

NESLAB DIMAX

DI Maximum Cooler

Thermo Manual P/N U00858 Rev. 12/28/05

**Installation-Operation-
Basic Service**



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Preface

Compliance

Listed to:

Products tested and found to be in compliance with the requirements defined in the EMC standards defined by 89/336/EEC as well as Low Voltage Directive (LVD) 73/23/EEC can be identified by the CE Mark on the rear of the unit. The testing has demonstrated compliance with the following directives:

LVD, 73/23/EEC Complies with IEC/EN61010-1

EMC, 89/336/EEC IEC/EN61326-1

For any additional information, refer to the Declaration of Conformity that shipped with the unit.

Unpacking

Retain all cartons and packing material until the unit is operated and found to be in good condition. If the unit shows external or internal damage, or does not operate properly, contact the transportation company and file a damage claim. Under ICC regulations, this is your responsibility.

After-sale Support

Thermo Electron Corporation is committed to customer service both during and after the sale. If you have questions concerning the operation of your unit, contact our Sales Department. If your unit fails to operate properly, or if you have questions concerning spare parts or Service Contracts, contact our Customer Service Department. Before calling, please obtain the following information from the unit's serial number label:

- *BOM number* _____
- *Serial number* _____
- *Software version (see page 14)* _____

Section I Safety

Warnings

Make sure you read and understand all instructions and safety precautions listed in this manual before installing or operating your unit. If you have any questions concerning the operation of your unit or the information in this manual, contact our Sales Department (see After-sale Support).

Observe all warning labels.

Never remove warning labels.

Never operate damaged or leaking equipment.

Never operate the unit without cooling fluid in the reservoir.

Always turn off the unit and disconnect the line cord from the power source before performing any service or maintenance procedures.

Always empty the reservoir before moving the unit.

Always turn off the unit and disconnect the line cord from the power source before moving the unit.

Additional safety warnings are posted throughout the manual. These warnings are designated by an exclamation mark inside an equilateral triangle with text highlighted in bold. Read and follow these important instructions. Failure to observe these instructions can result in permanent damage to the unit, significant property damage, or personal injury or death.

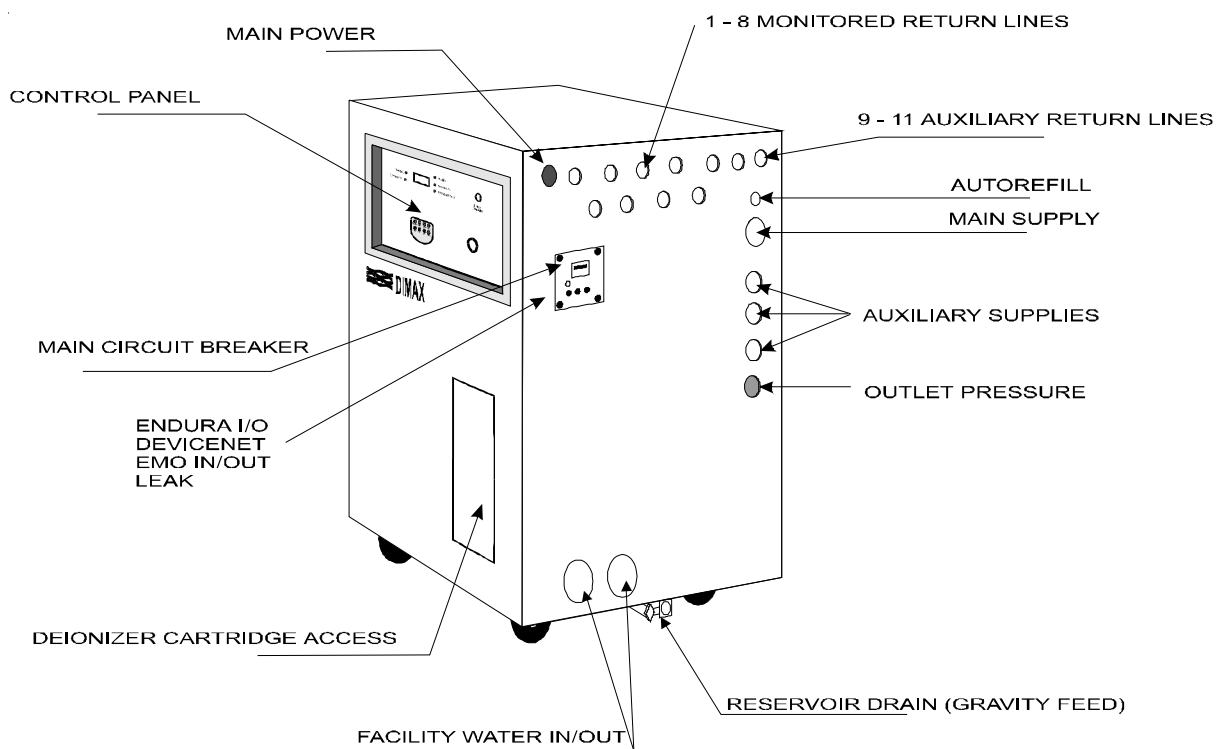
Section II General Information

Description

The DIMAX Liquid to Liquid Heat Exchanger is designed to remove heat loads from liquid-cooled instruments. The unit uses facility cooling or tap water as the secondary cooling medium to remove heat from the primary fluid in the closed recirculation loop.

The unit consists of a plate heat exchanger, recirculation pump, stainless steel reservoir, built-in replaceable deionizing cartridge, and a microprocessor controller. The controller monitors temperature, controls resistivity and displays all fluid flows.

The unit has 11 return lines. The flow rate in 8 of these lines as well as the facility flow line is monitored by flow transducers. The unit also has fluid level sensors designed to protect the unit's pump and your application. A resistivity sensor monitors resistivity and sends a signal to the controller when replacement is necessary.

