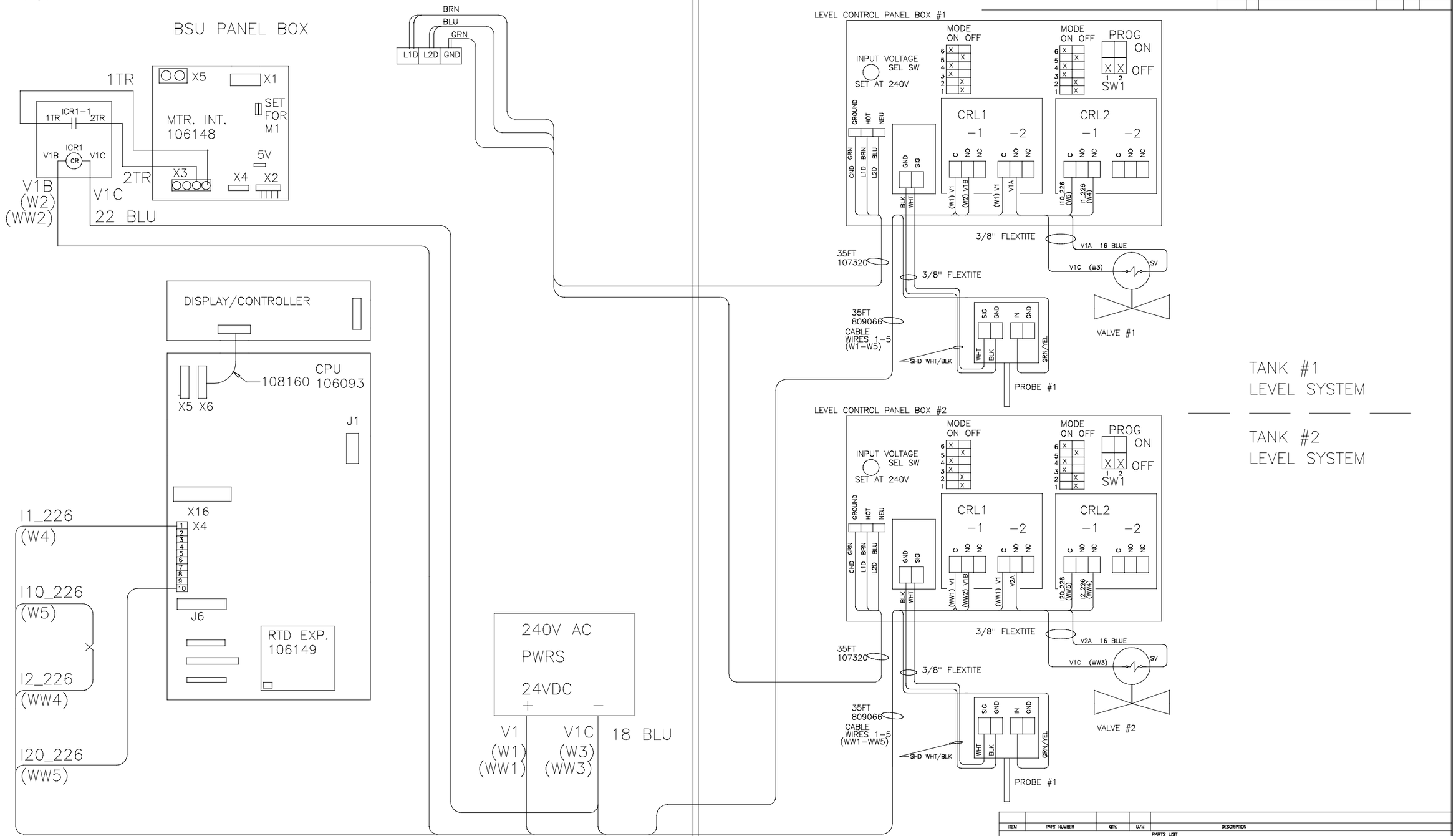
TITLE: WIRING FOR LEVEL CONTROL OPTION M SERIES

SCALE: NONE	DRAWN BY: JJ	CHECKED BY:	APP'D BY:
DATE: 9.10.03	SHEET 1 OF SHEETS 2	DRAWING NO. 809117	

DWG. NO. 809117	SH. 2	REV. A

REVISIONS

REL.	REV.	DESCRIPTION	DATE	BY	APPROVED
03493	A	FIRST RELEASE	9.10.01	JJ	



THIS PAGE FOR DUAL TANK SYSTEMS, REFER TO SYSTEM SCHEMATIC FOR ADDITIONAL WIRING

ITEM	PART NUMBER	QTY.	U/M	DESCRIPTION

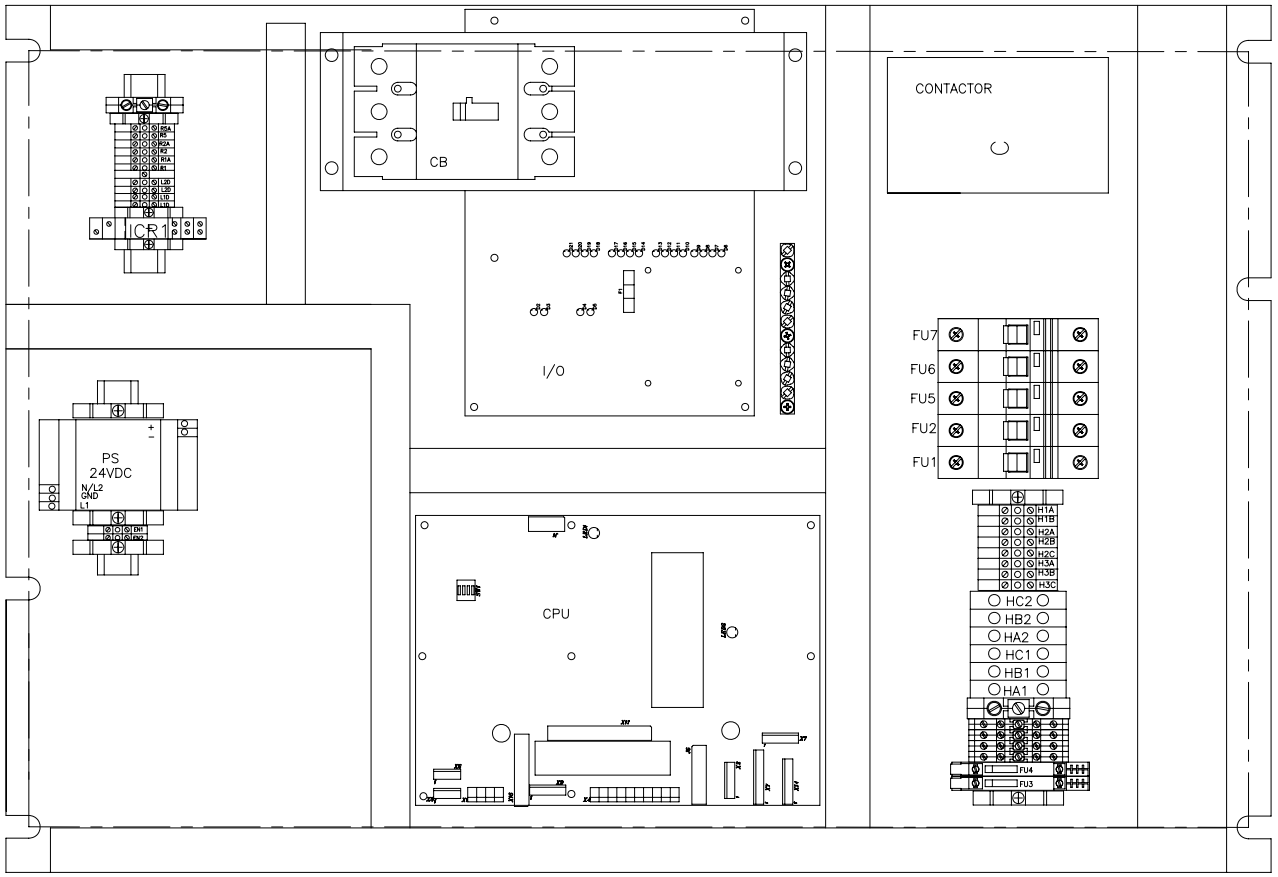
PARTS LIST

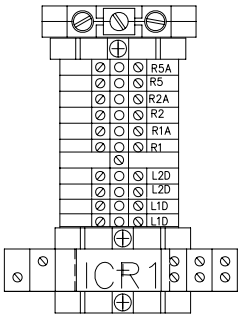
DO NOT SCALE DRAWING	TOLERANCES (UNLESS OTHERWISE SPECIFIED)	ITW Dynatec HENDERSONVILLE, TN	
COMPUTER DESCRIPTION(25 CHARACTERS)	U/M	TITLE: WIRING FOR LEVEL CONTROL OPTION M SERIES	
NEXT ASSY.	STATUS / SIZE	SCALE: NONE / DRAWN BY: JJ / CHECKED BY: / APP'D BY:	
FOR MACHINING STANDARDS AND SYMBOLS, SEE ITW/DYNATEC SPEC. A05800	SOURCE / REV. A	DATE: 9.10.03 / SHEET 2 OF SHEETS 2 / DRAWING NO. 809117	

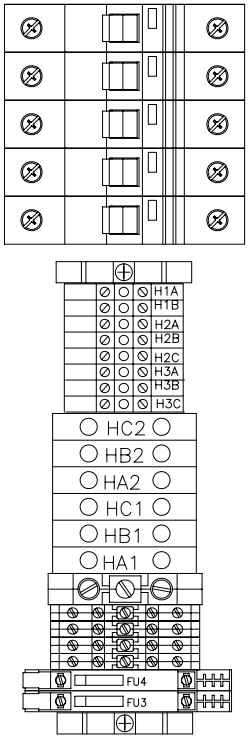
DRG. NO. 812137 | SH. 1 | REV. A

REVISIONS

REL.	REV.	DESCRIPTION	DATE	BY	APPROVED
	A	FIRST RELEASE	8/02/06	JJ	







PARTS LIST

ITEM	PART NUMBER	QTY.	U/M	DESCRIPTION

DO NOT SCALE DRAWING

TOLERANCES (UNLESS OTHERWISE SPECIFIED)

U/M

STATUS: S | SIZE: B

SOURCE: E | REV: A

COMPUTER DESCRIPTION(25 CHARACTERS) | NEXT ASSY.

FOR MACHINING STANDARDS AND FINISH, SEE ITW/DYNATEC SPEC. A05800

ITW Dynatec
HENDERSONVILLE, TN

TITLE: PBA 55GAL DRUM UNL PP LAYOUT

SCALE:	DRAWN BY:	CHECKED BY:	APP'D BY:
	JJ	RJ	

DATE: 8/02/06 | SHEET 1 OF SHEETS 1 | DRAWING NO. 812137

DWG. NO. 811280 SH 1 REV A

REVISIONS

REL.	REV.	DESCRIPTION	DATE	BY	APPROVED
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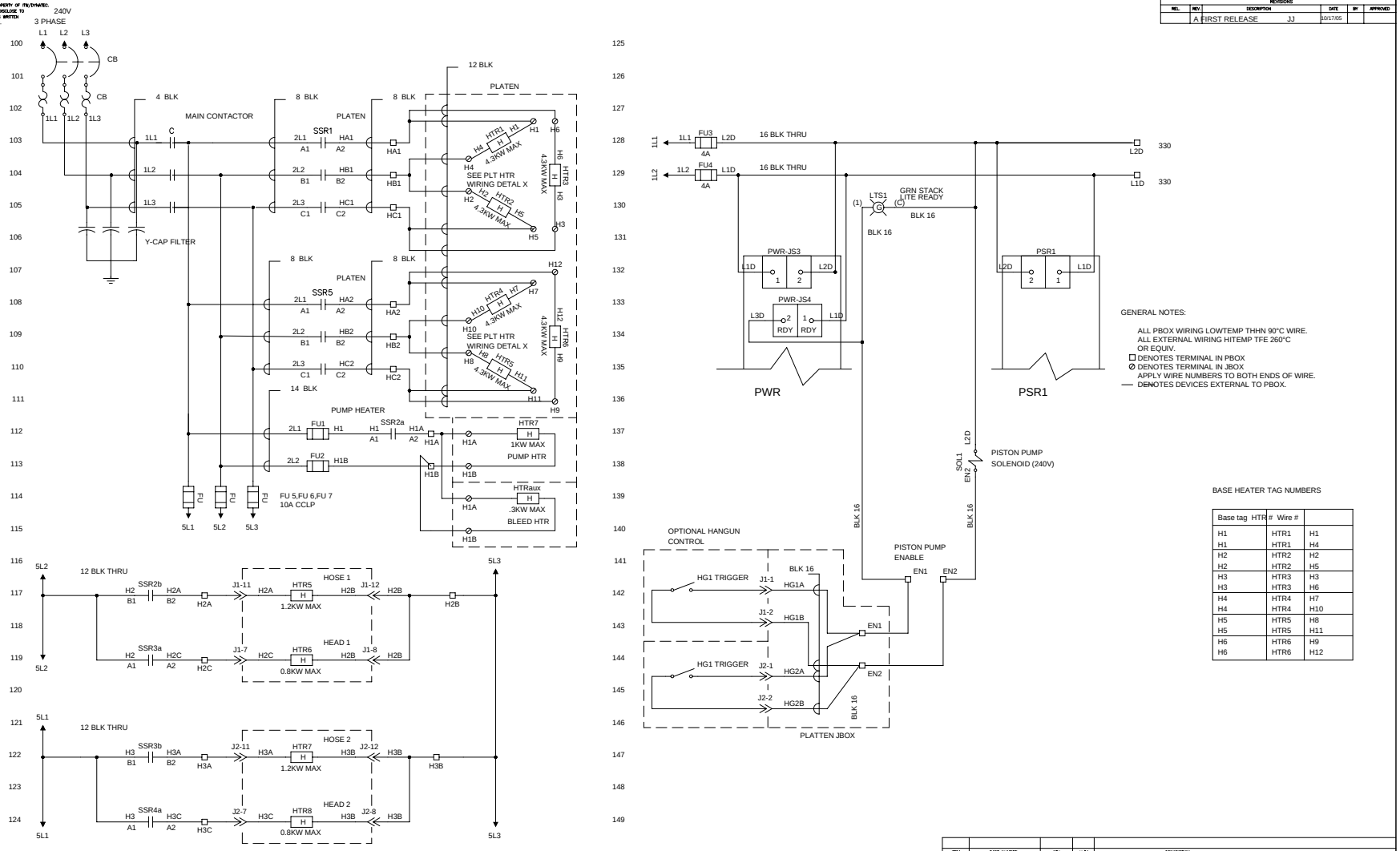


BASE HEATER TAG NUMBERS

Base tag	HTR #	Wire #	
H1	HTR1	H1	
H1	HTR1	H4	
H2	HTR2	H2	
H2	HTR2	H5	
H3	HTR3	H3	
H3	HTR3	H6	
H4	HTR4	H7	
H4	HTR4	H10	
H5	HTR5	H8	
H5	HTR5	H11	
H6	HTR6	H9	
H6	HTR6	H12	

PARTS LIST

ITEM	PART NUMBER	QTY.	U/M	DESCRIPTION

DO NOT SCALE DRAWING

COMPUTER DESCRIPTION(25 CHARACTERS) | NEXT ASSY.

FOR MACHINING STANDARDS AND FINISH'S, SEE ITW/DYNATEC SPEC. A05800

TOLERANCES (UNLESS OTHERWISE SPECIFIED)