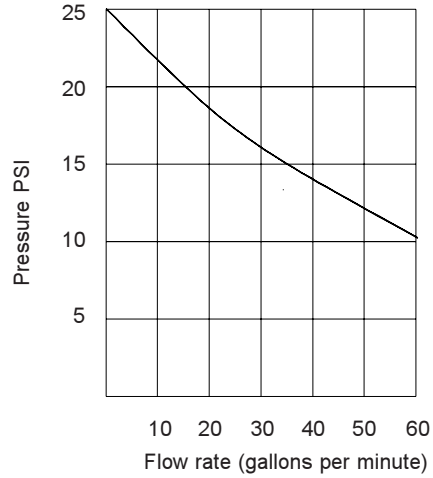


Specifications

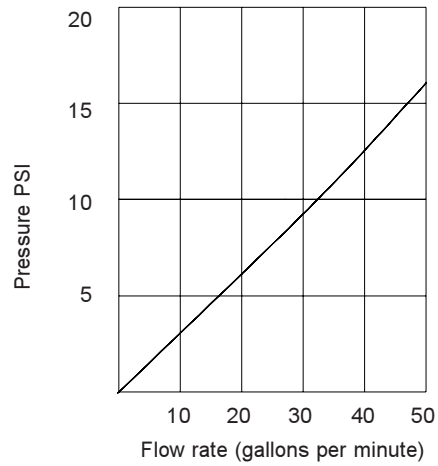
Temperature Range¹

+20°C to +30°C

Pumping Capacity



Facility Water Requirements



Reservoir Volume

Gallons

68.0

Liters

257

Unit Dimensions

(H x W x D)

Inches

55 x 32½ x 32½

Centimeters

139.7 x 82.6 x 82.6

1. Lower limit determined by facility water temperature.

Section III Installation

Site

The unit should be placed in a location with easy access to a facility cooling water and a drain.

For proper ventilation, a minimum clearance of 6 inches (15 centimeters) at the rear of the unit is necessary.



Never place the unit in a location where excessive heat, moisture, or corrosive materials are present.

Facility Water Requirements

For the unit to operate at its full rated capacity, the facility water flow rate must be at least 50 gallons per minute and the facility water temperature must be between 17°C to 22°C. If the facility water does not meet these requirements, the cooling capacity will be reduced.

Facility water supply should not exceed 100 psi and the maximum pressure differential between facility water supply and return should not exceed 65 psi.

Electrical Requirements

Refer to the serial number label on the rear of the unit for the specific electrical requirements of your unit.



For high-voltage 380-415/480V units only, ensure the voltage selector switch is in the correct position to meet the power source rating. The switch is located behind the main circuit breaker panel on the right-hand side of the unit.

Ensure the voltage of the power source meets the specified voltage, $\pm 10\%$.



Make sure an adequate ground connection is provided.

Field Wiring Configuration

The configuration is a 3 phase, 4 wires with PE. Remove the circuit breaker panel cover to access the DIMAX main circuit breaker (CB1). The Circuit Breaker is rated for Ring Lugs (RL).

The copper wires of the multi-conductor flexible power cable are terminated with ring lugs with #10 holes at both ends. Crimp the ring lugs.

One terminal is connected to the branch circuit breaker, and the other to CB1.

Facilities Type	Fitting Size	Fitting Type	Material	Pressure	Flow	Comments
Monitored return	1"	FPT	Brass	~5 psi	>10gpm at <15psi	
Auxiliary return	1"	FPT	Brass	~5 psi		
Main Supply	2"	FPT	Brass	25 psi max	50gpm at <15psi at the mainframe	
Auxiliary supply	1"	FPT	Brass	25 psi max		
Facility water In/Out	2"	FPT	Brass	100 psi max	50gpm max	Higher pressures-consult Thermo NESLAB
Autorefill	1/2"	FPT	Brass	75 psi max	Unregulated	Higher pressures-consult Thermo NESLAB
Reservoir Drain	1/2"	FPT	Brass	Atmospheric	N/A	
Reservoir Overflow	1"	FPT	Brass	Atmospheric	N/A	
AC Power Input	Customer Supplied	N/A	N/A	N/A	N/A	

Table 1 Facilities Requirements

The multi-conductor cable has 3 current carrying conductors and 1 non-carrying conductor (Ground). Each cable conductor is made of stranded copper, and is at least size AWG 12.

The multi-conductor flexible jacketed cable is type S, SO, ST and STO with insulation rated for a minimum of 600 V, 75°C (140°F).

The multi-conductor cable enters the DIMAX through a flex-type, non-metallic, ¾ inch diameter strain relief. 3-4 inches of the insulated jacketed should remain un-stripped for slippage purposes.

Each conductor is connected to the DIMAX main circuit breaker using the ring lug. Torque each screw to 20 in-lbs.

The Ground conductor should be approximately 6 inches long in order to reach the ground bus through the ring lug. Torque the screw as well to 20 in-lbs.

Plumbing Requirements

Before installing the unit to an instrument that previously used tap water as a cooling fluid, flush the instrument several times to remove any rust or scale that has built up. The manufacturer of the instrument should be able to recommend a cleaning fluid for their equipment.

The plumbing connections are located on the right side of the unit and are labelled FACILITY WATER OUT (2"FPT), FACILITY WATER IN (2"FPT), MAIN SUPPLY (2"FPT), AUXILIARY SUPPLY 1 - 3 (1"FPT), RETURN LINES 1 - 8 (1"FPT), AUXILIARY RETURN LINES 9 - 11 (1"FPT), AUTOREFILL (½" FPT), and OVERFLOW (1"FPT).

Connect the SUPPLY line to the inlet of your application. Connect the eight MONITORED RETURN LINES and the three UNMONITORED AUXILIARY RETURN LINES to the applicable lines (monitored or unmonitored). Connect the FACILITY WATER IN to the cooling water supply and the FACILITY WATER OUT to the cooling water drain or return.