U/M | STATUS | SIZE: S | B | SOURCE | REV: A

ITW Dynatec HENDERSONVILLE, TN

TITLE: SCHEM, DM55G, SBC, PP DRUM 240V 3PH SB

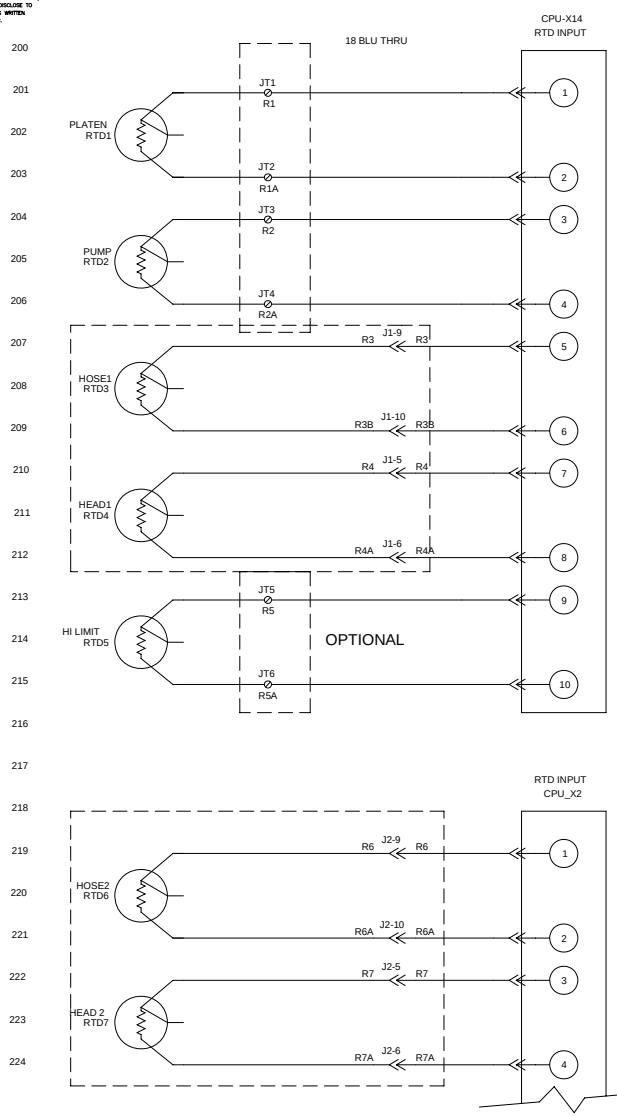
SCALE: | DRAWN BY: JJ | CHECKED BY: RJ | APP'D BY:

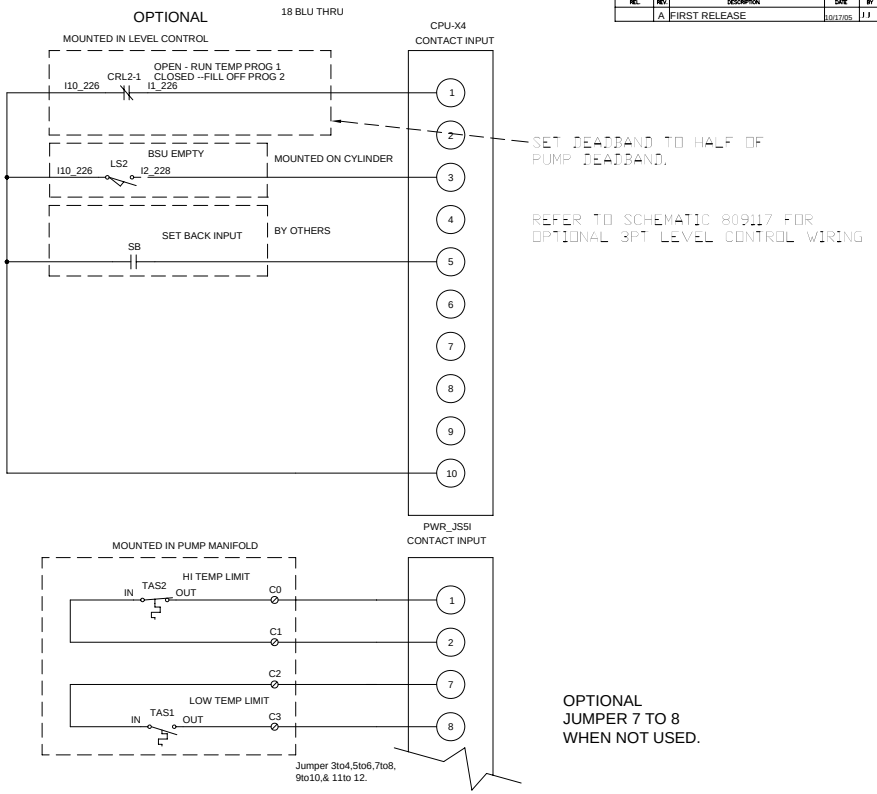
DATE: 10.17.05 | SHEET 1 OF SHEETS 3 | DRAWING NO. 811280

DWG. NO.	SH	REV.
811280	2	A

REVISIONS

REL.	REV.	DESCRIPTION	DATE	BY	APPROVED
	A	FIRST RELEASE	10/17/05	JJ	





ITEM	PART NUMBER	QTY.	U/M	DESCRIPTION

PARTS LIST

DO NOT SCALE DRAWING

COMPUTER DESCRIPTION(35 CHARACTERS)	NEXT ASSY.	STATUS	SIZE
		S	B
	FOR MACHINING STANDARDS AND SYMBOLS, SEE ITW/DYNATEC SPEC. AD5800	SOURCE	REV.
		C	A

TOLERANCES (UNLESS OTHERWISE SPECIFIED)
U/M

ITW Dynatec
HENDERSONVILLE, TN

TITLE: SCHEM 55G, SBC, PP I/O

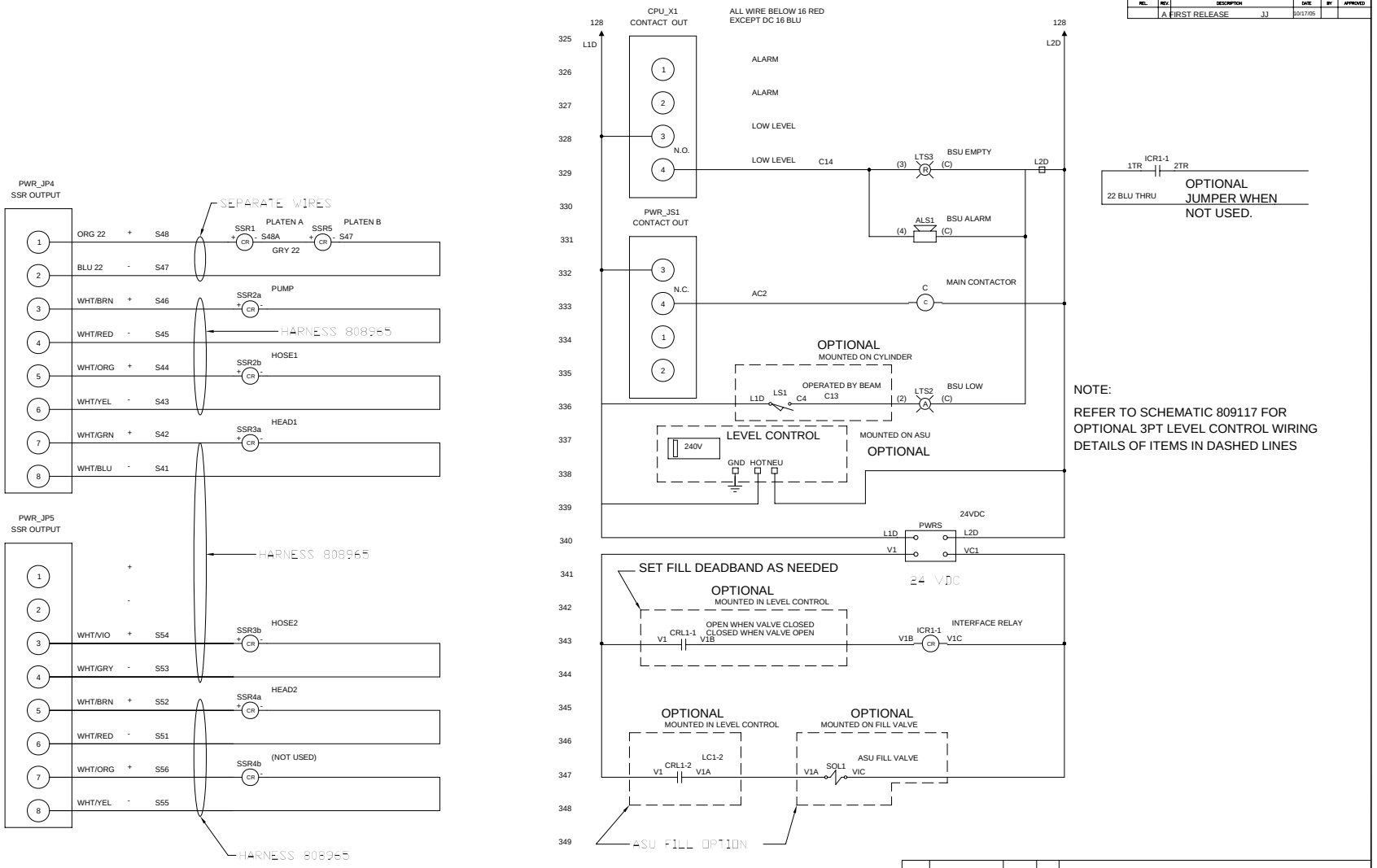
SCALE:	DRAWN BY:	CHECKED BY:	APP'D BY:
	JJ	RJ	

DATE	SHEET	OF SHEETS	DRAWING NO.
10.17.05	2	3	811280

DWG NO. 811280 | SH 3 | REV A

REVISIONS

REL.	REV.	DESCRIPTION	DATE	BY	APPROVED
	A	FIRST RELEASE JJ	10/17/05		



NOTE:

REFER TO SCHEMATIC 809117 FOR OPTIONAL 3PT LEVEL CONTROL WIRING DETAILS OF ITEMS IN DASHED LINES

ITEM	PART NUMBER	QTY.	U/M	DESCRIPTION

PARTS LIST

TOLERANCES (UNLESS OTHERWISE SPECIFIED)
U/M
DO NOT SCALE DRAWING
COMPUTER DESCRIPTION(25 CHARACTERS)
NEXT ASSY.
FOR MACHINING STANDARDS AND FINISHES SEE ITW/DYNATEC SPEC. A05800
STATUS S
SIZE B
SOURCE
REV. A

ITW Dynatec
HENDERSONVILLE, TN

TITLE: SCHEM, DM55G, SBC, PP OUTPUT

SCALE	DRAWN BY	CHECKED BY	APP'D BY
NONE	JJ	RJ	

DATE	SHEET	OF SHEETS	DRAWING NO.
10.17.05	3	3	811280

Appendix

TOOL-STEEL HIGH ACCURACY GEAR PUMPS
USER'S GUIDE

Pump #	Identifier	Displacement	Type	# Gears	# Plates	Shaft Seal #
108863	TSHA*	0.160 cc rev.	single	2	3	807729
108864	TSHA*	0.160 cc rev.	dual	4	5	807729
108865	TSHA*	0.297 cc rev.	single	2	3	807729
108866	TSHA*	0.297 cc rev.	dual	4	5	807729
108867	TSHA*	0.584 cc rev.	single	2	3	807729
108868	TSHA*	0.584 cc rev.	dual	4	5	807729
108869	TSHA*	1.168 cc rev.	single	2	3	807729
108870	TSHA*	1.168 cc rev.	dual	4	5	807729
108871	TSHA*	1.752 cc rev.	single	2	3	807729
108872	TSHA*	2.920 cc rev.	single	2	3	807729
108873	TSHA*	4.500 cc rev.	dual	4	5	807729
108874	TSHA*	2.920 cc rev.	dual	4	5	807729
108875	TSHA*	8.500 cc rev.	single	2	3	807729
110289	TSHA*	20.0 cc rev.	single	2	3	808680
110290	TSHA*	30.0 cc rev.	single	2	3	808680
110291	TSHA*	45.0 cc rev.	single	2	3	808680

** Tool Steel, High Accuracy*

Customer should read and thoroughly understand this manual before installation and operation of pump.

If necessary, any Dynatec pump requiring maintenance can be returned to the factory for complete repair and overhaul. Please contact our Rebuild Department for further details.

Description

ITW Dynatec's metering gearpumps are manufactured to precise tolerances. To retain their high performance, these pumps must be carefully installed and maintained. These pumps are CE (Declaration of Conformity) rated.

Health & Safety

Dismantling

Internal components are precisely machined and have sharp edges and corners. These features are essential to the accurate metering performance. Particular care must be exercised when handling these components.

Cleaning

Cleaning fluids and methods are subject to strict Health and Safety regulations. Avoid contact with skin, do not inhale fumes and protect eyes.

Operation

Pump outlet pressure and speed limits are dependant on fluid viscosity and throughput. Pump inlet pressure is an important feature for lubrication and fluid homogeneity. Materials for pump construction are important for corrosion and wear resistance. Consult ITW Dynatec for detailed applications. Normally the pumps are single or dual output. Typical speed ranges are 10-90 rev/min.

Flushing

To avoid contamination of process fluid, the pump should be flushed out to remove test oil. Precaution must also be taken to flush out pumps at plant shutdown, since congealed fluid can cause seizure.

Filtration

Unless fluid purity can be guaranteed (especially from metal fragments), filtration must be installed before pump inlet, to avoid damage to pump internals.

Note: The following guide is for general purposes only. Due allowance must be made for any special features.

Installation

Ensure pump is free from protective packing materials and rotates freely.

Pump Drive

Drive alignment is very important. Ensure backlash is 0.1mm (0.004") to avoid shock or radial load. In the event of driveshaft connection, two flexible components must be incorporated into each driveshaft to allow for misalignment. These flexible components must have the capacity to distort over the misalignment range while ensuring that any radial load is minimal. Do not allow

shaft to put end thrust on the pump.

Rotation
Ensure drive rotates in correct direction (generally counter-clockwise at the pump drive spindle). The pump must be checked for smooth operation by hand.

Fixing and Lubrication
The pump must be fixed securely to maintain position and alignment. When secured by lubricated bolts, torque them evenly to the suggested torque (see Maintenance).

Start drive and bring up to speed slowly. Flush with process fluid.

Note: motor baseplate assemblies should be pre-checked in case the drive alignment has been disturbed.

Gland Leakage
If oil seal is fitted, there should not be any fluid leakage.

Problem-finding Chart

Problem	Remedy
LEAKAGE	
Screws not tight	Re-torque
Seal scratched or worn	Replace seal
FLOW RATE ERROR	
Gear worn on diameter or width	Return to ITW Dynatec
Gear teeth damage	Return to ITW Dynatec
Plates worn, scratched or not flat	Return to ITW Dynatec
Low inlet pressure (cavitation)	Check process
High outlet pressure (slippage)	Check process

Cleaning

Before removal from machine, the pump should be rotated for a short period (with inlet supply shut off) to discharge process fluid. Care should be taken, when removing and stripping the pump, to allow for any residual fluid. Pump components can be solvent or ultrasonically cleaned by immersion, using a compartmentalized wire baset. Dry in air. Stubborn residues may be removed with a brass wire brush. Avoid burnishing the sharp edges of gear and gear races.

Fluid immersion in rust inhibitor is advised. If components are to be stored for some time, they should be lightly smeared with oil.

Maintenance

Tightening Torque
for High Tensile ISO 12.9 Lubricated Bolts (300°C max)

Bolt Size & Qty.	Bolt Location	Torque Nm/ Ft.lbs.
M5 (4)	retainer cap	7.1/ 5.2
M10, 12 (4)	mounting bolts	41/ 30 at ambient temperature
M10, 12 (4)	mounting bolts	24/ 18 at production temperature

Notes: If mounting bolts are torqued at production temperature, they should be re-torqued (to 41 Nm/30 Ft lb.) when machine is at ambient temperature.

1 Nm = 8.85 in/lbs. Torques given above are for Metric and UNF threads. Multiply by 0.8 for UNC and BSF threads.Multiply by 0.8 for BSVV threads (multiply by 0.67 for stainless steel)

ITW Dynatec frequently provides special features at their customer's request. Please consult with ITW Dynatec, quoting job and pump references, if questions arise.

Reconditioning

Should reconditioning (overhauling) become necessary, return the pump to ITW Dynatec.

Pump Shaft Seal Replacement

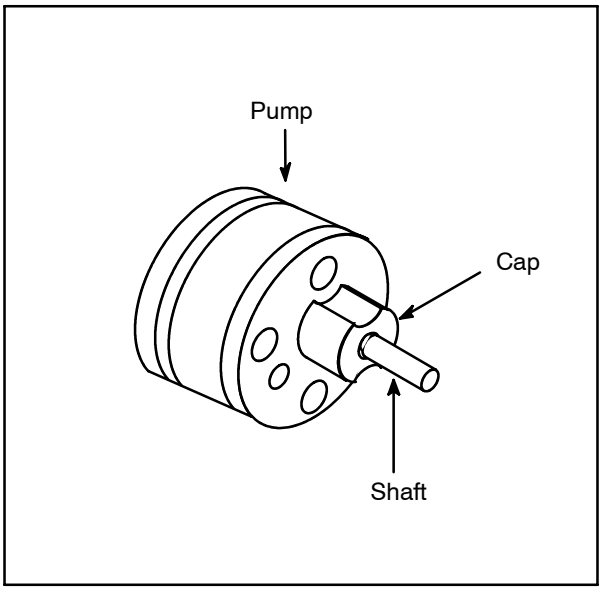
The ITW Part Number for all Standard Tool Steel High Accuracy Pump Shaft Seals (8.5cc and smaller) is PN 807729.