Flexible tubing, if used, should be of heavy wall or reinforced construction. The FACILITY WATER IN is subjected to the maximum pressure of the facility cooling water. Hose connections should be securely clamped and rated to withstand the maximum pressure of the system. Facility water supply should not exceed 100 psi. Avoid running tubing near radiators, hot water pipes, etc. If substantial lengths of tubing are necessary, insulation may be required to prevent loss of cooling capacity.

The unit's pump is capable of generating up to 40 psi. The SUPPLY plumbing should be rated to withstand that pressure.

Tubing and insulation are available from Thermo. Contact our Sales Department for more information (see Preface, After-sale Support).

It is important to keep the distance between the unit and the instrument being cooled as short as possible, and to use the largest diameter tubing practical. Tubing should be straight and without bends. If diameter reductions must be made, they should be made at the inlet and outlet of the instrument being cooled, not at the unit.

If substantial lengths of cooling lines are required, they should be pre-filled with cooling fluid before connecting them to the unit.

Fluids



Never use flammable or corrosive fluids with this unit.



Do not use automobile anti-freeze. Commercial anti-freeze contains silicates that can damage the pump seals. Use of automobile anti-freeze will void the manufacturer's warranty.

The selected fluid must have a viscosity of 50 centistokes or less at the lowest operating temperatures.

DEI water is the recommended fluid for operation.

NOTE: The DEI cartridge is intended for maintaining resistivity only. If tap water is used the cartridge will not last very long and will take a long time to come up to resistivity.

Filling Requirements

The reservoir must be filled with a minimum of 16 gallons to ensure the pump head remains submerged.

The unit has a nominal evaporation rate of up to 2.5 gallons per day. Ensure the autorefill system is installed.

Autorefill will activate if the level is below 20 gallons and de-activate above 22.5 gallons.

The total reservoir capacity is 68 gallons (257 liters). To prevent siphoning, all tank return lines are located at the top of the tank.

Microprocessor Controller

The controller has four different loops. An alphanumeric LCD display presents numeric readings of various operating conditions within the chiller. Display function is selected by pressing the appropriate keys to move through a menu of available information.

Various controller loops allow the operator to display and/or alter different parameters of the controller. When the controller is first powered up it goes through a short self test and then enters the Operator Loop, displaying the reservoir fluid temperature.

The various controller loops can be accessed from the Operators Loop by pressing and holding the key combinations shown on the next four pages.

NOTE: Should you desire to return to the Operators Loop and abort any changes, keep pressing **LAST** or **NEXT** until the display reads **SAVE?** Press **NO**.

The **YES** key increments the value. The **NO** key decrements the value. Pressing both keys for over three seconds accelerates the changing value. The display will flash as soon as either key is depressed, and will continue to flash until the **ENTER** key is pressed to accept the new value. The new value will not be used by the controller until the **ENTER** key is depressed and the display stops flashing.

If the **NEXT** key is pressed while the value is flashing, the new value will not be accepted. The display will stop flashing and the original value will be displayed. In this case the **NEXT** key can be used to abort data entry. The display will not sequence unless the **NEXT** key is depress again.

LEDs

The yellow **FAULT** indicates a unit fault. The LCD display will indicate the specific fault, see Fault Messages on page 16.

The green **CARTRIDGE OK** indicates the resistivity is above the low level setpoint. The red **REPLACE CARTRIDGE** indicates the resistivity is below the setpoint.

The bi-color **MODULE STATUS** LED indicates whether or not the device has power and is operating properly. Reference page 23 for devicenet LED status.

The bi-color **NETWORK STATUS** LED indicates the status of the communication link. Reference page 23 for devicenet LED status.

Operators Loop

When the controller is first powered it goes through a short self test and then enters the Operators Loop, displaying the temperature of the fluid in the reservoir, the resistivity of coolant leaving the chiller, the facility water flow rate and any fault message.

By pressing the NEXT key the controller will step through the menus shown.

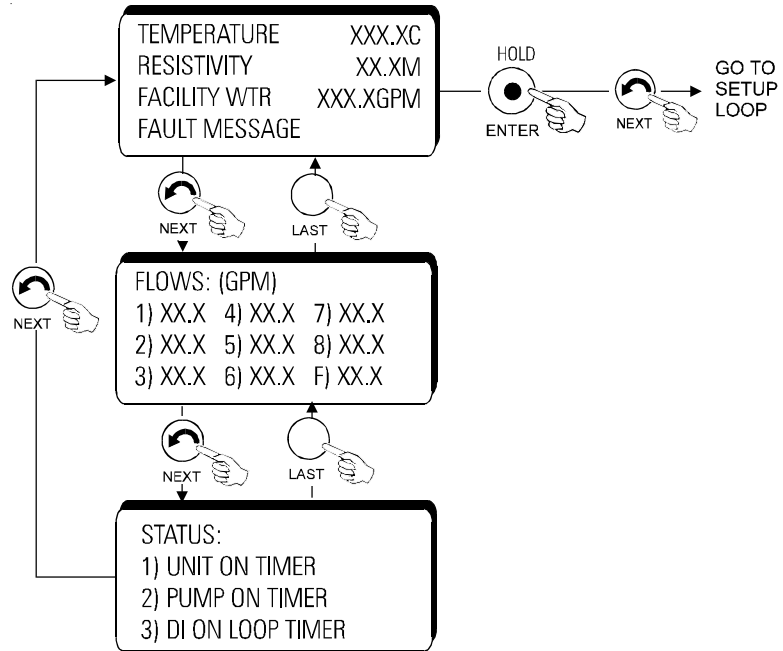


Figure 2 Operators Loop

TEMPERATURE displays the temperature of the coolant leaving the chiller in °C. RESISTIVITY is the resistivity of the coolant leaving the chiller in meg-ohms/cm. FACILITY WTR is the facility water flow rate in gallons per minute. The most current fault message is also displayed.

FLOWS displays the flow rate in each of the eight process return lines (1 - 8) and the facility water return line (F) in gallons per minute.