DANGER HOT SURFACE & HIGH VOLTAGE

If the pump is not operable but the heating system will function, raise the temperature of the application system to the operating temperature to aid in the pump disassembly process. Otherwise, a heat gun or other controlled heating method is recommended to melt hardened hot melt material. Never use a torch or an open flame on any of the components of the application system. Once the system is up to temperature, disconnect all incoming power before proceeding.

Pump Shaft Seal (O-ring) Replacement:

In most cases, the pump does not have to be removed from the ASU in order to replace the shaft seal.



1. Disconnect the drive coupling so that the pump may be accessed.

2. Remove the four screws in the pump “cap” and remove the cap.

3. Within the cap is the pump shaft seal. Remove the old seal.

4. Clean all pump parts, paying particular attention to the pump shaft seal groove.

5. Lightly lubricate the shaft seal before inserting it in the shaft seal groove.

6. Before re-assembling, wrap a small piece of paper around the shaft so that the shaft’s woodruff key seat does not damage the new seal.

7. Re-assemble. Remove paper.

8. Re-tighten four screws.

9. Re-connect drive coupling.

10. Return ASU to operation and check pump for leaks.

INSTRUCTIONS–PARTS LIST

307–431
Rev. R

This manual contains IMPORTANT
WARNINGS AND INSTRUCTIONS
READ AND RETAIN FOR REFERENCE

This manual contains changes not included throughout the contents. Please see the second page of this book (page 1A) for a description of the revisions and additions.

CARBON STEEL, PTFE PACKED

Displacement Pumps

STANDARD MODELS (used by Dynatec, 15:1)

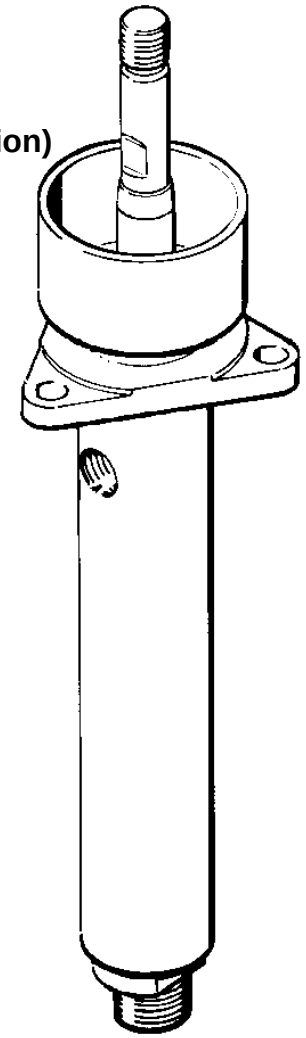
215–930, Series E
0.884 in.^{2} (570 mm^2) Effective Piston Area
2000 psi (140 bar) MAXIMUM WORKING PRESSURE

SEVERE–DUTY MODELS (not used in Dynatec's application)

These pumps have an abrasion and corrosion resistant displacement rod and sleeve. Refer to **WETTED PARTS** information on page 11.

221–074, Series A
0.470 in.^{2} (303.2 mm^2) Effective Piston Area
3000 psi (210 bar) MAXIMUM WORKING PRESSURE

221–026, Series A
0.278 in.^{2} (179.4 mm^2) Effective Piston Area
3000 psi (210 bar) MAXIMUM WORKING PRESSURE



Model 221–074 Shown

TABLE OF CONTENTS

WARNING

Plural Components Chemical Hazard
Graco Inc. does not manufacture or supply any of the reactive chemical components that may be used in this equipment and is not responsible for their effects. Because of the vast number of chemicals that could be used and their varying chemical reactions, before using this equipment, the buyer and the user should determine all facts relating to the components used, including any of the potential hazards involved. Particular inquiry and investigation should be made into potential dangers relating to toxic fumes, fires, explosions, reaction times, and exposure of human beings to the individual components or their resultant mixtures. Graco assumes no responsibility for loss, damage, expense or claims for bodily injury or property damage, direct or consequential, arising from the use of such chemical components.

GRACO INC. P.O. BOX 1441 MINNEAPOLIS, MN 55440–1441

SAFETY WARNINGS

HIGH PRESSURE SPRAY CAN CAUSE SERIOUS INJURY. FOR PROFESSIONAL USE ONLY. OBSERVE ALL WARNINGS. Read and understand all instruction manuals before operating equipment.

FLUID INJECTION HAZARD

General Safety

This equipment may be used in a system which generates very high fluid pressure. Spray from the gun/valve, leaks or ruptured components can inject fluid through your skin and into your body and cause extremely serious bodily injury, including the need for amputation. Also, fluid injected or splashed into the eyes or on the skin can cause serious damage.

NEVER point the spray gun/dispense valve at anyone or at any part of the body. NEVER put hand or fingers over the spray tip.

ALWAYS have the tip guard in place on the spray gun when spraying.

ALWAYS follow the **Pressure Relief Procedure**, at right, before cleaning or removing the spray tip or servicing any system equipment.

NEVER try to stop or deflect leaks with your hand or body.

Be sure equipment safety devices are operating properly before each use.

Medical Alert––Airless Spray Wounds

If any fluid appears to penetrate your skin, get **EMERGENCY MEDICAL CARE AT ONCE. DO NOT TREAT AS A SIMPLE CUT**. Tell the doctor exactly what fluid was injected.

> ***Note to Physician*****:** *Injection in the skin is a traumatic injury.* **It is important to treat the injury surgically as soon as possible***. **Do not delay treatment to research toxicity.** Toxicity is a concern with some exotic coatings injected directly into the blood stream. Consultation with a plastic surgeon or reconstructive hand surgeon may be advisable*.

Spray Tip and Nozzle Safety

Use extreme caution when cleaning or changing spray tips or nozzles. If the spray tip/nozzle clogs while spraying, engage the gun/valve safety latch immediately. ALWAYS follow the **Pressure Relief Procedure** and then remove the spray tip/nozzle to clean it.

NEVER wipe off build–up around the spray tip/nozzle until pressure is fully relieved and the gun/dispense valve safety latch is engaged.

Spray Gun and Dispensing Valve Safety Devices

Be sure all gun/valve safety devices are operating properly before each use. Do not remove or modify any part of the gun/valve; this can cause a malfunction and result in serious bodily injury.

Tip Guard (spray guns only)

ALWAYS have the tip guard in place on the gun while spraying. The tip guard alerts you to the fluid injection hazard and helps reduce, **but does not prevent,** the risk of accidentally placing your fingers or any part of your body close to the spray tip.

Safety Latch (if applicable)

Whenever you stop spraying, even for a moment, always set the gun safety latch in the closed or “safe” position, making the gun inoperative. Failure to set the safety latch can result in accidental triggering of the gun.

Diffuser (if applicable)

The gun diffuser breaks up spray and reduces the risk of fluid injection when the tip is not installed. Check diffuser operation regularly. Follow the **Pressure Relief Procedure**, below, then remove the spray tip. Aim the gun into a metal pail, holding the gun firmly to the pail. Using the lowest possible pressure, trigger the gun. If the fluid emitted *is not* diffused into an irregular stream, replace the diffuser immediately.

Trigger Guard (if applicable)

Always have the trigger guard in place on the gun when spraying to reduce the risk of accidentally triggering the gun if it is dropped or bumped.

Pressure Relief Procedure

To reduce the risk of serious bodily injury, including fluid injection, splashing fluid or solvent in the eyes or on the skin, or injury from moving parts or electric shock, always follow this procedure whenever you shut off the pump, when checking or servicing any part of the spray/dispense system, when installing, cleaning or changing spray tips or nozzles, and whenever you stop spraying/dispensing.

1. Engage the gun/dispensing valve safety latch.
2. Shut off the power to the pump .
3. Disengage the gun/dispensing valve safety latch. Hold a metal part of the gun/dispensing valve firmly to the side of a grounded metal pail, and trigger to relieve pressure.
4. Engage the gun/dispensing valve safety latch.
5. Open the pump drain valve, (required in your system) having a container ready to catch the drainage. Leave the valve open until you are ready to spray/dispense again.

If you suspect that the spray tip/nozzle or hose is completely clogged, or that pressure has not been fully relieved after following the steps above, VERY SLOWLY loosen the tip guard retaining nut or hose end coupling to relieve pressure gradually, then loosen completely. Now clear the tip or hose.

EQUIPMENT MISUSE HAZARD

General Safety

Any misuse of the spray equipment or accessories, such as overpressurizing, modifying parts, using incompatible chemicals and fluids, or using worn or damaged parts, can cause them to rupture and result in fluid injection or other serious bodily injury, including splashing in the eyes or on the skin, fire, explosion or property damage.

NEVER alter or modify any part of this equipment; doing so could cause it to malfunction.

CHECK all spray equipment regularly and repair or replace worn or damaged parts immediately.

ALWAYS read and follow the fluid and solvent manufacturer’s recommendations regarding the use of protective eyewear, clothing and equipment, including respirators.

System Pressure

Displacement pump Models 221–026 and 221–074 have a *3000 psi (210 bar) MAXIMUM WORKING PRESSURE.* Displacement pump Model 215–930 has a *2000 psi (140 bar) MAXIMUM WORKING PRESSURE. NEVER* exceed the stated maximum working pressure of the pump or of the lowest rated component in your system.

Be sure that any components or accessories added to the system are rated to withstand this pressure.

Fluid Compatibility

BE SURE that all fluids and solvents used are chemically compatible with the wetted parts shown in the **TECHNICAL DATA** section on page 11. Always read the fluid and solvent manufacturer’s literature before using them in your system.

HOSE SAFETY

High pressure fluid in the hoses can be very dangerous. If the hose develops a leak, split or rupture due to any kind of wear, damage or misuse, the high pressure spray emitted from it can cause a fluid injection injury or other serious bodily injury or property damage.

ALL FLUID HOSES MUST HAVE SPRING GUARDS ON BOTH ENDS! The spring guards help protect the hose from kinks or bends at or close to the coupling which can result in hose rupture.

TIGHTEN all fluid connections securely before each use. High pressure fluid can dislodge a loose coupling or allow high pressure spray to be emitted from the coupling.

NEVER use a damaged hose. Before each use, check the entire hose for cuts, leaks, abrasion, bulging cover, or damage or movement of the hose couplings. If any of these conditions exist, replace the hose immediately. DO NOT try to recouple high pressure hose or mend it with tape or any other device. A repaired hose cannot contain the high pressure fluid.

HANDLE AND ROUTE HOSES CAREFULLY. Do not pull on hoses to move equipment. Do not use fluids or solvents which are not compatible with the inner tube and cover of the hose. DO NOT expose Graco hose to temperatures above 180°F (82°C) or below –40°F (–40°C).

Hose Grounding Continuity

Proper hose grounding continuity is essential to maintaining a grounded spray/dispense system. Check the electrical resistance of your air and fluid hoses at least once a week. If your hose does not have a tag on it which specifies the maximum electrical resistance, contact the hose supplier or manufacturer for the maximum resistance limits. Use a resistance meter in the appropriate range for your hose to check the resistance. If the resistance exceeds the recommended limits, replace it immediately. An ungrounded or poorly grounded hose can make your system hazardous. Also read **FIRE OR EXPLOSION HAZARD.**

FIRE OR EXPLOSION HAZARD

Static electricity is created by the flow of fluid through the pump and hose. If every part of the spray/dispensing equipment is not properly grounded, sparking may occur, and the system may become hazardous. Sparking may also occur when plugging in or unplugging a power supply cord or using a gasoline engine. Sparks can ignite fumes from solvents and the fluid being sprayed, dust particles and other flammable substances, whether you are spraying/dispensing indoors or outdoors, and can cause a fire or explosion and serious bodily injury and property damage.

If you experience any static sparking or even a slight shock while using this equipment, **STOP SPRAYING/DISPENSING IMMEDIATELY**. Check the entire system for proper grounding. Do not use the system again until the problem has been identified and corrected.

Grounding

To reduce the risk of static sparking, ground the pump and all other spray equipment used or located in the spray/dispensing area. CHECK your local electrical code for detailed grounding instructions for your area and type of equipment. BE SURE to ground all of this equipment:

1. *Pump:* connect a ground wire and clamp to a true earth ground as instructed in your separate pump manual.
2. *Air & Fluid hoses:* use only grounded hoses. See **Hose Grounding Continuity**.
3. *Spray gun or dispensing valve:* obtain grounding through connection to a properly grounded fluid hose and pump.
4. *Object being sprayed:* according to local code.
5. *Fluid supply container:* according to local code.
6. *All solvent pails used when flushing,* according to local code. Use only metal pails, which are conductive. Do not place the pail on a non–conductive surface, such as paper or cardboard, which interrupts the grounding continuity.
7. *To maintain grounding continuity when flushing or relieving pressure*, always hold a metal part of the gun firmly to the side of a grounded metal pail, then trigger the gun/dispensing valve.

Flushing Safety

To reduce the risk of fluid injection injury, static sparking, or splashing follow the **Pressure Relief Procedure** on page 2, and remove the spray tip (spray guns only) before flushing. Hold a metal part of the gun firmly to the side of a grounded metal pail and use the lowest possible fluid pressure during flushing.

MOVING PARTS HAZARD

In a pneumatic system, the piston in the air motor, located behind the air motor plates or shield, moves when air is supplied to the motor. Moving parts in the motor or any other part of the system can pinch or amputate your fingers or other body parts. Therefore, NEVER operate the pump with the air motor plates removed. KEEP CLEAR of moving parts when starting or operating the pump. Follow the **Pressure Relief Procedure** on page 2 before checking or servicing any part of the system, to prevent it from starting accidentally.

IMPORTANT

United States Government safety standards have been adopted under the Occupational Safety and Health Act. These standards – particularly the General Standards, Part 1910, and the Construction Standards, Part 1926 – should be consulted.

Service for 215–930, Series E Displacement Pump

WARNING

To reduce the risk of serious injury, including fluid injection, splashing in the eyes or on the skin, or injury from moving parts, ALWAYS follow the **Pressure Relief Procedure** on page 2 before checking or repairing any part of the pump or system.

NOTES:

1. Repair Kit 218–559 is available. Use all the new parts in the kit for the best results. Kit parts are indicated by a reference number followed by an asterisk, for example, (1*).
2. Always replace the glands when replacing the packings, whether or not you use a repair kit. Install the packings one at a time to be sure they “nest” properly.
3. Clean parts with a compatible solvent. Inspect for wear or damage and replace parts as needed.

Disassembling Pump

Unscrew intake valve housing (13) from pump housing (15). Remove pin (7), ball (2), retainer (9) and o–ring (8). See Fig 2. If seat in valve housing (13) is chipped or worn, replace housing.

Loosen throat packing nut (16), push displacement rod (17) down, grasp piston (14), and pull piston and displacement rod out through bottom of pump housing.

Scoring or irregular surfaces on the displacement rod (17) or polished inner wall of the sleeve (4) cause premature packing wear and leaking. Check these parts by rubbing a finger on the surface and by holding the parts up to the light at a slight angle. If the sleeve cannot be removed easily to replace it, contact Graco Technical Assistance (see back page). When replacing the sleeve, be sure to replace the gasket (3*).

Screw piston (14) out of displacement rod (17). Remove ball (1), glands (10 & 11), packings (6), shims (22), and packing retainer (5).

Screw throat packing nut (16) out of pump housing (15). Remove packings (6) and glands (10 & 11).

Assembling Pump

Lubricate packings, displacement rod (17) and inside of sleeve (4) before assembling.

Install male gland (10*), five v–packings (6*) *with the lips facing down,* and female gland (11*) in throat of pump housing (15). See Fig 2. Install packing nut (16) loosely.

Install the ball guide (21) and ball stop pin (18) into the displacement rod if they were removed. Secure the stop pin with two cotter pins (19).

Install up to six shims (22*) on the piston, to attain a packing stack height of 0.668–0.683 in. (17.0–17.3 mm). Install the female gland (11*), four v–packings (6*) *with the lips facing up*, male gland (10*) and packing retainer (5) on the piston (14). Verify that the packing stack height is correct. See Fig 2.

Place ball (1*) on piston (14). Apply liquid thread sealant to threads of piston (14) and screw piston into displacement rod (17). Torque to 35–40 ft–lb (47–54 N.m).

Install displacement rod (17) and piston (14) up through bottom of pump housing (15).

Place ball (2*) in intake housing (13) and install o–ring (8), retainer (9) and pin (7) in housing. Lubricate threads of valve housing (13) and screw valve housing into pump housing (15). Tighten throat packing nut (16) just enough to stop leakage—no tighter.