NOTE: Flow rate may be present but OFF will be displayed for any line if that line's alarm is set to zero using the Setup Loop discussed on page 14.

STATUS displays the unit, pump and DI loop on time in hours.

Setup Loop

The setup loop allows the operator to change the DI setpoints and flow alarm limits.

To enter this loop you must be in the operators loop and displaying the temperature. Depress and hold the ENTER key while pressing the NEXT key.

Scroll through the SETUP menu using the NEXT or LAST key, press ENTER to go to the desired sub-menu. Scroll through the sub-menu options using the NEXT or LAST key, change the values using the YES or NO key. Leave the sub-menu using the NEXT or LAST key. The display will indicate the save prompt, press YES or NO.

NOTE: To disable the flow alarm for return lines which are off, set the flow alarm to zero. At least one flow sensor must be set greater than zero for the pump to come on.

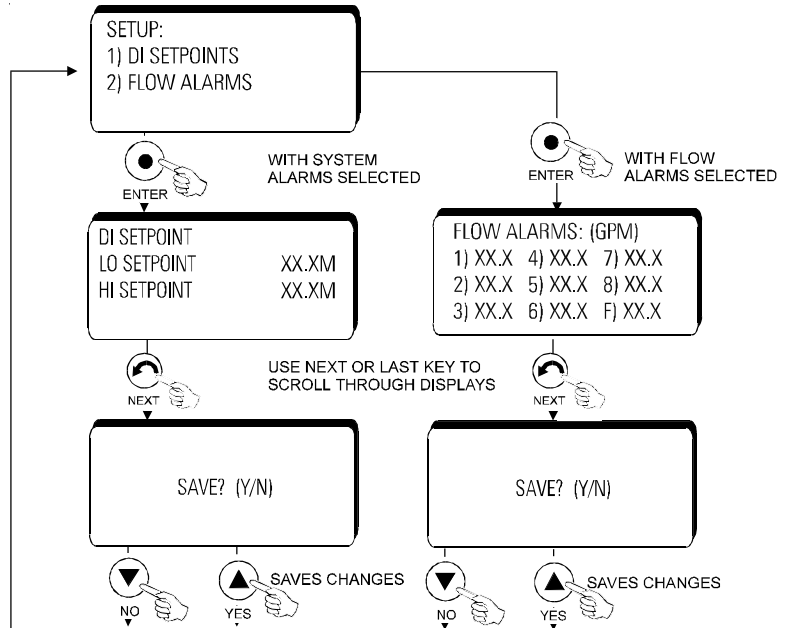


Figure 3 Setup Loop

Configuration Loop

The configuration loop allows you to configure frequency, enable the buzzer and verify software version number.

To enter this loop you must be in the operators loop and displaying the temperature. Depress and hold the ENTER key. While holding the ENTER key enter the key sequence NO-YES-NO.

Scroll through the CONFIGURE menu using the NEXT or LAST key, press ENTER to go to the desired sub-menu. Scroll through the sub-menu options using the NEXT or LAST key, toggle the options using the YES or NO key. Leave the sub-menu using the NEXT or LAST key. The display will indicate the save prompt, press YES or NO.

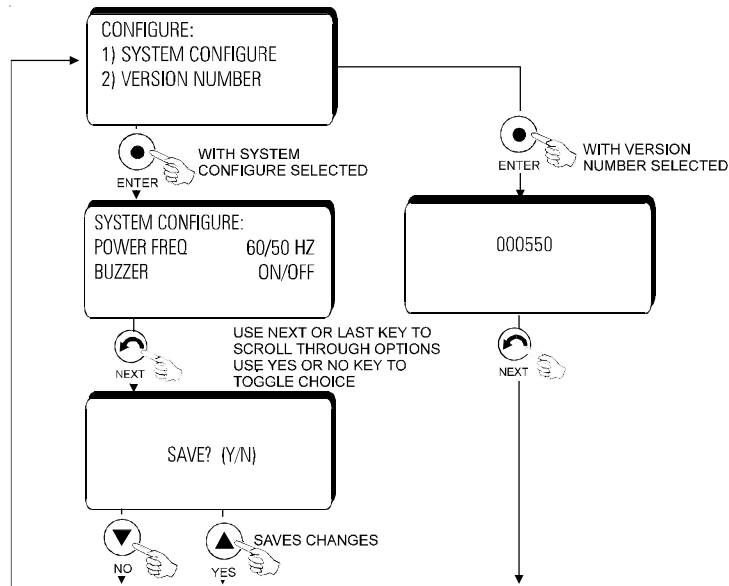


Figure 5 Configuration Loop

Calibration Loop

To enter this loop you must be in the operators loop and displaying the temperature. Depress and hold the ENTER key. While holding the ENTER key enter the key sequence YES-NO-YES.

Use this loop to calibrate the RTD, resistivity, the range of the resistivity out signal (V/Mohm), the range of the temperature out signal (100mV/°C) and the high and low flow calibration parameters.

Scroll through the CALIBRATE menu using the NEXT or LAST key, press ENTER to go to the desired sub-menu. Scroll through the sub-menu options using the NEXT or LAST key, change the values using the YES or NO key. Leave the sub-menu using the NEXT or LAST key. The display will indicate the save prompt, press YES or NO.