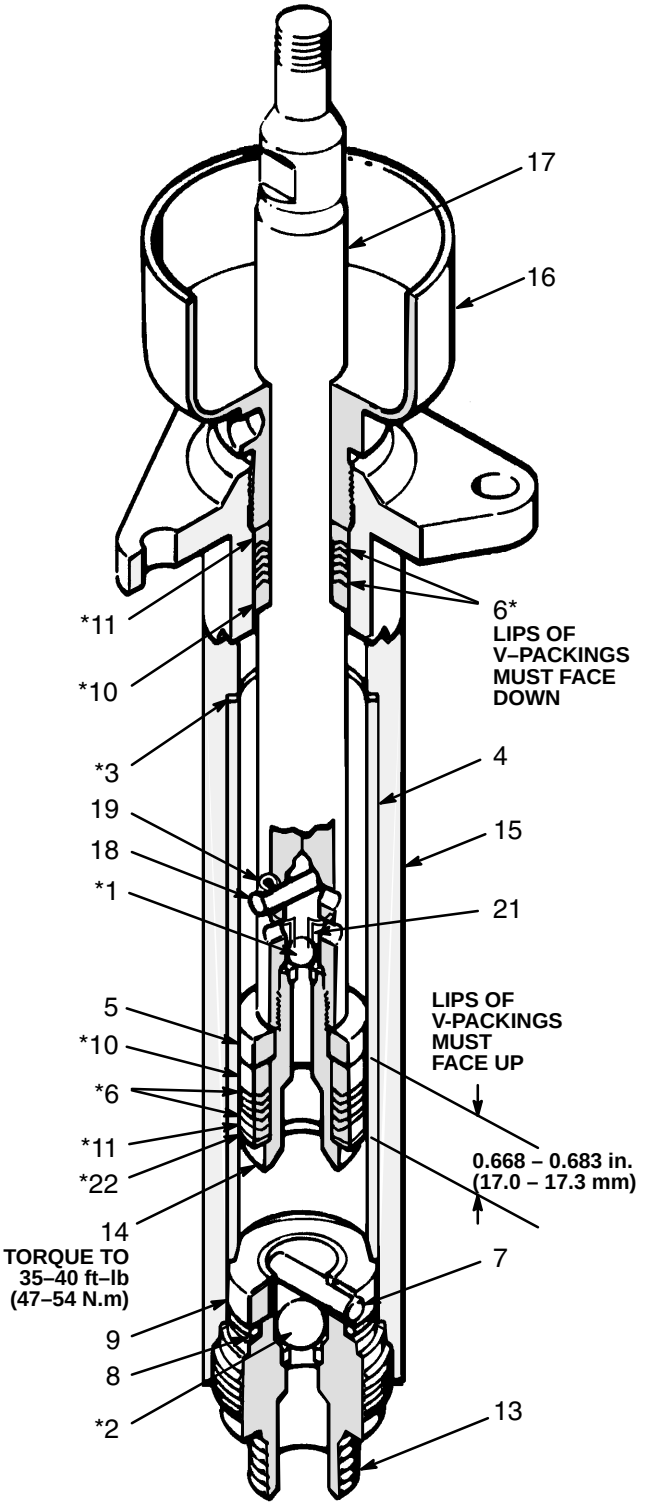
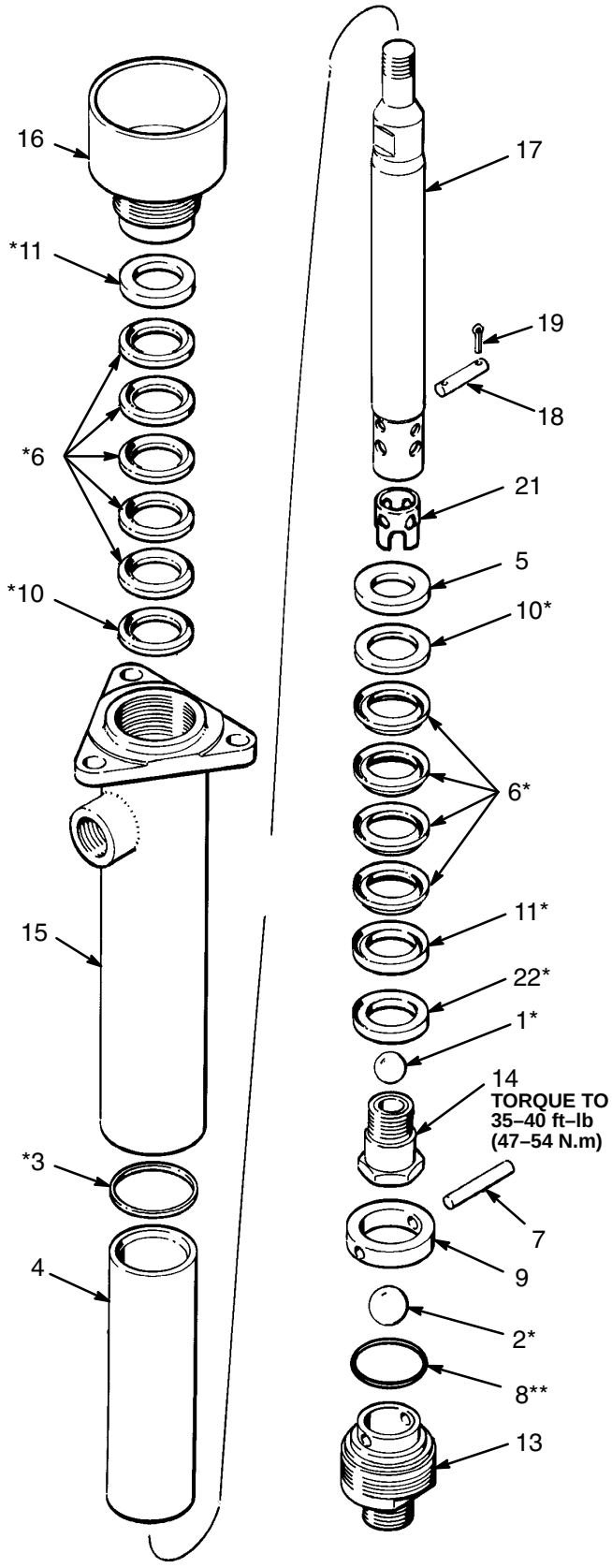


Fig 2

PARTS DRAWING

Model 215–930 Series E



PARTS LIST

Model 215–930 Series E

REF NO.	PART NO.	DESCRIPTION	QTY
1	101–822*	BALL; sst; 5/8" (16 mm) dia	1
2	101–859*	BALL; sst; 3/4" (19 mm) dia	1
3	167–668**	GASKET; PTFE	1
4	167–669	SLEEVE, cylinder	1
5	167–672	RETAINER	1
6	167–665*	V–PACKING; PTFE	9
7	167–662	PIN, straight	1
8	165–053**	O–RING; PTFE	1
9	167–663	RETAINER	1
10	183–644*	GLAND, male	2
11	183–645*	GLAND, female	2
13	207–357	HOUSING, intake	1
14	207–356	PISTON	1
15	207–354	HOUSING, pump	1
16	207–355	NUT, packing	1
17	167–670	ROD, displacement	1
18	167–671	PIN, straight	1
19	100–063	PIN, cotter	2
20	172–479	TAG, warning (not shown)	1
21	183–022	GUIDE, ball	1
22	187–831*	SHIM	0–6

**Supplied in Repair Kit 218–559.*

***Recommended "tool box" spare parts. Keep on hand to reduce down time.*

Repair Kit 218–559 For Displacement Pump 215–930
Must be ordered separately.
Consists of:

Ref No.	Qty.
1	1
2	1
3	1
6	9
10	2
11	2
22	6

HOW TO ORDER PARTS

1. To be sure you receive the correct replacement parts, kit or accessories, always give all the information requested in the chart below.
2. Check the parts list to identify the correct part number; **do not use the ref. no. when ordering.**
3. Order all parts from your nearest Graco distributor.