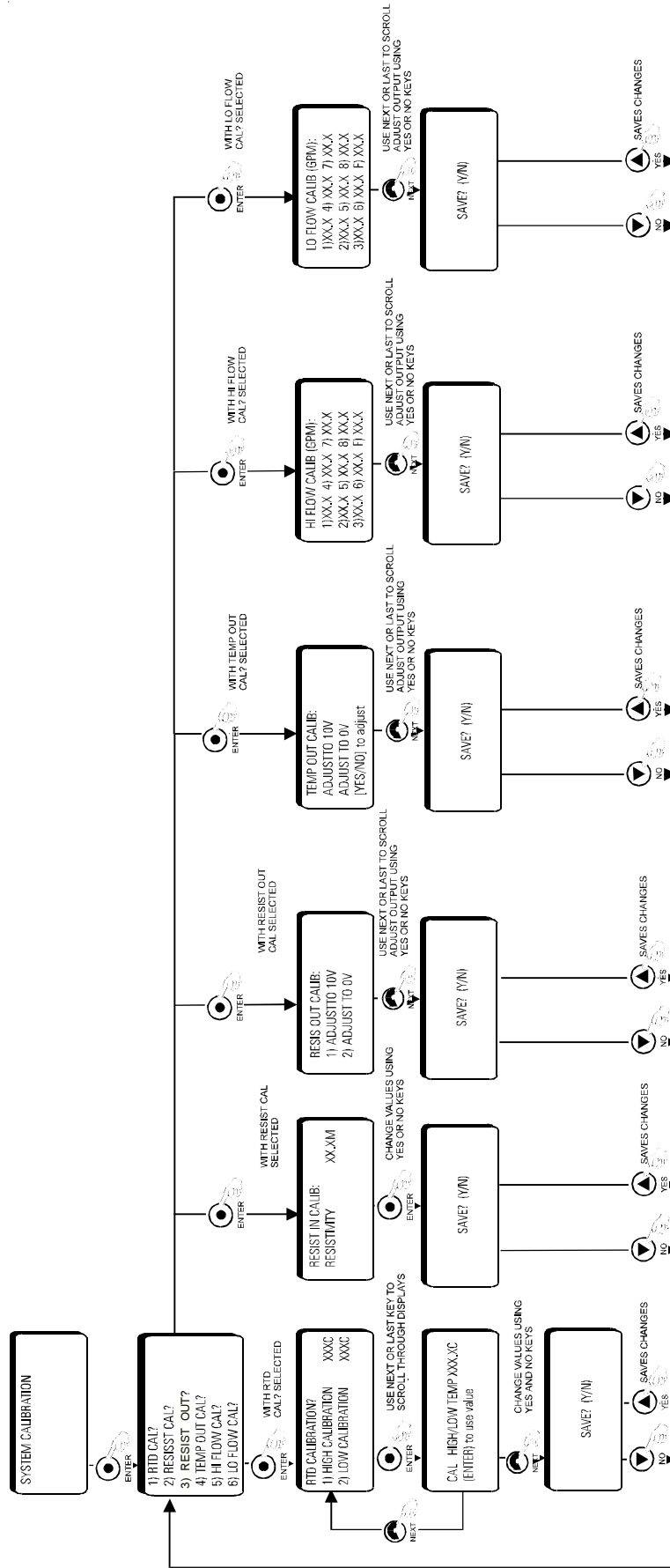


Figure 4 Calibration Loop

Fault Messages

Fault messages are displayed in the Operators Loop and the alarm will sound. The faults are prioritized. When a fault is cleared and RESET is pressed, the next prioritized fault is displayed. The messages below are listed from highest to lowest priority.

NOTE: Use the controller's MUTE button to silence the alarm.

LOWLEVEL CUTOUT

Displayed when the tank level is less than 16 gallons. The message clears after the fault is cleared and the RESET button is depressed.

MOTOROVERLOAD

Displayed when the motor overload trips. The message clears after the fault is cleared and the RESET button is depressed.

RTD FAIL

Displayed when the temperature is over 100°C (RTD open circuit). The message clears after the fault is cleared and the RESET button is depressed.

WARNING LOW LEVEL

Displayed when the tank level is less than 20 gallons. The message clears after the fault is cleared and the RESET button is depressed.

HIGH TEMPERATURE

Displayed when the temperature is over 40°C. The message clears after the fault is cleared and the RESET button is depressed.

LOW FLOW

Displayed when a return line flow drops below the alarm setpoint. The message clears after the fault is cleared and the RESET button is depressed.

REPLACE CARTRIDGE

Displayed when the resistivity drops below the low setpoint for more than one hour. The message clears after the fault is cleared and the RESET button is depressed.

RESISTIVITY HIGH

Displayed when the resistivity is greater than the high setpoint for more than eight hours. The message clears after the fault is cleared and the RESET button is depressed.

EMO

Displayed when the EMO button is depressed. The message self-clears when the EMO is returned to the normal position.

Section IV Operation

Start Up

Connect the unit to a power source, refer to Section III Installation. See unit serial tag for power supply requirements.

Before starting the unit, check all plumbing connections and make sure the circulating system (the DIMAX, your application, and the tubing that connects them) has been properly filled with cooling fluid. The reservoir level must be above the low level switches.

Close the main circuit breaker (CB1). The white POWER AVAILABLE light will illuminate, and the controller initializes and displays the Operators Loop. If a fault is present, it will be displayed. **NOTE:** Certain faults prevent the pump from starting, see Fault Messages on previous page.

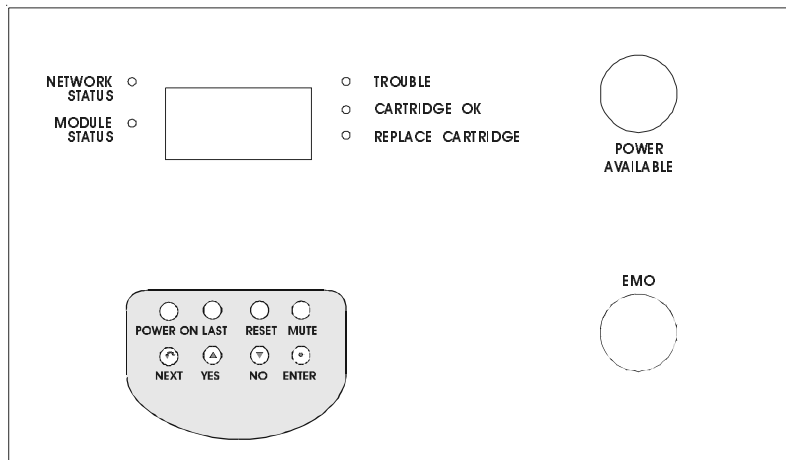
For units with the GFI option, be sure the GFI is in the ON position before closing the circuit breaker and turning on the unit.

Depress the PUMP ON/OFF button on the controller to start the pump. At least one flow sensor must be set greater than zero for the pump to come on.

The unit may need additional fluid after the pump starts.

NOTE: If the pump performance is marginal on *initial start up* the electrical phase may be wrong. Open the top of the unit and observe the pump's rotation. If it is wrong, shut the unit down and disconnect it from its power source. Swap any two AC line conductors.

Depress the PUMP ON/OFF button on the controller to stop the pump. Turn the unit off by opening CB1.



Flow Transducers

Flow transducers are connected to return lines one through eight as well as the facility water inlet line. The transducers monitor the flow rate of the cooling fluid returning from your application and the facility water flow. Flows are displayed on the controller's Operators Loop. If any flow rate drops below the setpoint, entered in the controller's Setup Loop, a flow error message appears and a flow alarm sounds.

NOTE: If the setpoint is set to zero, the flow alarm is disabled.

Low Fluid Level Safety

If the reservoir fluid level drops to 20 gallons, a fault message is displayed on the controller, the TROUBLE LED illuminates, and a remote signal alarm is generated. The alarm has to be reset once the fault is cleared. If the level drops below 16 gallons, the alarm sounds and the pump is de-energized.

Autorefill

The unit has a nominal evaporation rate of up to 2.5 gallons per day. Ensure the autorefill system is installed.

If the reservoir fluid level drops below 20 gallons, the autorefill solenoid will activate and fill the reservoir to approximately 22.5 gallons.

Emergency Off (EMO)

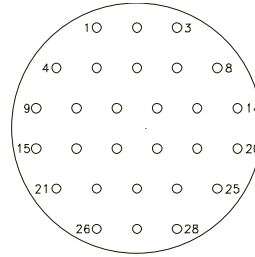
A guarded red mushroom shaped push-button switch with twist-to-reset is provided in the front of the unit to turn off the unit in case of an emergency. The button head is engraved with "EMO" in large white filled letters.

Activation of the EMO button will remove power from the main contactor coil stopping operation of the unit.

Resetting of the EMO button will not restart the unit. After all hazards have been removed and the EMO is reset, the unit must be reset by pushing the PUMP ON button on the control panel.

Remote Interface

The temperature of the cooling fluid and the status of the low flow and low fluid detectors can be monitored by an external device using the monitor receptacle located on the control panel.



Monitor receptacle

- Pin #1 Flow monitor output (return #1), active if flow is satisfactory sink current.*
- Pin #2 Flow monitor output (return #2), active if flow is satisfactory sink current.*
- Pin #3 Flow monitor output (return #3), active if flow is satisfactory sink current.*
- Pin #4 Flow monitor output (return #4), active if flow is satisfactory sink current.*
- Pin #5 Flow monitor output (return #5), active if flow is satisfactory sink current.*
- Pin #6 Customer supplied 24VDC power supply to unit (+).*
- Pin #7 Customer supplied 24VDC supply common.*
- Pin #8 Customer supplied +15VDC supply to unit (+).*
- Pin #9 Customer supplied ± 15 VDC common.*
- Pin #10 Customer supplied -15VDC supply to unit (-).*
- Pin #11 Temperature signal output (+). The temperature scale is 100mVDC/ $^{\circ}$ C.*
- Pin #12 Analog signal output common (-).*
- Pin #13 Low fluid level monitor output, active if level is satisfactory sink current..*
- Pin #14 24VDC common output. Common connection for flow switches and low fluid level safeties.*
- Pin #15 Flow monitor output (return #6), active if flow is satisfactory sink current.*
- Pin #16 Flow monitor output (return #7), active if flow is satisfactory sink current.*
- Pin #17 Flow monitor output (return #8), active if flow is satisfactory sink current.*
- Pin #18 DI water resistivity output (1V/meg-ohm) , active if flow is satisfactory sink current.*
- Pin #19 Cartridge good/bad output, active if resistivity is above low resistivity setpoint.*
- Pin #20 Flow monitor output (facility water), active if flow is satisfactory sink current.*

Flow monitors, low fluid level monitor, and cartridge monitor connections are active (current sink to pin 14) when respective conditions are satisfactory, and open when conditions are unsatisfactory (or when unit is off).

The temperature signal circuit has a differential output. Pin 12 must be connected to ground in the monitoring system. This signal is only available if the unit is on and 24VDC and ± 15 VDC is supplied to this connector.

Resistivity Sensor

The controller displays and maintains resistivity between adjustable setpoints. If the resistivity goes above the high setpoint, the line through the DI cartridge closes. Flow through the DI cartridge resumes when the resistivity drops to the low setpoint. If the resistivity drops below the low setpoint for more than one hour, a fault is displayed, the REPLACE CARTRIDGE LED illuminates and a remote signal is generated.

NOTE: Every time the controller is energized, a four hour clock disables the REPLACE CARTRIDGE fault.

Devicenet

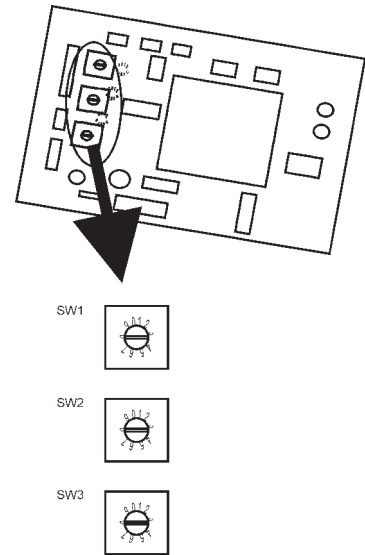
The Node Address and baud rate are all set with three rotary switches on the devicenet board, see illustration below.