6 digit PART NUMBER	QTY	PART DESCRIPTION

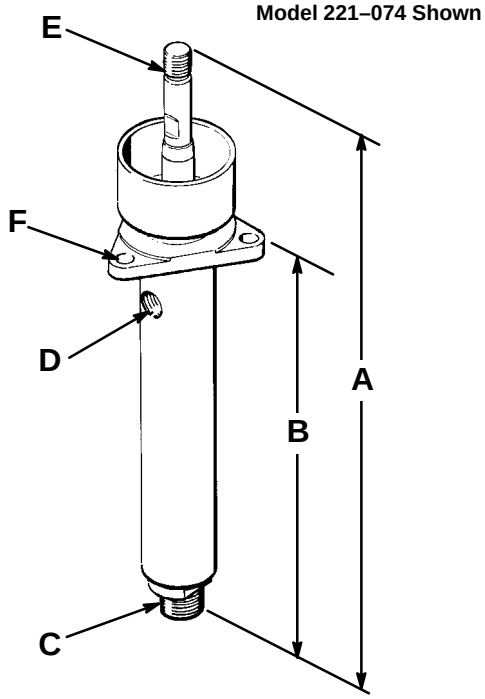
DIMENSIONAL DRAWING

Displ. Pump No.	A Length* in. (mm)	B Length* in. (mm)	C Inlet NPT	D Outlet NPT	E Rod Thd UNC	F Hole Dia.** in. (mm)
221–026	13.12 (333.2)	10.69 (271.5)	3/4 (m)	3/8 (f)	1/2–13(m)	0.406 (10.34)
215–930	13.62 (345.9)	10.69 (271.5)	3/4 (m)	1/2 (f)	5/8–11(m)	0.406 (10.34)
221–074	13.94 (354.1)	10.69 (271.5)	3/4 (m)	3/8 (f)	5/8–11(m)	0.406 (10.34)

*With connecting rod at bottom of stroke

**Three holes on a 3.5 in. (88.9 mm) bolt circle.

Model 221–074 Shown



SERVICE INFORMATION

Listed below by the assembly changed are Added and Deleted parts.

Assembly Changed	Status	Ref No.	Part No.	Name
Model 215–930, to Series E	Deleted (1*)	6	167–665	V–Packing
	Added (3**)	22	187–831	Shim

* Four v–packings are now used on the piston. The number of v–packings used in the pump throat remains at five.

** Use 0–6 shims, as required, to attain a piston packing stack height of 0.668–0.683 in. (17.0–17.3 mm). See page 6.

TECHNICAL DATA

Displ pump Number	Cyl. ID Area In.^{2} (mm^2)	Disp Rod OD Area In.^{2} (mm^2)	% of Diff.	Effective Area In.^{2} (mm^2)	Max. Stroke In. (mm)
221–026*	0.557 (359.37)	0.276 (178.1)	–1.6	0.278 (179.936)	4.0 (101.6)
215–930**	1.767 (1140.07)	0.887 (565.8)	0.70	0.884 (570.35)	4.25 (108)
221–074*	0.940 (606.49)	0.473 (305.18)	1.2	0.470 (303.24)	4.25 (108)

**3000 psi (210 bar) Maximum Working Pressure*
***2000 psi (140 bar) Maximum Working Pressure*

WETTED PARTS

Models 221–026 & 221–074
Chrome over Stainless Steel, Tungsten Carbide, Zinc–Plated Steel, PTFE

Model 215–930
Nitralloy Steel, Stainless Steel, Tungsten Carbide, Zinc–Plated Steel, PTFE

THE GRACO WARRANTY AND DISCLAIMERS

WARRANTY

Graco warrants all equipment manufactured by it and bearing its name to be free from defects in material and workmanship on the date of sale by an authorized Graco distributor to the original purchaser for use. As purchaser's sole remedy for breach of this warranty, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment proven defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

This warranty does not cover, and Graco shall not be liable for, any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non–Graco component parts. Nor shall Graco be liable for malfunction, damage or wear caused by the incompatibility with Graco equipment of structures, accessories, equipment or materials not supplied by Graco, or the improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Graco.

This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Graco distributor for verification of the claim. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor and transportation.

DISCLAIMERS AND LIMITATIONS

THE TERMS OF THIS WARRANTY CONSTITUTE PURCHASER'S SOLE AND EXCLUSIVE REMEDY AND ARE IN LIEU OF ANY OTHER WARRANTIES (EXPRESS OR IMPLIED), INCLUDING WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, AND OF ANY NON–CONTRACTUAL LIABILITIES, INCLUDING PRODUCT LIABILITIES, BASED ON NEGLIGENCE OR STRICT LIABILITY. EVERY FORM OF LIABILITY FOR DIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES OR LOSS IS EXPRESSLY EXCLUDED AND DENIED. IN NO CASE SHALL GRACO'S LIABILITY EXCEED THE AMOUNT OF THE PURCHASE PRICE. ANY ACTION FOR BREACH OF WARRANTY MUST BE BROUGHT WITHIN TWO (2) YEARS OF THE DATE OF SALE.

EQUIPMENT NOT COVERED BY GRACO WARRANTY

GRACO MAKES NO WARRANTY, AND DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO ACCESSORIES, EQUIPMENT, MATERIALS, OR COMPONENTS SOLD BUT NOT MANUFACTURED BY GRACO. These items sold, but not manufactured by Graco (such as electric motor, switches, hose, etc.) are subject to the warranty, if any, of their manufacturer. Graco will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

IMPORTANT PHONE NUMBERS

TO PLACE AN ORDER, contact your Graco distributor, or call this number to identify the distributor closest to you: **1–800–328–0211 Toll Free**

FOR TECHNICAL ASSISTANCE**,** service repair information or assistance regarding the application of Graco equipment: **1–800–543–0339 Toll Free**

Factory Branches: Atlanta, Chicago, Dallas, Detroit, Los Angeles, Mt. Arlington (N.J.)
Subsidiary and Affiliate Companies: Canada; England; Switzerland; France; Germany; Hong Kong; Japan; Korea

GRACO INC. P.O. BOX 1441 MINNEAPOLIS, MN 55440–1441

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233559 Accessory Kit

For 6-1/2 inch Ram

GRACO ***INFORMATION ENCLOSED***

PN 806679 Optional Hood Vent

⚠ WARNING

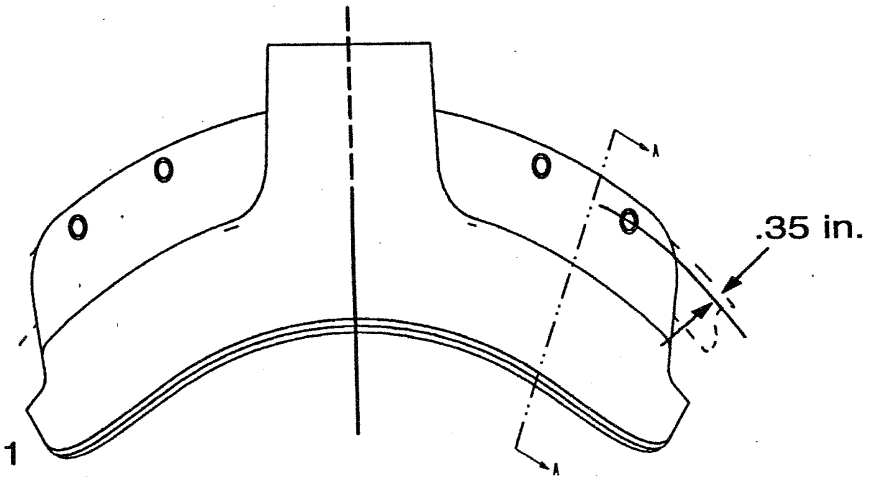

Fig. 1

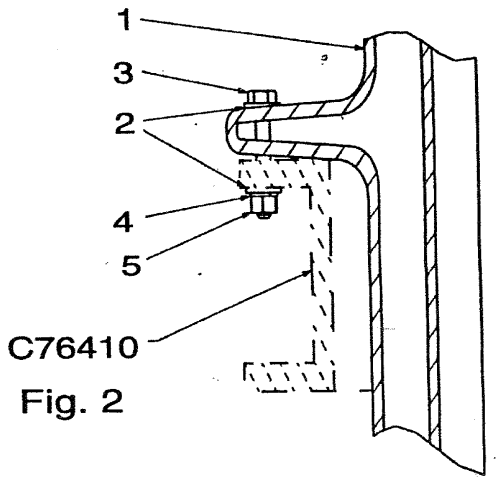

Fig. 2

To install on an existing system that does not have mounting holes drilled in the ram arch, center the hood between the ram posts with the hood lip resting on the arch. Ensure the mounting holes are close to the rear of the arch, .35 in. (on center) inward from the rear of the arch (see Fig. 1). Center-punch through the holes in the hood and clear all tubing or hoses from the top and bottom of the arch. Drill 5/16" holes where marked by the center punch.

Mount the hood using the hardware provided. Re-install hoses or tubing as necessary. Move the ram up and down and ensure there is no interference with cables, tubes, or hoses. It may be necessary to slightly re-route cabling or hoses.

	Part Number	Description
1.	280434	Vent, hood
2.	110755	Washer, plain
3.	114988	Screw, cap, hex head
4.	100016	Washer, lock
5.	112248	Nut, hex, 1/4-inch