SW1 and SW2 are used to set the MAC ID. The MAC ID can be set from 1 to 63. It is factory set at 60. SW1 is the Most Significant Digit (MSD) and SW2 is the Least Significant Digit (LSD). To set the device to a MAC ID of 60, set SW1 to 6, SW2 to 0.

SW3 is used to set the baud rate. The baud rate is factory set to 500K.

SW3 position
0 = 125K
1 = 250K
2 = 500K
3 = Blank

NOTE: If the baud rate is changed, recycle the controller for it to read the change.



DeviceNet Interface

Resistivity Scaling

Unsigned binary is used to represent the 0V to +10V range. 12 bits of resolution is available at the DeviceNet interface.

0 to +10V range	
AI Digital Value (at the DeviceNet Interface)	Resistivity input to controller
0	0 Mohm
4095	20 Mohm

Flow Scaling

Unsigned binary is used to represent the 0V to +10V range. 12 bits of resolution is available at the DeviceNet interface.

Facility Flow

0 to +10V range	
AI Digital Value (at the DeviceNet Interface)	Flow input to controller
0	0 gpm
4095	100 gpm

Process Flow

0 to +10V range	
AI Digital Value (at the DeviceNet Interface)	Flow input to controller
0	0 gpm
4095	20 gpm

Temperature Scaling

Unsigned binary is used to represent the -5V to +5V range. 12 bits of resolution is available at the DeviceNet interface.

-5V to +5V range	
AI Digital Value (at the DeviceNet Interface)	Temperature input to controller
0	0°C
2048	+50°C
4095	+100°C

DeviceNet Messaging

Poll Command Message:

Byte	7	6	5	4	3	2	1	0
0								PUMP

PUMP = Command for pump to be on or off. 1 = on, 0 = off..

Respond Message:

Byte	7	6	5	4	3	2	1	0
0	Water Temperature (LSB)							
1	Water Temperature (MSB)							
2	Water Resistivity (LSB)							
3	Water Resistivity (MSB)							
4	Flow 1 (LSB)							
5	Flow 1 (MSB)							
6	Flow 2 (LSB)							
7	Flow 2 (MSB)							
8	Flow 3 (LSB)							
9	Flow 3 (MSB)							
10	Flow 4 (LSB)							
11	Flow 4 (MSB)							
12	Flow 5 (LSB)							
13	Flow 5 (MSB)							
14	Flow 6 (LSB)							
15	Flow 6 (MSB)							
16	Flow 7 (LSB)							
17	Flow 7 (MSB)							
18	Flow 8 (LSB)							
19	Flow 8 (MSB)							
20	Facility Water Flow (LSB)							
21	Facility Water Flow (MSB)							
22			AF	WLW	PUMP	FW	CB	WLF
23	0	0	0	0	0	0	0	0

CB = Cartridge Good/Bad, 1 = Good, 0 = Bad

WLF = Water Level Low Fault, 1 = Good, 0 = Bad

FW = Facilities Water Flow, 1 = Good, 0 = Bad

PUMP=Status of Pump, 1 = ON, 0 = OFF

AF = Autorefill Status, 1 = ON, 0 = OFF

WLW = Water Level Warning, 1 = OK, 0 = OFF

Upon receipt of a poll command, we will send the 23 bytes of data through the DeviceNet. The 23 byte response is in accordance to the Device Net fragmentation protocol of the DeviceNet Specification (revision 1.3).

MODULE STATUS LED

The bi-color (green/red) LED provides device status. It indicates whether or not the device has power and is operating properly.

Status	LED	Indication
No power	Off	Device not powered
Device operational	Green	Device operating in a normal condition
Device in standby	Flashing Green	Device needs commissioning due to configuration missing, incomplete or incorrect. Device may be in the standby state
Minor fault	Flashing Red	Recoverable fault
Unrecoverable fault	Red	Device has an unrecoverable fault and may need replacing
Device self test	Flashing Red/Green	Device is in self test

NETWORK STATUS LED

The bi-color (green/red) LED indicates the status of the communication link.

Status	LED	Indication
Not powered/ Not on-line	Off	Device not on line Device has not yet completed the Dup_MAC_ID test Device may not be powered, look at MODULE status LED
On-line, not connected	Flashing Green	Device on-line but has no connection in the established state Device has passed the Dup_MAC_ID test, is on-line, but has no established connection to other nodes For a Group 2 Only device it means that the device is not allocated to a master For a UCMM capable device it means that the device has no established connection
Link OK on-line, connected	Green	Device is on-line and has connections in the established state For a Group 2 Only device it means that the device is not allocated to a master For a UCMM capable device it means that the device has one or more established connection

Connection time-out	Flashing Red	One or more I/O connections are in the timed-out state
Critical link failure	Red	Failed communication device. Device has detected an error that has rendered it incapable of communicating on the network (Duplicate MAC ID, or Bus-off)
Communication faulted and received an identify comm fault Request - Long Protocol	Flashing Red/Green	A specific communication faulted device. Device has detected a network access error and is in the communication faulted state. The device has subsequently received and accepted an identify communication faulted request - Long Protocol message

Section V Maintenance

Service Contracts

Thermo offers on-site Service Contracts that are designed to provide extended life and minimal down-time for your unit. For more information, contact our Service Department (see Preface, After-sale Support).

Deionizing Cartridge

When the resistivity drops below the low setpoint for more than one hour the REPLACE CARTRIDGE LED illuminates. This indicates replacement is necessary.

Open the resistivity strap on the cartridge. Click open the quick disconnects on the top and bottom of the cartridge and pull the cartridge from the unit. Remove the hoses from both ends of the cartridge and then replace the cartridge.

When reinstalling, ensure the flow arrow on the cartridge is pointing up.



To avoid crimping damage, keep tubing clear of the door area.

Remove the reservoir to observe pure fluid flow. On the front side of the tank, the center return line is purified fluid, the large return line is for auto refill, and the other small return line is a pump protection bypass line.

Cleaning

Clean the strainer when the pressure decreases. Ensure the O-ring is seated properly.

Clean the flow transducers every 12 - 18 months.

Section VI Service & Troubleshooting



For personal safety and equipment reliability, the following procedure should only be performed by a qualified technician. Contact our Service Department for assistance (see Preface, After-sale Support).

Algae

To restrict the growth of algae in the reservoir, it is recommended that the reservoir cover be kept in place and that all circulation lines be opaque. This will eliminate the entrance of light which is required for the growth of most common algae.

We recommend the use of Chloramine-T, 1 gram per 3.5 liters.

Checklist

Unit does not start when turned on.

Check the unit's circuit breaker. For units with the GFI option, be sure the GFI is in the ON position before closing the circuit breaker and turning on the unit. Check fault messages.

Check fluid level in reservoir.

Check power supply.

No/poor controller display

Open up the top panel and locate 1INST. Turn the plastic pot screw . (labelled R35) in the middle of 1INST to adjust the intensity.

Pump does not start.

At least one flow sensor must be set greater than zero for the pump to come on. See page 14.

Poor pump performance on *initial start up*.

The electrical phase may be wrong. Open the top of the unit and observe the pump's rotation. If it is wrong, shut the unit down and disconnect it from its power source. Swap any two AC line conductors.

Unit continues to run for a short period and then stops.

Check reservoir level. The unit has a nominal evaporation rate of up to 2.5 gallons per day. Ensure the autorefill system is installed. Also, check total system for leaks.

Make sure unit running on proper voltage.

Service Assistance

If, after following these trouble shooting steps, your unit fails to operate properly, contact our Service Department. Before calling, please obtain the following information:

BOM Number

Serial number

Software Version

Application

Type of fluid used

Temperature at which the problem occurs

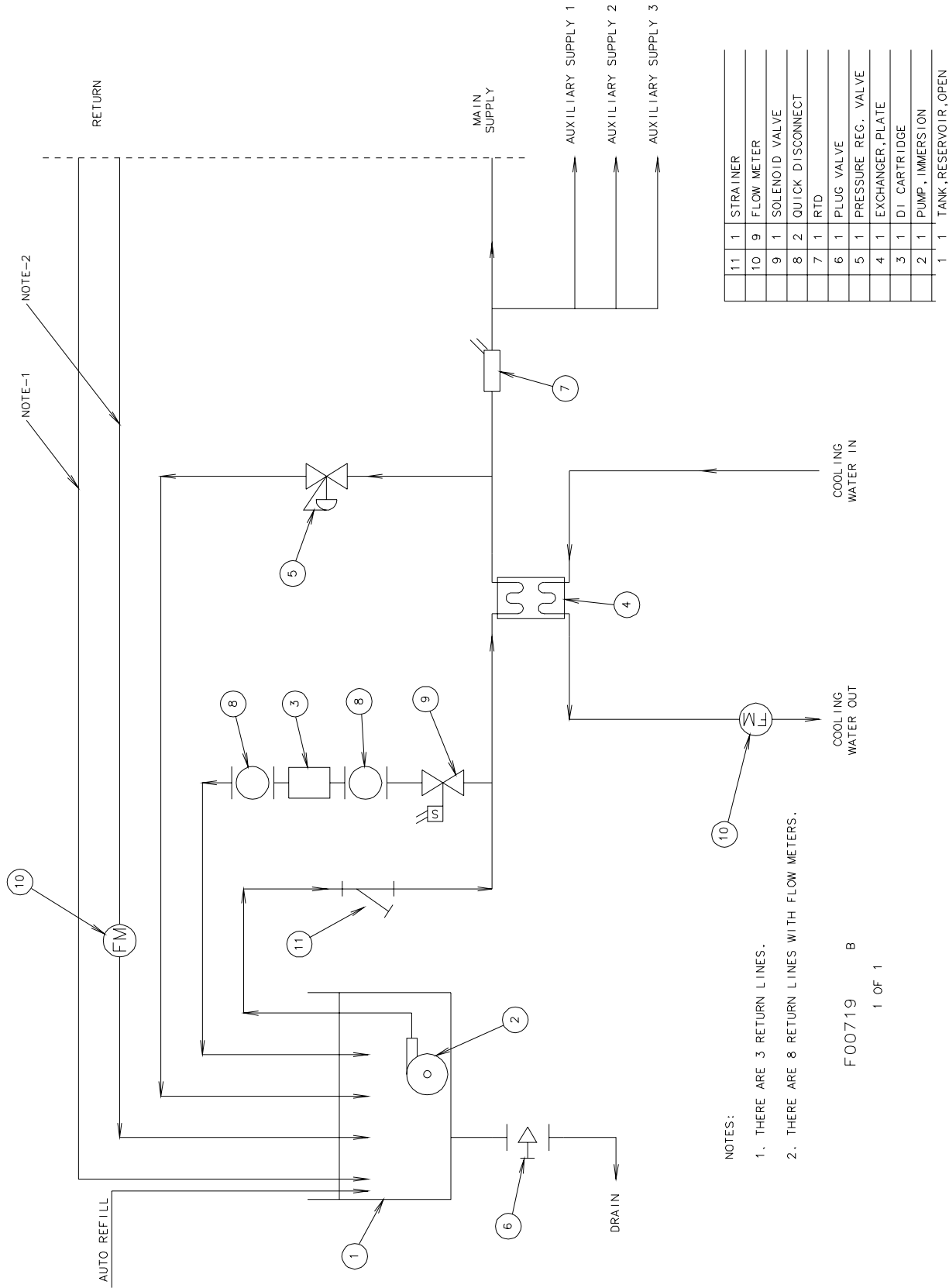
Voltage at power supply of unit

Temperature of facility cooling water

Pressure of facility cooling water

Section VIII Diagrams

Flow Diagram



NOTES:
 1. THERE ARE 3 RETURN LINES.
 2. THERE ARE 8 RETURN LINES WITH FLOW METERS.

FOO719 B
 1 OF 1